STATE OF ARKANSAS

Arkansas Geological Commission

Norman F. Williams, State Geologist

INFORMATION CIRCULAR 23

MERCURY DISTRICT OF SOUTHWEST ARKANSAS

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by

Benjamin F. Clardy and William V. Bush

Little Rock, Ark.
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MERCURY DISTRICT OF SOUTHWEST ARKANSAS

by B. F. Clardy and W. V. Bush

ABSTRACT

Cinnabar was discovered in southwestern Arkansas in 1930. Mining began in 1931 and mercury was produced each year through 1944. Production through this period was approximately 1,500 76-pound flasks. Mining has been negligible since 1944.

Surface rocks in the mercury district are sandstone, shales, and siltstones of the Mississippian and Pennsylvanian Systems; and gravel, clay, sand, and limestone of the Cretaceous System. The Paleozoic rocks have been folded and faulted into steeply dipping generally east-west trending ridges and valleys. In places, the Paleozoic rocks are covered by gently dipping Cretaceous strata.

Cinnabar and other primary minerals were deposited from aqueous solutions rising through the fractured Paleozoic rocks. The majority of ore deposits are associated with the larger faults in the area and generally occur in the over-thrusted fault blocks within a mile of the fault traces. Prospecting along these major trends has been by examination of outcrops, pitting, trenching, core drilling, and some geochemical evaluation. Future exploration in the district should begin in the areas of major faulting.

INTRODUCTION

The mercury district in southwest Arkansas occurs in a belt 6 miles wide and 30 miles long extending from eastern Howard County through Pike County and into western Clark County (Figure 1). All investigations of the mercury district have been from surface showings, from a few shallow drill holes and from geologic investigation of underground mines. Following the decline of activity in the mercury district in 1946, information on the district has become limited.

The purpose of this report is to give a complete description of all mines and prospects in the district, and hopefully to enhance orderly development of the district.

The discovery of cinnabar (HgS) in 1930 started a rapid investigation of the area. During the 15-year period in which the mines were active, they were opened up on the basis of surface shows with little or no other exploration work. Although more than 100 occurrences of cinnabar have been found across the district, ten mines accounted for most of the production.

All mines, prospects, and occurrences of cinnabar have been visited and described. Descriptions of the mines, production data, and other factual information were taken from earlier publications, Arkansas Geological Commission files, and from discussions with people living in the district.

Reed and Wells report, U. S. Geological Survey Bulletin 886-C, Geology and Ore Deposits of the Southwestern Arkansas Quicksilver District is the most comprehensive publication on the district. Other publications and reports on mines and prospects in the district are listed in the bibliography.

ACKNOWLEDGMENTS

A grateful acknowledgment is extended by the writers to Norman F. Williams, Arkansas State Geologist, and the staff members of the Arkansas Geological Commission for their contributions to this report.

Boyd R. Haley of the U. S. Geological Survey was helpful in the stratigraphy and the structure of the district.

Crown Cox of Delight, Arkansas and Verdis Cox of Murfreesboro, Arkansas, broadened our knowledge of the history of the district and furnished locations of previously unreported occurrences of cinnabar. Crown Cox first found a piece of cinnabar in 1930, which later led to the development of the district. Especial thanks to the property owners and residents in the area who were friendly and helpful.

HISTORY

The first account of a cinnabar claim in Arkansas was in Montgomery County around 1880, but apparently no cinnabar was actually found. In sections 24 and 25, T. 5 S., R. 27 W., Pike County, four claims were filed for cinnabar on October 4, 1897 (Reed and Wells, 1938). There is not a record of any mining in the area and when we visited the location in 1970 we did not find cinnabar mineralization; neither did a chemical analysis of a random sample indicate mercury.

Reed and Wells (1938) stated that:

> "According to local reports metallic mercury was found in a spring, and the legend is that it was unwittingly dropped there by an old prospector, one of a number who were searching for gold in the vicinity at that time."

The first documented discoveries of cinnabar in Arkansas were made in 1930 by two people. In May 1930, D. F. Short found a rock containing cinnabar at Nutts Crossing in section 28, T. 6 S., R. 23 W., at a Missouri Pacific Railroad rock quarry. Mr. Short placed the rock in a mineral collection at Caddo Gap, Arkansas. Moritz Norden identified the mineral as cinnabar on July 22, 1930 (Reed and Wells, 1938).

In July of 1930, Crown Cox found a rock containing cinnabar in section 1, T. 7 S., R. 26 W. The rock was given to W. F. Hintze of Murfreesboro who forwarded it to W. M. Weigel, who identified the red mineral as cinnabar on July 14, 1931 (Reed and Wells, 1938).

On August 30, 1931, George C. Branner, the Arkansas State Geologist, made public the discoveries thus starting the rapid development of the mercury district (Reed and Wells, 1938). Field investigations showed cinnabar occurring in an east-west zone, 24 miles long and about a mile wide, starting in section 13, T. 7 S., R. 27 W., Howard County and ending at the Antoine River in section 33, T. 6 S., R. 23 W. in Pike County.

The two areas of greatest concentration were (1) just west of the Antoine River and (2) on both sides of the Little Missouri River.

The property west of Antoine River was owned by Ozan Graysonia Lumber Co. W. N. Bemis, president of the Ozan Graysonia Lumber Co., and Moritz Norden formed the Arkansas Quicksilver Company and developed this area with a series of test pits and tunnels. The hill is now known as Bemis Hill (Reed and Wells, 1938).

Leo Yount began the development of the area around the Little Missouri River is section 1, T. 7 S., R. 26 W., and section 6, T. 7 S., R. 25 W. The Southwestern Quicksilver Company was formed by Leo Yount and W. C. McBride, who then operated the Gap Ridge, Parker Hill and Parnell Hill Mines (Reed and Wells, 1938).

Many smaller companies and individuals found over 100 different showings of cinnabar on the surface. The district had a steady development from 1931 through 1937 and then a rapid decline in 1938. In 1939 activity resumed and continued through 1944, reaching a peak in 1942. In 1945 no mercury was produced and only 11 flasks were produced in 1946.

Since 1946 the only reported production has been 27 flasks produced in 1965 at a mill located one mile south of Kirby on Arkansas Highway 27 (Mineral Industry of Ark., U.S.B.M. 1965). Over the years additional discoveries have expanded the area to over 30 miles long and about 6 miles wide with the main mineralized zone being one mile wide (Plate II).

Within the past 10 years properties have been leased and geochemical samples have been taken on surveyed grids in some areas. No large scale mining has been attempted since 1946.

FIELD METHODS

The examination of the mineralized area occupied two winter seasons when vegetation afforded maximum ground visibility.

The first field season was spent visiting all reported prospects, mines and occurrences of cinnabar in Arkansas. A list of locations was compiled from past bulletins, reports, and letters in the Arkansas Geological Commission file. Our search began at the westernmost prospect, the Rock Fence Prospect, and proceeded eastward across the district into Clark County. During this period 67 different locations were visited and pertinent data were recorded on mimeographed report forms.

Each report consists of size and description of the present workings, type of mineralization, country rock, data from earlier reports, microscopic analysis of select samples and chemical analyses of all samples taken.

Three types of samples were taken at most prospect localities. (1) Select sample: the best 5-pound high grade ore sample that could be found in the

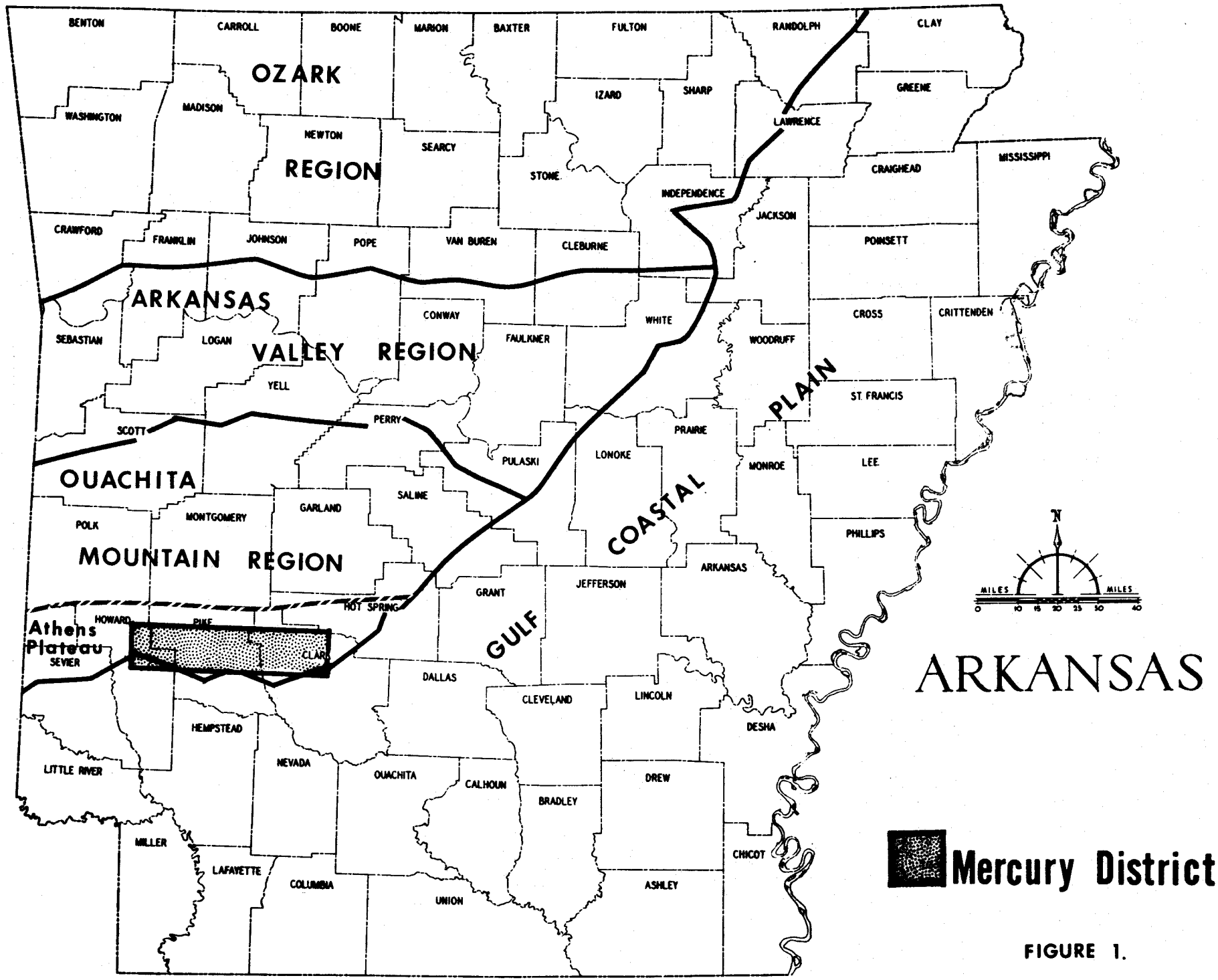


FIGURE 1.

Figure 1: Physiographic Divisions and Extent of Mercury District in Southwest Arkansas

old workings or in the stockpiles. (2) Random chip: represent 5-pound grab samples taken from the outcrop within the workings or from the stockpiles. (3) Random dirt or shale: represent 0.5-pound samples taken from the dirt or shale beds, in the mines, prospect trenches, or pits.

The select samples were reduced to about 2 pounds and examined under a microscope. All samples were crushed, split, fine-ground and chemically analyzed by chemists of the Arkansas Geological Commission. The method used for chemical analyses is included in the appendix with the chemical analyses.

Upon completion of field work on the prospects, field reports were evaluated and boundaries were determined for a geologic map. Seven and a half minute topographic quadrangles were available over most of the district except for the east end which is covered by the Antoine 15-minute quadrangle.

Before geologic mapping began, all information was reviewed and transferred to modern topographic maps. Geologic maps from Reed and Wells, U.S.G.S. Bulletin 886-C and Miser's U.S.G.S. Bulletin 808 were consulted for reference material.

The structure map was prepared from aerial photographs. The following field season previous work was field checked and a geologic map of the area was prepared. Very little modification was done to earlier maps; however, the geologic mapping was extended to the east approximately 8 miles, 2 miles to the north, and 2 miles to the south.

GEOGRAPHY

Location:

The mercury district in southwest Arkansas lies mainly in the Athens Plateau, a province of the Ouachita Mountain Region (figure 1). The westernmost occurrences of cinnabar are in sections 12 and 13, T. 7 S., R. 27 W., Howard County and the easternmost occurrences are in section 5, T. 7 S., R. 22 W., Clark County.

Culture:

There are no towns or communities in the area as described above. Kirby, population 135, on the north edge of the district, is the closest community. The town of Amity on the northeast edge has a population of 543. Other towns located to the south are Antoine, population 163, Delight, population 446, Murfreesboro, population 1320, the county seat of Pike County, and Nashville, population 4109, the county seat of Howard County. Situated twenty miles east of the district is Arkadelphia, population 9014, the county seat of Clark County. Five miles north of the district is Glenwood, population 1145.

Most of the mines and prospects have some kind of roads or trails leading to the old workings. The nearest Interstate Highway is I-30 twenty miles to the east. Arkansas Highway 27 that cuts north and south through the district and Arkansas Highway 19 to Narrows Dam are the major highways that serve the district. U.S. Highway 70 to the north parallels the district. Dirt and gravel roads, both county and private, are plentiful throughout the district and passable when dry; due to the relief, there is rapid run-off of rain water, making roads bad during winter months when most of the rain occurs. Most creeks and streams are crossed by low water bridges. The Missouri Pacific Railroad serves the area on the east end of the district along Antoine River.

Narrows Dam located on the Little Missouri River impounds Lake Greeson, which has covered up Parker Hill Mine, part of the Gap Ridge Mine and the Parnell Hill Mine. The dam was constructed after the district became inactive in 1946. The land around the lake and the lake belong to the Federal Government, and any prospecting or mining on this property would have to meet with their approval.

The climate is moderate with little or no snow. The average yearly rainfall in the area is about 50 inches. Tree farming is the major industry with some chicken farms and cattle ranches. At present there is no mining in the district.

Relief: The Athens Plateau lies north of the Cretaceous sediments that overlap the Paleozoic rocks. The plateau consists of east-west trending ridges which are divided by narrow valleys. Major trunk streams flow in a southeasterly direction cutting gaps through the east-west trending ridges; whereas the tributary streams flow east-west in the valleys between the ridges (Reed and Wells, 1938). Plates 1-A and 1-B show the topography of the area.

Drainage: The drainage pattern of the mercury district is a modified trellis pattern. The two major trunk streams are the Little Missouri River

on the west end and the Antoine River on the east. Both streams flow in a southeast direction, cutting through the east-west trending ridges. Highway 27 is approximately half-way between the two drainage systems. The Little Missouri River and Antoine River are usually the only perennial streams in the district.

GEOLOGY
GENERAL FEATURES

The rocks exposed in the mercury district are all of sedimentary origin and include the Mississippian, Pennsylvanian, Cretaceous, and Quaternary Systems. The Paleozoic rocks consist of steeply dipping beds of sandstone, siltstone, shale, and conglomerate, which have been folded and faulted by compressive forces from the south during Pennsylvanian time (Miser and Purdue, 1929). The surface of these Paleozoic rocks forms a part of the Athens Plateau.

Sedimentary rocks of the Athens Plateau are covered to the south by gently dipping Cretaceous sediments of the Gulf Coastal Plain. Cretaceous rocks in the district consist of gravel, sand, clay and limestone.

Quaternary age rocks are associated with the major streams in the area and consist of unconsolidated sand, clay, and gravel.

STRATIGRAPHY
MISSISSIPPIAN SYSTEM

Stanley Shale: The Stanley Shale is the surface rock on much of the Athens Plateau. In the mercury district this formation occupies the broad lowland on the north and west, as well as two narrow east-west valleys between ridges of Jackfork Sandstone (Plates 1-A and 1-B). The Stanley Shale is Mississippian age and attains a thickness of 6,000 feet in the district (Miser and Purdue, 1929).

This formation is primarily a black, fissile, clay shale which weathers into thin green and reddish brown plates. The Stanley Shale contains about three-fourths shale and one-fourth sandstone (Miser and Purdue, 1929). In outcrops where sandstone beds are absent, it is often impossible to determine bedding because of the intense crumpling.

Fresh exposures of sandstone are generally greenish gray to gray. The sandstones are composed of fine to medium grained quartz sand with minor amounts of shale particles, white angular feldspar grains, and in places quartz and chert pebbles.

Three sandstone units near the top of the formation are ore bearing in the narrow belt of Stanley Shale in Cowhide Cove. These are reported by Reed and Wells (1938) as follows:

> "The 300-foot sandstone 1250 feet below the top of the Stanley, together with the 150-foot shale bed above it and the still higher 100-foot sandstone, has been called the Gap Ridge sandstone member by Stearn, after the Gap Ridge mine which is opened in it. The name is retained here but is used in a more restricted sense, being applied to the 300-foot lower sandstone only. The reason for the restriction is that the upper 100-foot sandstone cannot be differentiated throughout the district, although it is unquestionably present at many places. The Gap Ridge sandstone is more resistant to weathering than the more shaly parts of the formation above and below it, and consequently it forms a distinct but disconnected ridge, traceable, with a few breaks, throughout the length of the medial lowland.
>
> The sandstone zone 160 feet thick in the Stanley Shale 2240 feet below its top has been shown on the map from a point near the northeast corner of section 35, T. 6 S., R. 25 W., eastward for about 3 miles into the southern part of sec. 35, T. 6 S., R. 25 W. Stearn believes this zone to be the same as that at the Parker Hill mine, just west of the Little Missouri River, and therefore calls it the "Parker Hill Member". This correlation across an interval of about 2½ miles may well be the correct interpretation, but as the structure of the region is so complex it may also be erroneous and therefore has not been adopted."

Microscopic examinations of specimens from the Gap Ridge Sandstone show it to be composed of a gray, fine to medium-grained mosaic of rounded to sub-angular grains of quartz with minor amounts of shale grains and flakes of mica. Occasionally, near fractures in the sandstone, discrete grains of clay and cinnabar occur.

The Stanley Shale is conformably overlain by the Jackfork Sandstone (Miser and Purdue, 1929). The contact as mapped may be in error a few hundred feet as the change in character of the rocks is somewhat gradual. However, when considering the general characteristics of the two units they are notably different and form distinct topographic features.

PENNSYLVANIAN SYSTEM

Jackfork Sandstone: The Jackfork Sandstone forms the rugged east-west ridges and mountains in the area. In much of the southern part of the district steeply dipping truncated edges of the Jackfork are covered by nearly flat-lying Cretaceous strata. The Jackfork Sandstone is Pennsylvanian age (Gordon and Stone, 1969) and is about 6,000 feet thick in the district (Miser and Purdue, 1929). The most complete and least complicated section of Jackfork is the northernmost ridge along the Okolona and Alpine Roads (Plate I-B). This ridge is named Chalybeate Mountain.

The Jackfork Sandstone is composed of about 80% sandstone and 20% shale (Reed and Wells, 1938). The shale is greenish gray to black and occurs interbedded with the sandstone. Individual shale beds range from a few inches up to 100 feet thick. In places the shale has a ribbon-like appearance due to thin, alternating light and dark colored layers.

The sandstone beds range from an inch to more than 20 feet thick. Much of the sandstone is composed of medium to coarse-grained quartz which is sub-angular to rounded, and light gray on fresh exposures. The weathered sandstone is light gray, yellow-brown, and brown with gray being the most common color. Fine grained, sub-angular, greenish gray quartz sandstone occurs in the more shaley portions of the Jackfork. These fine grained beds contain mica and altered feldspar grains.

Quartz pebble conglomerate beds may be observed in the formation. They are generally in the massive, clean, coarse-grained sandstone, but occasionally may be found associated with the fine grained sandstone and shale. The quartz pebbles are white, rounded, and up to 0.25 of an inch in diameter.

In many places the Jackfork Sandstone forms topographic prominences near its base and near its top, with a relatively low strike valley in between the two ridges. This low land consists of poorly exposed, weathered yellow-brown, crumbly, soft sandstone.

In the mercury district the Atoka Formation rests upon the Jackfork Sandstone. There are strata resembling the Johns' Valley Shale overlying the Jackfork in places; however, no conclusive evidence has been found and the strata are here included in the base of the Atoka Formation. These questionable strata may be observed in the railroad cut at Graysonia (Figure 2) and on Arkansas Highway No. 19 just south of Narrows Dam.

Atoka Formation: The Atoka Formation of Pennsylvanian age forms lowlands along synclinal axes in the mercury district. These lowlands are bounded on the north and south by ridges of Jackfork Sandstone. The lower 6,000 feet of Atoka strata are exposed in the district; the upper part of the formation is absent due to erosion. In the southern part of the district steeply dipping edges of Atoka sandstone and shale are covered by nearly flat-lying Cretaceous strata.

The Atoka Formation consists of nearly equal amounts of sandstone and shale. The sandstone is micaceous, ripple marked, gray and greenish gray on fresh exposures, and after weathering the color is brown. Many beds in the Atoka border on being siltstone; however, most can be classed as very fine to medium-grained sandstone. These sandstones often contain enough clay and clay fragments to give them a dirty appearance. Some beds near the base of the formation contain altered feldspar, scattered coarse grains of sand, and some white quartz pebbles.

In the lower portion of the formation black fissile clay is present in beds up to 50 feet thick. Most of the shale in the upper part of the formation is silty, sandy, micaceous, and gray to black. The shale weathers to rusty red and green angular fragments and then to a red plastic clay.

Specific outcrops of Atoka strata may not be distinguishable from strata of the Jackfork or Stanley. However, when considering the general characteristics of the formations over a large area the Atoka can be identified.

CRETACEOUS SYSTEM

Trinity Formation: Lower Cretaceous age strata occur as outliers and also form an undulating south dipping outcrop belt on relatively high elevations in the southern part of the mercury district. The Trinity Formation ranges from 70 to more than 600 feet thick (Miser and Purdue, 1929). The top of the formation has been removed by erosion and only the lower portion remains in this area.

The Trinity Formation consists of unconsolidated to partially consolidated beds of gravel,

Figure 2: Lower Atoka or Johns Valley strata exposed in the Missouri Pacific Railroad cut at Graysonia in the NE¼, NW¼, Sec. 22, T. 7 S., R. 23 W., Clark County, Arkansas.

clay, sand, limestone, and minor amounts of gypsum and celestite. At the base of the formation 20-50 feet of gravel occur. This is the Pike Gravel Member and it is the most widespread unit in the district. In sections 13, 14, 23, and 24, T. 7 S., R. 28 W., barite occurs as a cement in gravel and sandstone. In most places the Pike Gravel is made of unconsolidated, rounded novaculite and chert pebbles, with minor amounts of novaculite cobbles, sandstone cobbles, quartz pebbles, and sandstone pebbles. These gravels were derived from Paleozoic strata of the Ouachita Mountains which lie to the north.

QUATERNARY SYSTEM

Terrace Deposits: Quaternary terrace deposits exist along the Little Missouri River south of Narrows Dam. The base of the terrace is about 485 feet in elevation. These gravels are composed primarily of unconsolidated novaculite pebbles with minor amount of quartz and sandstone pebbles.

Alluvium: Small patches of alluvium occur along the major streams in the area. They are composed primarily of fine sand, silt, and some gravel. The alluvium is probably no more than 15 feet thick anywhere in the mercury district.

STRUCTURE

Sedimentary rocks of the mercury district were deposited in essentially horizontal beds. The Cretaceous strata presently dips to the south at about 100 feet to the mile, and the Paleozoic strata dips at steep angles generally greater than 40 degrees from the horizontal.

Miser and Purdue (1929) stated:

> "The general structure of the Athens Plateau is that of a southward-sloping monocline corregated with many minor folds. These folds are nearly parallel and have a general south of west trend."

The Paleozoic rocks in the mercury district lie in a series of roughly east-west trending anticlines and synclines which have been broken in places by faults. The majority of the folding and faulting occurred near Middle Pennsylvanian time, when compressive forces from the south formed the present structure of the Athens Plateau (Miser and Purdue, 1929). The Paleozoic rocks generally dip south due to the faulting and overturned folds which are present in many places. Outcrops are sparse along the southern portion of the district in the area of Cretaceous onlap. The determination of the structure was primarily from previous work and from interpretations of aerial photographs.

Folding: The major folds east of Antoine River trend north 70° east, and from north to south consist of: (1) a syncline with the axial trace about 0.5 mile south of Chalybeate Valley, with a south limb partially covered by thrust faulting: (2) a highly faulted anticline with the axial trace roughly paralleling the Ashbrook and Caldwell Roads; and (3) a syncline with the axial trace about halfway between Shawmut and Graysonia.

West of Antoine River and east of Lake Greeson, the major folds trend north 75° east and from north to south consist of: (1) a syncline with the south limb overturned in places and the axial trace at the surface covered by strata thrust northward; (2) an anticline with the axial trace covered by northward thrusting of the south limb; and (3) a syncline near the area of Cretaceous onlap.

West of Lake Greeson there is an anticline and a syncline in addition to the folds described on the east side of the lake. This anticline and syncline are in the northern part of the mercury district and trend north 60° east. The dips recorded on the west end of the syncline were often below 25° while those on the east end were generally greater than 70°. These structures die out to the northeast and southwest (Plates I-A and I-B).

The general structure of the mercury district is often masked in the outcrops by minor structures. These minor structures are most numerous in the overriding fault blocks near the fault trace. Two distinct types of minor folding are important because of their relationship with ore deposits. One type of fold is termed an S bend (Figure 3), but generally has the position of an S rotated 90 degrees when viewed normal to the strike of the rocks. The other type of fold is termed a Z bend (Figure 4) and appears as a Z when viewed normal to the strike of the rocks (Gallagher, 1942). In the rocks on the tensional side of the maximum curvature of these folds, many fractures have developed. These fractures have served as important loci for ore deposition. The minor folds are from a few feet to a few hundred feet in strike

Figure 3: An S-bend exposed in the north back of the road about halfway to the top of the hill west of Narrows Dam in the SE¼, NE¼, Sec. 13, T. 7 S., R. 26 W., Pike County, Arkansas.

Figure 4: A Z-bend in the Jackfork Sandstone in the western part of the spillway at Narrows Dam in the NW¼, NW¼, Sec. 18, T. 7 S., R. 25 W., Pike County, Arkansas. Note the numerous fractures in the axial region of the fold marked by the geology pick.

length and have been found to be discontinuous at depth. Excellent examples of these folds may be observed in the spillway and road cuts at Narrows Dam on Lake Greeson. These minor folds are associated with faults and generally found in overriding thrust blocks or adjacent to tear faults.

Faults: In the mercury district high angle reverse or thrust faults were developed along with the east-west folding during Middle Pennsylvanian time. Some of the reverse faults are essentially parallel with the average strike of the rocks in the area. The Cowhide Cove Fault is a good example of the parallel thrust fault and extends east-west throughout most of the district. These faults are more difficult to locate and map than the cross or tear faults which cut across the strike of the strata. The Amity Fault is a good example of a cross fault. Cross Faults are easily recognized on aerial photographs even when they extend less than a mile and have a horizontal displacement of only a few hundred feet. Much of the movement along these cross faults has probably been in the direction of the strike of the fault plane. Thus they probably should be classed as strike slip faults rather than thrust faults. Reed and Wells (1938) refer to these smaller faults as tear faults. The Amity Fault is probably a strike slip fault in places and a thrust fault elsewhere. In reference to the Amity Fault, Miser and Purdue (1929) stated:

> "Although the hade was not observed, the fault is thought to belong to the thrust variety because of the almost exclusive occurrence of this type in most of the Ouachita region. Much of the displacement may have been horizontal--that is, in a south-eastward direction on the northeast side of the fault and in a north-westward direction on the southwest side."

Small reverse faults, normal faults, and bedding plane faults occur in large numbers near the larger faults. Displacement ranges from less than a foot to several thousands of feet. The cinnabar mineralization in the district is generally found in or near these fault zones.

ORE DEPOSITS

MINERALOGY

Deposits of mercury ore in the district contain only a few ore and gangue minerals. A list of these minerals compiled from many sources and in the general order of their abundance includes: (1) dickite, (2) quartz, (3) iron oxides (limonite, goethite, and hematite), (4) cinnabar, (5) siderite, (6) pyrite, (7) stibnite, (8) native mercury, (9) metacinnabar, (10) barite, (11) opal, (12) calcite, (13) eglestonite, (14) livingstonite, (15) calomel, (16) stibiconite, and (17) galena.

Ore Minerals: Cinnabar is the only primary ore mineral in the district. The cinnabar occurs as fine to medium crystalline coatings on fractured surfaces and as coarsely crystalline cinnabar filling larger fractures and open spaces. Dickite and quartz are crystallized with cinnabar and are associated with it in the fracture fillings. Freshly exposed cinnabar is translucent and bright vermillion red. Metacinnabar, calomel, eglestonite, livingstonite, and native mercury are found near the surface where the cinnabar has been partially oxidized. Metacinnabar often forms a thin black coating over unaltered grains of cinnabar. Eglestonite occurs as a greenish-yellow mineral with calomel in irregular masses (Sohlberg, 1933) and as reaction bands around cinnabar. Native mercury occurs as beads and globules in open cavities. Livingstonite has been found as an alteration product of cinnabar and stibnite (Sohlberg, 1933). Some of the earthy cinnabar is probably secondary.

Other Sulfide Minerals: Pyrite occurs in amounts of less than one percent of the primary minerals, and is in the form of small cubes in open cavities and coatings on fractures. Stearn (1936) reported:

> " . . . a sample of pyritiferous rock having assayed 0.02 ounces of gold and 0.4 ounces of silver to the ton. The same assay showed a small amount of arsenic, indicating the presence of arsenic minerals, which, however, have not been identified."

Stibnite occurs in the western part of the district and is best described by Stearn who visited the western mines while they were producing. Stearn's (1936) description follows:

> "Stibnite occurs in small amounts at Parnell Hill near the surface, and at Gap Ridge about 180 feet below the surface. It has been noted in shale gouge, in distorted acicular crystals, in

open fractures with bladed crystals at right angles to the walls and bent by movement along them, and plastered on fracture walls in radiating rosettes. Within the masses of stibnite, crystals of cinnabar are common. Cinnabar, quartz (chalcedony or opal) and dickite all replace and are pseudomorphous after stibnite, which, therefore, must have been formed before the main metallization. Rarely, inclusions of stibnite are observed in cinnabar crystals."

Stearn also reported that stibiconite formed as an oxidation product of stibnite.

Two small cubes of galena were observed during microscopic examination of samples collected in conjunction with this report. The surface of the galena was whitish gray due to oxidation, but after cleaning with a probe was bright steel gray. The cubes were about one millimeter in diameter. The samples containing the galena came from the Mac-Holmes Mine and Prospect 36, numbers 30 and 36, respectively, in the section entitled "Mines and Prospects."

Gangue Minerals: Dickite and quartz are the most prominent and widespread primary gangue minerals in the mercury district. Dickite is a soft white to light brown clay mineral. It is often powdery or has a fine grained appearance with some crystals forming pseudo-hexagonal book-like aggregates as much as 0.15 mm in diameter (Sohlberg, 1933). The dickite occurs in most fractures and in quartz veins. It also occurs in bedding planes and as grains disseminated in the sandstone. Dickite is present at all of the mines and prospects in the district. Dickite often covers quartz crystals projecting from the walls of fractures and in places dickite is included in quartz crystals.

Quartz occurs as clear crystals and as massive milky quartz in fractures and open spaces. Stearn (1936) also reported smoky quartz intimately intergrown with dickite and cinnabar. Quartz, in some form, was deposited throughout primary mineral emplacement. Dickite replaces early formed quartz and is included by later formed quartz. Reed and Wells (1938) picture a clear quartz crystal with stibnite needles and cinnabar crystals included in it.

Barite and calcite occur sparingly as primary gangue minerals in some of the mines in the western part of the district. Cinnabar crystals have been noted as inclusions in some of the barite crystals (Reed and Wells, 1938). Barite and calcite are both white to clear and seem to have been deposited during the late stage of primary mineral emplacement.

Brown translucent crystals of siderite occur associated with many of the fractures in the mercury district. They are generally surrounded by dickite and quartz, but protrude into open cavities and show crystal terminations. Siderite is found in waste and low grade ore piles near the deeper shafts, and is not generally observed in near surface fractures. Boxwork in dickite indicates that siderite was present in these surface fractures but has subsequently been leached.

The only secondary gangue minerals identified were opal and iron oxides (goethite, limonite, and hematite). Iron oxides produced in part from oxidizing siderite and pyrite form thin coatings, stains and larger accretionary masses in near surface fractures and open spaces. These iron oxides range in color from black through shades of yellow, brown, and red. They range in texture from earthy to massive and some are botryoidal. Reed and Wells (1938) reported that goethite was introduced late and replaces crystalline quartz and quartz sand grains.

Figure 5 is a paragenetic chart of ore and gangue minerals in the mercury district.

SIZE AND SHAPE OF ORE BODIES

Ore bodies in the mercury district occur as pipelike bodies in association with minor folds and cross faults, and as tabular bodies generally restricted to an individual sandstone bed or a small group of beds. Mineralizing solutions deposited the ore in open fractures, fault breccias, and sparingly in pore spaces in the sandstone. Stearn (1936) recognized three dominant sets of fractures in the district and classified them as follows:

"1. A system with nearly horizontal attitude or dips of 10° to 20° either west or east, and with strikes normal to the bedding.

2. A system striking N. 4° to 30°E. and dipping from 60° to vertical.

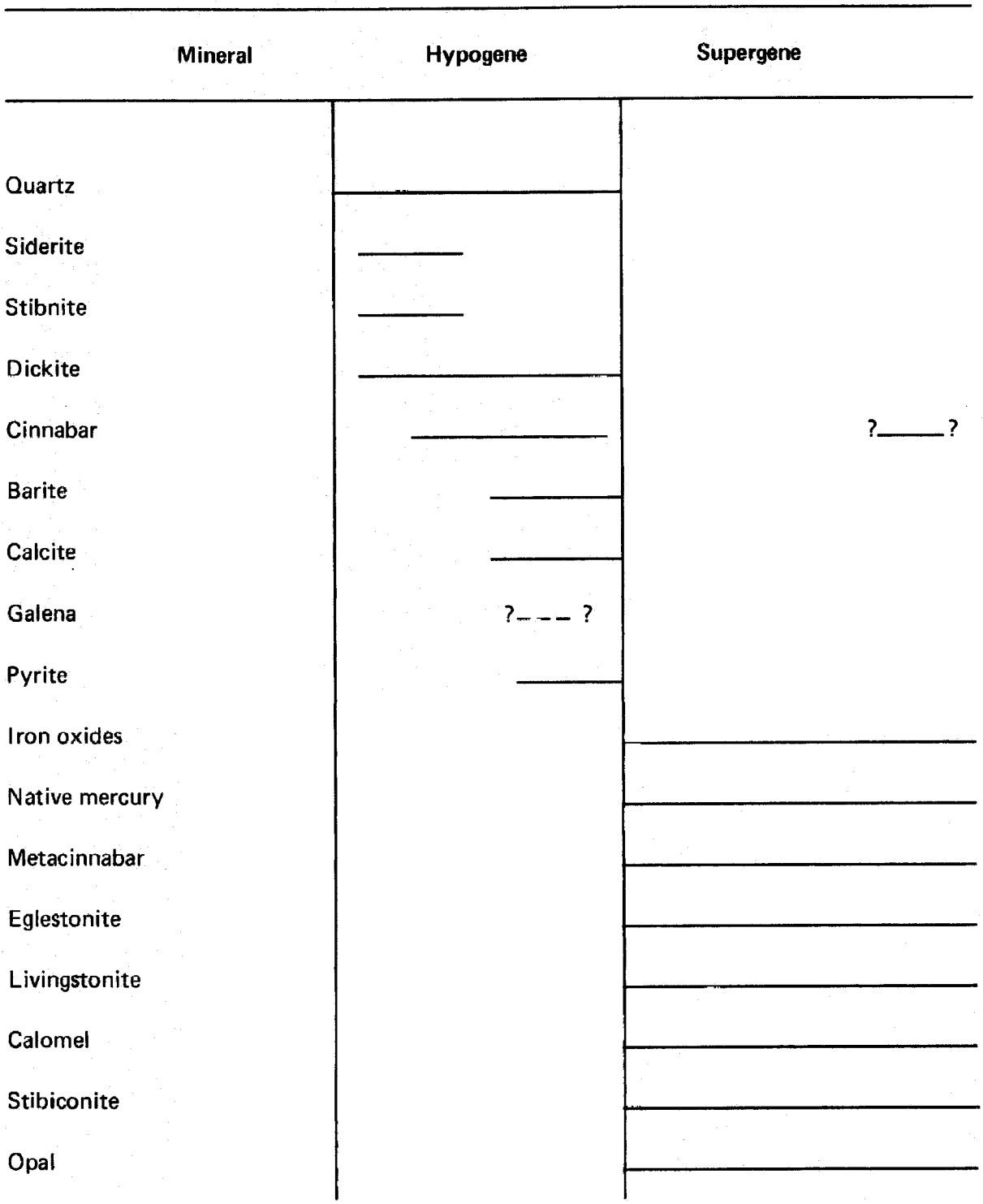


Figure 5. Paragenetic diagram.

3. A system striking N. 10° to 20°W. and dipping from 75° to vertical.

Fractures belonging to System 1 are found to interrupt and offset fractures belonging to Systems 2 and 3, and vice-versa, so that it seems possible that System 1 fractures developed both before and after those of Systems 2 and 3. Systems 2 and 3 are much more abundant than System 1. Mineralization is rarely found in System 1. In fact, fractures belonging to System 1 have been observed to cut off mineralization in fractures of System 2.

Single fractures belonging to Systems 2 and 3 are habitually discontinous from bed to bed, although rarely they cut a thick series of beds, and fracture zones that cut several beds are common."

The mercury deposits are discontinuous and irregular in both vertical and horizontal outline. Fractured mineralized beds are commonly adjacent to fractured unmineralized beds. Fractures containing cinnabar and gangue often give way both laterally and vertically to fractures containing only gangue minerals. McElvenny, Smith, and McElwaine (1950) give descriptions of maximum mine development in the mercury district as follows:

"With few exceptions the found ore bodies of commercial grade were small, with horizontal areas 6 to 300 square feet and heights greatly exceeding the lateral dimensions. Humphrey 6-2-1 oreshoot was the largest discovered in the district, the stope was 100 feet long, 30 feet wide and 120 feet high and bottomed below the 150-foot level of the mine. The 50-foot long ore body of the Parker Hill Mine was mined from the surface to a depth of 520 feet and had by far the greatest vertical extent of any ore body mined in the district. At the Gap Ridge mine a surface cut 6 to 8 feet wide and 55 feet long was opened on an oreshoot that was worked to a depth of 320 feet. Several ore bodies in the district were over 100 feet in height. On the other hand, the Bloody Cut, on Parnell Hill, was 150 feet long, but the ore played out at 30 feet below the surface.

As a rule, small pockets of rich ore were commoner in the western part of the district, whereas large bodies of disseminated ore were found in the eastern part, probably due to greater fracturing and consequent higher porosity of the sandstone in the latter area."

The Pike City Prospect (28) in September, 1970, had nearly continuous exposures of low grade mineralization extending for more than 500 feet along the outcrop, and was the most continuous mineralization known in the district at that time. Random chip samples along the mineralized beds contained 3 pounds of mercury to the ton. The mineralized beds range from 2 to 10 feet thick and exhibit no major cross structures. The Pike City Prospect (28) has been prospected to a depth of approximately 10 feet by scattered surface pits along the strike of the beds for 1,200 feet, and all of the pits exposed cinnabar mineralization.

Some cinnabar was found in association with discordant quartz veins near the Little Missouri River in the Parker Hill Mine (Branner, 1932).

DISTRIBUTION

The mines and prospects of the mercury district occur in folded and faulted generally east-west trending anticlines and synclines of the southern Ouachita Mountains. All of the known cinnabar mineralization of the district occurs in the Stanley Shale of Mississippian age and the Jackfork Sandstone of Pennsylvanian age (Plate II).

Cinnabar has been found in minor amounts along partings in shale but all deposits worked in the district were associated with sandstone. The Gap Ridge Sandstone Member of the Stanley Shale contains 27 of the total mines and prospects reported in the district. Other sandstone beds in the Stanley Shale account for another seven of the prospects. The remaining 33 mines and occurrences are in the Jackfork Sandstone. Most of the mines were located in the overriding blocks of reverse faults and less than one mile south of the fault traces. The other mines may be associated with similar unmapped structures or minor faults (Plates I-A and I-B).

ORIGIN AND AGE

Cinnabar and other primary minerals were deposited from aqueous solutions rising through fractured and porous rock. These mercury bearing

solutions were probably the results of epithermal emanations from igneous rocks south of the present mineralized area. It is postulated that these solutions traveled northward up fault planes and into fractured sandstones and fault breccias in the overthrusted fault blocks. When these solutions reached the proper environment cinnabar precipitated in open spaces.

The nearest surface igneous rocks to the mercury district are the peridotite plugs near Murfreesboro. These plugs along with sedimentary acidic tuffs and conglomerates near Nashville are Lower Cretaceous age. Most surface and subsurface igneous rocks in Arkansas are Cretaceous and Precambrian ages (Stone and Sterling, 1964). Igneous rocks of Paleozoic age presently known to exist in Arkansas are serpentine bodies in Saline County and beds of tuff in the western Ouachita Mountains (Stone and Sterling, 1964).

Although there is agreement on the age of major igneous activity in Arkansas, there are differences of opinion on the age of mineralization in the mercury district. Stearn (1936), and Reed and Wells (1938), have ascribed mineralization of the district to middle Pennsylvanian time, because this was the period of major thrusting and in many of the ore deposits there has been movement after mineralization. Branner (1932) stated:

> "It does not seem highly probable, however, as Miser (communication of May 19, 1932) has pointed out, that the Arkansas cinnabar mineralization took place during mid-Pennsylvanian time, since the folded rocks, which are now exposed on the surface of the Athens Plateau, were buried at great depths in Mid-Pennsylvanian time. Cinnabar, however, almost always occurs as a near surface deposit."

In view of the conditions affecting the mercury district it seems probable that the cinnabar mineralization occurred during Lower Cretaceous time in connection with vein quartz deposition and the major period of igneous activity in Arkansas.

MINING AND PROSPECTING

Initial mining in the district was by extracting ore from surface pits, trenches, and glory holes developed on surface showings of cinnabar. During the late 1930's and early 1940's, regular underground methods of mining were used. McElvenny, Smith, and McElwaine (1950) give descriptions of some of the mines as follows:

> "In the eastern part of the district, the mines were open mainly by cross cutting adits, from which drifts were extended on the ore zones. Humphrey 6, Caddo, Humphrey 34, and Bemis Hill Mines are all adit mines with interior winzes and sub-levels below the adit levels. The longest cross-cut adit at the Big Six Mine reached a length of 760 feet.
>
> "In the rest of the district, the vertical shaft, or an occasional incline, was the medium of development. The shafts are mostly single-compartment and cribbed. The Parker Hill, however, is three-compartment and vertical to 307 feet, from which level an interior inclined winze extends to the 520 foot level, making this by far the deepest mine in the district."

Underhand and shrinkage stoping methods were used in mining with square sets required to hold the backs and walls of the stopes.

All of the ore was hand sorted and with the exception of a few low grade ore piles, it was furnaced or retorted as soon as it was mined. There was a total of 13 furnaces in the district with a total capacity of over 300 tons of ore per day. Both the Gould-type rotary kiln and the Nichols-Herreshoff furnaces were used. Some ore and all soot and mud from furnace operations were treated in retorts (McElvenny and others, 1950).

Although 91 to 97% of mercury contained in the ore was liberated by the furnaces (McElvenny and others, 1950), the actual recovery may have been considerably less due to loss of mercury vapors during the process.

The companies that have been involved in mining in the district have been small, and mining and prospecting was carried out with little capital investment. All of the early prospecting was done by individuals examining outcrops and loose surface material. When showings of cinnabar were located, a pit was usually dug to evaluate the show. A mine developed if the mineralization persisted and was mill grade ore. The United States Bureau of Mines in 1941, drilled 3,539 feet of diamond drill core with 61.2% recovery and dug 5,309 linear feet of trench with an average width of 11 feet and an average depth of 2.17 feet (McElvenny and others, 1950). More ore grade mineralization was located by the trenching than was detected

in the core holes. Only 8 feet of core analyzed over 3 pounds of mercury to the ton. In the surface trenches, 45 square feet of samples analyzed above 3 pounds of mercury to the ton.

Recent prospecting involves trenching, pitting surface prospecting, geochemical methods and some drilling. The areas that have been prospected the most are near fault intersections.

PRODUCTION

The production of mercury in Arkansas varied with the price of mercury over the 15-year period that the district was active. Over fifty mining companies were active during this period with a dozen of these companies accounting for 98% of the recorded production. McElvenny, Smith and McElwaine (1950) lists the following companies as the major producers of mercury:

"Arkansas Quicksilver Co.: worked the mines on Bemis Hill intermittently from 1931 to the middle of 1934.

Southwestern Quicksilver Co.: operated the Parker Hill, Gap Ridge, and Parnell Hill mines from 1932 to 1934.

Mid-Continent Quciksilver Corp.: operated the Bemis Hill area mines from 1935 to 1939.

Mercury Mining Co.: (also known as Mercury Producers, Inc.) worked Section 32, Parker Hill, Parnell Hill, and Bell Mines in 1935 and 1936.

Caddo Quciksilver Corp.: operated the Caddo Mine from 1939 to 1943.

United States Mercury Co.: operated the U. S. Mine (Hintze prospect from 1939 to 1943.)

Superior Mining Co.. operated Section 11, Section 32, Valley, and Section 17 mines from mid-1941 to mid-1942.

Humphreys Gold Corp.: (Arkansas Quicksilver Division) operated the Humphrey 6 and Humphrey 34 mines from 1942 to 1944."

Mercury produced in Arkansas totaled about 12,500 seventy-six pound flasks. The total is hard to determine exactly, because many small operations failed to report their production. Table 1 shows production from 1931-1946. The only reported production since 1946 was 27 flasks in 1965, at Kirby, Arkansas (Minerals Yearbook of Arkansas, 1931-1965).

TABLE 1

PRODUCTION 1931-1946

YEAR	FLASKS PRODUCED
1931-1936	3,960
1937	776
1938	205
1939	364
1940	1,159
1941	2,012
1942	2,392
1943	1,532
1944	191
1945	0
1946	11

The market price has been a big factor in the production of mercury. Table 2 shows the yearly average price of mercury per flask from 1930-1972 based on the market at New York:

TABLE 2

PRICE OF MERCURY PER 76 POUND FLASK

AT NEW YORK

	Average
1930	$115.01
1931	87.35
1932	57.93
1933	59.23
1934	73.87
1935	71.99
1936	79.92
1937	90.18
1938	75.47
1939	103.94
1940	176.87
1941	185.02
1942	196.35
1943	195.21
1944	118.36
1945	134.89
1946	98.24
1947	83.74
1948	76.49
1949	79.46
1950	81.26
1951	210.13
1952	199.10
1953	193.03
1954	264.39
1955	290.35
1956	259.92
1957	246.98
1958	229.06
1959	223.50
1960	210.76
1961	240.00
1962	191.21
1963	189.45
1964	314.79
1965	570.75
1966	441.72
1967	489.36
1968	535.56
1969	504.00
1970	407.77
1971	292.41
1972	218.00

Minerals Yearbook of Arkansas 1930-1972.

TENOR

The mercury ore in the district was not systematically sampled and analyzed to determine the tenor being mined. Hand selected high grade ore contained as much as 200 pounds of mercury to the ton (Stearn, 1936). McElvenny, Smith, and McElwaine (1950) reported:

> "The U. S. Geological Survey, however, computed the tenor at 3.0 pounds of mercury a ton of ore mined to January, 1937 and 1.3 pounds a ton mined during several subsequent years. The grade of the ores treated at the various furnaces in the district range from 3 to 18 pounds a ton."

Table 3 was taken from U.S.G.S. Bulletin 886-C, page 53, by Reed and Wells (1938). Their footnotes are below the table.

MINES AND PROSPECTS

During investigation of the mercury district a separate report was compiled on 67 mines and prospects. These reports include: a description of the prospects; a brief history of mining and production and chemical analyses of samples taken at the mines and prospects. The percent of Hg, Sb, Cu, Zn, Au, and Ag contained in each sample appears in the appendix.

Some of the mines were difficult to locate because the district has been idle many years. New names were given to several mines and prospects where old names could not be determined. The mines were visited from west to east and the number following each name corresponds with the location numbers on Plates 1-A, 1-B, and II.

The Parker Hill Mine could not be visited because it is covered by Lake Greeson. The mine was located on a small hill in the SE¼SW¼ section 1, T. 7 S., R. 26 W., in Pike County. The mine consisted of two shafts, one abandoned at 75 feet because of a collapsing hanging wall (Reed and Wells, 1938). The second shaft known as the Parker Hill shaft was the deepest in the district. It was vertical to 307 feet with an interior, inclined winze to the 520 foot level (McElvenny and others, 1950). Reed and Wells (1938) placed the mine in the Parker Hill Member of the Stanley Shale, which is below the Gap Ridge Sandstone. Mineralization was in fracture fillings associated with dickite. Native mercury was found in the discovery shaft 113 feet below the surface.

TABLE 3

TENOR OF ORE

Mine or Prospect	Waste	Ore	Tenor of Ore
	Tons	Tons	Pounds per Ton
Gap Ridge mine[1]	3,730	2,250	22
Parker Hill mine[1]	3,150[2]	850	22
Wall Rock shaft	750	275	5-8
Wall Mountain shaft	2,650	400	10-12
Prospect on Wall Mountain near Wall Mountain shaft	450	50	15-18
Cuts in sec. 32, T. 6 S., R. 23 W.	1,530	40	7-9
Hill 2, cut 1	425	115	17-20
Hill 2, cut 2	2,500	315	15-18
Hill 2, cut 3 and cut 5 combined	1,000	95	14-16
Hill 2, cut 4	100	20	12-15
Hill 2, cut 6	400	55	10-12
Hill 3, cut near center of sec. 33, T. 6 S., R. 23 W.	350	75	12-14
Hill 3, cut a short distance north of last mentioned cut	525	140	10-12
Sec. 34, T. 6 S., R. 23 W., large cut near west end of hilltop	3,260	1,350	8-10
Sec. 34, T. 6 S., R. 23 W., shaft near east end of hilltop	660	180	12-15

[1] Figures from Stearn, N. H., Econ. Geology, vol. 31, no. 1, 1936; all others from R. C. Rohrdanz, of the Mid-Continent Quicksilver Corporation.

[2] 1,800 tons of the waste came from preliminary stripping operations.

ROCK FENCE (1)

The Rock Fence prospect is located in the NE¼ NW¼, section 13, T. 7 S., R. 27 W., in Howard County. This prospect was discovered in late 1932 by Z. A. Copeland, and presently is the westernmost occurrence of cinnabar in the district (Reed and Wells 1938).

The property had recently been worked in March of 1969 and consisted of a bulldozed area 10 feet wide, 720 feet east-west along strike, and about 2 feet deep. There is an open pit in the center of the bulldozed area 90 feet east-west, 110 feet north-south, and with an average depth of 20 feet. Earlier work consists of a stope which was worked to the surface 10 feet east of the open pit. The stope began at the 75 foot level and is 85 feet long and 2½ feet wide. At the east end of the stope is a shaft 10 feet square. A two-tube Gould retort was located at this mine in 1934 by C. Q. Schow and C. E. Holmes (Reed and Wells, 1938).

The prospect is located in the Gap Ridge Sandstone Member of the Stanley Shale. Here the rocks have a strike of N. 80°E. and a vertical dip. A microscopic examination of the select samples taken at this prospect showed the cinnabar occurring as fracture fillings and as disseminated grains within the sandstone. Gangue minerals are dickite, goethite, limonite, quartz, and siderite. Total production from the old stope was 11 flasks of mercury (Reed and Wells, 1938).

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
4	Random sample E-W cut	0.05
5	Shale and dirt from open pit	0.05
6	Random open pit (rock chip)	0.05
7	Select sample from original dump	1.3

FLOYD PROSPECT (2)

The Floyd prospect, located in Howard County, is in the SW¼SE¼, section 12, T. 7 S., R. 27 W. The digs were opened in 1933 by O. Brown and Rison and consisted of a few prospect holes, a shaft 10 feet square and 35 feet deep, and a one-tube retort (Reed and Wells, 1938). Recent bulldozer work has cleared off an area 160 feet east-west, 40 feet north-south, and has a maximum depth of 8 feet. Several shallow trenches are in the area.

There is no known production of mercury from this prospect and only traces of cinnabar were noted as fracture fillings in the sandstone. Gangue minerals are quartz, dickite, and limonite. The prospect is in the Stanley Shale, which strikes E-W and dips 80°S.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
1	Select	0.25
2	Random chip	0.10
3	Shale and dirt	0.05

PYLE PROSPECT (3)

The Pyle prospect was originally opened in early 1932 by F. A. Copeland in the SE¼SE¼, section 12, and the NE¼NE¼, section 13, T. 7 S., R. 27 W., in Howard County. In 1933 further prospecting was done by O. Brown and Rison, and in 1934 by C. E. Holmes and C. Q. Schow (Reed and Wells, 1938). Later work extended the prospect into the NW¼NW¼, section 18, T. 7 S., R. 26 W., in Pike County.

At present the prospect consists of three major trenches and various smaller prospect digs. In section 18 there is a trench 5 feet wide, 15 feet long, and 5 feet to standing water. The trench in section 13 is 40 feet long, 5 feet wide, and has a maximum depth of 5 feet. A pit in section 12 is 10 feet by 15 feet and 10 feet to standing water.

This prospect is located in the Gap Ridge Sandstone Member of the Stanley Shale, which at this locality has an average strike of N 65°E and dips 85°S. The prospect is located adjacent to a tear fault trending N 81°E and dipping 80°SE (Reed and Wells, 1938). The cinnabar and metacinnabar occurs as fracture fillings and as a black coating. Gangue minerals at this prospect are quartz, limonite, dickite, barite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
8	Random from trenches sections 8 and 13	0.00
9	Select from section 13	0.10
10	Select from pit, sec. 12	0.30

PROSPECT 4 (4)

Prospect 4 is located in Pike County, in the NW¼NW¼, section 16, and SE¼SE¼ of section 8, T. 7 S., R. 26 W., and was previously reported as an occurrence of cinnabar by Reed and Wells (1938).

This prospect is in the Gap Ridge Sandstone Member of the Stanley Shale and consists of: 2½ acres bulldozed down to bedrock; two partially covered north-south trenches 75-100 feet long; one old shaft; and the remains of a tunnel on the east side of the bulldozed area. The rocks strike east-west and dip vertically.

There is no known production from the area and the bulldozer work is recent. The cinnabar occurs as fracture fillings and metacinnabar as a black coating. Gangue minerals are dickite, quartz, limonite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
17	Select	1.2
18	Random dirt	0.05
19	Random chip	0.00

PROSPECT 5 (5)

Prospect 5 encompasses an area 400 feet east-west, and 300 feet north-south, bulldozed to bedrock. This prospect is located in the NW¼NW¼ section 16, T. 7 S., R. 26 W., Pike County.

No previous report has been made on Prospect 5 and the bulldozed work appears to be fairly recent. Remains of old mill timbers, probably of the Hudgins prospect, are piled up on the west end of the cleared area. The prospect is located in the Gap Ridge Sandstone Member of the Stanley Shale, which strikes east-west and dips vertically. Cinnabar occurred in fracture fillings and as disseminated grains within the sandstone. Metacinnabar was found as fracture fillings. Gangue minerals include quartz, dickite, limonite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
14	Random chip	0.10
15	Random dirt	0.05
16	Select	1.6

HUDGINS PROSPECT (6)

The Hudgins Prospect is located in the SE¼SW¼ section 9, T. 7 S., R. 26 W., in Pike County about 500 feet east of Prospect 5. This prospect was opened in late 1933 by W. O. Hudgins with a 7-foot square shaft, 30 feet deep (Reed and Wells, 1938).

Recent bulldozer work has exposed the bedrock 200 feet north-south and 300 feet east-west. In the center of the cleared area is a water filled shaft 7 feet by 12 feet. Thirty feet northeast of this center shaft are two water filled shafts, one 7 feet by 12 feet and the other 10 feet by 15 feet. In the southeast corner of the cleared area is a 6-foot by 12-foot shaft. Southeast of the cleared area in the woods are two water filled trenches 25 feet by 10 feet and 40 feet by 4 feet, and a water filled shaft 15 feet by 10 feet. Two hundred feet east from the cleared area is a tunnel caved back 75 feet from the portal. The recent bulldozer work on Hudgins Prospect, Prospect 4 and Prospect 5 was done by the International Paper Company to cover up some mines as a safety precaution. The old millsite described in Prospect 5 is probably from the Hudgins mill and retort. In 1933 a 2-tube retort was constructed with a capacity of 1,200 pounds of ore per day (Reed and Wells, 1938).

The Hudgins Prospect is in the lower Jackfork Sandstone, which strikes N80°E and dips 75°S. The prospect lies a few hundred feet east of the surface trace of a northeastward-trending tear fault and the contact of the Stanley Shale (Reed and Wells, 1938). Cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. Gangue minerals are quartz, dickite, limonite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
20	Random chip	0.00
21	Random dirt	0.00
22	Select	0.9

PROSPECT 7 (7)

In the area of Prospect 7 an occurrence of cinnabar was reported (Reed and Wells, 1938). In 1935 the Mercury Mining Co. opened a cut 40 feet long, 6 feet wide and 30 feet deep. The prospect is located in the NE¼SW¼, section 9, T. 7 S., R. 26 W. in Pike County (unpublished material Ark. Geol. Comm., 1970). At present about 2 acres have been bulldozed to bedrock covering the previous work.

Prospect 7 is in the Gap Ridge Sandstone Member of the Stanley Shale, which strikes N70°E and dips 80°N. Cinnabar is abundant as fracture fillings and some disseminated grains are found in the sandstone. Gangue minerals are quartz, dickite, and limonite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
11	Random dirt	0.10
12	Random chip	0.05
13	Select	0.6

MUDDY FORK MINING CO. (8)

The Muddy Fork Mining Co. Mine, located in Pike County in the NE¼SW¼, section 34, T. 7 S., R. 26 W., consists of an area a quarter mile long paralleling an old woods road. On the west end are several trenches, each about 5 feet wide and 30 feet long cutting across the strike of the rock. On the west end is a trench, a caved-in stope, and the remains of a concrete head frame. Throughout the hillside are small prospect digs and trenches. On the east end is a caved hole, 15 feet by 18 feet, with dumps around it.

The Muddy Fork prospect is one of the southernmost occurrences of cinnabar. The cinnabar occurs as fracture fillings in the Jackfork Sandstone. The rocks have an east-west trend and a near vertical dip. Gangue minerals are quartz, dickite, and limonite. Muddy Fork prospect was a producing mine in 1943 but the production history is not known.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
181	Select	0.39
182	Random chip	0.19
183	Random dirt	0.19

WEST GAP RIDGE (9)

The West Gap Ridge prospect is located on a ridge west of Gap Ridge in the SE¼NW¼ of section 11, T. 7 S., R. 26 W., in Pike County. The original work was on land owned by Southern Kraft Corp. and in 1935 work was done by Mercury Mining Co. (Reed and Wells, 1938).

The prospect is adjacent to Lake Greeson with the major portion on the south side of the hill. Most of the old workings are centered around the old millsite to the south which has a water filled stope 12 feet by 20 feet, with a drift to the north at the bottom. East of the millsite, 40 feet, is a stope 6 feet by 15 feet, and 30 feet to water. A trench 6 feet wide, 25 feet long, and 12 feet deep at maximum depth is 100 feet east of the millsite. On the east end of the ridge near the lake is a pit 45 feet long, 12 feet wide, with a 5-foot square drift off the west end. All of the above workings are located along the same trend. On the north side of the hill, directly north from the millsite is a trench 30 feet long, 4 feet wide, and 25 feet deep. Northwest of the millsite, 300 feet, is a small open pit 7 feet square and 4 feet deep.

The prospect is located in the Gap Ridge Sandstone Member of the Stanley Shale, which strikes N70° and dips 85°S. The cinnabar occurs as fracture fillings and as disseminated grains in the sandstone. Gangue minerals are dickite, quartz, limonite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
23	Random chip	0.10
24	Select	1.0
25	Random dirt	0.25

GAP RIDGE (10)

The Gap Ridge prospect is located in the SW¼NE¼, section 11, T. 7 S., R. 26 W., in Pike County. The prospect is a quarter mile north from the Parker Creek Public Use Area on Lake Greeson to the top of the ridge. The Southwestern Quicksilver Corp. operated the mine in 1934 and the Arkansas Quicksilver Mines, Inc. operated it in 1940 (unpublished material, Ark. Geol. Comm., 1970).

The main stope is 25 feet north-south by 75 feet east-west and is reported by Reed and Wells (1938) to have been 230 feet deep, but presently it is filled with water up to within 40 feet from the surface. Reed and Wells (1938) report 5,980 tons of rock were removed from the stope. Several hundred flasks of mercury have been produced from the mine. West of the main stope 200 feet is a caved open cut. A cut 30 feet east of the main stope 15 feet square and 10 feet deep has caved. Two hundred feet east of the main stope is a cut 15 feet by 30 feet with a maximum depth of 25 feet. A cut 40 feet long, 30 feet wide with a maximum depth of 40 feet is 300 feet east of the main stope. Along the same trend to the east is a trench 30 feet long, 3 feet wide and 30 feet deep. East of the main stope 320 feet is a caved cut 5 feet by 15 feet by 15 feet deep. A cut 20 feet east-west, 40 feet north-south, and 30 feet to water is located 350 feet from the main stope. A few smaller trenches and digs are found in this area.

Three cross faults cut across the area which the ore follows. The ore extends along the strike of the rock 550 feet with a width of 5 to 25 feet (unpublished material, Ark. Geol. Comm. 1970).

The Gap Ridge prospect is located in the Gap Ridge Sandstone Member of the Stanley Shale and is on the same trend as the West Gap Ridge prospect and the prospect on the eastern part of Gap Ridge. The rocks strike N80°E and dip 87°N. The cinnabar occurs as fracture fillings and as disseminated grains in the sandstone. Gangue minerals are dickite, quartz, limonite, siderite, and barite.

Laboratory Analysis

Sample No.	Type Sample	Analysis % Hg
26	Random chip	0.05
27	Random dirt	0.00
28	Select	3.6
29	Select disseminated	1.0

EASTERN PART OF GAP RIDGE (11)

Eastern Part of Gap Ridge is located a quarter mile north of the Lake Greeson park area on top of the ridge in the SW¼NW¼, section 12, T. 7 S., R. 26 W., in Pike County. It was first opened in 1937 by Arkansas Quicksilver Co., and worked in 1940 by Arkansas Quicksilver Mines, Inc. (unpublished material, Ark. Geol. Comm.,1970).

The prospect consists of 3 main areas, two on the south side of the ridge and one on the north. On the eastern end of the south side are two pits, one 10 feet by 6 feet east-west with an average depth of 4 feet; the other pit much smaller. West along the same trend is a partially caved pit 8 feet by 20 feet and 7 feet to water with a drift into the side of the hill to the north. At the top of the hill on the north side are two pits; one is 15 feet by 12 feet and 6 feet to water, and the other is a caved pit 6 feet by 8 feet. Various small digs and trenches occur along the ridge.

The prospect is in the Gap Ridge Sandstone Member of the Stanley Shale which at this location strikes N75°E and dips 85°S. The cinnabar occurs as fracture fillings in the sandstone. Gangue minerals are quartz, dickite, limonite, and goethite. The water level of Lake Greeson presently comes to the edge of some pits and trenches. The production from these pits is not known, but judging from the size of the dumps very little ore was taken from this prospect.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
30	Select	0.70
31	Random dirt	0.00
32	Random chip	0.00

PROSPECT 12 (12)

The Prospect 12 digs are located along the north side of the county road in the SE¼SW¼ section 12, T. 7 S.,R. 26 W., in Pike County.

This prospect consists of small digs a few feet deep that expose fresh rock. A nearby covered shaft could be one of the Parker Prospect (Big Six Mining Co.) (13). The cinnabar occurs as fracture fillings in the sandstone. Gangue minerals are dickite, quartz, goethite, and limonite. The rocks trend east-west and have a near vertical dip. These digs are in the Jackfork Sandstone.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
36	Select	1.5
37	Random chip	0.45
38	Random dirt	0.00

SOUTH MILL MT. PROSPECT (13)

South Mill Mt. Prospect is located on the south side of Mill Mt. on the edge of Lake Greeson in the SW¼NE¼, section 12, T. 7 S., R. 26 W., in Pike County.

Most of the workings are under water. The exposed workings consist of a pit 20 feet long, 8 feet wide, and 6 feet deep. Also along the same trend on the east end of the hill is an L-shaped trench with sides 45 feet and 30 feet that open out on the side of the hill. A few feet east is a small pit 7 feet square and 5 feet deep. The first opening was started in late 1931 by George Bell and W. F. Hintze. Work was taken over in 1937 by Cinnabar Mining Co. and in 1940 by Arkansas Quicksilver Mines, Inc. (Reed and Wells, 1938).

The prospect is in the Jackfork Sandstone and at this location the rocks strike N63°E and dip 75°S. Cinnabar occurs as fracture fillings and as disseminated grains in the sandstone. Gangue minerals are dickite, quartz, and limonite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
39	Select	0.7
40	Random chip	0.30
41	Random dirt	0.00
39-A	Disseminated	0.25

PARKER PROSPECT (BIG SIX MINING CO.)(14)

These workings are located on the north and south sides of the county road in the SE¼SW¼, section 12, and the N½NW¼, section 13, T. 7 S., R. 26 W., in Pike County. Reed and Wells (1938) report that the prospect was started by two brothers and worked from May to September 1933. Between 1933 and 1939 McNaughton Mercury Co. operated the prospect and brought the total production to 21 flasks. Big Six Mining Co. took over operations in 1939 extending the work to three shafts 115, 130, and 190 feet deep. The 190-foot shaft has an 800-foot drift at the 180-foot level. They installed a 25-ton Cottrell plant (unpublished material, Ark. Geol. Comm.).

The Parker Prospect is located north of the road and consists of a main shaft that is now covered up. A few old digs, trenches, and the remains of an old loading ramp are nearby. The area worked by Big Six Mining Co. is south of the road about a quarter mile. All past workings are covered and cleared. Two smaller areas, each about a half acre in size to the west are cleared. On the edge of the eastern clearing is a dump from one of the old shafts.

Both prospects are in the Jackfork Sandstone which at this location generally strikes east-west and has a nearly vertical dip. The cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. The prospect is located east of one of the major tear faults (Reed and Wells, 1938). Gangue minerals are dickite, quartz, limonite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
33	Select	1.0
34	Random chip	0.00
35	Random dirt	0.00

PARNELL HILL (15)

Parnell Hill mine is located on the east side of Lake Greeson, on the south slope of Parnell Hill, in the SW¼SW¼, section 6, T. 7 S., R. 25 W., in Pike County. Cinnabar was first found here in 1931 by Mr. Leo Yount (Reed and Wells, 1938). Mr. Yount then started the Southwestern Quicksilver Company which operated the mine from 1932 through 1934. From 1935 through 1937 the Mercury Producers, Inc. operated the mine and the last year the mine was opened was in 1940 by the Arkansas Quicksilver Mines, Inc. (Gallagher, 1942). At present the site is on the edge of Lake Greeson on land owned by the federal government.

The mine consists of three main cuts into the side of the hill, cut No. 1, cut No. 12, and cut No. 15. They all run along the trend of the Gap Ridge Sandstone Member of the Stanley Shale. The rocks strike east-west and have a dip of 85°S.

On the west end of Parnell Hill is cut No. 1, which is located at a major Z-bend (Gallagher, 1948). Cut No. 1 is 20 feet east-west, 15 feet north-south and 45 feet deep at the back. There are three drifts at the north end of the cut. Reed and Wells (1938) reported cut No. 1 to be 60 feet deep at the back with a shaft 14 feet below the floor.

Cut No. 12, to the east of cut No. 1, is approximately 30 feet wide and has a maximum depth at the back of 50 feet. Reed and Wells (1938) report that an incline followed an ore shoot 87 feet below the floor of the cut. Approximately 20 feet to the east is a caved shaft believed to be Eunson's shaft which followed a rich ore zone (Gallagher, 1942).

To the west of cut No. 12 is the Bloody cut, which is 225 feet long, 15 feet wide, and has an average depth of 25 feet. This cut runs along the strike of the rocks and is in a highly fractured and faulted zone. A dump on the south side extends down the hill into Lake Greeson and contains good samples of cinnabar.

Cut No. 15 is east of cut No. 12 and is 30 feet long, 50 feet deep and tapers out to the side of the hill at the lake's edge. There are several smaller adits and cuts in the area and some occur below water level. One of these adits could be the Parnell Hill adit which had approximately 700 feet of total tunneling.

The cinnabar occurs as fracture fillings in the sandstone. Gangue minerals are quartz, dickite, limonite, goethite, and siderite. The fractures in the rocks at Parnell Hill are due to a cross fold near the middle of the hill and a tear fault that offsets the Gap Ridge Sandstone (Reed and Wells, 1938). Total production is not known, but from the amount of prospecting and the amount of cinnabar in the dumps a large quantity of ore was removed.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
42	Select	3.0
43	Random chip	0.10
44	Random dirt	0.00
45	Select Bloody cut	36.5

YENGLIN MINE (16)

The Yenglin Mine is a small prospect, started in 1934 by Otto Yenglin. The prospect is located in the SE¼SW¼, section 6, T. 7 S., R. 25 W., in Pike County (Reed and Wells, 1938).

The mine at present consists of two open trenches, one 40 feet by 7 feet, and has a maximum depth of 7 feet, and the other trench is 40 feet east-west by 8 feet wide and 40 feet deep. The second trench has a large dump by it. It has been reported in unpublished material from the Ark. Geol. Comm. that a shaft 100 feet deep and eight cuts 240 feet in total length were made. A total of 10 flasks were produced through 1939. The rocks are of the Gap Ridge Sandstone Member of the Stanley Shale and at this location strike N75°E and dip 85°S. The trenches are located just west of a slight synclinal fold (Gallagher, 1942). Cinnabar and metacinnabar were found in the fractures of the sandstone. Gangue minerals are quartz, dickite, limonite, goethite, barite, and calcite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
49	Select	1.5
50	Random chip	0.05
51	Random dirt	0.00

HOPKINS PROSPECT (17)

The Hopkins Prospect is located in the NE¼ SW¼ and the SE¼SW¼ of section 6, T. 7 S., R. 25 W., in Pike County.

The prospect is in the Gap Ridge Sandstone Member of the Stanley Shale and has a trench 45 feet long and 5 feet wide that was cut into a sinuous S-bend. The trench is said to have produced 47 tons of good ore (Gallagher, 1942). The rocks strike N50°E and dip 75°SE.

Gallagher (1942) describes results of the U. S. Bureau of Mines diamond drill hole No. 12:

> "was put in from the north at an inclination of 49° to explore the possible downward extension of this ore body, which, according to the projected surface dips, should have been reached at a depth of 185 feet. Only a small showing of cinnabar was encountered at 147 feet, and none deeper than the entire surface dips suggest, because the surface rocks have slumped downhill a few degrees. This small ore body is the best that has so far been worked in the synclinal portion of the S-bend."

The cinnabar occurs as fracture fillings in the sandstone. Gangue mineral are dickite, quartz, limonite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
46	Select	1.2
47	Random chip	0.00
48	Random dirt	0.00

HALES MINE AND U. S. MERCURY CO. (18)

The Hales Mine and U. S. Mercury Co. properties are adjacent to each other in the SE¼ NW¼ and the NE¼ SW¼, section 6, T. 7S., R. 25W., Pike County. Both mines were reported together since all the old working presently overlap.

Hales Mine is in the SE¼ NW¼ of section 6 and was opened in 1940 by Hales Mining and Development Co. A shaft was dug to 100 feet with drifts at 42, 72 and 100-foot levels. At the 100-foot level it was stoped back to the drift on the 72-foot level. The shaft lies in the footwall of an east-west fault zone exposed during the bulldozing of the area (Gallagher, 1942). Figure 6 is a surface map of Hales Mine and U. S. Mercury Co. properties.

U. S. Bureau of Mines diamond drill hole No. 10 encountered ore at the 72-foot level but missed ore by a few inches at the 100-foot level which was revealed when the shaft was dug (Gallagher, 1942). The only known production was reported in 1940 and was 133 flasks. A rotary Cottrell Plant was installed by Hales Mining and Development Company (unpublished material, Ark. Geol. Comm., 1971).

The U. S. Mercury Co. property located in the NE¼ SW¼ of section 6 was opened in 1939 by U. S. Mercury Co. and operated for two years. A 160-foot shaft was dug in the footwall of the fault with drifts at the 112 and 160-foot levels.

Three diamond drill holes were drilled by the U. S. Bureau of Mines: (1) No. 7 was an inclined hole to the west but showed no cinnabar; (2) No. 8 showed only traces of cinnabar; (3) and No. 9 was abandoned because of poor coring conditions before reaching any cinnabar (Gallagher, 1942).

A Gould D tube retort was located at the mine and produced 27 flasks in 1939 and 134 flasks in 1940 (unpublished material, Ark. Geol. Comm., 1971).

The mill foundations still exist with large dumps on the hillside. There are several bulldozer cuts in this area.

Both mines are in a faulted zone in the Jackfork Sandstone which Gallagher (1942) believed to be part of the Cowhide Fault. The rocks strike east-west and dip 60°S. Cinnabar occurs as fracture fillings in the sandstone. Gangue minerals are dickite, quartz, limonite, goethite, siderite, calcite, and pyrite.

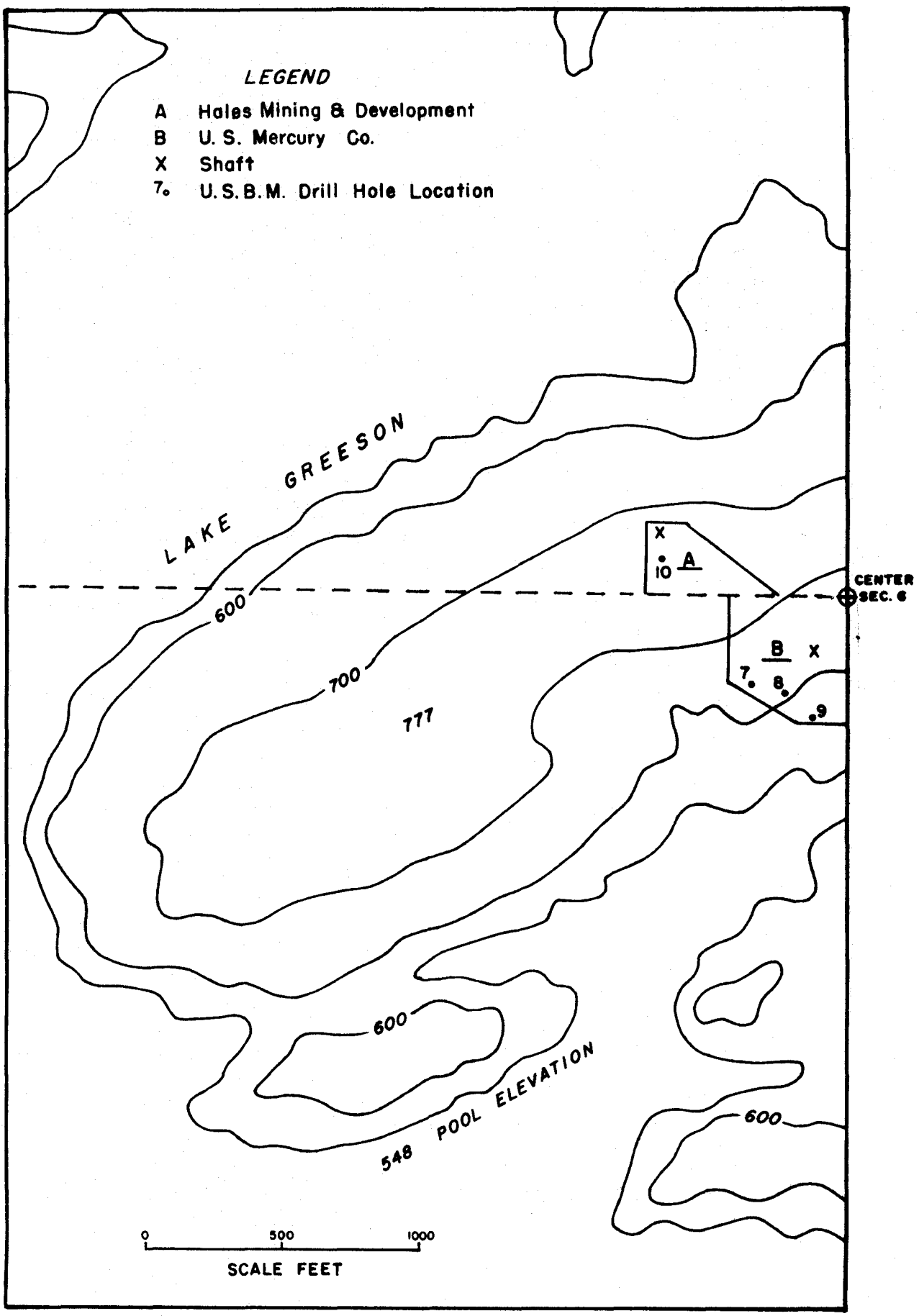


Figure 6. A location map of the Hales—U. S. Mercury Mines. Portion of the west half of Section 6, T.7S.,R.25W.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
53	Select	1.2
54	Random chip	0.05
55	Random dirt	0.00

ISABELL WEST (19)

The Isabell West mine is part of the Isabell Mine, which has been separated by Lake Greeson. The mine is located at the edge of the water on the east end of the ridge in the NE¼ SE¼, section 6, T. 7 S., R. 25 W., Pike County.

The mine consists of a small trench 35 feet long, 4 feet wide and 3 feet deep, with various smaller digs and trenches on the side of the hill.

The mine is located on the west side of a cross fault in the Gap Ridge Sandstone Member of the Stanley Shale. The rocks strike east-west and have a near vertical dip. Cinnabar and metacinnabar occur as fracture fillings. Gangue minerals are quartz, dickite, limonite, goethite, barite, and calcite.

A laboratory analysis of a select sample (52) consisted of 0.7% Hg.

ISABELL MINE (20)

The Isabell Mine is located at the west end of an island on Lake Greeson in the NE¼SE¼, section 6 and NW¼SW¼, section 5, T. 7 S., R. 25 W., Pike County. Operation at the mine began in 1931 by Fletcher F. Isabell, and it was worked through 1935. In 1939 and 1940 the Craig Mining Co. worked the mine (Gallagher. 1942).

Part of the Isabell Mine has been separated by the lake and is now known in this report as Isabell West. A cross fault cuts to the west of the Isabell Mine which is located in the anticlinal part of an S-bend (Gallagher, 1942). On the west end of the island about 40 feet above water level are three shafts, one 15 feet by 25 feet and 60 feet to water. The other two are each 10 feet by 12 feet and filled with water. A large dump extends from the shafts to the edge of the lake. A mill site is on the edge of the lake at the west end of the island. Small digs and trenches have been dug for sampling eastward along the ridge. The main shaft was known as the Isabell shaft, which is 100 feet deep and at the 85-foot level has a 15-foot drift and a 30-foot lateral (unpublished material, Ark. Geol. Comm.).

The mine is in the Gap Ridge Sandstone Member of the Stanley Shale, which at the mine has an east-west strike and a vertical dip. Cinnabar occurs as fracture fillings in the sandstone. Gangue minerals are quartz, dickite, limonite, and goethite.

A one-tube retort was located at the mine and produced 13 flasks up to 1939, 11 flasks in 1939 and 12½ flasks in 1940 (unpublished material, Ark. Geol. Comm.)

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
157	Select	0.7
158	Random chip	0.00
159	Random dirt	0.00

YANTIS MINE (21)

The Yantis Mine is in the NE¼NE¼, section 6, T. 7 S., R. 25 W., in Pike County.

The main shaft has been filled in with timbers from the old mill and a small pit 6 feet square and 8 feet deep is located 50 feet to the east. The mill-site is 25 feet down the hill from the shaft.

Reed and Wells (1938) reported that the Yantis Mine was a producing mine but no production records were available. The mine is in the Jackfork Sandstone, which at this location strikes east-west and dips 85°S. Cinnabar occurs as fracture fillings in the sandstone. Gangue minerals are quartz, dickite, and limonite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
187	Select	0.68
188	Random chip	0.32
189	Random dirt	0.27

LOWERY AND JAMES (22)

The Lowery and James prospect is on a peninsula just above Lake Greeson on the south side of the hill. The mine was opened by J. W. Lowery and operated by W. M. James (Gallagher, 1942). It is in the SE¼NW¼ and the SW¼NE¼ of section 5, T. 7 S., R. 25 W., Pike County.

The ridge is in a small Z-bend located at the eastern end of the peninsula (Gallagher, 1942). The main pit is 30 feet long, 12 feet wide, and at 30 feet maximum depth there is a caved drift to the south. According to Gallagher (1942), the pit is located on the anticlinal axis of the bend where the best ore occurred. On the side of the hill are two large waste dumps. West of the main pit along the same trend there is a trench 75 feet long, 12 feet wide and filled with water.

Another trench 150 yards further west is 40 feet long, 10 feet wide, and 10 feet deep. A shaft 10 yards west of the trench is 6 feet by 10 feet with 5 feet of exposed rock to water and it is reported to be 20 feet deep (Gallagher, 1942). A trench 40 yards further west along the same trend is 30 feet long, 8 feet wide, and 6 feet deep. The work on the west was done in 1940 by Max Crockett for George Hales (Gallagher, 1942).

The prospect is in the Gap Ridge Sandstone Member of the Stanley Shale and at this location the rocks strike east-west and dip 85°S. The cinnabar occurs as fracture fillings, in breccia, and some disseminated grains within the sandstone. Gangue minerals include dickite, quartz, limonite, barite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
56	Select	1.1
57	Random chip	0.05
58	Random dirt	0.00
59	Select specimen	1.4

OLD ARGENTINE MINE (23)

North of the road to Cowhide Cove Recreation Area in the NW¼NW¼, section 4, T. 7 S., R. 25 W., in Pike County is the Old Argentine Mine.

The mine is on a ridge in the Stanley Shale stratigraphically below the Gap Ridge Member and the strata strikes N80°E and dips 75°S. In the latter months of 1932 C. Caponetto sunk two shafts 30 feet deep finding native mercury at 15 feet in one shaft (Reed and Wells, 1938). The only remaining shaft is now 20 feet square and 15 feet deep with several smaller trenches and digs along the ridge.

The cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. Gangue minerals are dickite, quartz, and limonite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
60	Select	1.0
61	Random chip	0.05
62	Random dirt	0.00

PROSPECT 24 (24)

Prospect 24 is on the south side of Cowhide Cove Road in the NE¼NE¼, section 4, T. 7 S., R. 25 W., Pike County.

There has been no previous report of this occurrence, which consists of a trench 35 feet east-west, 5 feet north-south, and 10 feet deep; and another trench along the same trend 45 feet east-west, 4 feet north-south, and 3 feet deep.

This prospect is in the Stanley Shale which strikes N55°E and dips 85°N. The cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. Gangue minerals are quartz, dickite, and limonite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
63	Select	0.10
64	Random chip	0.00
65	Random dirt	0.05

FUNDERBURK PROSPECT (25)

The Funderburk Prospect was opened in 1932 by C. I. Barfield on land owned by J.H. Funderburk in the NW¼NW¼, section 3, T. 7 S., R. 25 W., in Pike County on a ridge north of Cowhide Cove Road (Reed and Wells, 1938).

The prospect is in the Stanley Shale and on the same trend as the Old Argentine Mine. The rocks strike N80°E and dip 75°S. The fractures in the sandstone strike N20°E and dip 60°SE (Reed and Wells, 1938). The original work is located at the east end of the ridge and consists of a trench 75 feet long, 10 feet wide, and 20 feet deep. Recent work consists of a trench west of the original trench 40 feet long, 15 feet wide, and 15 feet deep. Further west along the same trend are two pits 8 feet square and 6 feet deep; a trench 25 feet long, 5 feet wide, and 4 feet deep; and a pit 10 feet by 12 feet and 20 feet deep. The mine produced 4 flasks of mercury in 1940 while operated by Greer and Johnson (unpublished material, Ark. Geol. Comm., 1971).

Cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. Gangue minerals are dickite, quartz, and limonite. Mac B. Woodward of the Arkansas Geological Commission found a dendritic form of cinnabar at this prospect in 1964 (personal communication, 1969).

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
66	Select	0.15
67	Random chip	0.05
68	Random dirt	0.05

COX PROSPECT (26)

The Cox Prospect located in the NE¼NE¼ section 3, T. 7 S., R. 25 W., consists of two small shafts, one 25 and the other 30 feet deep, a 20-foot trench, and several small prospect pits. It is located in the Gap Ridge Sandstone Member of the Stanley Shale, just west of a cross fault. The rocks strike S80°E and dip 70°S. No cinnabar was noted during the study at the prospect. Gangue minerals include dickite, quartz, and limonite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
69	Select	0.05
70	Random chip	0.00
71	Random dirt	0.10

PROSPECT 27 (27)

Prospect 27 includes the N½NW¼ of section 2, T. 7 S., R. 25 W., Pike County. This report covers the ridge in the Gap Ridge Sandstone, from the Cox prospect to Highway 27. The strata strikes east-west and dips 75°S. There is no reported production from the few small prospect pits and trenches which occur along the ridge. Some traces of cinnabar were observed. No samples were taken for analysis.

PIKE CITY PROSPECT (28)

The Pike City Prospect is one of the southernmost occurrences of cinnabar and is located in the N½SW¼ of section 19, T. 7 S., R. 24 W., in Pike County.

The cinnabar occurs in the upper Jackfork Sandstone with mineralization contained within a 10-foot thick section of sandstone. Most of the cinnabar occurs as fracture fillings, but disseminated grains within the sandstone were occasionally noted. The general trend of the sandstone is east-west with a near vertical dip.

At present the prospect consists of an area 50 feet north-south and 1,200 feet east-west bulldozed to bedrock. There are numerous hand dug pits which contained high grade ore along the sandstone exposure. Cinnabar was conspicuous all along the sandstone bed. Gangue minerals include dickite, quartz, and limonite.

Figure 7 shows the prospect viewing from the west end.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
175	Select	1.4
176	Random chip	0.10
177	Random dirt	0.05

Figure 7: Pike City Prospect located in the N½, SW¼, Sec. 19, T. 7 S., R. 24 W., Pike County, Arkansas. Cinnabar mineralization occurs throughout the length of the cleared area which is approximately 1200 feet long.

PROSPECT 29 (29)

Prospect 29, located in the NW¼SE¼ of section 31, T. 6 S., R. 24 W., Pike County, was originally opened by Union Mining Co. (Waters, 1943). It was operated later in 1939 and 1940 by Central Mercury Mining and Development Co. which produced 3 flasks in 1939 (unpublished material, Ark. Geol. Comm., 1970).

The property consists of an old mill, a shaft filled with water which was 100 feet deep with 110 feet of drifts and laterals (unpublished material, Ark. Geol. Comm. 1970). Two trenches, one 60 feet by 8 feet, and the other 10 feet by 15 feet are located near the shaft. The mine is in the Gap Ridge Sandstone Member of the Stanley Shale and generally trends east-west. The cinnabar occurs as fracture fillings in the sandstone. Gangue minerals are dickite, quartz, siderite, and pyrite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
74	Select	1.2
75	Random chip	0.05
76	Random dirt	0.10

MAC-HOLMES MINE (30)

The Mac-Holmes Mine is located in the SW¼ NW¼, section 32, T. 6 S., R. 24 W., in Pike County. It was first opened by C. Caponetto in 1932, later operated by C. E. Holmes and R. B. McElwaine in 1936 and 1937, and Valley Mining Co. operated the mine in 1934 (unpublished material, Ark. Geol. Comm., 1970).

The Mac-Holmes Mine consisted of two shafts presently caved and filled with water. Old mill timbers and the foundation from a 20-ton Gould Retort are located between the two shafts. Many small trenches and pits are on the hillside along with some recent bulldozer work. Production for 1939 was 270 flasks and for 1940 was 60 flasks (unpublished material, Ark. Geol. Comm., 1970). A stockpile and waste dump showed a good quantity of cinnabar. Just west of the Mac-Holmes Mine is a shaft which could be the Interstate Mill Prospect. Along the top of the ridge above the shaft are some more small trenches and recent bulldozer work.

The Caponetto shaft was sunk in 1932 to the 40-foot level. In 1936 Holmes and McElwaine sunk a 90-foot shaft with 100 feet of drifts at the 55 and 85-foot level (Reed and Wells, 1938). McElwaine reports that a shaft at Mac-Holmes Mine was 241 feet deep and had 580 feet of tunnels and 250 feet of stopes (unpublished report, Ark. Geol. Comm. files, 1952).

These two prospects are in the Gap Ridge Sandstone Member of the Stanley Shale, which at this location strikes N75°E and dips 75°S. The cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. Gangue minerals include dickite, quartz, limonite, siderite, pyrite, stibnite, and galena.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
77	Select	1.1
78	Random chip	0.05
79	Random dirt	0.35

RESEARCH MINING CO. (31)

The Research Mining Co. property is a quarter mile east of Mac-Holmes Mine in the SE¼NW¼, section 32, T. 6 S., R. 24 W., in Pike County.

The main shaft is filled, and there is a large dump on the south side of it. Another shaft is by the millsite 50 feet east of the dump. Between the Research Mining Co. property and Mac-Holmes Mine are a few prospect trenches along the strike of the same sandstone beds. The prospect is in the Gap Ridge Sandstone Member of the Stanley Shale, which strikes east-west and dips vertically. Waters (1943) reported that this was a producing mine but production figures are not available.

The cinnabar occurs as fracture fillings in the sandstone. Gangue minerals are quartz, dickite, and limonite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
190	Select	0.52
191	Random chip	0.79
192	Random dirt	0.38

OCCURRENCE 32 (32)

This occurrence is in the SE¼NE¼ of section 20, T. 7 S., R. 24 W., Pike County, on the roadside along the same trend as the Pike City Prospect.

The mineralization is in the upper part of the Jackfork Sandstone which generally strikes east-west. No previous report has been made on the area. The cinnabar occurs as fracture fillings in the sandstone. Gangue minerals are dickite, quartz, and limonite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
184	Select	0.17
185	Random chip	0.18
186	Random dirt	0.36

PROSPECT 33 (33)

Prospect 33 is located near the center of the NW¼ of section 33, T. 6 S., R. 24 W., in Pike County.

There appears to have been no production from these prospects and only an occurrence of cinnabar has been reported (Waters, 1943). Along the ridge on the south side of the creek are a few digs and trenches along the trend of the Gap Ridge Sandstone Member of the Stanley Shale. The rocks strike east-west and dip 75°S. The cinnabar occurs as fracture fillings and as disseminated grains in the sandstone. Gangue minerals include dickite, quartz, limonite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
80	Select	0.25
81	Random chip	0.10
82	Random dirt	0.15

PROSPECT 34 (34)

Prospect 34 is located in the NW¼NE¼ of section 33, T. 6 S., R. 24 W., Pike County.

The prospect consists of a trench on the east end 100 feet long, 2 feet wide and 2 feet deep; a pit 100 feet west is 25 feet by 40 feet and is filled with water; and 150 feet further west are two more trenches, one L-shaped, the other trending north-south and 50 feet long, 2 feet wide and 2 feet deep.

The prospect is in the Gap Ridge Sandstone Member of the Stanley Shale which at this location has an east-west strike and dips 80°S. The cinnabar occurs as fracture fillings. Gangue minerals are dickite, quartz, goethite, and limonite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
83	Select	0.35
84	Random chip	0.05
85	Random dirt	0.00

PROSPECT 35 (35)

A trench 5 feet wide, 60 feet long and a maximum depth of 5 feet is located in the SW¼SW¼ of section 27, T. 6 S., R. 24 W., in Pike County.

The prospect is in the Gap Ridge Sandstone Member of the Stanley Shale which strikes east-west and dips 85°S. Along the ridge for a quarter mile east and west are a few small pits and prospect digs. The cinnabar occurs as disseminated grains within the sandstone. Gangue minerals are dickite, quartz, and limonite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
98	Select	0.05
99	Random chip	0.00
100	Random dirt	0.00

PROSPECT 36 (36)

A water-filled shaft 8 feet long by 6 feet wide is located in the SE¼SW¼, section 27, T. 6 S., R. 24 W., in Pike County.

The prospect is located in the Gap Ridge Sandstone Member of the Stanley Shale. The rocks in the shaft have a strike of N75°E and a dip of 75°S. This shaft has not been previously reported, and there is no known production. Cinnabar was not

found but gangue minerals of quartz, dickite, limonite, and galena were found. Only a random sample was taken and the analysis was 0.00% mercury (Sample No. 101 in the Appendix).

WALL ROCK SHAFT (37)

The Wall Rock Shaft is located in the NW¼NE¼ of section 3, T. 7 S., R. 24 W., in Pike County and was sunk by Mid-Continent Quicksilver Corp. in 1937 (Reed and Wells, 1938). The prospects along the south side of Wall Mt. are some of the southernmost prospects in the district.

The shaft was about 70 feet deep and produced about 275 tons of 5 to 8-pound ore. A pit 600 feet southwest of the shaft was 8 feet long, 5 feet wide, and 25 feet deep and produced 50 tons of 15 to 18 pound ore (Reed and Wells, 1938).

At present the shaft is filled with water and a dump is next to the pit. There has been no recent work in the area. The shaft is located in the Jackfork Sandstone, which has a strike of N 85° E and a dip of 80° S. Reed and Wells (1938) state that,

> "the beds at the shaft are cut by a tear fault that trends northwest across the beds and has no displacement at the surface. The displacement on the fault increases with depth at the rate of about 6 inches to 10 feet of depth. The beds are displaced to the left—that is, to the north on the east side of the fault. The ore shoot followed a breccia zone along the tear fault, and ore is reported at the bottom of the shaft."

Cinnabar and metacinnabar were found as fracture fillings in the sandstone. Gangue minerals are quartz, limonite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
95	Select	1.4
96	Random chip	0.35
97	Random dirt	0.00

PROSPECT 38 (38)

An area 50 feet by 200 feet was recently bulldozed to bedrock and is located 200 feet NE of Wall Rock Shaft in the NE¼ NE¼ of section 3, T. 7 S., R. 24 W., in Pike County.

The area is in the Jackfork Sandstone and the rocks strike N 85°E and dip 80°S. Cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. Gangue minerals are quartz, dickite, and limonite. No report has previously been made on this area. A select sample was taken which contained 0.20% mercury (Sample No. 94 in the Appendix).

PROSPECT 39 (39)

Two trenches, each 20 feet long and 4 to 6 feet wide, are located in the SW¼SE¼ of section 27, T. 6 S., R. 24 W., in Pike County. The two trenches are at the bottom of a hill on the east side of the creek. Two water-filled shafts, each about 10 feet by 15 feet are located on each side of the creek.

The ridge is in the Gap Ridge Sandstone Member of the Stanley Shale, which strikes east-west and dips 70°S. Considerable cinnabar occurs as fracture fillings in the sandstone. Gangue minerals include siderite, dickite, quartz, pyrite, limonite stibnite, hematite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
102	Select	0.10
103	Random chip	0.00
104	Random dirt	0.00

PROSPECT 40 (40)

A water-filled shaft and recent bulldozer work was found between Wall Rock Shaft and Wall Mt. Shaft in the NW¼NW¼, section 2, T. 7 S., R. 24 W., in Pike County.

The shaft has not been reported previously, but the occurrence of cinnabar in the sandstone was noted along this ridge by Reed and Wells (1938). The position of the shaft is along the same trend as Wall Rock and Wall Mt. shafts and is in the Jackfork Sandstone. The rocks strike east-west and have a dip of 80°S. The cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. Gangue minerals are quartz, dickite, limonite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
92	Select	1.1
93	Random chip	0.00

PROSPECT 41 (41)

An occurrence of cinnabar in the NW¼SW¼ of section 26, T. 6 S., R. 24 W., in Pike County was reported by Branner (1932). At present the prospect consists of a water-filled shaft 8 feet by 10 feet; a trench 6 feet wide, 35 feet long, and 5 feet deep; and an area 60 feet by 20 feet that has been bulldozed to bedrock. There were good showings of cinnabar in the fresh cuts.

The prospect is located in the Gap Ridge Sandstone Member of the Stanley Shale, which strikes east-west and has a vertical dip. The cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. Gangue minerals are quartz, dickite, and limonite. There has been no known production from this prospect.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
108	Select	0.20
109	Random chip	0.00
110	Random dirt	0.00

PROSPECT 42 (42)

Prospect 42 includes several prospect trenches cut across the strike of the rocks on the south side of Wall Mountain in the NE¼NW¼ of section 2, T. 7 S., R. 24 W., in Pike County. An occurrence of cinnabar and a pit 8 feet long, 5 feet wide, and 25 feet deep were reported at this locality by Reed and Wells (1938). The trenches start about a quarter mile southwest from Wall Mountain Shaft and extend along the strike of the rock for the next quarter mile to the west. The reported pit has caved and was sampled along with the trenches. A concrete foundation and remnants of a retort were found. About 50 tons of 15-18 pound ore were taken from the pit (Reed and Wells, 1938).

The prospects are in the Jackfork Sandstone which at this location strikes east-west and dips 80°S. The cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. Gangue minerals include quartz, dickite, and limonite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
89	Select	0.7
90	Random chip	0.25
91	Random dirt	0.5
89A	Select	0.33

WALL MT. SHAFT (43)

Along the south side of Wall Mountain in the SW¼SE¼, section 35, T. 6 S., R. 24 W., in Pike County, the Wall Mountain Shaft is located. The original mine, started by Mid-Continent Quicksilver Co. in 1935, consisted of a shaft 12 feet square and 110 feet deep which produced 400 tons of 10-12 pound ore (Reed and Wells, 1938). Later work by J. O. Wright and W. B. Guess in 1939 and 1940 produced about 75-80 flasks of mercury from the mine (unpublished material, Ark. Geol. Comm.). There is some very recent bulldozer work on top of the ridge near the original main shaft.

At present the prospect consists of the original shaft which has caved and an open pit 12 feet wide, 15 feet long, and 7 feet deep about 50 yards southwest of the main shaft. Two hundred yards southwest from the main shaft is a trench, a water filled shaft, and the remains of a small kiln. Three hundred yards southwest from the main shaft is the millsite. Along the side of the hill are various small prospect digs and trenches.

The Jackfork Sandstone beds at the prospect strike N85°W and dip 75°S. A vertical fault of unknown displacement cuts off the beds at the east end of the main shaft (Reed and Wells, 1938). The cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. Two-inch veins of solid cinnabar were seen during the

mining of the main shaft (Reed and Wells, 1938). Many of the fractures that contain the cinnabar trend across the beds and dip 45° S (Reed and Wells, 1938). Gangue minerals are quartz, dickite, and limonite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
86	Select	0.9
87	Random chip	0.25
88	Random dirt	0.05

PALMER PROSPECT (44)

The Palmer Prospect is a group of trenches and shafts in the NW¼ SE¼, section 26, T. 6 S., R. 24 W., in Pike County, started by T. B. Palmer in 1934 (Reed and Wells, 1938).

Three trenches spaced about 15 feet apart run in a north-south direction across the strike of the Gap Ridge Sandstone Member of the Stanley Shale. The trenches are 5-8 feet wide which expose a good section of rock. On the south end of the west trench is a shaft 20 feet square and 52 feet deep (Reed and Wells, 1938). Another shaft 10 feet square is located at the north end of the eastward trench. On the south side of the hill are two drifts, and a third at the road with a dump across the road. All three drifts have caved.

Cinnabar was not noted in abundance at any of the prospects and that observed was as fracture fillings in the sandstone. Leached out irregular shaped holes were found in the sandstone and may represent cinnabar boxwork. The rocks trend east-west and have a near vertical dip. The ridge is structurally complex, with cross folds, Z-bends, and tear faults. The shaft at the west end is located in the highly fractured axis of a Z fold. The following is taken from Reed and Wells, giving a description of what they observed in 1937:

> "Much of the shattered rock appears to be impregnated with hydrothermal quartz, which partly fills the vugs. Crystalline dickite and a large amount of limonite are present also. Some of the dickite is stained brown or red with hydroxides of iron. A bright red amorphous-appearing mineral, thought in the field to be hydrated oxide or iron, was shown by laboratory tests to contain considerable cinnabar. It is probably contaminated with iron compounds."

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
105	Select	0.05
106	Random chip	0.00
107	Random dirt	0.00

PROSPECT 45 (45)

A few trenches and pits yielded a small amount of mercury in the early 1930's in the SW¼NW¼, section 25, T. 6 S., R. 24 W., in Pike County (Reed and Wells, 1938). The prospect is in the Gap Ridge Sandstone Member of the Stanley Shale which strikes east-west and dips vertically. Some cinnabar occurs as fracture fillings along with quartz, dickite and limonite. A random sample (Sample No. 111 in the Appendix) collected at the prospect contained 0.00% mercury.

PROSPECT 46 (46)

Several prospect trenches and a caved shaft filled with water occur in the NW¼NE¼, section 19, T. 6 S., R. 23 W., Pike County.

No cinnabar was noted at any of the prospects, but there was considerable boxwork in the dickite-quartz veins dissecting the sandstone. The prospect is the northernmost prospect in the mercury district. One random sample was taken (Sample No. 115 in the Appendix) which contained 0.00% mercury.

PROSPECT 47 (47)

A small mine located in the NW¼NE¼, section 19, T. 6 S., R. 23 W., in Pike County, is one of the most northern occurrences of cinnabar in the district.

A shaft and a trench were reported dug on this property in the early 1930's with no production of mercury (Reed and Wells, 1938). Further investigation revealed a 20-foot square shaft with a millsite at the shaft. The shaft has caved and a dump is located on the hillside below the shaft.

Smaller trenches and pits extend to the west for a quarter mile. The production from this later work is not known.

The prospect is in the Stanley Shale with mineralization occurring in a 12-foot bed of massive sandstone which strikes N33°W and dips 72°S. The cinnabar was found around the main shaft as fracture fillings. Gangue minerals are quartz, dickite, and limonite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
178	Select	0.60
179	Random chip	0.54
180	Random dirt	0.31

PROSPECT 48 (48)

In the N½NW¼, section 32, T. 6 S., R. 23 W., Pike County, the Arkansas Quicksilver Company, the Mid-Continent Quicksilver Corporation, and the Ozark Quicksilver Corporation prospected and recovered some ore (Reed and Wells, 1938).

Beginning just east of the power line in the northwest corner of the quarter section there are two open digs in the side of the hill. The first dig is 100 feet long, 40 feet wide and the second dig is 60 feet long, 30 feet wide, and both have a maximum depth of 25 feet. At the west end is a shaft filled with water. The pits disclose folding, faulting, and highly fractured rocks. A trench 500 feet east is 50 feet long, 12 feet wide, with a 10 by 12-foot water-filled shaft in the middle. On the east end of the trench is a pit 20 feet by 30 feet and 15 feet deep. A few feet from the pit is a trench, 150feet long near the road. East of the surface trench, 300 feet along the same trend is a trench 100 feet long, 14 feet wide, and with a maximum depth of 20 feet. The trench appears to be the oldest work at the prospect. On the east end of the prospects, 500 feet further east on the same ridge, are three small digs and a small stockpile of ore.

These prospects are located in the Jackfork Sandstone south of the Amity Fault. The beds strike N75°W - N85°W and dip 70° - 80°S. Cinnabar occurs as fracture fillings in the sandstone, and Reed and Wells (1938) reported that native quicksilver was found. Reports indicate the first work yielded 13 tons of 20-pound ore and later work recovered 40 tons of 7 to 9-pound ore from 1,570 tons of rock (Reed and Wells, 1938). Gangue minerals are quartz, dickite, limonite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
116	Select from each area	1.8
117	Random chip	0.00
118	Random dirt	0.00

CLARK PROSPECT (49)

Three filled in pits with associated dumps were found at a reported occurrence of cinnabar in the NE¼NW¼, section 5, T. 7 S., R. 23 W., Pike County (Reed and Wells, 1938). One pit is on top of the ridge and the other two on the south side. These pits are about 20 feet square and spaced about 30 yards apart.

The cinnabar occurs as fracture fillings and as disseminated grains within a conglomeratic sandstone bed of the Jackfork Sandstone which strikes N65°E and dips 85°S. Gangue minerals are quartz, dickite, limonite, and goethite.

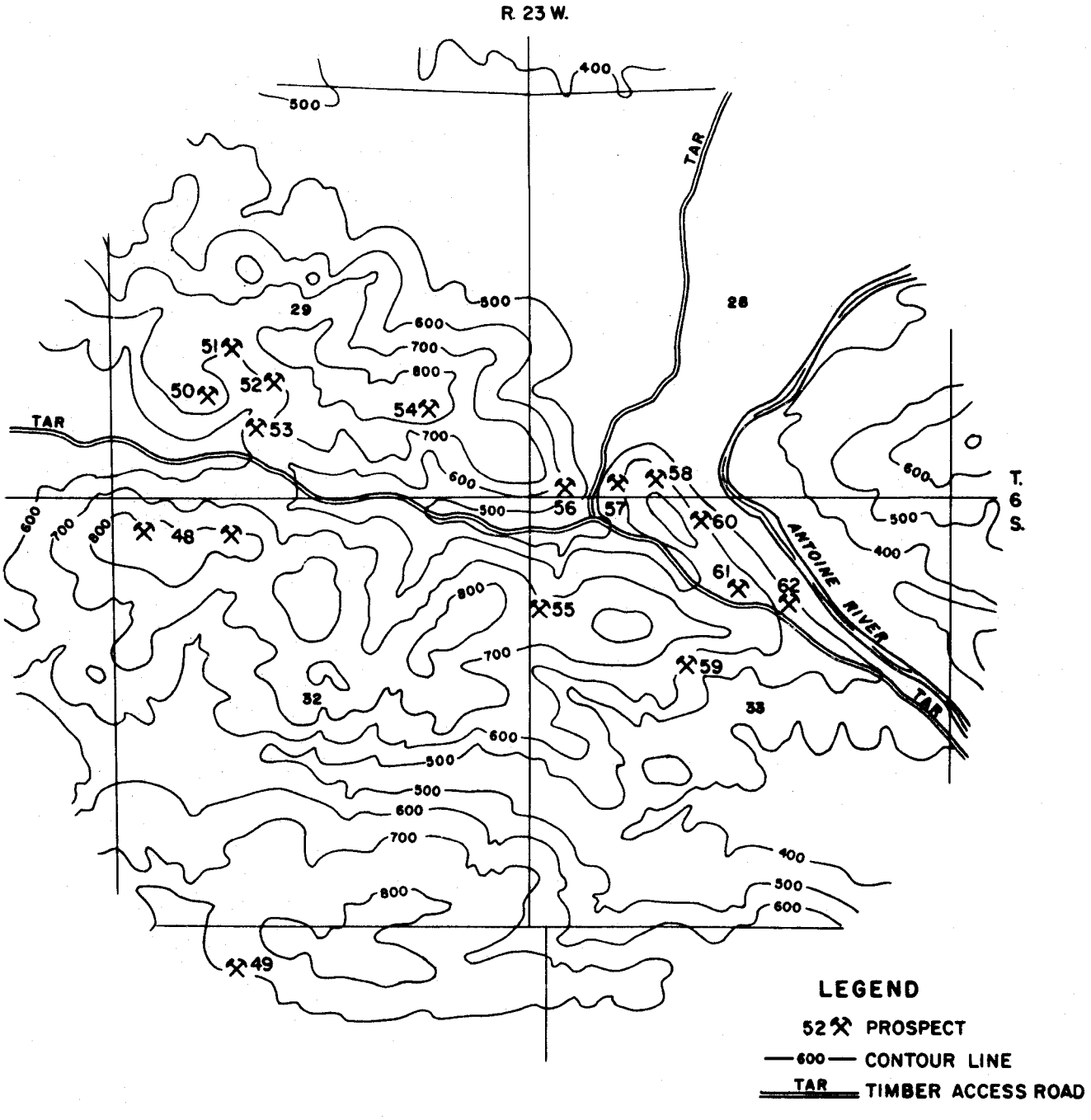
Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
112	Select	1.5
113	Random chip	0.00
114	Random dirt	0.05

HILL 2, HILL 3, AND BEMIS HILL

Hill 2, Hill 3, and Bemis Hill are all located in the Jackfork Sandstone on the west side of the Antoine River. Thre three hills are covered with mines and small prospects which are described separately on the following pages. Plate III shows the location of mines on the three hills.

The Arkansas Quicksilver Co. started work in this area in 1931. Mid-Continent Quicksilver Corp. was soon to follow with Mercury Mines, Inc. reopening parts of Hill 2 in 1940.



Drafting by L. P. Kelone

1975

PROSPECT LOCATION ON BEMIS HILL, HILL 2, AND HILL 3.

A 50-ton per day capacity Nichols-Herreshoff multi-hearth plant was located on Hill 2 and produced 2,380 flasks of mercury from 1931 to 1939, 60 flasks of mercury in 1939, and 60 flasks of mercury in 1940 (unpublished material, Ark. Geol. Comm., 1970).

There was a plant located on Bemis Hill in 1935 by Mid-Continent Quicksilver Corp., but production figures were not available except for 145 flasks of mercury produced at the Glory Hole on Bemis Hill (Reed and Wells, 1938).

Reed and Wells (1938) describe the area as follows:

> "Hill 2 constitutes a large block of Jackfork sandstone that lies south of the Amity and Cowhide Faults and north of the south branch of the Cowhide Fault. The block is caught between relatively major thrust faults and is intensely deformed. Small thrust faults, tear faults and cross folds are common.
>
> "Hill 3 lies south of Bemis Hill and Hill 2, on the south side of the south branch of the Cowhide Fault.
>
> "Bemis, also a block of the Jackfork Sandstone, is on the west side of Antoine Creek. A lot of small mines and glory holes have been dug over Bemis Hill. It is also caught between relatively major thrust faults and is intensely deformed."

The prospects on these three hills have been separated and names placed on them from past references. Prospects 50-62 describe the various mines and prospects on these hills.

HILL 2, CUT 2 (50)

Cut 2 is an open cut about 60 feet long, 30 feet wide and 40 feet to water, with a small dump on the south side. An area 20 feet by 30 feet has been bulldozed to bedrock. The location of Cut 2 is 100 feet north of the county road, under the power line, in the SE¼SW¼, section 29, T. 6 S., R. 23 W., in Pike County.

At this prospect the Jackfork Sandstone has an east-west strike and dips 75°S. Cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. The cut is located at a faulted cross fold and in the cut the beds strike N55°E and dip 72°S.

From Cut 2, 2,800 tons of ore and rock were mined which yielded 315 tons of 15-18 pound ore (Reed and Wells, 1938). Gangue minerals are quartz, dickite, limonite and goethite, with some siderite boxwork noted.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
122	Select	0.55
123	Random chip	0.00
124	Random dirt	0.00

HILL 2, CUT 6 (51)

A trench 65 feet long. 12 feet wide, and 10 feet deep is located in the NE¼SW¼, section 29, T. 6 S., R. 23 W., Pike County. The general trend of the massive beds of Jackfork Sandstone is east-west and the dip is nearly vertical. The cut yielded 55 tons of ore with 10-12 pounds of mercury to the ton (Reed and Wells, 1938). Cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. Gangue minerals are quartz, dickite, limonite and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
133	Select	1.20
134	Random chip	0.80
135	Random dirt	0.10

HILL 2, CUTS 3 AND 5 (52)

Cuts 3 and 5 are a few hundred feet southeast of Cut 6 in the southeast corner of the NE¼SW¼, section 29, T. 6 S., R. 23 W., Pike County. About 1,100 tons of rock were taken from these cuts which yielded about 96 tons of ore with a tenor between 14-16 pounds to the ton (Reed and Wells, 1938).

Cut 3 is a 10-foot diameter pit about 30 feet deep on the southeast side of the valley. Reed and Wells (1938) state:

"Cinnabar was found at the surface in several beds but near the bottom of the pit was confined to a 6-inch bed.

Cut 5 is an open cut 35 feet long and 30 feet high at the face. Boulders of ore lie in shale in a fault zone. The shale carried some cinnabar. Part of the cinnabar occupies small quartz veinlets."

The area is tightly folded and faulted with highly contorted rocks. The general trend of the Jackfork sandstone at these pits is east-west with a nearly vertical dip. The cinnabar occurs as fracture fillings in the sandstone and the shale (Reed and Wells, 1938). Gangue minerals are quartz, dickite, limonite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
130	Select	1.00
131	Random chip	0.00
132	Random dirt	0.00

HILL 2, CUT 4 (53)

Cut 4 is a tenth of a mile east of Cut 2 in the SE¼ SW¼, section 29, T. 6 S., R. 23 W., Pike County. The shaft is 20 feet in diameter and 15 feet to water. Reed and Wells (1938) reported that Cut 4 yielded 20 tons of 12-15 pound ore.

The shaft was dug in shale with thin Jackfork sandstone beds. Most of the cinnabar occurs as fracture fillings in the sandstone, and some shale contains cinnabar as fracture fillings. The general trend of these rocks is east-west with a near vertical dip. Gangue minerals are quartz, dickite, limonite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
125	Select	0.20
126	Random chip	0.00
127	Random dirt	0.00

HILL 2, RECENT CUT (54)

Four-tenths of a mile east of Cut 4 is an unreported prospect in the SE¼ SE¼ of section 29, T. 6 S., R. 23 W., in Pike County.

A trench 110 feet long, 10 feet wide and 5 feet deep was found and a pit 20 feet by 10 feet by 3 feet deep. Some recent bulldozer work had been done on the crest of the ridge. This prospect is along the same east-west trend and the rocks have a nearly vertical dip. The cinnabar occurs as fracture fillings in the Jackfork Sandstone. Gangue minerals are quartz, dickite, limonite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
128	Select	0.05
129	Random chip	0.15

HILL 2, CUT 1 (55)

Cut 1 is on the east end of Hill 2, at Suck Hollow Creek in the NW¼ NW¼ of section 33, T. 6 S., R. 23 W. The trench was cut into the side of the hill 40 feet long, 20 feet wide with a maximum depth of 30 feet. Several smaller trenches and digs occur in the vicinity.

Reed and Wells (1938) describe the early work here as follows:

"The early work opened up a wedge shaped mass of intricately folded and contorted shale, from which were found round pieces of sandstone rich in ore up to 1½ feet in size and large slabs of highly mineralized sandstone. This is bounded on the northeast by a thrust plane that strikes N74°W and dips 64½°SW, against which lay 2 feet of ore. The footwall of the fault plane is massive sandstone. The south side of the wedge is bounded by an irregularly curved slickensided wall of sandstone. About 80 feet higher on the hill two beds of mineralized sandstone were opened by a trench. The ore extended through what is apparently the fault plane.

Later work at Cut 1, nearer the creek and only a few feet above it, shows sandstone and shale, in the upper block of the minor thrust fault mentioned above, folded into an overturned anticline and cut off against the thrust plane."

The production of mercury from Cut 1 has not been reported. At Cut 1 the Jackfork Sandstone has a strike on N75°W and a dip of 65°SW. Boxwork of cinnabar was found, but most cinnabar seen was as fracture fillings. Native mercury was also found at the trench. Gangue minerals were dickite, quartz, limonite, and siderite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
119	Select	0.20
120	Random chip	0.00
121	Random dirt	0.00

BEMIS HILL NORTH (56)

Bemis Hill North is in the SW¼SW¼, section 28, T. 6 S., R. 23 W., in Pike County, just north of Black Tunnel on Bemis Hill. An old mine road from the top of Bemis Hill goes down to the prospect and dead ends.

At present the prospect consists of a water-filled cut 12 feet by 30 feet with a maximum depth of 30 feet, and a water-filled shaft 6 feet by 8 feet. There is one large dump by the cut.

The rocks are Jackfork Sandstone and have an east-west trend and a vertical dip. The prospects are in a highly faulted and folded interval. All the cinnabar occurs as fracture fillings in the sandstone. Gangue minerals are quartz, dickite, limonite, and siderite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
148	Select	6.00
149	Random chip	1.50
150	Random dirt	0.00

BEMIS HILL (57)

Bemis Hill consists of several tunnels in the SW¼SW¼, section 28 and the NW¼NW¼, section 33, T. 6 S., R. 23 W., Pike County.

Black tunnel is an open 8-foot square adit in massive sandstone, just up the hill from Suck Hollow Creek in section 28. Across the creek is an adit and a trench that is on Hill 2. To the southeast, 500 feet into section 33, is a tunnel 8 feet square with a large dump that extends down the hillside. The mines are in the Jackfork Sandstone which on Bemis Hill is highly faulted and fractured. The cinnabar occurs as fracture fillings. Gangue minerals are quartz, dickite, and limonite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
136	Select	1.20
137	Random chip	0.00
138	Random dirt	0.00

BEMIS HILL TUNNEL NO. 1 (58)

The entrance to Tunnel No. 1 is located in the SE¼SW¼ of section 28, T. 6 S., R. 23 W., on top of Bemis Hill. The main portal has caved and makes a hole 120 feet long, 25 feet wide and 6 feet deep. The tunnel has been stoped back to the surface 150 feet up the hill and makes an opening 60 by 40 feet. The main portal is about 600 feet above sea level on the east side of the hill. On the other side of the hill are pits and trenches; one could possibly have been a shaft. At the base of the main portal is the graded track bed which was used for haulage.

The trend of the Jackfork Sandstone on Bemis Hill is variable due to the high degree of folding and faulting which has intensely fractured the rocks. The cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. Gangue minerals are quartz, dickite, limonite, goethite, and siderite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
151	Select	0.70
152	Random chip	0.80
153	Random dirt	0.05

HILL 3 (59)

Hill 3 is in section 33, T. 6 S., R. 23 W., just south of Hill 2 and Bemis Hill, and on the south side of the south branch of Cowhide Fault. The

original workings were opened by Arkansas Quicksilver Co. and later enlarged by Mid-Continent Quicksilver Corp. (Reed and Wells, 1938).

On the southeast end of Hill 3 is where the cinnabar was mined. A few prospect trenches and small pits are scattered over the top of the hill, but there was no recorded production. In the SE¼ NW¼, section 33, there are two general locations where cinnabar has been mined. A large cut is located midway up the hill at the end of an old mine road in a valley. Further up the hill is a caved adit 120 feet long, 12 feet wide and 8 feet deep, which has a large dump estimated at 3,000 tons of rock. Just below the dump is an open adit 6 feet square at the opening. Southeast of this adit about 500 feet is another adit 6 feet square at the opening. Just south are several small trenches, pits, and waste piles. A pit 40 feet square and 15 feet deep is 40 feet up the hill. One hundred feet higher in elevation in a northward direction is a pit 20 feet by 40 feet and 20-40 feet deep. A lot of smaller pits are located on the hillside.

Earlier reports indicate that from one cut 75 tons of 12-14 pound ore was produced and from another 140 tons of 10-12 pound ore (Reed and Wells, 1938). In one of the early cuts on the southeast end three pronounced folds in the interbedded sandstone and shale of the Jackfork Sandstone are exposed. The cinnabar occurs in the fractures near axial planes of the folds in a sandstone bed that ranges from 6 to 30 inches thick. Ore was also found in other sandstone beds. The cut up the hill to the north exposes a wide fault zone. The cinnabar was found in brecciated zones related to the thrust fault (Reed and Wells, 1938).

The rocks strike N70°E and dip 70°S. Gangue minerals are quartz, dickite, limonite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
154	Select	8.30
155	Random chip	0.05
156	Random dirt	0.00

BEMIS HILL TUNNEL NO. 2 (60)

Entrances to Tunnel No. 2 are from both sides of Bemis Hill in the NE¼NW¼, section 33, T. 6 S., R. 23 W. The main portal is on the southwest side of the hill on the east side of the road going up Bemis Hill. The main portal has caved but a small opening would still allow entrance. A trench 80 feet long, 30 feet wide, with a maximum depth of 50 feet is located on the hillside 50 feet to the northwest. To the southeast of the portal 50 feet is another trench 75 feet long, 25 feet wide and 15 feet deep. Each trench has a dump by it and a large dump is below the portal on the south side of the road.

On the east side of the hill Tunnel No. 2 is stoped back to the surface and has a surface opening of 30 feet by 60 feet. The stope is located 300 feet north of the Glory Hole. Tunnel No. 2 was later extended and used as a haulage-way (Reed and Wells, 1938). On the top of the hill are many smaller prospect digs.

The cinnabar occurs as fracture fillings in the Jackfork Sandstone which is highly fractured due to faulting and folding on Bemis Hill. Gangue minerals are dickite, quartz, limonite, goethite, and siderite. Production statistics from Tunnel No. 2 are not available.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
142	Select	0.35
143	Random chip	0.00
144	Random dirt	0.00

BEMIS HILL GLORY HOLE (61)

The Glory Hole is located on the top of Bemis Hill in the NE¼NW¼, section 33, T. 6 S., R. 23 W. and is an open pit 100 feet long, 50 feet wide, and 50 feet deep, with an adit at the north end trending north into Tunnel No. 2. A trench 30 feet long, 15 feet wide, and 15 feet deep is 30 feet south of the Glory Hole. Southeast of the Glory Hole 150 feet is an open cut 50 feet long, 25 feet wide and 20 feet deep. At the road junction 300 feet southeast of the Glory Hole is an open pit 30 feet square, 12 feet to water. In this general area there are numerous waste dumps and smaller prospect digs.

The Glory Hole produced 145 flasks of mercury from about 2,500 tons of ore for the Ark-

ansas Quicksilver Co. and was greatly enlarged by the Mid-Continent Quicksilver Corp. (Reed and Wells, 1938).

The walls of the Glory Hole show the intensely complex structure which occurs in the Jackfork Sandstone on Bemis Hill. Gangue minerals include dickite, quartz, limonite, siderite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
145	Select	1.30
146	Random chip	0.10
147	Random dirt	0.15

BEMIS HILL STOP NO. 2 (62)

Stop No. 2 is a pit 50 feet square and 30 feet deep located on the south slope of Bemis Hill in the NW¼ NE¼, section 33, T. 6 S., R. 23 W. A dump is on the hillside below.

Cinnabar was found in the wall rock along the fractures in the Jackfork Sandstone. The massive sandstone blocks are highly contorted from faulting and folding. Gangue minerals are dickite, quartz, limonite, goethite, and stibnite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
139	Select	1.4
140	Random chip	0.10
141	Random dirt	0.00

HILL 34 (63)

Hill 34 is in the southern part of section 34, T. 6 S., R. 23 W., and is the first of a series of prospects on the east side of Antoine River. Work on Hill 34 was started in 1934 by Mercury Mining Co., followed later by Mid-Continent Quicksilver Co. (unpublished material, Ark. Geol. Comm.). Most of the work was done by the Humphrey Gold Corp. starting in 1941 (Waters, 1943).

The mined areas on top of the hill have been obliterated by recent bulldozer operations. Along the haulage road to the top of the hill are the remains of the mill. The two principal openings on the hill are a shaft and a cut. The shaft 6 feet by 12 feet and 60 feet deep is on the top of the hill southeast of the haulage road. The cut is 150 feet long and at its face is about 35 feet below the surface. A shaft sunk near the face of the cut is 110 feet deep (Reed and Wells, 1938).

Production from the shaft is reported at 180 tons of 12-15 pound ore and the cut and shaft were reported to have produced 1,350 tons of 8-10 pound ore (Reed and Wells, 1938).

Hill 34 is in the Jackfork Sandstone, and the rocks have a general east-west trend with a 70^{o}-80^{o} dip. The structure of the hill is complex, due to the fact it is a fault slice.

Reed and Wells (1938) give a description of the rocks in the shaft on the east end as follows:

> "At the shaft near the east end on top of the hill the rocks trend parallel to the hill and are vertical. There is no faulting and folding there, but the walls exposed in the shaft are grooved. The sandstone beds are fractured, and no shale was seen. The beds were mineralized to a depth of 40 feet over the 6-foot width of the shaft and along the beds for about 12 feet. Beginning at a depth of 40 feet there was less cinnabar and the shoot was not as large. The last 10 feet of the shaft was sunk in barren rock. About three-fourths of the cinnabar taken out was in fractures, and about one-fourth was disseminated through the sandstone."

The bottom of the 110-foot shaft was reported to have been in ore. In the cut a vertical fault is exposed (Reed and Wells, 1938).

Disseminated ore is more common on Hill 34 than any other place in the district. Gangue minerals are quartz, dickite, limonite, and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
160	Select	0.20
161	Random chip	0.05
162	Random dirt	0.00

PROSPECT 64 (64)

Recent bulldozer work has covered the old shaft or trench in the NE¼ NE¼, section 34, and the NW¼, section 35, T. 6 S., R. 23 W., in Pike County. These workings are in the Jackfork Sandstone and strike N. 75°E. and dip 80°S. The cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. Gangue minerals are quartz, dickite, limonite and goethite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
163	Select	0.70
164	Random chip	0.10
165	Random dirt	0.10

CADDO MINE (65)

Caddo Mine is on the north side of Ashbrook Road in the NE¼ SE¼ and S½ SE¼, section 1, T. 7 S., R. 23 W., and the NW¼ SW¼, section 6, T. 7 S., R. 22 W., in Clark County and is composed of numerous pits, trenches, and old shafts. Haulage roads were built to the north of Ashbrook Road down the hillside, then back east along the north side of the ridge to the Okolona Road. These mines were started by S. E. Evans in 1938 and operated by Caddo Mines in 1939 and 1940. There were three tunnels with a total length of 875 feet, ten drifts with a total length of 810 feet, and five stopes 2,560 cubic yards in size. Production in 1939 was 54 flasks and in 1940 was 208 flasks (unpublished material, Ark. Geol. Comm., 1970).

At the present time there are trenches in section 1 cutting across the strike up to 12 feet wide and 80 feet long, and some scraped off areas as large as one-fourth acre in size. Recent bulldozer work appears to have covered up a shaft or pit. To the east across the section line in section 6 there are several prospect trenches on the hillside. The foundation of an old millsite was found, with a large waste dump. A 50-ton per day Cottrell furnace with Gould condensing system was located at this site (unpublished material, Ark. Geol. Comm.).

The cinnabar at the eastern end of the district occurs as disseminated grains within the sandstone and as fracture fillings. The rocks are part of the Jackfork Sandstone Formation and at this location have an east-west strike and dip 70°-80°S. Gangue minerals are dickite, quartz, and limonite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
166	Select	1.50
167	Random chip	0.10
168	Random dirt	0.00

HUMPHREY GOLD CORP. (66)

Additional prospects are located on the eastern end of the district in the SE¼ SW¼, section 6, T. 7 S., R. 22 W., in Clark County. These prospects were operated by Humphrey Gold Corp. starting in 1941 (Bulletin 10, Ark. Geol. Comm.). East of the millsite along the same Jackfork ridge are several caved drifts with waste dumps. Halfway up the hill is an area that has been scraped by a bulldozer and an open pit 200 feet east-west and 50 feet north-south, east of the millsite. There are also two shafts 150 feet deep with two orebodies (Bulletin 10, Ark. Geol. Comm.). There was a tunnel at the 90-foot level and at the 150-foot level. The shafts could be covered up in the cleared off area. Figure 8, copied from Bulletin 10, Ark. Geol. Comm., page 29 is a cross section of the shaft showing the two orebodies. Average tenor of the ores in the two sections was 7½ pounds to the ton (Bulletin 10, Ark. Geol. Comm.).

The general trend of the strata is east-west and the dip is 70°-80°S. The cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. Gangue minerals include dickite, quartz, and limonite.

Laboratory Analysis

Sample No.	Type Sample	Analysis %Hg
169	Select	1.20
170	Random chip	0.00
171	Random dirt	0.00

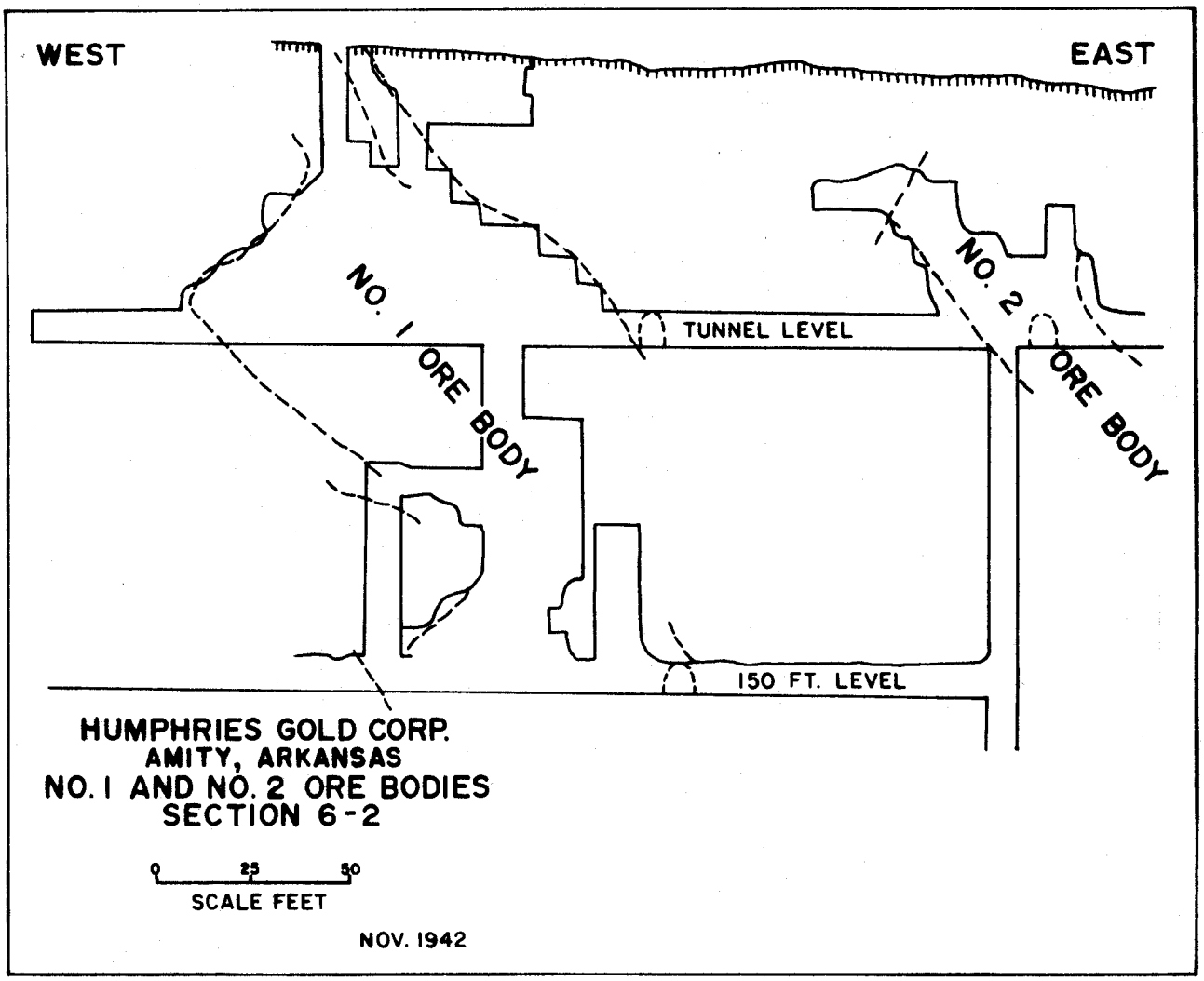


Figure 8. A cross section of the underground workings at the Humphrey Gold Corp. Mine. Reproduced from Figure 12, Bulletin 10, Arkansas Geological Commission, Annual Report of the State Geologist, 1942.

OKOLONA ROAD (67)

The easternmost prospect in the mercury district is in the SE¼ SE¼, section 6, T. 7 S., R. 22 W., in Clark County. North of Ashbrook Road a quarter mile on Okolona Road are two pits. On the north side of Okolona Road is a pit 50 feet by 60 feet with a waste dump. A more recent prospect on the south side of Okolona Road is a pit 100 feet by 50 feet with small loading ramp and a waste dump.

Further east in section 5 are some small trenches and pits which show traces of cinnabar. These are the easternmost occurrences of cinnabar found.

At the larger pits the Jackfork Sandstone has an east-west strike and a dip of 60^{o}-70^{o} south. The cinnabar occurs as fracture fillings and as disseminated grains within the sandstone. Gangue minerals include quartz, dickite, limonite, and barite.

Laboratory Analysis

Sample No.	Type Sample	Analyisis %Hg
172	Select	1.40
173	Random chip	0.05
174	Random dirt	0.00

ECONOMIC POTENTIAL

There are not any proven reserves of mercury ore in the district, and only during peak periods of mining were reserves reported in excess of a few thousand tons. However, exploration in the mercury district has been limited and was generally carried out by surface prospecting and by mine development. The large number of cinnabar occurrences along the strike of the host rock, the fine-grained disseminated nature of some of the mineralization, and the relationship of mineralization to structural features indicate that larger scale exploration programs are justified. Methods, such as geochemical surveys, radar imagery, and geophysical surveys may be used in reconnaissance surveys of the district to outline the most promising areas for detailed exploration. Detailed exploration probably should consist of surface mapping, close spaced geochemical and geophysical surveys, core drilling and possibly some trenching and pitting. A well financed and well organized exploration program may prove sizable reserves of commercial grade ore in the district.

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APPENDIX

CHEMICAL ANALYSIS

Sample Preparation

Samples were crushed in a jaw crusher, riffled, pulverized in a Braun-Pulverizer then mixed to achieve homogeneity. The samples, so prepared, were dried in an electric oven at 105°C for one hour. Analyses were performed on these samples.

Method of Chemical Analysis

One-gram samples were weighed and transferred into 100-ml volumetric flasks.

Ten milliliters of a 1:5 mixture of concentrated nitric and hydrochloric acids were added. The samples were swirled slightly then allowed to stand for one hour, after which time they were diluted with 10 ml of water and placed on a hot-water bath for fifteen minutes.

The flasks were removed from the hot-water baths, the solutions were allowed to cool and their volumes were diluted to 100 ml and mixed. These solutions were filtered into other flasks and mercury determinations were performed thereon by atomic absorption spectrophotometry. Two procedures were used, A and B:

Procedure A

This procedure was most generally applied. Selected mercury-bearing samples were evaluted for their mercury content by means of an "Amalgamation Method" (1). These samples, after processing as described above, were used as calibration standards from which an absorbance: mercury-concentration curve was drawn.

The spectral absorbances, read from sample solutions under analysis, were referenced to this curve and their respective mercury concentration values were recorded. All absorption readings were made at the 2536.5 A°, Hg-line. A Perkin Elmer, Model 303, atomic absorption spectrophotometer, equipped with a DCR-1 readout, was used.

Procedure B

This procedure was largely used as a verification of procedure A, and therefore was less generally applied. It consisted of an extraction of mercury with methyl isobutyl ketone and the atomic absorption spectrophotometric measurement of mercury's resonant-radiation absorption in the solvent extract. This method is published in detail by Tindall (1967).

CHEMICAL ANALYSIS

Type Sample	%Hg	%Sb	%Cu	%Zn	%Au	%Ag
1. Select	0.25	0.06	0.001	0.009	Nil	0.000
2. Chip	0.10	0.00	0.002	0.002	Nil	
3. Dirt	0.05	0.02	0.002	0.003	Nil	0.000
4. Chip	0.05	0.01	0.002	0.002	Nil	
5. Dirt	0.05	0.00	0.004	0.005	Nil	0.000
6. Chip	0.05	0.02	0.002	0.001	Nil	
7. Select	1.3	0.10	0.003	0.001	Nil	0.000
8. Chip	0.00	0.02	0.001	0.000	Nil	
9. Select	0.10	0.03	0.002	0.002	Nil	0.000
10. Select	0.30	0.05	0.002	0.002	$2.80/ton 0.0003	0.000
11. Dirt	0.10	0.01	0.002	0.002	Nil	0.000
12. Chip	0.05	0.02	0.001	0.000	Nil	
13. Select	0.60	0.04	0.002	0.001	$1.00/ton 0.0001	0.000

Type Sample	%Hg	%Sb	%Cu	%Zn	%Au	%Ag
14. Chip	0.10	0.01	0.001	0.003	Nil	
15. Dirt	0.05	0.00	0.001	0.002	Nil	0.000
16. Select	1.60	0.05	0.002	0.001	Nil	
17. Select	1.20	0.07	0.002	0.001	Nil	
18. Dirt	0.05	0.00	0.001	0.002	Nil	0.000
19. Chip	0.00	0.01	0.001	0.001	Nil	
20. Chip	0.00	0.03	0.002	0.001	Nil	
21. Dirt	0.00	0.01	0.001	0.002	Nil	0.000
22. Select	0.90	0.03	0.002	0.001	Nil	
23. Chip	0.10	0.01	0.002	0.001	Nil	
24. Select	1.0	0.05	0.002	0.003	Nil	
25. Dirt	0.25	0.00	0.002	0.032	Nil	0.000
26. Chip	0.05	0.00	0.002	0.036	Nil	
27. Dirt	0.00	0.01	0.001	0.002	Nil	0.000
28. Select	3.6	0.04	0.002	0.003	Nil	
29. Select	1.0	0.03	0.002	0.003	Nil	
30. Select	0.7	0.02	0.003	0.004	Nil	
31. Dirt	0.00	0.02	0.002	0.002	Nil	0.000
32. Chip	0.00	0.01	0.001	0.007	Nil	
33. Select	1.0	0.03	0.002	0.001	Nil	
34. Chip	0.00	0.01	0.002	0.002	Nil	
35. Dirt	0.00	0.01	0.001	0.002	Nil	0.000
36. Select	1.5	0.04	0.001	0.001	Nil	
37. Chip	0.45	0.03	0.001	0.000	Nil	0.000
38. Dirt	0.00	0.01	0.001	0.001	Nil	0.000
39. Select	0.7	0.02	0.001	0.001	Nil	
39A. Select	0.25	0.02	0.001	0.001	Nil	
40. Chip	0.30	0.02	0.002	0.000	Nil	
41. Dirt	0.00	0.00	0.001	0.002	Nil	0.000
42. Select	3.0	0.07	0.002	0.001	Nil	0.000
43. Chip	0.10	0.02	0.002	0.002	Nil	
44. Dirt	0.00	0.01	0.002	0.001	Nil	0.000
45. Select	36.5	0.07	0.002	0.009	Nil	0.000
46. Select	1.2	0.03	0.001	0.001	Nil	0.000
47. Chip	0.00	0.01	0.002	0.000	Nil	0.000
48. Dirt	0.00	0.00	0.001	0.003	Nil	0.000
49. Select	1.5	0.03	0.002	0.003	Nil	
50. Chip	0.05	0.01	0.001	0.000	Nil	
51. Dirt	0.00	0.00	0.002	0.003	Nil	0.000
52. Select	0.7	0.02	0.002	0.002	Nil	
53. Select	1.2	0.02	0.002	0.002	Nil	
54. Chip	0.05	0.00	0.002	0.001	Nil	
55. Dirt	0.00	0.00	0.001	0.002	Nil	0.000
56. Select	1.1	0.02	0.001	0.001	Nil	
57. Chip	0.05	0.01	0.001	0.000	Nil	0.000
58. Dirt	0.00	0.00	0.001	0.001	Nil	0.000
59. Select	1.4	0.02	0.001	0.001	Nil	
60. Select	1.0	0.03	0.002	0.000	Nil	0.000
61. Chip	0.05	0.02	0.002	0.002	Nil	
62. Dirt	0.00	0.00	0.001	0.001	Nil	0.000

Type Sample	%Hg	%Sb	%Cu	%Zn	%Au	%Ag
63. Select	0.10	0.03	0.001	0.001	Nil	
64. Chip	0.00	0.01	0.001	0.000	Nil	
65. Dirt	0.05	0.00	0.001	0.001	Nil	0.000
66. Select	0.15	0.02	0.003	0.002	Nil	
67. Chip	0.05	0.00	0.001	0.003	Nil	0.000
68. Dirt	0.05	0.00	0.001	0.002	Nil	0.000
69. Select	0.05	0.02	0.002	0.000	Nil	
70. Chip	0.00	0.02	0.001	0.000	Nil	
71. Dirt	0.10	0.00	0.002	0.001	Nil	0.000
72. No sample						
73. No sample						
74. Select	1.2	0.02	0.002	0.002	Nil	
75. Chip	0.05	0.01	0.002	0.003	Nil	
76. Dirt	0.10	0.00	0.003	0.004	Nil	0.000
77. Select	1.1	0.04	0.002	0.005	Nil	
78. Chip	0.05	0.01	0.003	0.000	Nil	
79. Dirt	0.35	0.01	0.004	0.012	Nil	0.000
80. Select	0.25	0.01	0.002	0.001	Nil	
81. Chip	0.10	0.01	0.001	0.001	Nil	
82. Dirt	0.15	0.00	0.002	0.004	Nil	0.000
83. Select	0.35	0.01	0.012	0.001	Nil	
84. Chip	0.05	0.02	0.002	0.000	Nil	
85. Dirt	0.00	0.00	0.003	0.001	Nil	0.000
86. Select	0.9	0.01	0.001	0.000	Nil	0.000
87. Chip	0.25	0.02	0.002	0.001	Nil	
88. Dirt	0.05	0.00	0.001	0.001	Nil	0.000
89. Select	0.7	0.01	0.002	0.001	Nil	
89A. Select	0.33	0.03	0.004	0.001	Nil	
90. Chip	0.25	0.00	0.001	0.000	Nil	
91. Dirt	0.5	0.00	0.001	0.002	Nil	0.000
92. Select	1.1	0.04	0.001	0.001	Nil	
93. Chip	0.00	0.01	0.000	0.000	Nil	
94. Select	0.20	0.02	0.001	0.000	Nil	
95. Select	1.4	0.02	0.001	0.001	Nil	
96. Chip	0.35	0.01	0.001	0.000	Nil	
97. Dirt	0.00	0.00	0.001	0.003	Nil	0.000
98. Select	0.05	0.02	0.001	0.001	Nil	
99. Chip	0.00	0.02	0.001	0.000	Nil	
100. Dirt	0.00	0.00	0.001	0.002	Nil	0.000
101. Chip	0.00	0.00	0.001	0.003	Nil	
102. Select	0.10	0.02	0.002	0.001	Nil	
103. Chip	0.00	0.01	0.003	0.002	Nil	
104. Dirt	0.00	0.00	0.002	0.003	Nil	0.000
105. Select	0.05	0.02	0.005	0.001	Nil	
106. Chip	0.00	0.03	0.001	0.000	Nil	
107. Dirt	0.00	0.00	0.001	0.001	Nil	0.000
108. Select	0.20	0.00	0.001	0.001	Nil	
109. Chip	0.00	0.01	0.004	0.001	Nil	
110. Dirt	0.00	0.00	0.001	0.004	Nil	0.000
111. Chip	0.00	0.00	0.001	0.001	Nil	

Type Sample	%Hg	%Sb	%Cu	%Zn	%Au	%Ag
112. Select	1.5	0.00	0.001	0.001	Nil	
113. Chip	0.00	0.00	0.000	0.000	Nil	
114. Dirt	0.05	0.00	0.001	0.002	Nil	0.000
115. Chip	0.00	0.00	0.002	0.000	Nil	
116. Select	1.8	0.00	0.002	0.001	Nil	0.000
117. Chip	0.00	0.01	0.001	0.001	Nil	
118. Dirt	0.00	0.00	0.002	0.005	Nil	0.000
119. Select	0.20	0.01	0.002	0.001	Nil	
120. Chip	0.00	0.01	0.002	0.001	Nil	
121. Dirt	0.00	0.01	0.004	0.005	Nil	0.000
122. Select	0.55	0.02	0.002	0.002	Nil	
123. Chip	0.00	0.02	0.002	0.001	Nil	
124. Dirt	0.00	0.00	0.003	0.005	Nil	0.000
125. Select	0.20	0.01	0.002	0.001	Nil	
126. Chip	0.00	0.02	0.003	0.000	Nil	
127. Dirt	0.00	0.00	0.003	0.000	Nil	0.000
128. Select	0.05	0.01	0.002	0.000	Nil	
129. Chip	0.15	0.02	0.001	0.001	Nil	
130. Select	1.0	0.03	0.002	0.002	Nil	
131. Chip	0.00	0.01	0.002	0.002	Nil	
132. Dirt	0.00	0.00	0.001	0.001	Nil	0.000
133. Select	1.2	0.01	0.002	0.001	Nil	
134. Chip	0.8	0.03	0.001	0.000	Nil	
135. Dirt	0.10	0.00	0.002	0.001	Nil	0.000
136. Select	1.2	0.01	0.002	0.001	Nil	
137. Chip	0.00	0.00	0.002	0.001	Nil	
138. Dirt	0.00	0.00	0.001	0.003	Nil	0.000
139. Select	1.4	0.01	0.002	0.001	Nil	
140. Chip	0.10	0.03	0.002	0.000	Nil	
141. Dirt	0.00	0.00	0.003	0.007	Nil	0.000
142. Select	0.35	0.01	0.001	0.001	Nil	
143. Chip	0.00	0.01	0.001	0.000	Nil	
144. Dirt	0.00	0.00	0.003	0.003	Nil	0.000
145. Select	1.3	0.00	0.001	0.001	Nil	0.000
146. Chip	0.10	0.01	0.002	0.001	Nil	
147. Dirt	0.15	0.00	0.001	0.002	Nil	0.000
148. Select	6.0	0.01	0.002	0.033	Nil	0.000
149. Chip	1.5	0.01	0.001	0.001	Nil	
150. Dirt	0.00	0.00	0.002	0.002	Nil	0.000
151. Select	0.7	0.01	0.002	0.003	Nil	
152. Chip	0.8	0.01	0.002	0.001	Nil	
153. Dirt	0.05	0.00	0.002	0.000	Nil	0.000
154. Select	8.3	0.02	0.002	0.004	Nil	0.000
155. Chip	0.05	0.01	0.001	0.000	Nil	
156. Dirt	0.00	0.00	0.001	0.004	Nil	0.000
157. Select	0.7	0.01	0.003	0.002	Nil	
158. Chip	0.00	0.01	0.003	0.003	Nil	
159. Dirt	0.00	0.00	0.002	0.002	Nil	0.000
160. Select	0.20	0.01	0.002	0.001	Nil	
161. Chip	0.05	0.00	0.001	0.000	Nil	

Type Sample	%Hg	%Sb	%Cu	%Zn	%Au	%Ag
162. Dirt	0.00	0.00	0.001	0.002	Nil	0.000
163. Select	0.7	0.01	0.001	0.000	Nil	0.000
164. Chip	0.10	0.01	0.001	0.001	Nil	
165. Dirt	0.10	0.00	0.001	0.001	Nil	0.000
166. Select	1.5	0.01	0.000	0.001	0.0000	
167. Chip	0.10	0.00	0.001	0.000	Nil	
168. Dirt	0.00	0.00	0.000	0.001	Nil	0.000
169. Select	1.2	0.01	0.001	0.000	0.0000	
170. Chip	0.00	0.01	0.002	0.000	Nil	
171. Dirt	0.00	0.01	0.003	0.002	Nil	0.000
172. Select	1.4	0.00	0.002	0.001	Nil	
173. Chip	0.05	0.01	0.002	0.001	Nil	
174. Dirt	0.00	0.01	0.002	0.002	Nil	0.000
175. Select	1.4	0.00	0.001	0.003	Nil	
176. Chip	0.10	0.00	0.001	0.002	Nil	
177. Dirt	0.05	0.01	0.002	0.004	Nil	0.000
178. Select	0.6	0.01	0.001	0.001	Nil	0.002
179. Chip	0.5	0.01	0.001	0.001	Nil	0.002
180. Dirt	0.30	0.02	0.002	0.002	Nil	0.002
181. Select	0.40	0.01	0.002	0.001	Nil	0.001
182. Chip	0.20	0.00	0.002	0.001	Nil	0.000
183. Select	0.20	0.00	0.002	0.002	Nil	0.000
184. Select	0.20	0.00	0.002	0.001	Nil	0.000
185. Chip	0.20	0.02	0.001	0.002	Nil	0.001
186. Dirt	0.35	0.00	0.002	0.003	Nil	0.001
187. Select	0.7	0.00	0.002	0.001	Nil	0.000
188. Chip	0.30	0.00	0.002	0.000	Nil	0.000
189. Dirt	0.25	0.01	0.001	0.003	Nil	0.000
190. Select	0.5	0.00	0.001	0.001	Nil	0.000
191. Chip	0.8	0.00	0.001	0.002	Nil	0.000
192. Dirt	0.40	0.00	0.002	0.006	Nil	0.000

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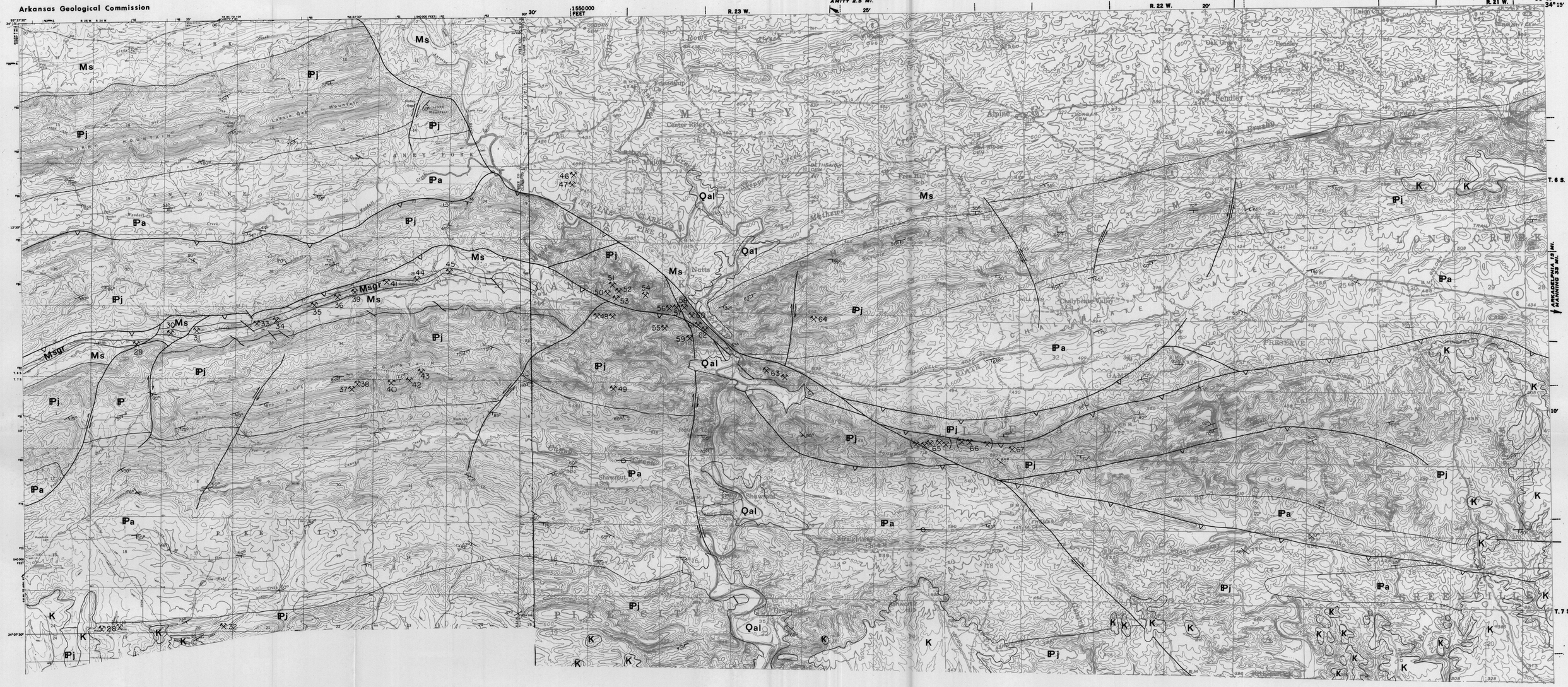

Topography by U.S.G.S.

EXPLANATION

Qal — Alluvium
Silt, sand, and gravel along stream channels.
Recent — QUATERNARY

Unconformity

K — Trinity formation
Gravel, silt, clay, siltstone, and sandstone with some barite in the western part.
Lower Cretaceous (Comanche series) — CRETACEOUS

Unconformity

Ppa — Atoka formation
Sandstone, shale, and siltstone.

Ppj — Jackfork sandstone
Sandstone, shale, and quartz

Msgr / Ms — Stanley shale
Shale and poorly sorted sandstone.
MISSISSIPPIAN — PENNSYLVANIAN

Contact of rock units.

Fault, indicating direction of thrust.

36 — Mercury mine or prospect. The number corresponds to prospect number in report.

70° — Strike and dip.

UTM GRID AND 1970 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Geology by W. V. Bush and B. F. Clardy

Scale 1:48000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

Drafting by L. P. Kelone
1975

ROAD CLASSIFICATION
Primary highway, all weather, hard surface
Light-duty road, all weather, improved surface
Unimproved road, fair or dry weather
U. S. Route
State Route

GEOLOGY OF THE MERCURY DISTRICT-EASTERN PART

Topography by U.S.G.S.

EXPLANATION

QUATERNARY	Recent	Qal — Alluvium. Silt, sand, and gravel along stream channels.	
	Pleistocene	Qt — Terrace deposits. Gravel, sand, and silt occuring along major streams.	
	Unconformity		
CRETACEOUS	Lower Cretaceous (Comanche series)	K — Trinity formation. Gravel, silt, clay, siltstone, and sandstone with some barite in the western part.	
	Unconformity		
PENNSYLVANIAN		Pa — Atoka formation. Sandstone, shale, and siltstone.	
		Pj — Jackfork sandstone. Sandstone, shale, and quartz pebble conglomerates.	
MISSISSIPPIAN		Msr / Ms — Stanley shale. Shale and poorly sorted sandstone. Gap Ridge Sandstone Member in upper Stanley.	

Contact of rock units.

Fault, indicating direction of thrust.

23 — Mercury mine or prospect. The number corresponds to prospect number in report.

70° — Strike and dip.

UTM GRID AND 1972 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

ROAD CLASSIFICATION
Secondary highway, all weather, hard surface
Light-duty road, all weather, improved surface
Unimproved road, fair or dry weather
State Route

Geology by W. V. Bush and B. F. Clardy

Scale 1:48000

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

Drafting by L. P. Kelone

1975

GEOLOGY OF THE MERCURY DISTRICT-WESTERN PART

Arkansas Geological Commission

GEOLOGIC MAP OF THE MERCURY DISTRICT OF SOUTHWEST ARKANSAS

Geology by W. V. Bush and B. F. Clardy

1975

Scale in Miles

1 0 1 2 3 4 5

Modified after Miser and Purdue 1929, and Reed and Wells 1938.

EXPLANATION

QUATERNARY

Recent

Qal — Alluvium. Silt, sand, and gravel along stream channels.

Pleistocene

Qt — Terrace deposits. Gravel, sand, and silt occuring on one level along major streams.

Unconformity

CRETACEOUS

Lower Cretaceous (Comanche series)

Kt — Trinity formation. Gravel, silt, clay, siltstone, and sandstone with some barite in the western part.

Unconformity

PENNSYLVANIAN

Atoka

ℙa — Atoka formation. Sandstone, shale, and siltstone.

Morrow

ℙj — Jackfork sandstone. Sandstone, shale, and quartz pebble conglomerates.

MISSISSIPPIAN

Ms — Stanley shale. Shale and poorly sorted sandstone.

Contact

Fault, indicating direction of thrust.

(50) Mercury mine or prospect. The number corresponds to prospect number in report.

Prospect Location Map, for prospects 55-62. Refer to Plate 3.