T.L. Pittman
(from R.P. Maloney, 3-16-67.)

RI bureau of mines
report of investigations 6892

INVESTIGATIONS OF THE WHITE MOUNTAIN MERCURY DEPOSIT, KUSKOKWIM RIVER BASIN, ALASKA

By Raymond P. Maloney

UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

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UNITED STATES DEPARTMENT OF THE INTERIOR
Stewart L. Udall, Secretary

BUREAU OF MINES
Walter R. Hibbard, Jr., Director

This publication has been cataloged as follows:

Maloney, Raymond P

Investigations of the White Mountain mercury deposit, Kuskokwim River Basin, Alaska. [Washington] U. S. Dept. of the Interior, Bureau of Mines [1967]

94 p. illus., tables. (U. S. Bureau of Mines. Report of investigations 6892)

Includes bibliography.

1. Mercury ores—Alaska. I. Title. II. Title: White Mountain mercury deposit, Kuskokwim River Basin, Alaska. (Series)

TN23.U7 no. 6892 622.06173

U. S. Dept. of the Int. Library

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INVESTIGATIONS OF THE WHITE MOUNTAIN MERCURY DEPOSIT, KUSKOKWIM RIVER BASIN, ALASKA

by

Raymond P. Maloney[1]

ABSTRACT

The Bureau of Mines investigated the White Mountain mercury deposit, in the Kuskokwim River Basin, to better determine the extent of mercury mineralization and to encourage its development by private industry. A program of diamond drilling, augering, bulldozer trenching, and sampling was carried on during four field seasons, from 1960 to 1963, inclusive. Significant amounts of cinnabar, with only trace amounts of arsenic and antimony, occur in dolomite over an area about 4,000 feet long and 1,500 feet wide. The deposit differs from other mercury deposits in the Kuskokwim River Basin by the absence of silica-carbonate and rhyolite intrusives. Small-scale mining was started in 1963 as the result of Bureau investigation and continued during the summers of 1964 and 1965. The investigations indicate that open pit mining might be the most feasible method of working this deposit.

INTRODUCTION

The mercury deposit at White Mountain, 65 airline miles southeast of McGrath and adjacent to the Farewell Fault, was first examined by the Bureau of Mines in 1958, and field investigations were carried on during the 1960-63 field seasons as part of the Department of the Interior program for the development of Alaska's resources. Owing to the remote location, lack of previous investigations, and scarcity of placer gold, the area has seldom been prospected. The deposit was discovered in 1958 as a result of a deliberate search for mercury by prospectors and engineers familiar with mercury prospects; some preliminary hand trenching was done at the time of discovery. The Bureau did augering, bulldozer trenching, diamond-core drilling, and sampling. Data resulting from this investigation are presented in detail in this report.

[1]Mine examination and exploration engineer, Area VIII Mineral Resource Office, Bureau of Mines, Juneau, Alaska.

Work completed on manuscript February 1966.

ACKNOWLEDGMENTS

Acknowledgment is made to Robert Lyman of Red Devil, Alaska, Ed Hager of Cordero Mining Co., Palo Alto, Calif., C. L. Sainsbury of the Geological Survey, Jack Egnaty of Sleetmute, and the Alaska Division of Mines and Minerals for information on the property; to the U.S. Air Force, the Alaska Air National Guard, the U.S. Fish and Wildlife Service, and the U.S. Bureau of Land Management for their help in transporting equipment and explosives; and to the U.S. Army Corps of Engineers and U.S. Army for assistance in obtaining shaped charges, and to the U.S. Bureau of Reclamation, the Federal Aviation Agency (FAA), the Arctic Health Research Center, The Alaska Railroad, the U.S. Bureau of Public Roads, and the General Services Administration for aid in obtaining equipment and supplies.

HISTORY AND OWNERSHIP

Eskimo folklore spoke of a hunter who had seen some heavy red rocks on a hill near the headwaters of the Tatlawitsuk River. Increased interest in mercury encouraged a descendant of the hunter to investigate this folk tale. In the summer of 1958, Jack Egnaty from Sleetmute found cinnabar float near a large limestone hill which he called White Mountain. Seven lode claims were staked by Egnaty and were leased to Cordero Mining Co. of Palo Alto, Calif. Numerous other claims have since been staked by various parties. A number of hand-dug trenches were excavated in 1958; most were only several feet in depth, but one reached a maximum depth of 12 feet. In the fall of 1958, a Bureau of Mines engineer made a reconnaissance of the property. In 1958-59, the Geological Survey examined and mapped the mineralized area, and late in the fall of 1959 a Bureau engineer examined it again. A Bureau party spent the 1960 field season at White Mountain, and in the spring of 1961 the Bureau moved tractors and a drill to the prospect from Farewell. The field seasons of 1961, 1962, and 1963 were spent sampling the White Mountain deposits with this equipment; in the early spring of 1964 all Bureau equipment was moved to McGrath. In the summers of 1963 to 1965, the White Mountain property was mined by Robert Lyman, who open pitted a small area.

LOCATION AND ACCESSIBILITY

The White Mountain mercury deposit is in the Kuskokwim River region, McGrath district, McGrath subdistrict, at latitude 62°10' N and longitude 154°52' W (figs. 1-2). It is approximately 65 airline miles southeast of McGrath between the headwaters of the Tatlawiksuk River and the Cheeneetnuk River (tributary of Swift River); it is 4 miles west of Big River (also called the West Fork of the Kuskokwim River). There are no roads or trails in this uninhabited, isolated, and barren area. A small boat could, with difficulty, go up Big River as far as the prospect. Natives are reported to have gone up the Cheeneetnuk River by small boat to within about 15 miles of White Mountain during high water. The Tatlawiksuk River does not appear to be navigable for more than 20 miles from its mouth.

A 2,600-foot airstrip suitable for small, light planes was cleared by the Bureau at the prospect. Large multiengine planes can operate from McGrath,

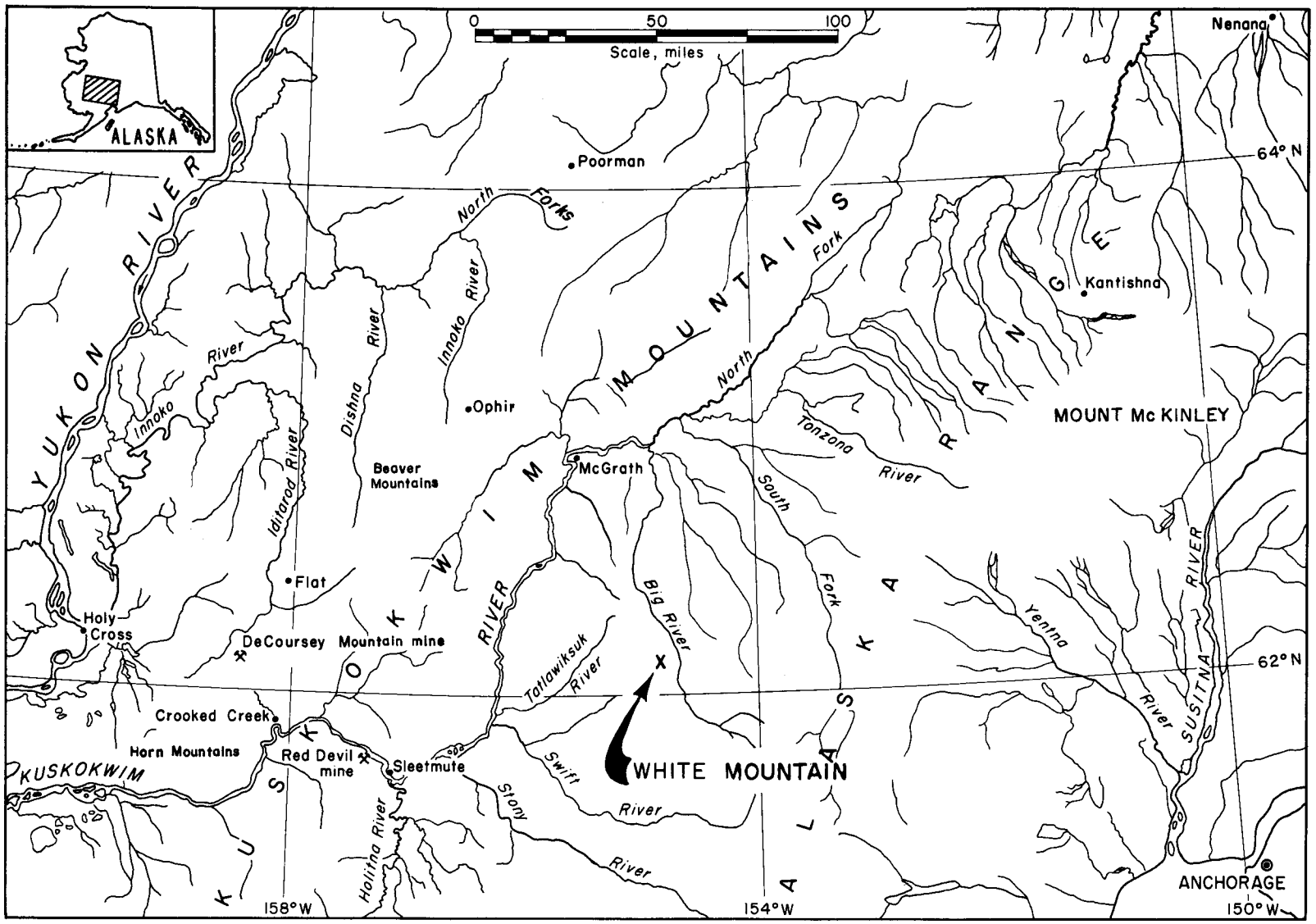

FIGURE 1. - Index and Location Map, White Mountain, Alaska.

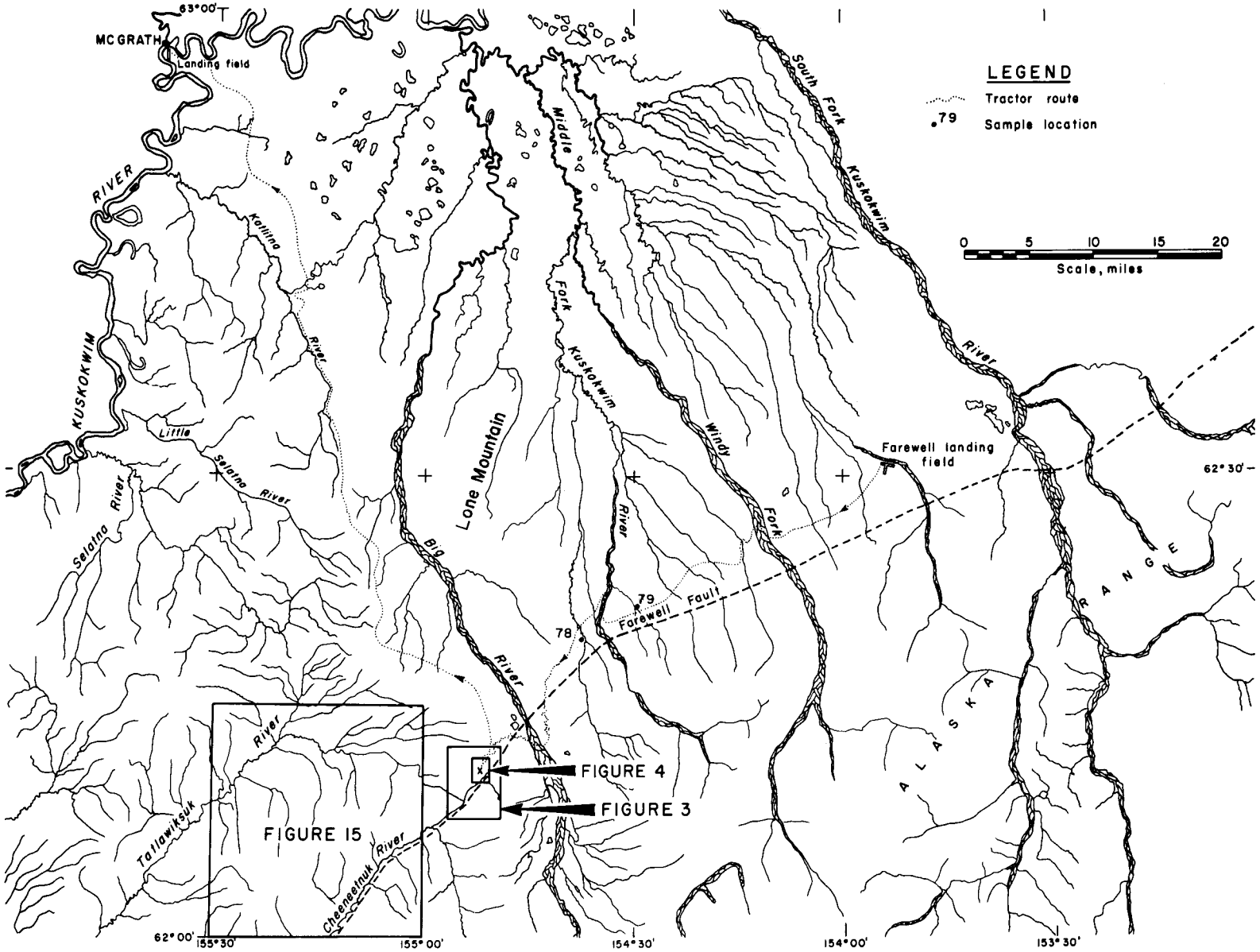

FIGURE 2. - Location and Figure Index Map, White Mountain, Alaska.

Farewell (an FAA station 45 airline miles northeast of the deposit), and from the Red Devil field about 85 airline miles southwest of White Mountain.

Tractor trails suitable only for winter freighting by crawler-type tractors were pioneered by the Bureau from Farewell to White Mountain, a distance of about 60 miles, and from White Mountain to McGrath, a distance of about 100 miles. Both routes have been traveled only once and leave much to be desired. The best overland route to river barge service would be between the Selatna River and the Little Selatna River to the Kuskokwim River, a distance of about 30 miles. River barges maintain a regular schedule on the Kuskokwim River from about late May to October.

PHYSICAL FEATURES AND CLIMATE

The White Mountain deposit is at the extreme north end of an isolated group of hills which extends southward for about 20 miles and has a maximum width of about 15 miles. The highest and most prominent peak is White Mountain, a barren summit which rises to an altitude of 3,435 feet. The mercury occurrences, adjacent to the mountain, range in altitude from about 1,600 to 2,200 feet.

The foothills of the Alaska Range are across Big River and less than 10 miles to the east where numerous peaks over 5,000 feet in altitude are covered with snow most of the year. The terrain to the north and west consists principally of low rolling moss-covered hills and poorly drained flats covered with spruce and brush interspersed with numerous open meadows and small lakes.

Vegetation is sparse. The numerous sharp peaks and ridges are usually barren; the rest of the area is covered by residual rock and glacial gravels of varying thickness overlain by a mantle of moss. Brush and spruce trees up to 18 inches in diameter are found in creek valleys. The trees are usually 35 feet or less in height, scrawny, taper rapidly, and are poor lumber material. The general appearance of the area is one of desolation and remoteness.

Animal life consists of a few stray caribou and moose, an occasional grizzly bear, wolverine, porcupine, weasel, and martin. Parka squirrels and beaver are more numerous. Wolves came within 100 feet of the camp. Grouse, both spruce and ptarmigan, are present in small numbers. A species of migratory plover uses the area as a summer nesting ground. Ravens, a few small hawks, and an occasional bald eagle are seen. The streams contain a few grayling, usually less than 4 inches long. .

Winters are long and cold and the summers short and comparatively warm. Temperatures range from about 90° F to probably more than -50° F with an average temperature of about 45° F during the warm summer months of June to September. Frost and snow occurred every month from May to September during the four years the Bureau worked here. The greatest snowfall during the four field seasons occurred on July 1, 1963, when 3 inches fell. Fog and rain are frequent with the annual precipitation estimated at about 20 inches or less. Winds up to an estimated 70 knots or more are common. Permafrost and ice lenses are encountered in most of the area.

GENERAL GEOLOGY

Detailed geology of this region is not available. A. T. Fernald of the Geological Survey has described the surficial deposits on a reconnaissance basis but has classified most of the bedrock as unsurveyed (2).[2] C.L. Sainsbury and E. M. MacKevett of the Geological Survey examined the deposit at White Mountain and made available to the Bureau the use of their detailed geologic map of the deposit area (4), and gave valuable advice on the location of trenches and drillholes. Other general features are described in the Geological Survey publications listed in the bibliography. The following brief discussions of the general geology are based on data from the above sources and from examinations and observations of the writer.

The group of unnamed dolomitic limestone and shale hills including White Mountain are part of the Kuskokwim uplands which rise out of a piedmont plain originating in the Alaska Range. Lone Mountain, made up of dolomitic limestone and shale, and the shale and conglomerate hills along the Selatna River are also part of these uplands. The limestone and shale at White Mountain are probably Paleozoic, and the conglomerate Cretaceous (4). The limestone and shale formations at Lone Mountain and the conglomerate forming the ridges at the head of the Selatna River appear to be similar to those at White Mountain.

The piedmont plain, covered with moraines, alluvial fans, and flood plains, extends northwestward from the Alaska Range to about Lone Mountain. From here to the Kuskokwim River there are swampy, poorly drained lowlands, shallow lakes, and numerous sand dunes. Big River, the largest stream, changes from a braided to a meandering type after it flows past Lone Mountain. Other streams are small and sluggish. Most of the area, including the deposit, has been glaciated (3), but the evidence is subdued.

There are three prominent geologic features in the immediate vicinity of the deposit; White Mountain, the Farewell Fault, and a tilted conglomerate formation (fig. 3). White Mountain, a massive dolomite limestone that can be seen from the air for 50 miles, is part of the Paleozoic shale and limestone formation which is host to the mercury mineralization. The Farewell Fault, a major regional fault, separates the limestone and shale beds from the conglomerate formation. The dip of this fault is probably almost vertical and evidence indicates that it has been active in recent times. The Cretaceous conglomerate formation on the east side of the Farewell Fault dips to the northeast. It is composed mainly of well rounded quartz and shale fragments up to one-fourth of an inch in size, well cemented, and is a very dark gray color when freshly broken; it weathers to a medium gray gravel. Significant mercury mineralization was not found in this formation. Petrographic analyses of type samples are in table 1; a spectrographic analysis of a conglomerate type sample (45-8) is in table 2.

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[2] Underlined numbers in parentheses refer to items in the bibliography at the end of this report.

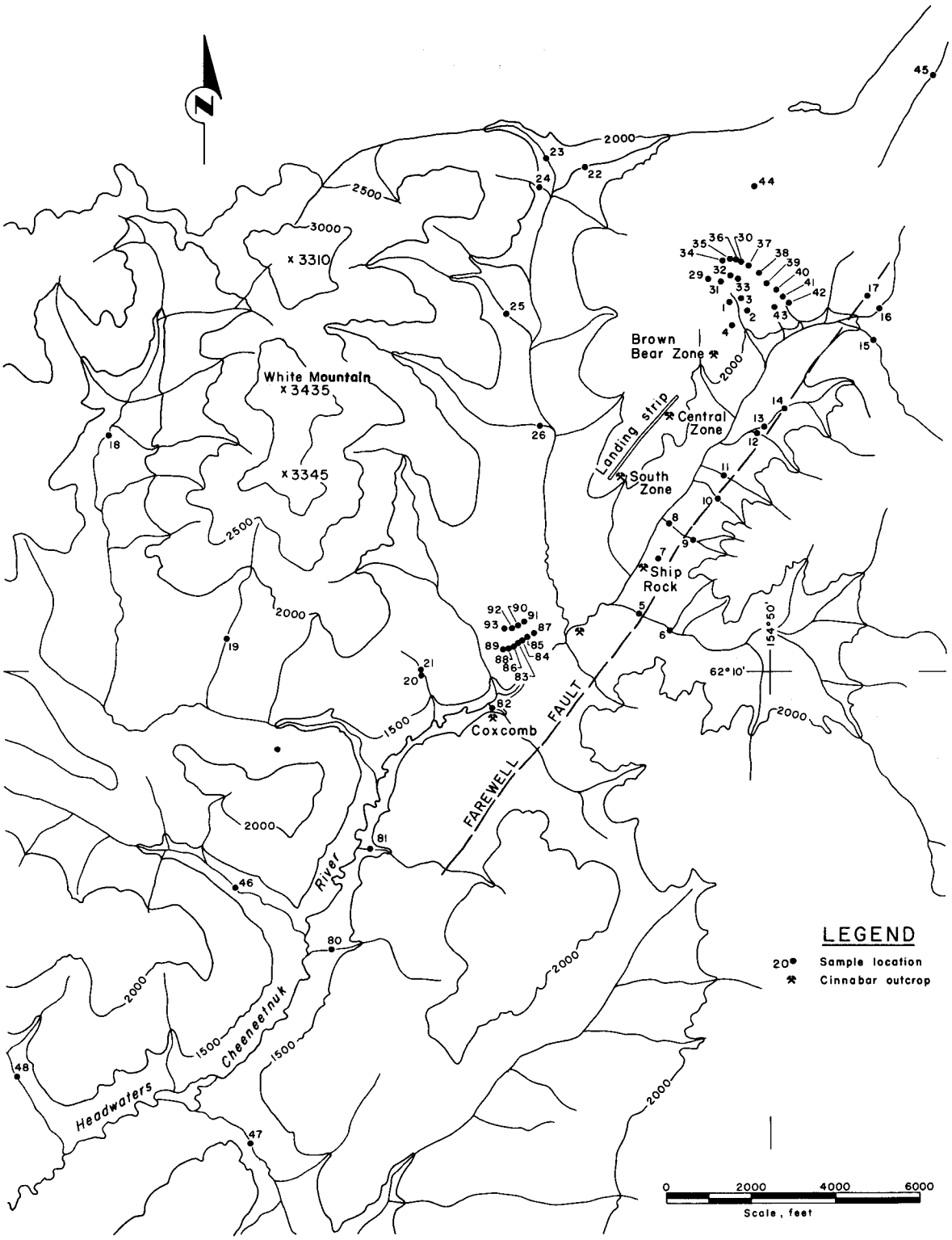

FIGURE 3. - Pan Concentrate Samples and Cinnabar Outcrops, White Mountain, Alaska.

TABLE 1. - Petrographic analyses, conglomerate and granitics

	Sample												
	45-8	45A-8	46-8	46A-8	46B-8	46C-8	46D-8	15-0	509-0	513-0	514-0	108-3	110-3
Sample description[1].....	1	1	1	1	1	1	1	2	1	2	1	2	1
Rock classification:													
Conglomerate.....	C	-	-	-	-	-	-	-	C	-	-	-	C
Diorite.....	-	-	-	-	-	-	C	-	-	-	-	-	-
Granodiorite.....	-	-	-	-	C	-	-	C	-	-	-	-	-
Granite.....	-	C	-	C	-	C	-	-	-	C	-	C	-
Sandstone.....	-	-	C	-	-	-	-	-	-	-	C	-	-
Mineral:													
Albite.....	-	-	-	S	A	S	-	P	-	-	-	S	-
Andesine.....	-	-	-	-	-	-	A	-	-	-	-	-	-
Apatite.....	-	-	-	-	-	-	T	-	-	-	-	-	-
Biotite.....	-	-	-	M	M	M	-	-	-	S	-	-	S
Carbon.....	F	-	-	-	-	-	-	-	-	-	-	-	M
Chlorite.....	A	-	-	-	-	M	-	M	S	F	S	-	-
Fluorite.....	-	-	-	-	-	-	-	T	-	-	-	F	S
Goethite.....	-	-	-	-	-	-	-	-	-	-	-	-	F
Hematite.....	-	T	-	-	-	-	-	T	-	-	-	-	-
Hornblende.....	-	-	-	-	M	-	A	-	-	T	-	M	-
Illite.....	A	-	A	-	-	-	-	-	P	-	A	-	-
Limonite.....	F	T	M	F	F	-	T	M	-	-	F	-	F
Magnetite.....	-	M	-	-	-	M	-	T	-	-	-	-	-
Microcline.....	-	-	-	-	-	-	-	-	-	P	-	-	-
Oligoclase.....	-	-	-	-	-	-	A	-	-	A	-	-	-
Orthoclase.....	-	P	M	A	S	A	T	A	-	-	-	A	-
Quartz.....	P	S	A	S	S	S	T	A	S	A	P	A	P

P--Predominant..... Over 50 percent.
A--Abundant..... 10 - 50 percent.
S--Subordinate..... 2 - 10 percent.
M--Minor..... 0.5 - 2 percent.
F--Few..... 0.1 - 0.5 percent.
T--Trace..... Less than 0.1 percent.
C--Rock classification.
[1]1--Conglomerate. 2--Granitic north of deposit.

TABLE 2. - Spectrographic analyses of type samples

	Sample						
	6-8	7-8	8-8	12-8	15-8	43-8	45-8
Sample description[1]	6	2	3	4	7	5	1
Element:							
Aluminum	C	C	D	D	D	C	C
Arsenic	-	D	-	D	-	-	-
Barium	E	E	-	-	-	-	-
Beryllium	G	G	-	-	-	-	-
Boron	D	D	F	F	-	F	F
Calcium	D	D	A	A	A	A	E
Chromium	E	E	F	F	F	E	E
Cobalt	-	-	-	F	-	-	-
Copper	G	G	G	G	G	G	F
Iron	C	A	D	C	D	D	D
Magnesium	D	D	B	A	B	D	D
Manganese	F	F	F	E	F	E	F
Mercury	E	E	A	E	D	A	D
Molybdenum	-	-	-	-	-	F	F
Nickel	F	F	F	F	F	-	E
Silicon	A	A	D	D	E	C	A
Sodium	D	D	E	E	E	-	D
Tin	-	-	-	-	-	E	D
Titanium	C	C	F	F	F	E	E
Vanadium	D	D	E	D	E	E	E
Zirconium	E	E	-	-	-	-	F

A--Over 10 percent.
B--5 to 10 percent.
C--1 to 5 percent.
D--0.1 to 1 percent.
E--0.01 to 0.1 percent.
F--0.001 to 0.01 percent.
G--Under 0.001 percent.

[1] 1--Conglomerate. 2--Fault gouge, South Zone (7-8). 3--High-grade cinnabar mineralization, South Zone (8-8). 4--Barren gray dolomite, South Zone (12-8). 5--High-grade cinnabar, Ship Rock. 6--Fault, Brown Bear Zone. 7--Dolomite with cinnabar in fractures, South Zone (15-8).

Granitic outcrops occur about halfway between the north end of the deposit and Big River. Petrographic analyses of type samples are in table 1. Granitic intrusives are also present about 2 miles downstream from the south end of the deposit adjacent to the north bank of the Cheeneetnuk River. Mercury mineralization was not found in any of these intrusives.

DESCRIPTION OF THE DEPOSITS

Between the west side of the Farewell Fault and White Mountain, cinnabar occurs in dolomite and limestone in an area about 12,000 feet long and 1,500 feet wide (fig. 3). This formation is composed of bedded shale, limestone, and dolomite; bedding planes strike N 30° E and dip about 85° E. Faulting is extensive and essentially parallel to the bedding planes.

Cinnabar is the mercury-bearing mineral, but unlike other cinnabar deposits in the Kuskokwim River Basin, antimony and arsenic are absent or only occasionally present in trace amounts. This deposit also differs from other deposits in the absence of altered silica-carbonate and rhyolite. Altered volcanic material or trachyte was found in several trenches and drillholes, but it did not appear to be associated with mercury mineralization. Petrographic analyses indicate that some of the steep faults were mineralization channels but the best of the cinnabar zones are probably of hydrothermal origin in a brecciated, silicified dolomite. Cinnabar was found in limestone in minor amounts; it was not found in shale.

A conspicuous exposure herein called the Coxcomb outcrop occupies the south end of this 12,000-foot-long mineralized area (fig. 3). This outcrop, about 10 feet long and 4 feet wide, is at the top of a sharp barren limestone ridge on the east bank of the Cheeneetnuk River. Here, a few small, short stringers of cinnabar occur in a black and gray limestone which is cut by numerous small stringers of calcite. Petrographic analyses of type samples (512-0, 488-0, and 88-3) of the outcrop are in table 3.

TABLE 3. - Petrographic analyses of Coxcomb, Ship Rock, Pump, and Sulfide Springs samples

	Sample									
	1-1	84-3	86-3	488-0	512-0	88-3	89-3	90-3	516-0	106-3
Sample description[1]	1	1	1	2	2	2	2	2	3	4
Rock classification:										
Dolomite	-	-	-	-	-	-	-	-	-	C
Limestone	C	C	C	C	C	C	C	C	-	-
Mud	-	-	-	-	-	-	-	-	C	-
Mineral:										
Calcite	P	A	P	P	P	P	P	P	-	A
Chlorite	-	-	M	-	M	M	S	S	S	-
Cinnabar	M	P	S	S	-	S	S	A	T	A
Dolomite	-	-	-	-	-	-	M	-	M	P
Goethite	-	-	-	-	-	-	-	-	-	T
Illite	-	-	M	-	-	M	S	S	M	-
Limonite	-	T	-	M	-	-	-	-	-	T
Quartz	-	-	-	M	-	-	-	-	P	-

P--Predominant..... Over 50 percent.
A--Abundant..... 10 - 50 percent.
S--Subordinate..... 2 - 10 percent.
M--Minor..... 0.5 - 2 percent.
T--Trace..... Less than 0.1 percent.
C--Rock classification.
[1] 1--Ship Rock. 2--Coxcomb to Ship Rock. 3--Sulfide Springs. 4--Pump.

Two stringers of cinnabar, each 2 feet long, 1/2 inch wide, and 50 feet apart, are in black limestone with calcite stringers about 3,600 feet north of the Coxcomb and on the same side of the Cheeneetnuk River. A petrographic analysis of a type sample (89-3) is in table 3. Approximately 900 feet further upstream, or north from this point, a few very small stringers of

cinnabar occur in similar limestone. A petrographic analysis of a type sample (90-3) is found in table 3.

The largest showing of mercury mineralization on the east side of the Cheeneetnuk River and adjacent to the Farewell Fault is called the Ship Rock outcrop; it is about 500 feet north of the last-mentioned outcrop, or 5,000 feet north of the Coxcomb (fig. 3), and is in the same black-gray limestone in which the three previously mentioned outcrops occur. Blocks of limestone as much as 10 by 10 feet in size lie at the base of a cliff 50 feet high and 200 feet long. Small stringers and lenses of cinnabar occur in these blocks and a few lenses of cinnabar can be seen in the face of the cliff. The largest lens is 4 by 12 inches. None are over 1/2-inch thick. Blasting with dynamite and shaped charges created a fresh face on the cliff and exposed other lenses of cinnabar, but mercury mineralization was irregular and minor. Considerable calcite is present.

Petrographic study of specimens from this area indicated that the limestone was first cut by calcite veins; later, cinnabar and more calcite were deposited. Traces of orpiment and realgar accompanied the introduction of cinnabar. Additional calcite veins then cut the cinnabar and the previously formed calcite deposits. Petrographic analyses of type samples from the Ship Rock outcrop are in table 3; chemical analyses of high-grade samples are in table 4.

TABLE 4. - Chemical analyses of Coxcomb, Ship Rock, Pump, and Sulfide Springs samples

Sample	Description	Percent		
		Mercury	Antimony	Arsenic
43-8	Stringers of cinnabar in black limestone at Ship Rock.	24.9	0.3	0.1
1-1	High-grade specimen at Ship Rock.....	4.58	-	-
2-1	Gossan near Sulfide Springs.....	.04	-	-
85-3	High-grade specimen of cinnabar and limestone at Ship Rock.	66.8	-	-
87-3	Cinnabar and limestone at Ship Rock.....	6.24	-	-
107-3	.....do.....	28.58	-	-
105-3	Very similar to 106-3, Pump Zone.....	9.12	-	-
516-0	Sulfide Springs mud.....	.03	.07	.02
526-0	Sulfide Springs water (ppm, negative tellurium and selenium).	<.02	<.02	.30

About 500 feet north, or upstream, from the Coxcomb and on the east side of the Cheeneetnuk River there is a hydrogen sulfide spring. Petrographic analyses of samples of the mud are in table 3, and chemical analyses of mud and water in table 4. These indicate that cinnabar is being deposited by this spring. Between this spring and the Ship Rock outcrop there are several other clear water springs; all originate on the east or Farewell Fault side of the Cheeneetnuk River.

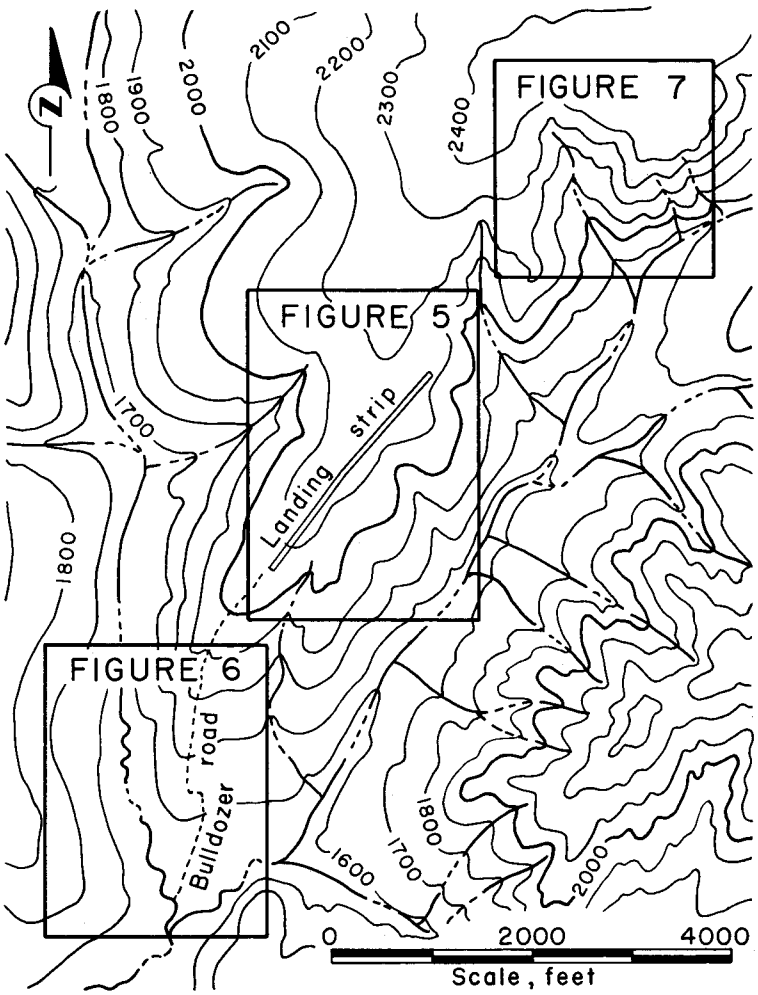

FIGURE 4. - Index of Trenching Maps.

The most mineralized section in this area is on the west side of the Cheeneetnuk River. This is where most of the Bureau work was done, including all of the trenching and diamond drilling (figs. 4-7). The description of deposits in this section will start from the south end with trench 52 (fig. 6) and continue on north.

Pan concentrates in the vicinity of trench 52 indicated that cinnabar was present, but trenching disclosed only a trace amount in bedrock. The locations of these concentrate samples are shown on figure 3; spectrographic and chemical analyses are in tables 5 and 6.

Between trench 52 and trench 30, bedrock is covered with vegetation and overburden. All drainage courses were panned and 3,000 linear feet of bedrock were exposed in a tractor road. No mercury mineralization was found.

The most important and greatest amount of mercury mineralization at the White Mountain deposit is found along a 4,000-foot length of the ridge between trench 30 and trench 33 (figs. 5, 7). All of the diamond drilling and most of the trenching was done here. Logs and assays of this drilling and trenching are in appendixes A-E. All mineralization was in a silicified gray dolomite or altered hydrothermal rock closely associated with the silicified dolomite.

The South Zone was one of the two original discoveries at White Mountain, the other being the Brown Bear Zone about 3,600 feet north. Figure 8 shows the location of diamond-drill hole 14 and channel samples in the South Zone. Tables 7 and 8 give chemical analyses of samples and table 2 spectrographic analyses of a few type samples.

When the South Zone was first discovered, high-grade cinnabar float was present. Trenches dug in 1958 by hand methods showed considerable cinnabar in a brecciated yellow and gray weathered dolomite zone about 100 feet long and 40 feet wide. The maximum depth of these trenches was 12 feet; mineralization at this depth was much less than near the surface. Cinnabar was

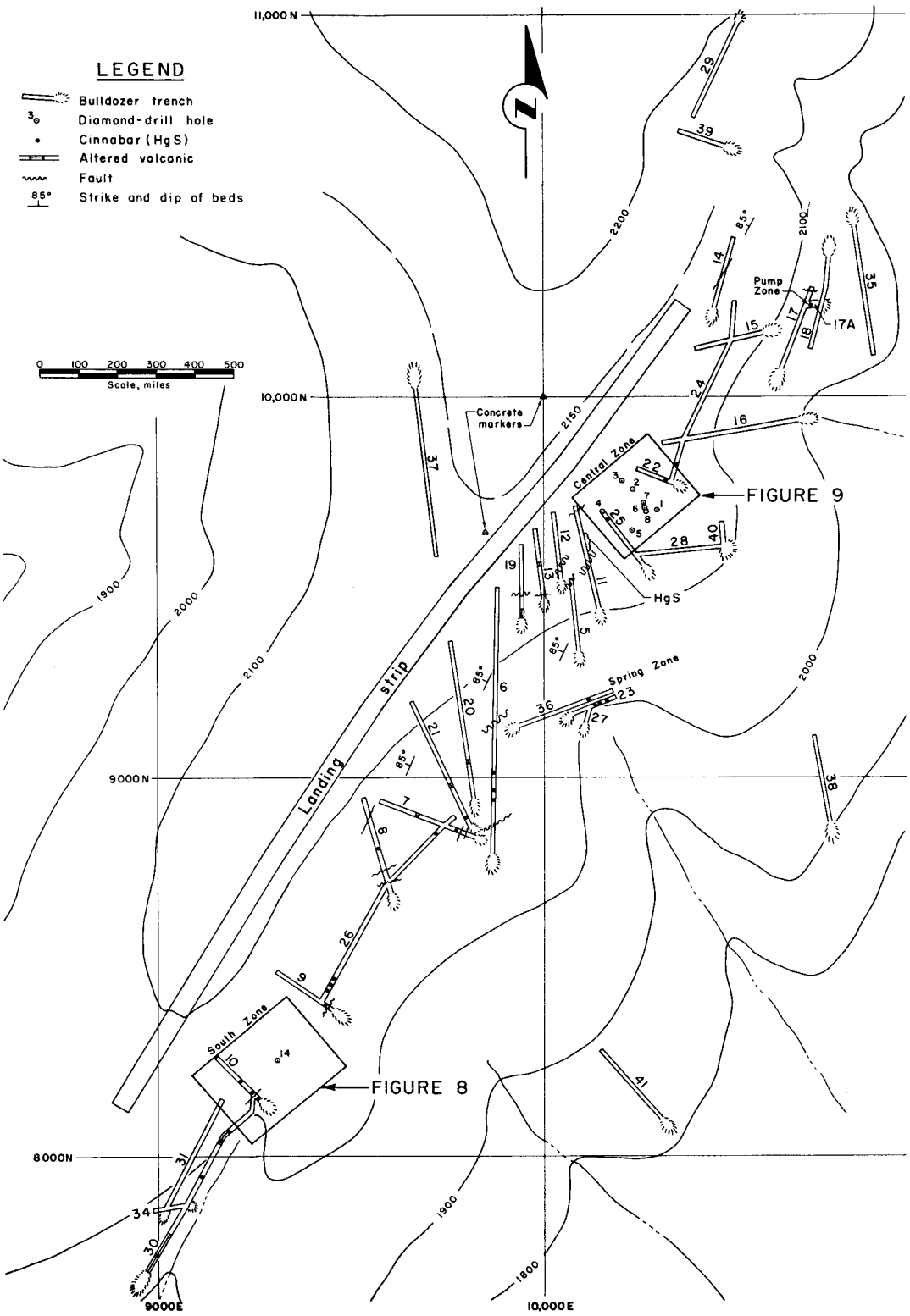

FIGURE 5. - Plan of Trenches and Diamond-Drill Holes, South and Central Zones.

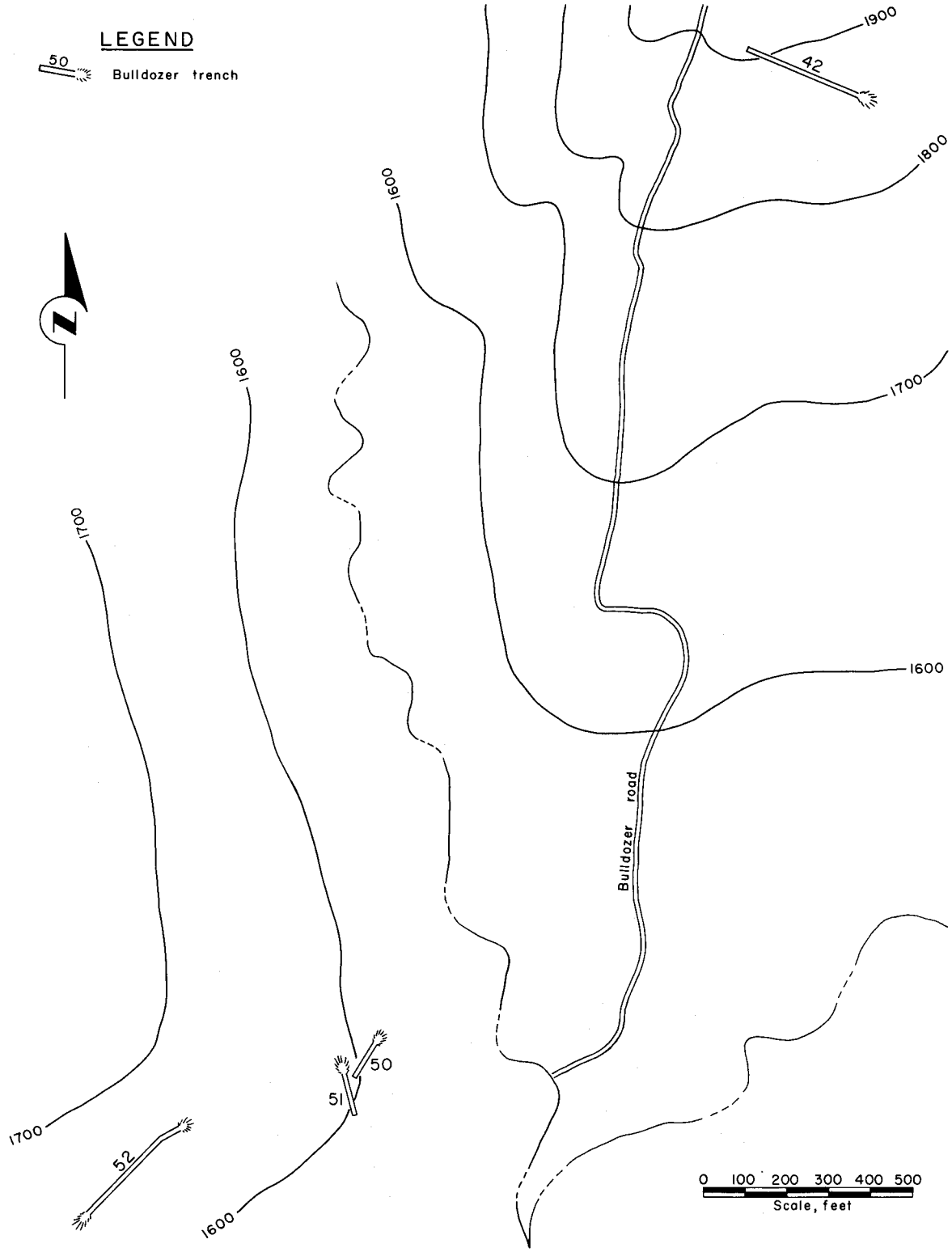

FIGURE 6. - Plan of Trenches South of South Zone.

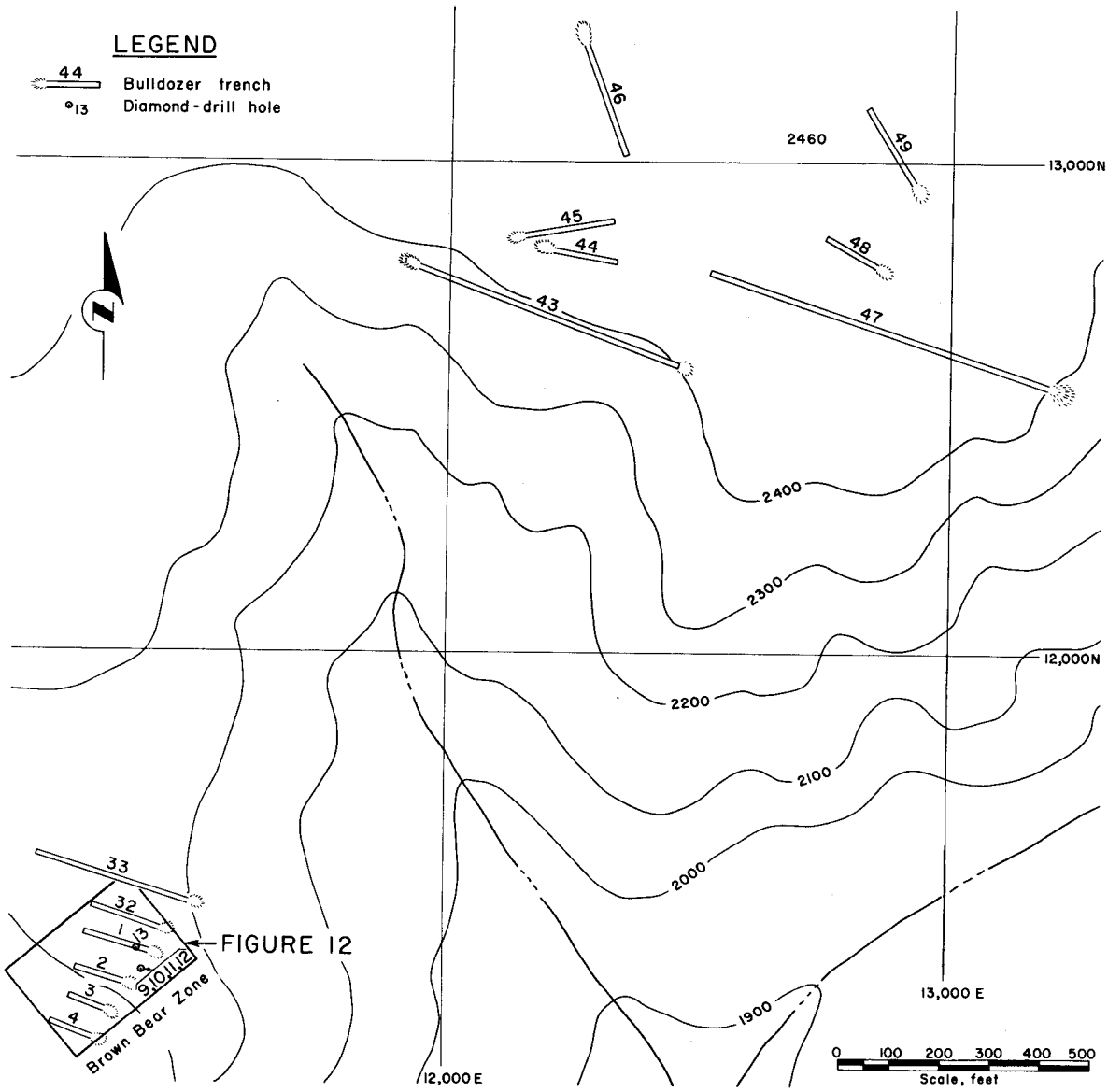

FIGURE 7. - Plan of Trenches and Diamond-Drill Holes, Brown Bear Zone and North.

present as small veins, small lenses, and fracture fillings. The dolomite was cut by veins of dolomite and cinnabar, the vein dolomite being the first introduced. In some instances, crystals of cinnabar had replaced dolomite with no channels of introduction visible. A brownish spherulitic crust of calcite was often present. Minor limonite and quartz were present, but only traces of stibnite and realgar.

TABLE 5. - Spectroscopic analyses of stream pan concentrates

Element	Sample[1]																																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Copper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-	-	-
Mercury	X	X	-	-	-	-	X	T	-	-	-	-	-	-	-	-	T	-	T	T	-	-	-	-	-	-	-	-	-	T	-	-	-	T	-
Silver	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	T
Titanium	X	X	T	X	X	X	X	T	T	X	T	T	X	X	X	X	X	T	-	-	-	X	X	T	-	-	T	T	T	T	X	X	X	X	X
Yttrium	-	-	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	T	T	-	T	T	T	T	T	T	T	T	T	T	T	T	-	T	-	-	-	-	T	T	-	-	T	T	T	-	T	T	T	T	-	T

Element	Sample[1]																																		
	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
Copper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	-	-	-	-	T	-	T	X	-	T	-	X	-	-	T	X	X	-	T	-	-	X	T	-	-	T	-	-	-	T	X	-
Silver	T	-	-	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	X	X	X	X	X	X	X	X	T	T	T	T	T	T	T	T	T	X	T	T	T	-	-	T	X	T	T	T	T	T	T	T
Yttrium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	-	T	-	T	T	T	-	-	-	-	-	T	T	-	-	T	T	X	T	T	T	-	-	T	-	T	-	T	T	T	-	T
Zirconium	T	T	T	T	T	T	T	T	T	T	T	T	T	-	-	-	T	-	-	-	-	-	-	-	T	-	-	-	-	-	T	-

Element	Sample[1]																													
	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	46A	47A	48A	58A	65A
Copper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	T
Mercury	T	X	X	T	X	T	-	T	-	-	X	T	X	T	X	X	X	X	X	X	X	X	X	X	X	X	X	T	-	-	-
Silver	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	X	X	X	T	T	X	T	X	T	T	X	X	T	T	T	T	T	T	T	T	T	-	T	T	T	-	T	T	T	T	T
Yttrium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	T	T	T	T	-	T	T	-	-	T	T	-	T	T	T	T	T	T	T	T	T	T	T	T	T	-	-	T	T	-	-
Zirconium	-	-	-	-	-	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

X--Detected in sample. T--Trace, less than 0.1 percent.

[1]Location in figures 3 and 15.

Note: Samples were taken in 1963

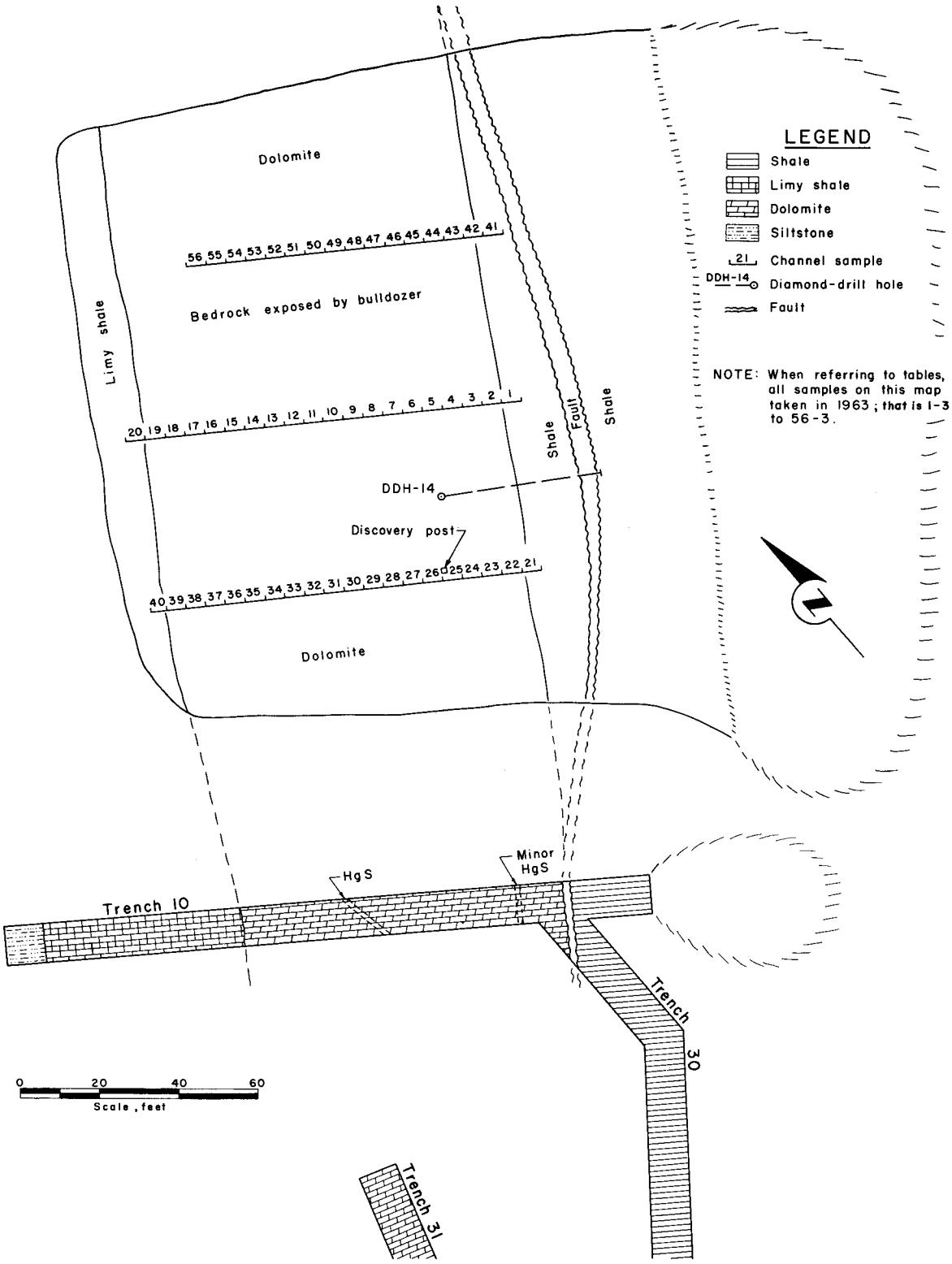

FIGURE 8. - Plan of South Zone.

TABLE 6. - Chemical analyses of stream pan concentrates[1]

Sample	Percent mercury
1	0.02
2	.02
43	.01
47	.02
69	.01
72	<.01
80	<.01
82	.05
83	1.45
84	7.08
85	.08
86	.57
87	.31
88	4.15
89	63.7
90	1.29
91	<.1
92	.03
94	.02
46A	.01

[1]Location shown in figures 3 and 15.

TABLE 7. - Chemical analyses of South Zone samples

Sample	Description	Percent			Ounce per ton	
		Mercury	Antimony	Arsenic	Gold	Silver
[1]7-8	Fault gouge	0.1	Trace	Trace	Trace	Trace
[1]8-8	Specimen of cinnabar and yellow dolomite.	10.5	Trace	Trace	Trace	Trace
9-8	Specimen of cinnabar and gray dolomite.	10.0	Trace	Trace	Trace	Trace
10-8	Barren gray dolomite	.05	Trace	0.05	Trace	Trace
11-8	Specimen of mineralized yellow dolomite.	7.4	Trace	.11	Trace	Trace
[1]12-8	Brown, decomposed dolomite, limonite stain.	.3	Trace	.1	Trace	Trace
13-8	Specimen of cinnabar and dolomite.	3.1	Trace	.9	Trace	Trace
14-8	do	2.7	Trace	.6	Trace	Trace
[1]15-8	do	5.6	Trace	.05	Trace	Trace
44-8	do	14.0	0.3	Trace	Trace	Trace

[1]See table 2 for spectrographic analyses.

In 1962 this zone was bulldozed to a depth of 3 to 4 feet. All evidences of the hand-dug trenches were removed or destroyed. Most of the visual evidence of the mercury mineralization was also removed by this bulldozing, although as shown by table 8 several good areas were still present. The amount of limonite exposed increased as much as 50 percent. Diamond-drill

hole 14 was drilled through what was the best surface showing of cinnabar (fig. 8). Logs and assays of this hole are in appendixes C and D. Results of this drillhole were disappointing, but core and sludge recovery were poor. Mineralization is probably better than indicated. Fracturing appeared to be much less as depth increased. Assays of channel samples taken over this bulldozed area are in table 8.

TABLE 8. - Chemical analyses of South Zone grid samples

Sample[1]	Line	Interval, feet	Width, feet	Percent mercury	Sample[1]	Line	Interval, feet	Width, feet	Percent mercury
1	1	0- 5	5	0.32	29	2	40- 45	5	0.02
2	1	5- 10	5	4.74	30	2	45- 50	5	.02
3	1	10- 15	5	.55	31	2	50- 55	5	<.01
4	1	15- 20	5	.03	32	2	55- 60	5	.43
5	1	20- 25	5	.33	33	2	60- 65	5	<.01
6	1	25- 30	5	<.01	34	2	65- 70	5	.04
7	1	30- 35	5	.17	35	2	70- 75	5	.14
8	1	35- 40	5	.57	36	2	75- 80	5	<.01
9	1	40- 45	5	.02	37	2	80- 85	5	.02
10	1	45- 50	5	<.01	38	2	85- 90	5	.02
11	1	50- 55	5	<.01	39	2	90- 95	5	<.01
12	1	55- 60	5	<.01	40	2	95-100	5	.02
13	1	60- 65	5	.07	41	3	0- 5	5	.03
14	1	65- 70	5	<.01	42	3	5- 10	5	.15
15	1	70- 75	5	.03	43	3	10- 15	5	.03
16	1	75- 80	5	.03	44	3	15- 20	5	.12
17	1	80- 85	5	.02	45	3	20- 25	5	.08
18	1	85- 90	5	.02	46	3	25- 30	5	<.01
19	1	90- 95	5	.02	47	3	30- 35	5	<.01
20	1	95-100	5	.02	48	3	35- 40	5	<.01
21	2	0- 5	5	.05	49	3	40- 45	5	<.01
22	2	5- 10	5	.10	50	3	45- 50	5	<.01
23	2	10- 15	5	.05	51	3	50- 55	5	<.01
24	2	15- 20	5	.05	52	3	55- 60	5	<.01
25	2	20- 25	5	.04	53	3	60- 65	5	.01
26	2	25- 30	5	.01	54	3	65- 70	5	.01
27	2	30- 35	5	<.01	55	3	70- 75	5	<.01
28	2	35- 40	5	<.01	56	3	75- 80	5	<.01

[1]See figure 8 for location of samples.

A fault separates the shale and dolomite at the South Zone (fig. 8). The material in this fault is composed of illite derived from altered feldspar. Some bentonite clay is present and a trace of carbonate. A similar fault is present at the Brown Bear Zone, but spectroscopically more iron and less magnesium were present in the samples from the South Zone fault. Petrographic studies of samples from this fault and from several of the numerous other faults in the area (including the one at the Brown Bear Zone) suggest that some of the samples may be clay residues of old mineralization channels rather than fault gouge. Spectrographic analyses of samples of the South Zone and Brown Bear Zone faults are in table 2.

Diamond-drill hole 14 penetrated, from 142.0 to 147.4 feet, a highly altered rock. This appears to be the same altered material as found in trenches 7, 13, 20, 21, and 30 and in drillholes 9, 10, and 12 at the Brown Bear Zone. A study by Bureau petrographers determined that the material is essentially a highly altered, fine-grained porphyritic igneous rock of hypabyssal origin with the general composition and characteristics of trachyte. The highly altered condition of this rock precludes a more exacting classification; however, the abundance and mode of occurrence of secondary chlorite and calcite suggest that the material might have been a basic igneous rock. This cannot be considered entirely conclusive inasmuch as at least some of the calcium and magnesium for formation of chlorite and calcite could have been made available by the intruded dolomite or limestone.

Mineralogically, the rock consists of small, corroded or replaced, elongated feldspar phenocrysts in a fine-grained groundmass which has been altered to chlorite, limonite, and calcite. Some of the calcite has replaced feldspar phenocrysts; some has replaced original groundmass minerals or filled interstices and veinlets. Most of the feldspar that is not completely altered is albite plagioclase. Laths are twinned, but the twinning planes are highly irregular, suggesting deuteric recrystallization and replacement of the original feldspar. No pyroxenes or amphiboles were observed in thin section; they either were not present originally or have been replaced subsequently by chlorite. Subject to these qualifications, the material is termed "trachyte" when referred to in trench and diamond-drill hole logs.

Considerable trachyte was found in trench 30 (fig. 5) which is adjacent to the south end of the South Zone. A 1-foot-wide mineralized zone over 30 feet long was found by bulldozing. It consisted of 3 to 12 inches of a white claylike trachyte capping on top of 6 to 12 inches of soft brown disintegrated dolomite which contained considerable fine granular cinnabar. In places, this 6 to 12 inches of dolomite below the trachyte contained over 60 percent mercury. Cinnabar mineralization appeared to end abruptly after a depth of 12 inches below the trachyte. The surrounding formation was a gray dolomite. There was no halo or gradually fading of mercury mineralization into the surrounding gray dolomite; it ended abruptly at the edge of the trachyte. This mineralized zone was still present when it entered the east wall of the trench, but with much less mineralization. However, on strike with this zone and about 500 feet further southwest a small lens of cinnabar was found in dolomite in a steep cut bank. This would be about 40 feet vertically below the zone in trench 30. Overburden in trench 30 was about 10 feet thick. No sign of mineralization was on the surface. Trenching has removed all evidence of mineralization in the trench and spoil from trenching has covered the small lens of cinnabar in the cut bank. Assays of samples are found in appendix A and petrographic analyses are in appendix B.

Minor occurrences of cinnabar were found in siliceous dolomite in a number of trenches between the South Zone (fig. 5) and the Brown Bear Zone (fig. 7). Chemical and spectroscopic analyses of samples of these occurrences are in table 3 and appendixes A and B. One of the largest of these occurrences was found in trench 23 and is called the Spring Zone (fig. 5). A spring flows about 30 feet below this zone; there did not appear to be any association between it and the mineralization.

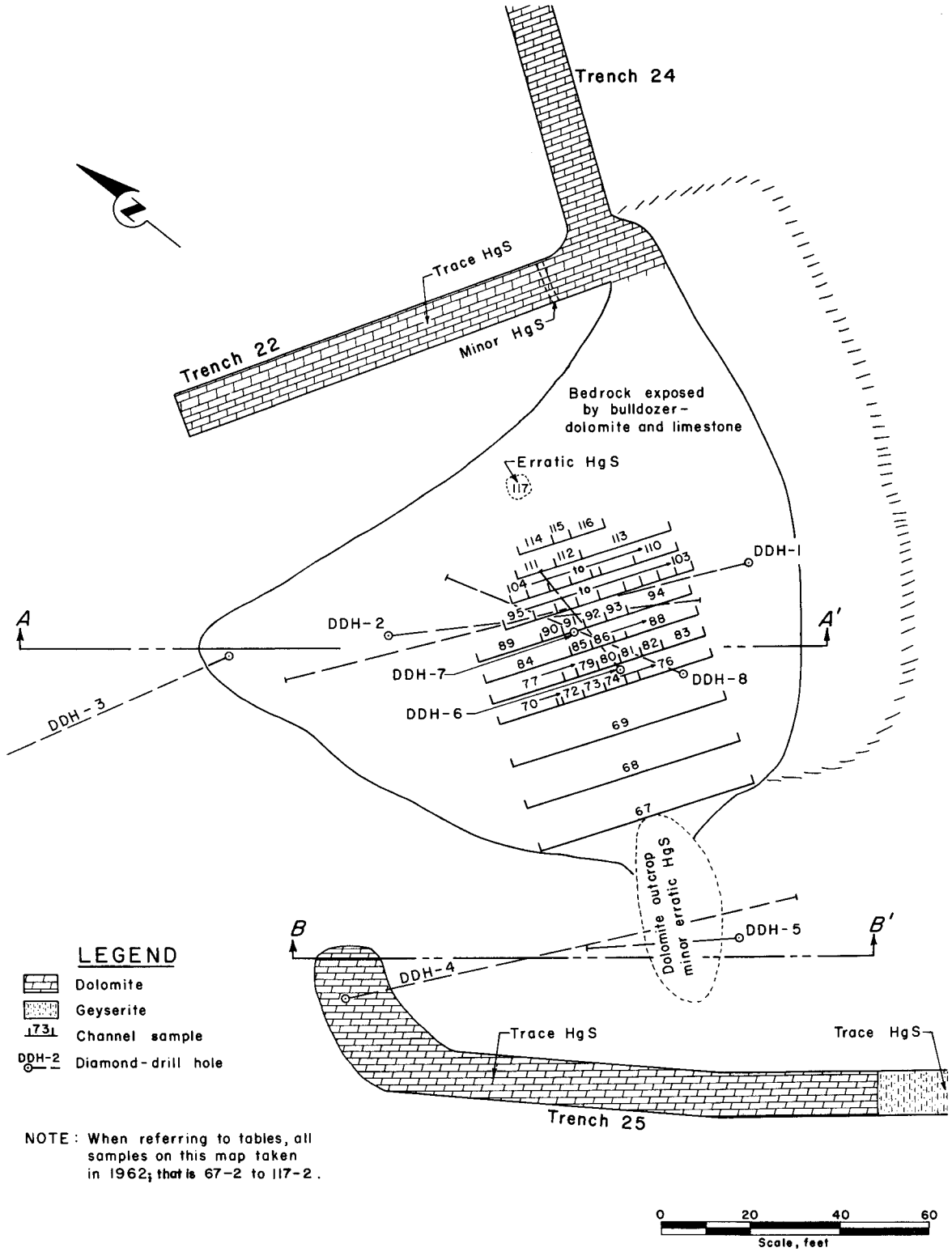

FIGURE 9. - Plan of Central Zone.

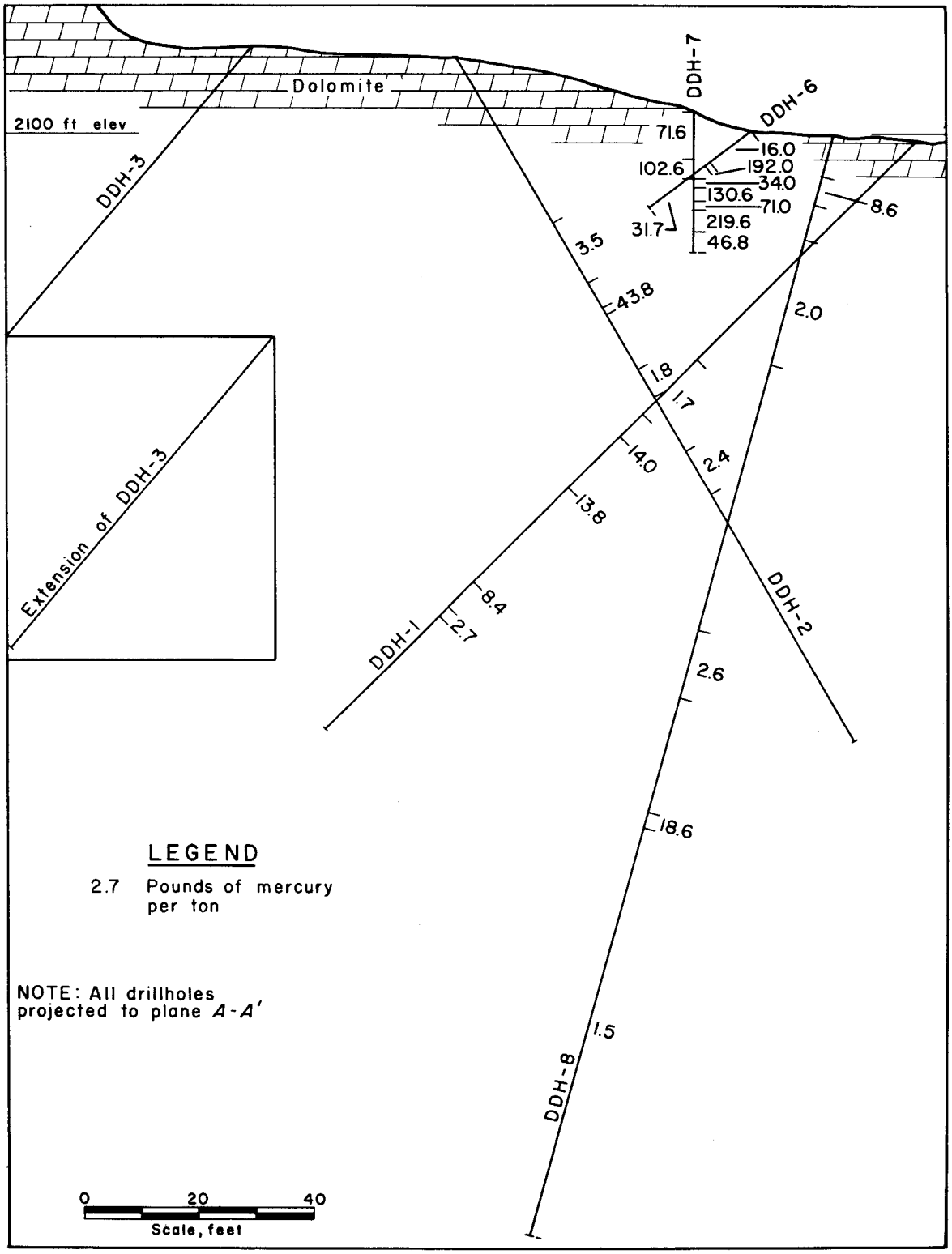

FIGURE 10. - Section on Line AA, Central Zone.

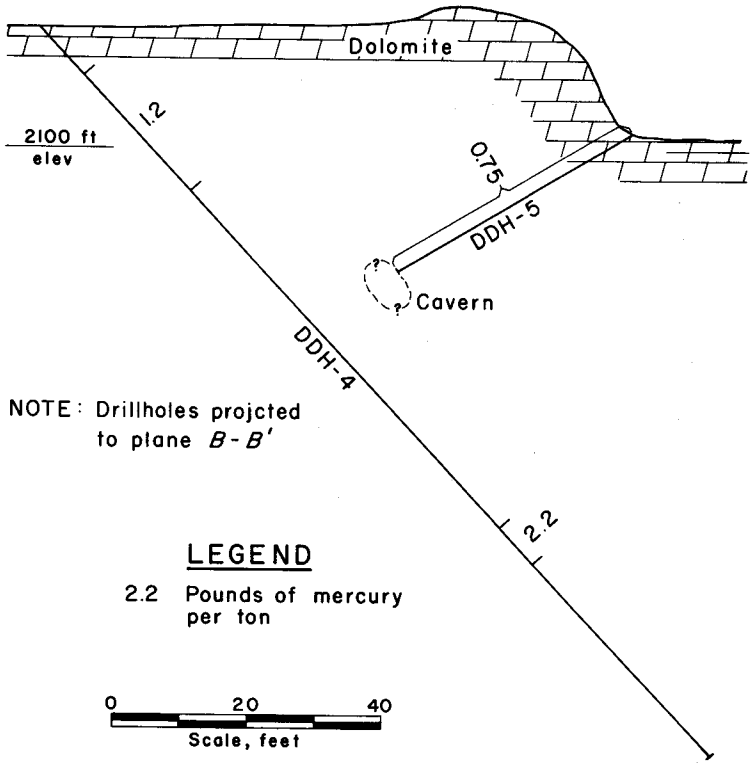

FIGURE 11. - Section on Line BB, Central Zone.

The Central Zone (figs. 5, 9-11) contains the best occurrences of cinnabar found at the White Mountain deposit. The only surface indication prior to work by the Bureau of Mines was a few minor cinnabar lenses exposed in a nearby dolomite outcrop. A power auger was used to outline a highly mineralized zone or pocket which is elliptically shaped, having about a 50-foot major axis and a 30-foot minor axis. Eight diamond-drill holes (holes Nos. 1-8, fig. 10) were drilled in and around this zone which was also channel sampled. Results are in tables 9 and 10 and appendixes C-E.

Core recovery was poor in some of these holes, but drilling indicates that high-grade mineralization extends to at least 25 feet below the surface; subsequent open pit mining of this zone is verifying this. Drill sludges indicate that cinnabar is present in lesser amounts at 200 feet below the surface, the greatest depth that could be drilled by a single shift operation because of difficult conditions encountered due to permafrost and coring broken formations. Much of the core was vuggy; occasionally a small lens or bleb of cinnabar would still be attached to a vug but could easily be broken off by hand.

Considerable geyserite occurs in the top 3 to 4 feet of the Central Zone deposit and it usually contains cinnabar. Gray, siliceous dolomite is the chief host rock. Drillhole 5 apparently penetrated a large cavern at 40 feet. All water was immediately lost and a strong blast of odorless air blew from this hole for 48 hours. In trench 11 about 100 feet southwest of the Central Zone (fig. 5) an erratic mineralized zone was exposed for about 80 feet. This was channel sampled and the results are in table 11. Other analyses are found in appendixes A and B.

A small deposit similar to the Central Zone was found by tracing cinnabar float approximately 1,000 feet up the slope of a steep hill from the pump or dam where drilling water was obtained. It was uncovered in trenches 17 and 17-A (fig. 5), and is called the Pump Zone. Cinnabar mineralization occurs in a 5- by 20-foot area of dolomite which also contains several pockets of geyserite, each less than a foot in diameter. Overburden, 15 to 20 feet in depth, covering this zone on a steep hillside, caused continued caving which made trenching difficult and dangerous; only a limited amount of sampling could be accomplished. Sampling results are given in appendix A.

TABLE 9. - Chemical analyses of Central Zone grid samples[1]

Sample[2]	Line	Interval, feet	Width, feet	Percent mercury	Sample[2]	Line	Interval, feet	Width, feet	Percent mercury
67	1	0-50	50	0.01	92	7	25-30	5	10.42
68	2	0-50	50	.04	93	7	30-35	5	8.12
69	3	0-50	50	.03	94	7	35-50	15	.43
70	4	0-14	14	.02	95	8	0- 7	7	1.05
71	4	14-15	1	.02	96	8	7-12	5	2.96
72	4	15-20	5	2.50	97	8	12-17	5	5.79
73	4	20-25	5	.39	98	8	17-22	5	12.60
74	4	25-30	5	7.94	99	8	22-28	6	4.67
75	4	30-33	3	13.32	100	8	28-32	4	.38
76	4	33-50	17	.10	101	8	32-36	4	.32
77	5	0-17	17	.01	102	8	36-40	4	7.04
78	5	17-20	3	5.34	103	8	40-44	4	.85
79	5	20-25	5	1.08	104	9	0-11	11	.84
80	5	25-30	5	2.94	105	9	11-15	4	4.77
81	5	30-35	5	1.11	106	9	15-20	5	2.34
82	5	35-40	5	.02	107	9	20-25	5	3.17
83	5	40-50	10	.20	108	9	25-30	5	1.06
84	6	0-20	20	.12	109	9	30-32	2	.10
85	6	20-25	5	4.61	110	9	32-50	18	1.07
86	6	25-30	5	2.67	111	10	0- 9	9	.20
87	6	30-33	3	5.50	112	10	9-15	6	1.41
88	6	33-50	17	.25	113	10	15-36	21	.07
89	7	0-15	15	.03	114	11	0- 8	8	.55
90	7	15-20	5	3.62	115	11	8-12	4	1.63
91	7	20-25	5	13.14	116	11	12-20	8	.12
					117	([3])	-	-	2.04

[1]See table 10 for petrographic analyses.
[2]See figure 9 for locations.
[3]Large grab sample.
Note: Samples were taken in 1963.

The Brown Bear Zone is at the north end of the White Mountain deposit, and along with the Central Zone, is one of the two most important mercury zones at White Mountain; figures 7 and 12-14 show locations of trenches and drillholes in this zone. Chemical and petrographic analyses of type samples in grid areas are in tables 12 and 13. Logs of trenches and drill holes are in appendixes A-E. Table 2 gives a spectrographic analysis of a sample (6-8) of a fault similar to that found in the South Zone (7-8).

At the Brown Bear Zone cinnabar occurs in a silicified dolomite in lenses, blebs, and veins over an area about 20 by 70 feet. The original discovery was a vein that was 6 to 12 inches wide and appeared to be over a hundred feet long, as indicated by float. Trenching proved that most of this indicated length was due to frost creep and that it was actually about 10 feet long and 6 feet deep. Mineralization was not found in the shale. Geyserite was not present, but trachyte was found in diamond-drill holes. These drillholes indicated that mineralization was shallow and did not go to any such depth as at the Central Zone; however, core and sludge recovery were poor and at the interval drilled short rich ore shoots can be straddled.

TABLE 10. - Petrographic analyses of Central Zone samples

	Sample[1]															
	485-0	511-0	515-0	517-0	525-0	67-2	71-2	72-2	78-2	81-2	91-2	94-2	95-2	99-2	117-2	103-3
Rock classification:																
Cinnabar ore.....	C	C	C	C	C	-	-	-	-	-	-	-	-	-	-	-
Dolomite.....	-	-	-	-	-	C	-	-	-	-	-	-	-	-	-	-
Limestone.....	-	-	-	-	-	-	-	-	-	-	-	C	-	-	-	-
Springs deposit...	-	-	-	-	-	-	C	C	C	C	C	-	C	C	C	C
Mineral:																
Calcite.....	-	-	S	-	-	F	T	-	T	-	N	P	N	N	-	-
Cinnabar.....	A	A	P	A	S	T	N	S	F	F	S	T	T	A	T	M
Dolomite.....	-	-	-	-	-	P	-	-	-	-	-	N	-	-	-	-
Limonite.....	-	-	-	-	-	-	M	-	-	-	-	-	-	-	-	-
Quartz.....	P	-	A	P	P	A	P	P	P	P	P	S	P	P	P	P

P--Predominant.....Over 50 percent.
A--Abundant.....10 - 50 percent.
S--Subordinate.....2 - 10 percent.
M--Minor.....0.5 - 2 percent.
F--Few.....0.1 - 0.5 percent.
T--Trace.....Less than 0.1 percent.
C--Rock classification.
N--Sought but not detected.
[1]Locations are shown in figure 9.
Note: Samples 485, 511, 515, 517, 525, and 103 are specimen samples; no chemical assay.

TABLE 11. - Channel samples in trench 11

Sample[1]	Interval in trench, feet	Width, feet	Percent mercury
67-3	44- 52	8	<0.01
66-3	52- 59	7	.13
65-3	59- 65	6	<.01
64-3	65- 72	7	.10
63-3	72- 79	7	.48
62-3	79- 85	6	.01
61-3	85- 90	5	.02
60-3	90- 97	7	.01
59-3	97-104	7	<.01
58-3	104-110	6	.03
57-3	110-116	6	.03
56-3	116-122	6	.26

[1]Sampled section shown in figure 5.

Trenches across the small stream north of the Brown Bear Zone (fig. 7) did not reach bedrock, though some were over 16 feet deep. Frozen gravel and boulders cover this area to an unknown depth. Pan concentrates and traces of cinnabar in nearby dolomite outcrops indicated that cinnabar might be present at this end of the White Mountain deposit.

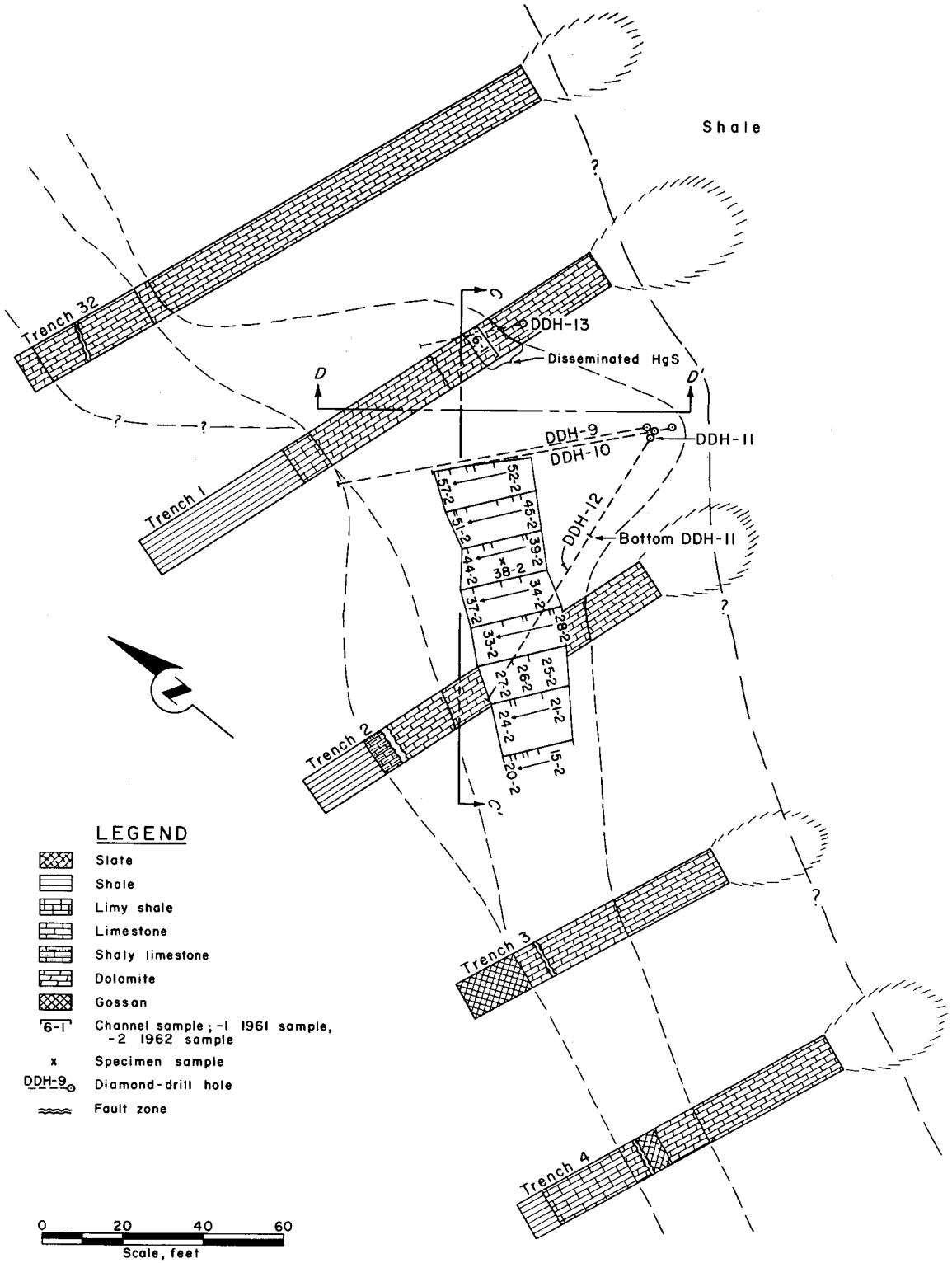

FIGURE 12. - Plan of Brown Bear Zone.

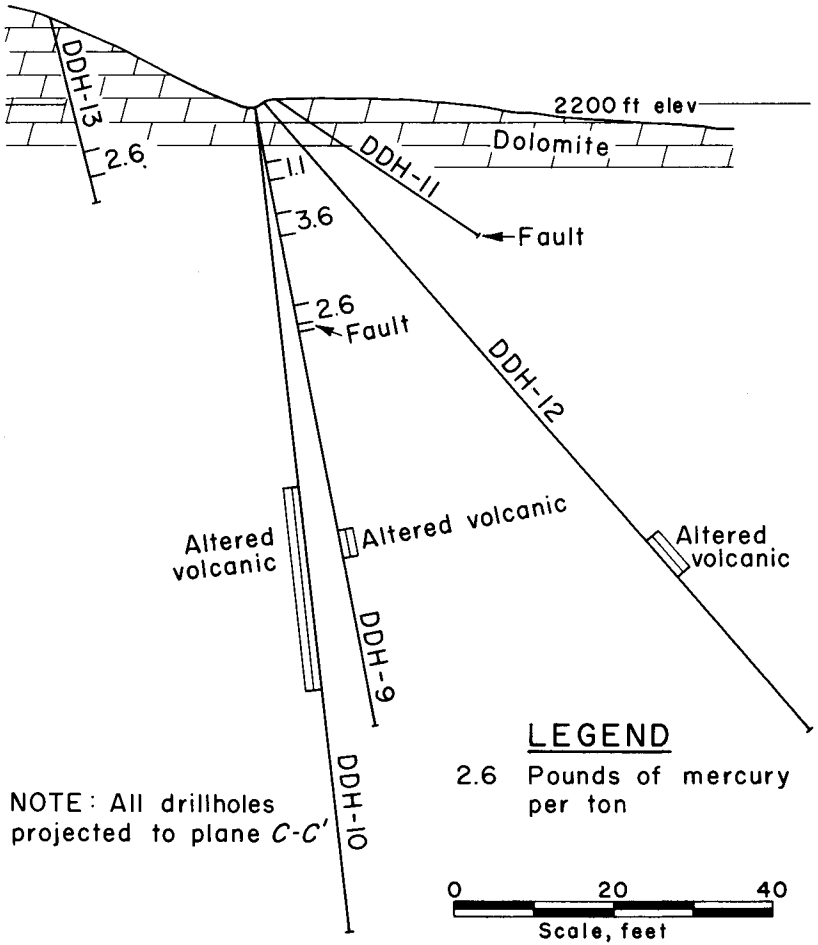

FIGURE 13. - Section on Line CC, Brown Bear Zone.

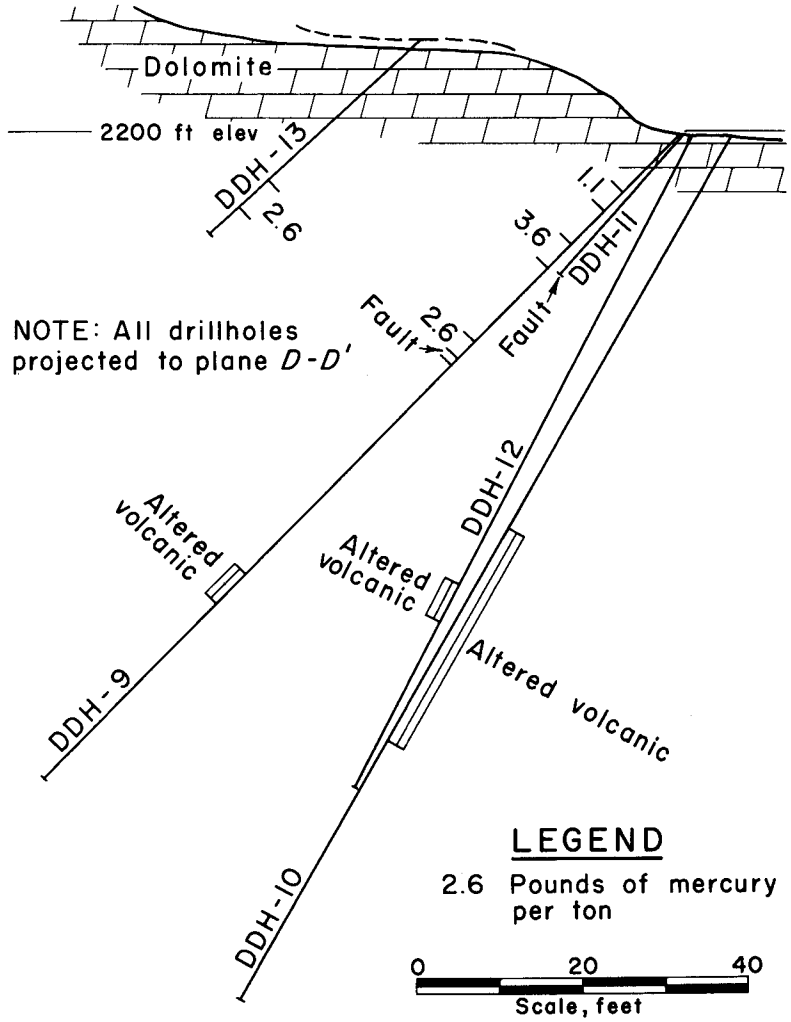

FIGURE 14. - Section on Line DD, Brown Bear Zone.

TABLE 12. - Petrographic analyses of Brown Bear Zone samples

	Sample																			
	5-8	518-0	15-2	17-2	19-2	21-2	25-2	29-2	31-2	34-2	37-2	38-2	39-2	42-2	43-2	44-2	47-2	51-2	54-2	57-2
Rock classification:																				
Clay.....	-	-	-	C	C	-	-	-	-	-	C	-	-	-	-	C	-	C	-	C
Dolomite.....	C	C	C	-	-	C	C	-	-	C	-	C	C	C	C	-	C	-	-	-
Gossan.....	-	-	-	-	-	-	-	-	C	-	-	-	-	-	-	-	-	-	-	-
Limestone.....	-	-	-	-	-	-	-	C	-	-	-	-	-	-	-	-	-	-	C	-
Mineral:																				
Calcite.....	-	M	T	-	-	M	F	P	M	-	-	T	M	M	F	S	F	-	P	-
Chlorite.....	-	-	-	P	P	F	-	-	-	-	P	-	-	-	-	P	-	P	-	A
Cinnabar.....	P	-	-	-	-	M	M	T	T	F	T	P	S	F	F	-	-	T	-	-
Dolomite.....	A	P	P	-	M	P	P	M	-	P	-	A	P	P	P	T	P	M	-	T
Illite.....	-	-	-	A	A	-	-	-	-	-	A	-	-	-	-	A	-	A	-	S
Kaolin minerals...	-	-	-	F	A	-	-	-	-	-	S	-	-	-	-	M	-	-	M	A
Limonite.....	-	-	F	S	-	F	T	A	-	-	-	F	T	F	T	S	T	S	M	A
Oligoclase.....	-	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Quartz.....	T	M	T	A	A	-	-	-	M	-	A	-	-	M	-	A	-	S	-	A

P--Predominant.....Over 50 percent.
A--Abundant.....10 - 50 percent.
S--Subordinate..... 2 - 10 percent.
M--Minor.....0.5 - 2 percent.
F--Few.....0.1 - 0.5 percent.
T--Trace.....Less than 0.1 percent.
C--Rock classification.
Note: Samples 5-8 and 518-0 are specimen samples; no chemical assay.

TABLE 13. - Chemical analyses of Brown Bear Zone grid samples[1]

Sample	Line	Interval, feet	Width, feet	Percent mercury	Sample	Line	Interval, feet	Width, feet	Percent mercury
15	1	0- 9	9	<0.01	36	5	12-19	7	1.96
16	1	9-12	3	<.01	37	5	19-22	3	.03
17	1	12-13	1	<.01	39	6	0- 4	4	.01
18	1	13-15	2	<.01	40	6	4- 5	1	.21
19	1	15-16	1	<.01	41	6	5-13	8	.05
20	1	16-18	2	<.01	42	6	13-15	2	2.03
21	2	0- 7	7	1.00	43	6	15-19	4	.71
22	2	7-14	7	.24	44	6	19-20	1	<.01
23	2	14-15	1	<.01	45	7	0- 4	4	.02
24	2	15-20	5	<.01	46	7	4- 6	2	<.01
25	3	0-10	10	1.46	47	7	6-10	4	<.01
26	3	10-14	4	1.09	48	7	10-18	8	.02
27	3	14-23	9	<.01	49	7	18-20.5	2.5	<.01
28	4	0- 2	2	.35	50	7	20.5-21	.5	1.30
29	4	2- 3	1	1.84	51	7	21-22	1	1.26
30	4	3- 9	6	.20	52	8	0- 9	9	<.01
31	4	9-10	1	.40	53	8	9-14	5	<.01
32	4	10-15	5	1.45	54	8	14-16	2	<.01
33	4	15-23	8	.02	55	8	16-20	4	.01
34	5	0- 7	7	3.09	56	8	20-23	3	.03
35	5	7-12	5	3.37	57	8	23-24	1	.81

[1]Sample locations are shown in figure 12.
Note: Samples taken in 1962; no petrographic or spectroscopic analyses made.

WORK BY THE BUREAU OF MINES

Transportation

The isolation and complete lack of roads, trails, and navigable rivers presented difficulties in getting equipment to this deposit. Permafrost, ice lenses, rivers, and swamps canceled any thought of going overland except on foot during the summer months. The first examination in 1958 was accomplished by landing a light plane with large tires on the conglomerate formation east of the deposit and walking the remaining few miles. The landing room was strictly marginal and required maximum performance from both plane and pilot.

In 1959 a three-man Bureau field party spent the summer at the deposit. A helicopter was used to bring in camp equipment and men. An airstrip about 500 feet long and 30 feet wide was scratched and smoothed out by hand shovel on what is now the south end of the present airstrip. A small plane used this field throughout the summer, but landing conditions were somewhat hazardous. The moss, which grows during the summer, presented one of the major problems. It was best removed and kept down by burning; this had to be done by burning small patches at a time so as not to start a major tundra fire.

In the fall of 1960 two crawler-type tractors, a 16-ton and an 8-ton, both equipped with wide pads and winches, a diamond drill with accessory

equipment and 500 feet of AX drill rods, pumps, tools, and 500 gallons of gas were flown to Farewell by U.S. Air Force planes. The total weight of this equipment was 72,000 pounds. Two thousand gallons of diesel fuel were flown to Farewell by a commercial tanker. An 8- by 16-foot wanigan was built at Farewell. Three freighting bobsleds plus oil barrels were obtained from the Federal Aviation Agency as surplus equipment, as was the material to build the wanigan. The sleds were repaired and the wanigan was mounted on one sled and the other two sleds were decked with 2- and 3-inch planks and loaded with all of the rest of the equipment.

On March 1, 1961, this outfit, pulled by the two tractors, left Farewell; it arrived at White Mountain March 11 over the route shown in figure 2. The distance traveled was about 60 miles. The trip was made by four Bureau employees in subzero temperatures as low as -40° F. The larger tractor broke through the ice on a small lake within 3 miles of the deposit into 16 feet of water; the temperature was -35° F. The driver was rescued in less than 5 minutes; the tractor was retrieved in May, and all equipment was at White Mountain by June 1.

A 2,500-foot airstrip was cleared at the deposit and all fuel oil and supplies after this was accomplished were flown in. Fuel oil was flown to Farewell by commercial tanker in bulk 2,000-gallon lots and there put in 55-gallon drums; it was then flown 5 barrels at a time by twin-engine plane to White Mountain. All other supplies were flown directly from McGrath or Anchorage.

The trip out with heavy equipment was made to McGrath in the spring of 1964 in 12 days by three Bureau employees without difficulty. The distance of about 100 miles was traveled in subzero temperatures as low as -40° F or colder. The trip out was made with a much lighter load than the trip in as practically all of the lighter equipment was flown out in the fall of 1963 by plane. Experience proved that it is much less expensive and more efficient to provide an airstrip when possible and fly equipment in rather than to winter freight it over any great distance, especially over a route that has not been traveled before.

Augering

In 1960, about 500 1-1/2-inch-diameter short length auger holes were drilled in the area with a power auger. The easily portable auger, powered with a standard chain saw 9-hp motor, weighed only 40 pounds. The auger attachment could be removed in a few minutes and a chain saw blade put on, converting it back to a standard chain saw. The continuous flight augers were each 3 feet long and had a flatter pitch than standard coal boring augers; the distance between flights was equal to the diameter of the auger (1-1/2 inches). This gave a better return of augered material. Detachable tungsten carbide bits of the type used in roof bolting were used. The type of bit found most satisfactory was a very flat faced bit; those with long prongs were useless in this fractured limestone, dolomite, and shale. Snap button couplings were first used, but proved unsatisfactory; a high-strength alloy pin and cotter key was found to be the most satisfactory coupling. Two men were required to

operate the auger. The type of auger used did not have a reverse, but a reverse is desirable.

This highly satisfactory augering equipment was used to drill over 7,000 feet of hole. Bit wear was negligible. The maximum depth that could be augered was 20 feet, but most holes were bottomed at around 10 feet. The equipment would not drill frozen gravel. The Central Zone was discovered by augering, which was used extensively in reconnaissance work in locating trenches as even trace amounts of cinnabar could be detected in the field by visual methods and panning. All auger hole cuttings were assayed and many were panned, but the presence of cinnabar could invariably be detected by a bright red streak on the bit. Holes had both a hole number and a line number and all hole locations were marked by a lath. Those that had cinnabar were additionally marked with colored flagging. A Brunton survey was made of all holes and a field map kept.

Explosives

Fifteen- and 45-pound lined-cavity beehive-shaped demolition charges were obtained from the U.S. Army and flown to McGrath via the Alaska Air National Guard. They were brought to White Mountain from McGrath by helicopter.

Holes having depths of 5 to 6 feet and diameters of 6 to 8 inches were obtained with these shaped charges in fractured and frozen dolomite. The 45-pound charge gave very little more penetration (usually less than a foot more) than the 15-pound charge. Penetration in coarse frozen gravel was about 3 to 4 feet; in this material boulders as large as 2 feet in diameter were numerous and were invariably found at the bottom of the hole, effectively blocking further penetration. A shallow surface crater about 3 feet in diameter and 18 inches deep was formed by the explosive charge; below this there was a 6- to 8-inch borehole filled with loose, warm, finely pulverized material that could easily be removed by hand or scoop. Firing another charge on top of the hole created by the first charge gave little, if any, additional penetration. Experience elsewhere in Alaska in fine frozen gravel and soil gave about 10-foot penetration where the use of several shaped charges and about 15 pounds of TNT in the bottom of each hole usually resulted in a pit about 12 to 14 feet deep and 8 to 10 feet in diameter. Frozen material is often thrown for several hundred feet. At White Mountain, these charges, especially the 45-pound charge, usually set the dry tundra on fire.

Trenching

Almost 12,000 linear feet of bulldozer trenching was done. Trenches were 10 feet wide and all were in permafrost. About 16 feet was the maximum depth and most trenches were 8 to 10 feet deep. Even minor cinnabar mineralization is easily seen because of the streak left by blade and track. The walls of many trenches were panned to aid in tracing the source of cinnabar float. Considerable drainage trouble was encountered in several trenches and care had to be taken to avoid getting stuck in frost boils. One tractor was always kept in a safe area so it could be used to winch out the mired one and it is doubtful if much work would have been accomplished with one tractor

alone. Both had winches which were very necessary in hauling out mired tractors and in freighting. It is also questionable if the 16-ton tractor would have been retrieved from the lake if the 8-ton tractor had not had a winch.

Core Drilling

All diamond drilling was done with AX rods and bits, except holes Nos. 6, 7, and 13 which were drilled with BX bits, and all collaring was BX size. Permafrost was always present. Considerable difficulty was experienced in cementing owing to the excessive cold in the hole. A mixture of lumnite and portland cement which would set up in 15 minutes on the surface would take 3 to 4 hours or more in the hole. Even a mixture used for a flash set of less than 5 minutes would do no better. The ratio found best suited for these conditions was 75 percent lumnite and 25 percent portland. This would set up in about 6 to 8 hours and gave the best strength and all around results.

Water had to be pumped for as far as 3,500 feet with about a 200-foot lift. Aluminum and plastic pipe was used for waterlines. Parka squirrels caused some trouble by eating the plastic hose until it was put in that section of line nearest the camp and the squirrels fed table scraps at the camp. They seemed to prefer the table scraps to the plastic pipe. Water was obtained by damming small streams with sand bags and lining the dam and pool back of the dam with polyethylene, since water had to be conserved. The squirrels also ate the polyethylene; porcupines ate the plywood core boxes.

Fourteen diamond-drill holes were drilled in 1961-62 for a total of 1,428 linear feet. The longest hole was 232.5 feet, this being the maximum that was practical to drill in permafrost working a single 8-hour shift.

Stream Sampling

Samples of stream gravels, minor drainage courses, and places where a residual placer concentration of cinnabar would likely occur were taken in a wide area around the deposit (figs. 3, 15), and panned down to a concentrate. A spectroscopic analysis (table 5) was made of all concentrate and a chemical analysis (table 6) was made of those in which cinnabar could be seen visually and in a few of those where cinnabar was detected by the spectroscope. An attempt was made to obtain pan concentrate of all the streams that cut the Farewell Fault for about 15 miles on the north side of Big River. All these streams are filled with coarse gravel, boulders, and glacial till. Bedrock could not be reached and the results were inconclusive though two samples, 78 and 79 (fig. 2), indicated that mercury might be present in this area.

Geophysical

A resistivity and self-potential survey made over the Brown Bear, Central, and South Zones gave negative results in indicating cinnabar mineralization known to be present. Results differentiated between siliceous dolomite and the shale, but this was more readily determined with a prospector's pick and visual observation. It is possible closer work with resistivity might have picked up fault formations or clay material possibly representing courses of mineralizing solutions. No such results were obtained.

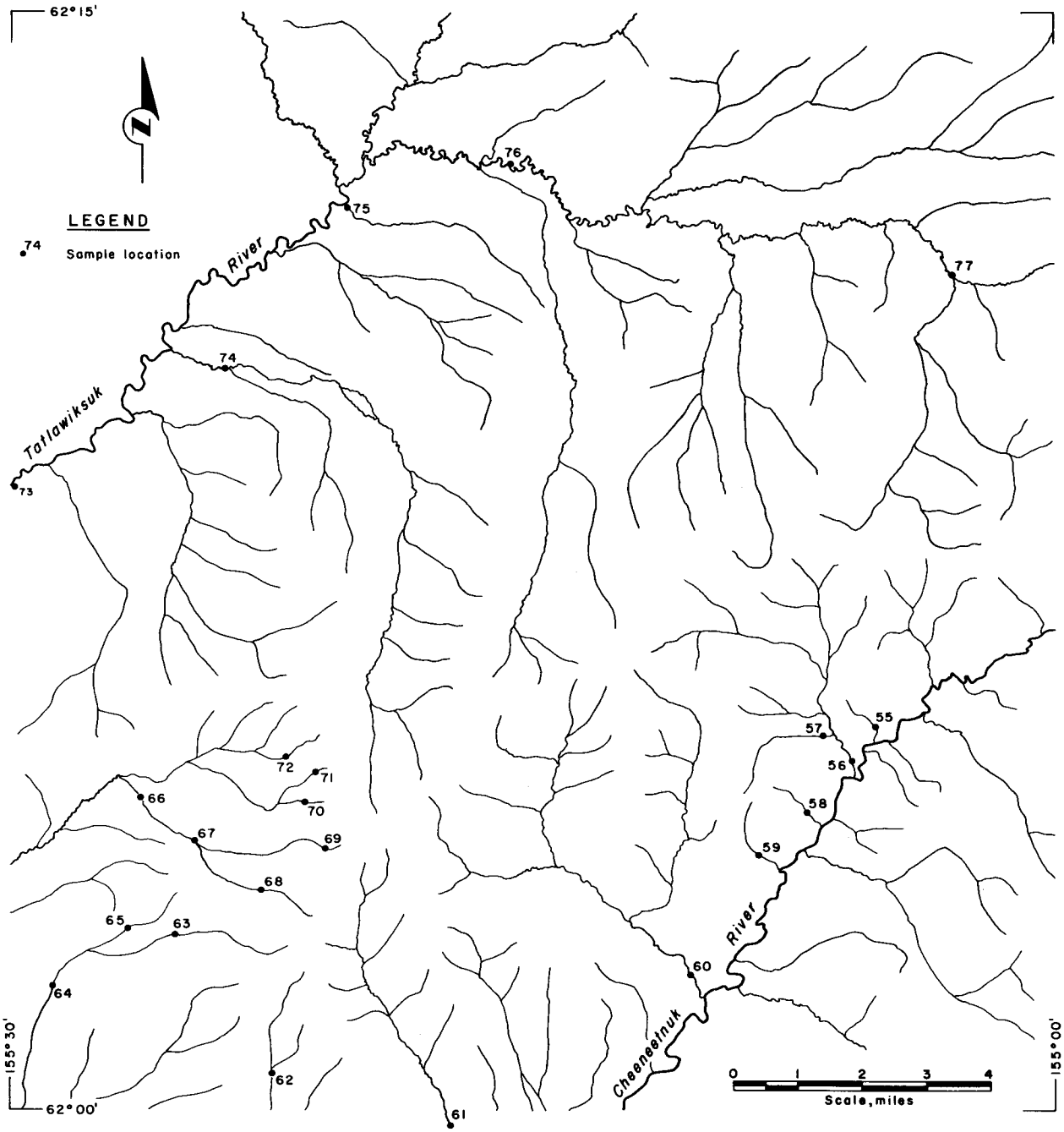

FIGURE 15. - Location of Stream Concentrate Samples.

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APPENDIX A. - LOGS OF TRENCHES

Under the heading "Sample" in the following logs of trenches, the columns "C" stand for chemical analysis and "P" for petrographic analysis. Petrographic analyses are found in appendix B. Chemical analyses are with the logs. Sample numbers listed under these columns are in chronological order by year; that is, 6-1 means sample 6 taken in 1961, 227-2 means sample 227 taken in 1962, and 92-3 means sample 92 taken in 1963. The chronological order of these samples does not necessarily coincide with the chronological numbering of the trenches; sample numbers are not in an unbroken series; that is, in sample numbers from 1 to 150 for 1962, numbers will be missing and not listed. Analyses of samples listed under columns in logs will be found in appropriate tables. Unless stated otherwise, samples were selected as typical specimens of the material described in the log interval. Where mercury mineralization appeared to be of sufficient size and importance, the showing was channel sampled, diamond drilled, or both.

Trench 1
(figure 7)

0 = West end Length: 133.0 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 42	-	-	Black, thin-bedded shale.....	-
42- 50	3-1	3-1	Black, fine-grained, blocky, limy shale.....	0.02
50- 84	4-1	4-1	Tan to brown shaly dolomite, blocky fracture pattern, limonite stain on fracture surfaces.	.02
84- 96	5-1	5-1	Light gray dolomite, blue-gray fault gouge at 86 feet.	.01
96-104	6-1	6-1	Dark gray dolomite, minor calcite veinlets, limonite stain on fractures, cinnabar disseminated in small blebs and lenses, about 1 foot of additional trenching into bedrock removed most of mercury mineralization.	2.09
104-133	7-1	7-1	Black, broken limestone with many calcite stringers, end trench.	.02

Trench 2
(figure 7)

0 = West end Length: 100 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 18	-	-	Dark gray shale.....	-
18- 23	8-1	8-1	Shaly limestone, abundant quartz and limestone	<0.005
23- 25	9-1	9-1	Fault gouge composed of carbonaceous shale and limestone.	.005
25- 40	10-1	10-1	Dark gray, hard limestone, calcite stringers..	<.005
40- 50	11-1	11-1	Gray to yellow, brecciated dolomite.....	<.005
50- 61	12-1	12-1	Yellow, gray to yellow, brecciated dolomite;	1.53
	13-1	13-1	erratic and widely disseminated cinnabar, minor calcite (see figure 12 and table 13 for channel samples).	2.42
61- 81	14-1	14-1	Gray, brecciated dolomite, a greater amount of	3.40
	15-1	15-1	disseminated cinnabar than 50-61 feet. Fault	2.53
	16-1	16-1	gouge at 81 feet (17-1) (see figure 12 and	11.30
	17-1	17-1	table 13 for channel samples).	.005
81-100	-	18-1	Dark gray to black limestone, much calcite....	-

Trench 3
(figure 7)

0 = West end Length: 72 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 16	-	19-1	Hard, brown gossan, looks like limestone with limonite at shale contact. Petrographic shows a trace of cinnabar.	-
16- 19	-	20-1	Black dolomite.....	-
19- 22	21-1	21-1	Broken dolomite, rusty iron stain on fractures	0.01
22- 23	22-1	22-1	Fault gouge, shale.....	.01
23- 44	23-1	23-1	Gray to yellow, brecciated dolomite, no	.04
	24-1	24-1	visible cinnabar, 6-inch fault gouge at 44 feet (24-1).	<.005
44- 72	-	-	Black limestone, numerous calcite veins.....	-

Trench 4
(figure 7)

0 = West end

Length: 88 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 7	25-1	25-1	Dark gray shale.....	<0.005
7- 18	26-1	26-1	Gray, limy shale, iron stain on fractures.....	.005
18- 29	27-1	27-1	Gray to yellow broken shale.....	.005
29- 33	-	28-1	Rusty dolomite.....	-
33- 34	-	29-1	Fault gouge, shale.....	-
34- 39	-	30-1	Gray shale.....	-
39- 50	31-1	31-1	Gray dolomite, dolomitic shale, fault gouge	.005
	32-1	32-1	(32-1).	.01
50- 88	33-1	33-1	Black limestone.....	.01

Trench 5
(figure 5)

0 = West end

Length: 200 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 16	-	-	Dark gray shale.....	-
16- 31	34-1	34-1	Yellow dolomite, trace cinnabar.....	0.02
31-200	35-1	35-1	Light gray, partially brecciated dolomite, minor shale.	.02

Trench 6
(figure 5)

0 = West end

Length: 700 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-163	35A-1	35A-1	Dark gray, thin-bedded, limy shale.....	0.03
163-347	36-1	36-1	Black, fine-grained, blocky, dolomitic shale, iron stain on fractures.	.03
347-365	-	-	Blue-gray fault gouge, N 1° W.....	-
365-480	37-1	37-1	Light gray dolomite.....	.03
480-534	200-2	200-2	Small lenses of cinnabar 1 to 6 inches wide and as much as 2 feet long, all striking east and west in area about 4 feet square at 534 feet.	3.63
534-565	39-1	39-1	Dark gray to black limestone, trace cinnabar at 560 feet. Formation similar to that of east end of trenches 1 to 4.	.03
565-620	-	201-2	Gray limestone, fine-grained, thin-bedded calcite.	-
620-629	-	-	Fault gouge, strike N 10° E.....	-
629-700	-	-	Dark gray limestone.....	-

Trench 7
(figure 5)

0 = West end Length: 245 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-100	40-1	40-1	Dark gray to black, limy shale, platy, thin-bedded. Beds strike N 25° W and dip 85° W.	0.005
100-105	41-1	41-1 205-2	Altered volcanic or trachyte, strike N 25° W.	.01
105-140	42-1 43-1	42-1 43-1 206-2	Black, dense dolomite, calcite stringers, angular inclusions of calcite, minor dolomite (43-1).	<.005
140-144	44-1	44-1	Dark yellow dolomite, limonite stain on fractures.	.01
144-222	45-1	45-1	Light gray dolomite, considerable calcite and quartz, minor limonite, trace of cinnabar at 214 feet.	<.005
222-226	46-1	46-1	Fault gouge, strike N 25° W.....	<.005
226-237	-	213-2	Dark gray dolomite, spherulite on nodular surface. Similar to South Zone section.	-
237-239	-	-	Fault gouge.....	-
239-245	47-1	47-1	Dark gray, dense limestone, calcite stringers, minor quartz.	<.005

Trench 8
(figure 5)

0 = West end Length: 234 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 53	-	-	Dark gray, limy shale, broken.....	-
53- 56	-	-	Fault gouge, shale, strike N 25° W.....	-
56-134	-	-	Gray, broken limestone and limy shale.....	-
134-143	-	-	Dark gray dolomite, trace cinnabar.....	-
143-195	-	-	Gray, broken limestone and limy shale.....	-
195-200	-	-	Black fault gouge with shale fragments, strike N 25° W.	-
200-227	-	-	Limy shale.....	-
227-234	-	-	Blue fault gouge.....	-

Trench 9
(figure 5)

0 = West end Length: 175 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 81	-	-	Dark gray, broken, limy shale, limonite stain on fracture surfaces.	-
81-158	-	-	Gray, broken dolomite, trace cinnabar at 152 feet.	-
158-164	-	-	Fault gouge, shale.....	-
164-175	-	-	Calcareous, thin-bedded sandstone, shale.....	-

Trench 10
(figures 5 and 8)

0 = West end Length: 160 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 10	-	-	Gray to black, thin-bedded siltstone.....	-
10- 60	-	-	Gray to black, limy shale, strike bedding N 25° W, vertical dip.	-
60- 91	-	-	Gray, broken dolomite, 3-inch altered zone at contact with shale (60 feet).	-
91- 93	50-1 217-2	50-1	Gray dolomite, 1-foot-wide zone of erratic cinnabar mineralization which starts in north wall and continues to south wall (N 50° W). Cinnabar occurs as fracture coating and is best in north wall of trench (see fig. 8).	2.22 2.73
93-129	-	-	Gray dolomite.....	-
129-130	-	-	Gray dolomite, minor cinnabar.....	-
130-141	-	-	Yellow dolomite, less hard than gray dolomite.	-
141-143	-	-	Fault gouge.....	-
143-160	51-1	51-1	Reddish shale, limonite coating on fractures. Petrographic analysis shows trace of cinnabar which was not noticed in field.	.005

Trench 11
(figure 5)

0 = West end Length: 270 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 11	-	170-2	Light gray dolomite with dark gray dolomite inclusions.	-
11- 15	-	-	Blue fault gouge, strike N 5° E.....	-
15- 36	-	-	Light gray dolomite.....	-
36- 54	-	172-2	Shale fault gouge (172-2), strike N 25° W, at 40 feet is 0.5 foot of altered limestone which also strikes N 25° W.	-
54- 63	-	-	Gray to yellow friable dolomite.....	-
63- 74	-	-	Light gray, hard dolomite.....	-
74- 78	173-2 48-1	173-2 48-1	Light gray, hard dolomite, small disseminated blebs and lenses of cinnabar, from 78 to 80 feet, a 1/8- to 1/4-inch-wide veinlet of cinnabar in center of trench.	0.03
78- 92	-	-	Light gray, hard dolomite.....	-
92- 95	174-2	-	Light gray, hard dolomite, with disseminated blebs and small lenses of cinnabar.	.13
95- 99	-	-	Light gray dolomite, no cinnabar.....	-
99-100	175-2	175-2	Light gray dolomite, disseminated cinnabar..	.11
100-110	-	-	Light gray dolomite.....	-
110-111	176-2 48-1 49-1	- 48-1 49-1	Light gray dolomite, 6-inch zone of cinnabar that strikes N 25° W. All of the mineralized sections of the trench from 74 to 111 feet strike about N 25° W. Sample 48-1 is a composite sample of numerous lenses and blebs of cinnabar with considerable dolomite. 49-1 is of selected high-grade cinnabar specimens.	2.92 1.37 6.54
111-121	-	-	Light to medium gray dolomite.....	-
121-122	177-2	-	Light to medium gray dolomite with disseminated blebs and lenses of cinnabar. Note: Special channel samples 56-3 to 67-3 have been taken over this area (74 to 122 feet) and are found in table 13.	.47
122-138	-	-	Light to medium gray dolomite.....	-
138-164	-	178-2	Fault gouge, shale, strike of contact at 164 feet is N 20° W.	-
164-210	-	-	Light gray dolomite.....	-
210-246	-	-	Dark gray, brecciated dolomite.....	-
246-270	-	-	Light gray dolomite.....	-

Trench 12
(figure 5)

0 = West end Length: 165 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 20	-	182-2	Gray to black, shaly limestone, calcite.....	-
20- 50	-	183-2	Yellow dolomite, minor limonite.....	-
50- 89	-	-	Light gray to yellow, fine-grained dolomite...	-
89-135	-	-	Light gray and gray dolomite, minor limonite..	-
135-159	-	186-2	Fault gouge, similar to 138-164 feet, trench 11, dolomite.	-
159-165	-	187-2	Light yellow dolomite.....	-

Trench 13
(figure 5)

0 = West end Length: 184 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 49	-	-	Black, fine-grained, shaly limestone, calcite stringers; bedding strike N 25° W, dip 85° W.	-
49- 88	-	189-2	Black, fine-grained shale.....	-
88- 96	190-2	190-2	Altered volcanic or trachyte.....	<0.01
96-169	-	-	Black, rusty yellow, silicified limestone, calcite stringers.	-
169-170	-	-	Fault gouge, strike normal to trench.....	-
170-173	-	192-2	Light rusty tan dolomite.....	-
173-174	-	-	Fault gouge, strike normal to trench.....	-
174-184	-	193-2	Dark gray dolomite, much calcite.....	-

Trench 14
(figure 5)

0 = West end Length: 190 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-100	-	-	Dark gray, fine-grained, thin-bedded limestone, strike of bedding N 22° W, dip 85° to 90° W.	-
100-190	-	-	Light to medium gray, very siliceous dolomite, no bedding, minor limonite stain. At 97 feet blue clay fault gouge 8 inches wide starts and enters west wall at 114 feet. Strike at 100 feet is N 21° W. There is more iron stain present at 100 feet than elsewhere.	-

Trench 15
(figure 5)

Not finished because of steep hillside and depth of overburden; probably dolomite; negative results in panning of overburden for cinnabar.

Trench 16
(figure 5)

0 = West end Length: 331 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 41	-	-	Light gray, siliceous dolomite, a few very small vugs or cavities.	-
41- 81	-	-	The same as 0 to 41 feet except much more limonite stain.	-
81- 99	-	150-2	Dark gray, fine-grained dolomite.....	-
99-110	-	-	Light gray, siliceous dolomite, a few very small vugs or cavities.	-
110-120	-	151-2	Dark gray to black, fine-grained, siliceous dolomite.	-
120-130	-	-	Gray, slightly brecciated dolomite.....	-
130-227	-	153-2	Light gray and yellow, siliceous dolomite, limonite stain. Very siliceous dark fragments of dolomite in lighter groundmass. At 133 feet is minor disseminated cinnabar in siliceous hot springs deposit.	-
227-245	-	-	Light gray, siliceous dolomite.....	-
245-248	-	156-2	Dark gray dolomite.....	-
248-251	-	-	Fault gouge, N 25° W.....	-
251-331	-	-	Black, fine-grained limestone, calcite stringers 330 to 331 feet, strike of bedding N 50° E, this section similar to east end of Brown Bear trenches.	

Trench 17
(figure 5)

0 = South end Length: 228 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 5	-	-	Black, fine-grained, siliceous limestone, has a platy structure, small calcite stringers.	-
5- 12	-	-	Blue clay fault, strike S 45° W.....	-
12- 35	-	121-2	Greenish black dolomite, petrographic analysis shows a trace of cinnabar, few small calcite and quartz stringers.	-
35- 64	-	-	No bedrock.....	-
64- 68	-	-	Black, fine-grained dolomite, small quartz stringers.	-
68-121	-	-	Black to yellow, broken dolomite.....	-
121-139	-	-	Yellow to gray, siliceous dolomite.....	-
139-155	-	125-2	Dark gray to yellow, brecciated, siliceous dolomite, reddish cast.	-
155-195	135-2 136-2 140-2 140A-2	135-2 136-2 140-2 140A-2	Dark gray to yellow dolomite, broken and brecciated. 135-2 loose cinnabar-bearing sand in west wall of trench. 136-2 pieces of geyserite containing cinnabar in the above sand. These samples at 170 feet. 140-2, 140A-2 loose unconsolidated material in west wall of trench at 175 feet.	18.7 40.0 .03 6.56
195-228	-	-	Dark gray to yellow, brecciated, broken dolomite, minor cinnabar at 200 feet.	-

Trench 17A--Cross Section
(figure 5)

0 = West end Length: 30 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0 - 3.5	-	127-2	This cross trench between trench 17 and trench 18 starts at 184 feet from 0 or south end of trench 17. Yellow-brown, friable geyserite or siliceous sinter, has a pumice-like texture.	-
3.5- 7.5	128-2	128-2	Brown, vuggy, broken limestone.....	0.13
7.5- 9	129-2	-	Brown, vuggy, broken limestone, quartz lenses, cinnabar.	10.36
9 -11	130-2	-	Brown, vuggy, broken, siliceous limestone, more quartz, minor cinnabar.	.05
11 -13	131-2	-	Brown, vuggy, broken, siliceous limestone, minor cinnabar.	2.02
13 -15.5	132-2	-	Fine sand (geyserite), light gray to yellow dolomite, minor cinnabar as soft paint or coating on fractures of dolomite.	2.98
15.5-18	133-2	-	Light gray to light yellow, siliceous, broken dolomite; trace cinnabar as soft paint or coating on fractures.	.12
18 -20	134-2	-	.....do.....	.33
20 -30	137-2 138-2	137-2 138-2	Yellow to gray dolomite, broken and brecciated, minor cinnabar. 137-2 is loose material found in large 12-inch diameter vug in dolomite rock. 138-2 is part of vug. Loose material in vug is geyserite.	.20 .06

Trench 18
(figure 5)

0 = South end Length: 250 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 33	-	1-2	Black, fine-grained, siliceous limestone with calcite stringers, has a platy or shaly structure, occasionally mammillary quartz on weathered fracture surfaces.	-
33- 55	-	1-2	Dark gray dolomite, blocky, numerous small lenses of calcite, limonite coating on fracture surfaces.	-
55- 83	-	-	Same as 33-55 feet but with less limonite.....	-
83- 89	-	-	Dark gray to black dolomite with a yellowish cast, more siliceous and more limonite than 0-83 feet, small angular inclusions of shale.	-
89- 92	-	-	Dark gray dolomite with minor red and green iron stain on fractures, strike of bedding N 5° E.	-
92-108	5-2	5-2	Dark gray, very siliceous, fine-grained dolomite, irregular blocky fractures.	0.01
108-112	7-2	-	Same as 89-92 feet, N 5° W.....	.01
112-123	-	-	Greenish gray dolomite, siliceous, cherty, many tiny vugs.	-
123-133	10-2	-	Dark gray to black dolomite with a yellowish cast, limonite on fractures, small angular shale inclusions. From 124-131 feet fine-grained cinnabar visible in trench walls (10-2).	11.5
133-137	11-2	11-2	Soft reddish yellow dolomite, petrographic analysis indicates a trace of cinnabar.	.02
137-163	-	-	Dark gray, siliceous dolomite, tiny stringers and blebs of calcite.	-
163-165	13-2	13-2	Soft reddish yellow dolomite.....	.01
165-250	-	-	Gray to dark gray dolomite, some high-grade cinnabar float in overburden from 200-250 feet.	-

Trench 19
(figure 5)

0 = West end Length: 193 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 18	-	-	Black to gray, shaly limestone.....	-
18-100	-	-	Black, fine-grained shale.....	-
100-128	-	-	Black to rusty, fine-grained, siliceous limestone, calcite stringers.	-
128-137	-	-	Fault, poorly exposed.....	-
137-159	-	-	Black, fine-grained limestone.....	-
159-171	-	-	Black, fine-grained dolomite, calcite stringers.	-
171-193	-	209-2	Altered volcanic or trachyte.....	-

Trench 20
(figure 5)

0 = West end Length: 418 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-218	-	195-2	Black, limy shale, few calcite stringers.....	-
218-263	-	209T-2	Black, fine-grained, limy shale, alternating in thin-bedded and blocky beds.	-
263-314	-	-	Same as 218-263 feet, but with limonite stain on fracture surfaces.	-
314-323	-	211-2	Altered volcanic or trachyte.....	-
323-358	-	-	Fault gouge, muck, poor bedrock exposures....	-
358-418	-	-	Light gray, siliceous dolomite.....	-

Trench 21
(figure 5)

0 = West end Length: 359 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-142	-	-	Gray to black, limy shale.....	-
142-200	-	-	Gray to black, fine-grained, limy shale.....	-
200-224	-	-	Gray to black, fine-grained, limy shale with considerable limonite stain on fractures.	-
224-237	-	-	Dark gray limestone.....	-
237-246	-	196-2	Altered volcanic or trachyte.....	-
246-275	-	-	Limestone and limy shale.....	-
275-359	-	-	Gray dolomite, minor cinnabar at 335 feet.....	-

Trench 22
(figure 5)

0 = West end Length: 100 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 79	-	146-2	Gray to yellow dolomite, limonite coating on fractures.	-
79- 80	-	147-2	Shaly limestone, minor cinnabar.....	-
80-100	-	-	Light gray, siliceous dolomite.....	-

Trench 23
(figure 5)

0 = North end Length: 125 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 17	-	218-2	Light to medium gray, siliceous, broken dolomite.	-
17- 26	-	-	Same as 0-17 feet, but more limonite.....	-
26- 29	220-2 221-2	220-2 -	Dark gray, siliceous dolomite, much limonite. Blebs and small lenses of cinnabar erratically disseminated in a poorly defined mineralized zone about 1 foot wide striking about N 10° W. Mineralization is best at center of trench and tends to fade or diminish toward the walls of the trench. 220-2 is sample of average mineralization in zone, 221-2 is sample of best mineralization in zone.	0.67 2.00
29- 45	-	-	Gray to yellow, siliceous dolomite.....	-
45- 47	223-2 224-2	223-2 224-2	Gray to yellow, siliceous dolomite with minor cinnabar. 223-2 is average sample, 224-2 is sample of best mineralization.	.01 1.06
47- 55	-	-	Gray to yellow, siliceous dolomite.....	-
55- 60	225-2 226-2 227-2	225-2 226-2 -	Yellow-brown dolomite, erratic cinnabar mineralization, dolomite often vuggy. Mineralization strikes N 45° W and could be continuation of cinnabar outcrop exposed in bank 75 feet to east and 25 feet lower. 225-2 is the top 12 inches of sinter in a 1- by 2-foot lens of cinnabar mineralization, 226-2 is of the mineralized dolomite under the sinter, 227-2 is average mineralization of zone. Trenching an additional foot in depth removed all visible cinnabar except that in trench walls.	10.98 3.13 .64
60- 61	228-2	228-2	Greenish gray dolomite, minor limonite.....	.03
61- 90	-	-	Gray to brown dolomite, much iron stain	-
90-125	-	-	Dark gray to yellow, hard, siliceous dolomite with calcite lenses, red iron mineralization.	-

Trench 24
(figure 5)

0 = North end Length: 550 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 83	-	-	Medium to light gray, siliceous dolomite.....	-
83-153	-	-	Medium to light gray, siliceous, slightly porous dolomite.	-
153-383	-	-	Medium gray, siliceous dolomite, zones with minor iron, less porous than 83-153 feet.	-
383-500	-	145-2	Light gray to yellow, siliceous dolomite, minor cinnabar at 463 feet.	-
500-550	-	-	Light gray to yellow dolomite, considerable iron stain.	-

Trench 25
(figure 5)

0 = West end Length: 170 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 28	-	159-2	Light gray dolomite, minor cinnabar at 24 feet.	-
28- 58	161-2	-	Light yellow to light gray dolomite, red iron stain.	0.06
58- 86	-	-	Yellow dolomite, much iron.....	-
86-110	-	-	Light gray, siliceous dolomite.....	-
110-128	-	165-2	Geyserite, medium gray, very hard and slightly porous, slightly reddish cast, minor cinnabar at 124 feet.	-
128-145	-	-	Gray, brecciated, siliceous dolomite, limonite coating on fractures.	-
145-152	-	-	Gray to yellow, fine-grained dolomite.....	-
152-154	-	168-2	Geyserite, dark steel gray, brecciated, siliceous.	-
154-170	-	-	Dark gray to yellow limestone, limonite stain.	-

Trench 26
(figure 5)

0 = North end Length: 600 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-600	-	-	Gray dolomite, bedrock poorly exposed in much of trench, minor erratic cinnabar lenses in last 75 feet on both sides of trench, mineralization similar to South Zone.	-

Trench 27
(figure 5)

0 = North end Length: 44 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-44	-	-	Dark gray to yellow, siliceous dolomite with a reddish cast.	-

Trench 28
(figure 5)

0 = West end Length: 270 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-270	-	-	Partially exposed bedrock, much muck, water, gray limestone and gray to dark gray limy shale. No evidence of cinnabar.	-

Trench 29
(figure 5)

Not excavated to bedrock owing to frost, deep overburden, and caving trench walls. Much gravel present in walls; loose material in trench bottom indicates bedrock may be limy shale. No cinnabar mineralization found in trench.

Trench 30
(figure 5)

0 = North end

Length: 540 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-100	-	-	Gray, limy shale, reddish iron stain common as coating on fractures.	-
100-118	-	-	Gray dolomite.....	-
118-150	-	-	Gray dolomite and altered volcanic or trachyte. Starting at 118 feet and 2.5 feet from west wall of trench and striking N 10° E and entering east wall at 153 feet was a 1-foot-wide mineralized zone consisting of a top layer of 3 to 12 inches of white claylike trachyte then 0.5 to 1 foot of brown disintegrated dolomite containing much cinnabar. Mineralization abruptly ended at maximum depth of 1 foot. Additional trenching removed all evidence of mineralization. The 10 feet of overburden gave no clue to this mineralization.	-
	-	225A-2	White claylike trachyte at 127 feet.....	-
	226A-2	226A-2	Rusty brown dolomite with much cinnabar capped by 1 foot of white claylike trachyte at 118 feet.	59.3
	227A-2	227A-2	Same as 226A-2 except at 141 feet, vuggy, bright red.	61.3
	228A-2	228A-2	Brown, disintegrated dolomite below the rich cinnabar-bearing dolomite, appears to contain no cinnabar. Suspect sample was salted.	4.05
	229A-2	229A-2	Rusty claylike trachyte at 135 feet.....	.06
	-	230A-2	Brown, decomposed dolomite directly under 229A-2 at 135 feet.	-
	-	231A-2	Trachyte at 134 feet, looks like greenish limestone or a greenish coating on black limestone.	-
	-	232-2	Steel gray, fine-grained, fresh trachyte at 134 feet.	-
150-161	-	234-2	Dark gray to black, siliceous and cherty dolomite, limonite. 4 feet in toward the center from the west side of the trench and parallel with the strike of the trench from 150-161 feet is a 0.5-foot-wide zone of trachyte that looks like a blue clay fault gouge (234-2).	-
161-178	-	-	Dark gray, fine-grained dolomite.....	-
178-210	-	-	Gray to dark gray, siliceous shale and argillaceous limestone. Strike of bedding is N 25° W.	-
210-286	-	-	Same as 178-210 feet with some yellow to brown limonite and segments of trachyte as in sample 234-2.	-
286-315	-	237-2	Yellow to brown, siliceous dolomite with dark grains.	-
315-440	-	238-2	Black, fine-grained limestone.....	-
440-484	-	239-2	Trachyte, looks like gray quartzite, abundant sanidine, siderite, and mesitite present.	-
484-523	-	240A-2	Trachyte, dark gray to rusty gray, looks like sandstone or siliceous limestone, petrographic analysis shows a trace of cinnabar.	-
523-540	-	240B-2	Same as 484-523 feet, but no cinnabar.....	-

Trench 31
(figure 5)

Deep, caving overburden made it impractical to complete this trench. Trench 34 exposes bedrock in the area from a better angle.

Trench 32
(figure 7)

0 = West end Length: 145 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0- 5	-	-	Gray dolomite.....	-
5- 16	-	-	Dark gray, fine-grained, platy limestone.....	-
16- 17	-	-	Fault gouge, strike N 5° E.....	-
17- 24	-	-	Black to gray limestone, platy, dip 85°+ to west.	-
24- 26	-	-	Yellow, siliceous limestone, strike N 20° W.....	-
26- 32	-	-	Black to gray, platy limestone.....	-
32- 34	-	-	Yellow, siliceous limestone.....	-
34- 38	-	-	Black, very hard, dense dolomite, some quartz...	-
38-145	-	-	Yellow to brown limestone, limonite coating on fractures.	-

Trench 33
(figure 7)

0 = West end Length: 315 feet

Very similar to trench 32, alternate zones of dolomite and limestone with limestone predominating; no cinnabar.

Trench 34
(figure 5)

0 = West end Length: 65 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-65	-	-	Gray to yellow dolomite, limonite coating on fractures. No cinnabar.	-

Trench 35
(figure 5)

0 = East end Length: 340 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-340	-	-	Gray to dark gray limestone and shale, limonite coating on fractures, minor dolomite. No cinnabar.	-

Trench 36
(figure 5)

0 = North end Length: 260 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-260	-	-	Light gray to yellow, siliceous dolomite, minor cinnabar from 65-70 feet, slight green cast to dolomite adjacent to cinnabar.	-

Trench 37
(figure 5)

0 = East end Length: 445 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-445	-	-	Interbedded sandy shale and limestone; no cinnabar mineralization.	-

Trench 38
(figure 5)

0 = West end Length: 230 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-230	-	-	Dark gray, sandy limestone, no cinnabar mineralization.	-

Trench 39
(figure 5)

0 = West end Length: 125 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-125	-	-	Gray, sandy shale, limestone, no cinnabar mineralization.	-

Trench 40
(figure 5)

0 = North end Length: 40 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-40	-	-	Dark gray limestone and dark gray shale; no cinnabar mineralization.	-

Trench 41
(figure 5)

0 = North end Length: 245 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-245	-	-	Dark gray, sandy shale, no cinnabar mineralization.	-

Trench 42
(figure 6)

0 = West end Length: 290 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-290	-	-	Dark gray, sandy shale, minor limonite.....	-

Trench 43
(figure 7)

0 = East end Length: 555 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-555	-	-	Trenched to approximately 15 feet; no bedrock, all frozen gravel and large boulders. No cinnabar mineralization or float in overburden. Glacial gravels.	-

Trench 44
(figure 7)

0 = East end Length: 128 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-128	-	-	No bedrock, trenched to approximately 12 feet in glacial gravels, permafrost to bottom, no evidence of cinnabar in overburden.	-

Trench 45
(figure 7)

0 = North end Length: 180 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-180	-	-	No bedrock, trenched to approximately 12 feet in glacial gravels, permafrost to bottom, no evidence of cinnabar in overburden.	-

Trench 46
(figure 7)

0 = East end Length: 236 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-236	-	-	No bedrock, permafrost, much muck, frozen silt, gravels, poor drainage, no evidence of cinnabar. Trenched to about 6 feet.	-

Trench 47
(figure 7)

0 = West end Length: 712 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-712	-	-	No bedrock, trench to 15- to 20-foot depth in places, all glacial gravels and still permafrost to bottom of maximum depth. Many boulders up to 2 to 3 feet in diameter. No evidence of cinnabar.	-

Trench 48
(figure 7)

0 = West end Length: 110 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-110	-	-	No bedrock, trenched to 10-foot depth, glacial gravels, large boulders, all permafrost, no evidence of cinnabar.	-

Trench 49
(figure 7)

0 = West end Length: 180 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-180	-	-	No bedrock, trench to 10-foot depth, glacial gravels, all permafrost, no evidence of cinnabar.	-

Trench 50
(figure 6)

0 = East end Length: 87 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-87	-	-	Dark gray, thin-bedded, shaly limestone, strike of bedding N 20° W, vertical dip. No cinnabar.	-

Trench 51
(figure 6)

0 = East end Length: 105 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-105	-	-	Dark gray, thin-bedded, shaly limestone and black limestone with calcite stringers, few hard reefs of limestone, strike of bedding N 15° W. No cinnabar.	-

Trench 52
(figure 6)

0 = South end Length: 300 feet

Interval, feet	Sample C	Sample P	Description	Percent mercury
0-300	-	92-3	Medium gray, hard, siliceous dolomite, minor calcite and iron stain. Trace cinnabar at 150 feet.	-

APPENDIX B.--PETROGRAPHIC ANALYSES OF TRENCH SAMPLES

The same numbering system is used here as in appendix A. The following legend applies to all petrographic samples in appendix B.

P--Predominant..... Over 50 percent.

A--Abundant..... 10 - 50 percent.

S--Subordinate..... 2 - 10 percent.

M--Minor..... 0.5 - 2 percent.

F--Few..... 0.1 - 0.5 percent.

T--Trace..... Less than 0.1 percent.

C--Rock classification.

X--Detected in sample.

	Sample											
	3-1	4-1	5-1	6-1	7-1	8-1	9-1	10-1	11-1	12-1	13-1	14-1
Trench.....	1	1	1	1	1	2	2	2	2	2	2	2
Rock classification:												
Altered volcanic.....	-	-	-	-	-	-	-	-	-	-	-	-
Clay.....	-	-	-	-	-	-	-	-	-	-	-	-
Dolomite.....	-	C	C	C	-	-	-	-	C	C	C	C
Gossan.....	-	-	-	-	-	-	-	-	-	-	-	-
Limestone.....	-	-	-	-	C	C	C	C	-	-	-	-
Shale.....	C	-	-	-	-	-	C	-	-	-	-	-
Springs deposit.....	-	-	-	-	-	-	-	-	-	-	-	-
Mineral:												
Albite.....	-	-	-	-	-	-	-	-	-	-	-	-
Andesine.....	-	-	-	-	-	-	-	-	-	-	-	-
Augite.....	-	-	-	-	-	-	-	-	-	-	-	-
Biotite.....	-	-	-	-	-	-	-	-	-	-	-	-
Calcite.....	A	-	-	M	P	A	A	P	-	-	F	S
Carbon.....	-	-	-	-	-	A	A	-	-	-	-	-
Chlorite.....	A	-	-	-	-	-	M	-	-	-	-	-
Cinnabar.....	X	X	-	M	-	T	-	-	T	T	S	S
Dolomite.....	S	A	P	P	-	-	-	-	P	P	P	P
Illite.....	A	A	-	-	-	A	A	-	M	-	-	-
Kaolin minerals.....	-	S	-	-	-	M	-	-	-	-	-	-
K-feldspar.....	-	-	-	-	-	-	-	-	-	-	-	-
Limonite.....	-	S	M	-	-	-	-	-	-	-	-	-
Magnetite.....	-	-	-	-	-	-	-	-	-	-	-	-
Mesitite.....	-	-	-	-	-	-	-	-	-	-	-	-
Muscovite.....	-	-	-	-	-	-	-	-	-	-	-	-
Pyrite.....	-	-	-	-	-	-	T	-	-	-	-	-
Quartz.....	-	-	T	-	-	A	T	-	M	-	-	-
Sanidine.....	-	-	-	-	-	-	-	-	-	-	-	-
Siderite.....	-	-	-	-	-	-	-	-	-	-	-	-

	Sample										
	15-1	16-1	17-1	18-1	19-1	20-1	21-1	22-1	23-1	24-1	25-1
Trench	2	2	2	3	3	3	3	3	3	3	4
Rock classification:											
Altered volcanic	-	-	-	-	-	-	-	-	-	-	-
Clay	-	-	-	-	-	-	-	-	-	-	-
Dolomite	C	C	-	-	-	C	C	-	C	-	-
Gossan	-	-	-	-	C	-	-	-	-	-	-
Limestone	-	-	-	C	-	-	-	-	-	-	-
Shale	-	-	C	-	-	-	-	C	-	C	C
Springs deposit	-	-	-	-	-	-	-	-	-	-	-
Mineral:											
Albite	-	-	-	-	-	-	-	-	-	-	-
Andesine	-	-	-	-	-	-	-	-	-	-	-
Augite	-	-	-	-	-	-	-	-	-	-	-
Biotite	-	-	-	-	-	-	-	-	-	-	-
Calcite	-	-	-	P	M	-	-	-	-	-	M
Carbon	-	-	-	-	-	-	-	-	-	-	-
Chlorite	-	-	-	T	M	-	M	A	-	S	A
Cinnabar	F	A	T	-	T	-	T	X	T	T	T
Dolomite	P	P	-	-	-	P	P	-	P	-	M
Illite	-	-	P	-	M	-	-	P	-	P	P
Kaolin minerals	-	-	-	-	P	-	-	-	-	-	-
K-feldspar	-	-	-	-	-	-	-	-	-	-	-
Limonite	A	-	-	-	S	-	-	-	-	M	S
Magnetite	-	-	-	-	-	-	-	-	-	-	-
Mesitite	-	-	-	-	-	-	-	-	-	-	-
Muscovite	-	-	-	-	-	-	-	-	-	-	-
Pyrite	-	-	-	-	T	-	-	-	-	-	-
Quartz	-	-	M	-	-	-	M	M	-	M	-
Sanidine	-	-	-	-	-	-	-	-	-	-	-
Siderite	-	-	-	-	-	-	-	-	-	-	-

	Sample										
	26-1	27-1	28-1	29-1	30-1	31-1	32-1	33-1	34-1	35-1	35A-1
Trench	4	4	4	4	4	4	4	4	5	5	6
Rock classification:											
Altered volcanic	-	-	-	-	-	-	-	-	-	-	-
Clay	-	-	-	-	-	-	-	-	-	-	-
Dolomite	-	-	C	-	-	C	-	-	C	C	-
Gossan	-	-	-	-	-	-	-	-	-	-	-
Limestone	-	-	-	-	-	-	-	C	-	-	-
Shale	C	C	-	C	C	-	C	-	-	-	C
Springs deposit	-	-	-	-	-	-	-	-	-	-	-
Mineral:											
Albite	-	-	-	-	-	-	-	-	-	-	-
Andesine	-	-	-	-	-	-	-	-	-	-	-
Augite	M	-	-	-	-	-	-	-	-	-	-
Biotite	-	-	-	-	-	-	-	-	-	-	-
Calcite	A	S	M	-	-	S-f	-	P	A	T	M
Carbon	-	-	-	-	-	-	-	-	-	-	-
Chlorite	-	S	-	A	-	-	-	-	-	-	-
Cinnabar	X	-	X	T	-	X	X	-	T	T	T
Dolomite	-	-	P	-	-	P	A	-	P	P	-
Illite	A	P	-	P	P	-	P	-	-	-	P
Kaolin minerals	-	-	-	-	-	-	-	-	-	-	-
K-feldspar	-	-	-	-	-	-	-	-	-	-	-
Limonite	S	S	-	T	-	-	-	-	-	-	-
Magnetite	-	-	-	-	-	-	-	-	-	-	-
Mesitite	-	-	-	-	-	-	-	-	-	-	-
Muscovite	-	-	-	-	-	-	-	-	-	-	-
Pyrite	-	-	-	-	-	-	-	-	-	-	-
Quartz	-	-	-	M	-	-	S	-	-	-	-
Sanidine	-	-	-	-	-	-	-	-	-	-	-
Siderite	-	-	-	-	-	-	-	-	-	-	-

	Sample										
	36-1	37-1	38-1	39-1	40-1	41-1	42-1	43-1	44-1	45-1	46-1
Trench	6	6	6	6	7	7	7	7	7	7	7
Rock classification:											
Altered volcanic	-	-	-	-	-	C	-	-	-	-	-
Clay	-	-	-	-	-	-	-	-	-	-	-
Dolomite	-	C	-	-	-	-	C	C	C	C	-
Gossan	-	-	-	-	-	-	-	-	-	-	-
Limestone	-	-	-	C	-	-	-	-	-	-	-
Shale	C	-	C	-	C	-	-	-	-	-	C
Springs deposit	-	-	-	-	-	-	-	-	-	-	-
Mineral:											
Albite	-	-	-	-	-	-	-	-	-	-	-
Andesine	-	-	-	-	-	-	-	-	-	-	-
Augite	-	-	-	-	-	-	-	-	-	-	-
Biotite	-	-	-	-	-	-	-	-	-	-	-
Calcite	S	f	-	P	S	S	-	M	A	M-f	-
Carbon	-	-	-	-	-	-	-	-	-	-	-
Chlorite	-	-	A	-	-	A	-	-	-	-	A
Cinnabar	-	-	T	-	-	-	-	-	T	-	T
Dolomite	A	P	-	-	S	-	P	P	P	P	-
Illite	-	-	P	-	P	-	A	-	-	-	A
Kaolin minerals	-	-	-	-	-	-	-	-	-	-	-
K-feldspar	-	-	-	-	-	A	-	-	-	-	-
Limonite	-	-	-	-	-	A	-	-	-	-	-
Magnetite	-	-	-	-	-	-	-	-	-	-	-
Mesitite	-	-	-	-	-	-	-	-	-	-	-
Muscovite	-	-	-	-	-	-	-	-	-	-	-
Pyrite	-	-	-	-	-	-	-	-	-	-	-
Quartz	-	-	S	M	-	-	-	-	-	-	A
Sanidine	-	-	-	-	-	-	-	-	-	-	-
Siderite	-	-	-	-	-	-	-	-	-	-	-

	Sample											
	47-1	48-1	49-1	50-1	51-1	1-2	2-2	5-2	10-2	11-2	13-2	121-2
Trench	7	11	11	10	10	18	18	18	18	18	18	17
Rock classification:												
Altered volcanic	-	-	-	-	-	-	-	-	-	-	-	-
Clay	-	-	-	-	-	-	-	-	-	-	-	-
Dolomite	-	C	C	C	-	-	C	C	C	C	C	C
Gossan	-	-	-	-	-	-	-	-	-	-	-	-
Limestone	C	-	-	-	-	C	-	-	-	-	-	-
Shale	-	-	-	-	C	-	-	-	-	-	-	-
Springs deposit	-	-	-	-	-	-	-	-	-	-	-	-
Mineral:												
Albite	-	-	-	-	-	-	-	-	-	-	-	-
Andesine	-	-	-	-	-	-	-	-	-	-	-	-
Augite	-	-	-	-	-	-	-	-	-	-	-	-
Biotite	-	-	-	-	-	-	-	-	-	-	-	-
Calcite	P	-	F	T	-	P	M	M	M	-	-	S
Carbon	-	-	-	-	-	-	-	-	-	-	-	-
Chlorite	-	-	-	-	-	-	-	-	F	-	-	-
Cinnabar	-	T	A	S	T	-	-	-	T	T	-	T
Dolomite	-	P	P	P	-	-	P	P	P	P	P	P
Illite	-	-	-	-	P	-	-	-	-	-	-	-
Kaolin minerals	-	-	-	-	-	-	-	-	-	-	-	-
K-feldspar	-	-	-	-	-	-	-	-	-	-	-	-
Limonite	-	-	-	-	S	-	T	F	-	M	S	-
Magnetite	-	-	-	-	-	-	-	-	-	-	-	-
Mesitite	-	-	-	-	-	-	-	-	-	-	-	-
Muscovite	-	-	-	-	-	-	-	-	-	-	-	-
Pyrite	-	-	-	-	-	-	-	-	-	-	-	-
Quartz	M	-	-	S	-	M	-	-	-	M	-	S
Sanidine	-	-	-	-	-	-	-	-	-	-	-	-
Siderite	-	-	-	-	-	-	-	-	-	-	-	-

	Sample								
	125-2	127-2	128-2	135-2	136-2	137-2	138-2	140-2	142-2
Trench	17	17	17	17	17	17	17	17	14
Rock classification:									
Altered volcanic	-	-	-	-	-	-	-	-	-
Clay	-	-	-	-	-	-	-	-	-
Dolomite	C	-	-	C	-	C	C	C	C
Gossan	-	-	-	-	-	-	-	-	-
Limestone	-	-	C	-	-	-	-	-	-
Shale	-	-	-	-	-	-	-	-	-
Springs deposit	-	C	-	-	C	C	-	C	-
Mineral:									
Albite	-	-	-	-	-	-	-	-	-
Andesine	-	-	-	-	-	-	-	-	-
Augite	-	-	-	-	-	-	-	-	-
Biotite	-	-	-	-	-	-	-	-	-
Calcite	T	A	P	-	-	-	-	-	-
Carbon	-	-	-	-	-	-	-	-	-
Chlorite	-	S	-	-	-	-	-	-	-
Cinnabar	-	-	S	S	A	T	-	A	-
Dolomite	P	M	-	P	S	A	P	A	P
Illite	-	S	-	-	-	-	-	-	-
Kaolin minerals	-	S	-	-	-	-	-	-	-
K-feldspar	-	-	-	-	-	-	-	-	-
Limonite	-	M	-	-	-	-	-	-	-
Magnetite	-	-	-	-	-	-	-	-	-
Mesitite	-	-	-	-	-	-	-	-	-
Muscovite	-	-	-	-	-	-	-	-	-
Pyrite	-	-	-	-	-	-	-	-	-
Quartz	M	P	S	M	P	P	-	M	S
Sanidine	-	-	-	-	-	-	-	-	-
Siderite	-	-	-	-	-	-	-	-	-

	Sample								
	145-2	146-2	147-2	150-2	151-2	153-2	156-2	157-2	159-2
Trench	24	22	22	16	16	16	16	16	25
Rock classification:									
Altered volcanic	-	-	-	-	-	-	-	-	-
Clay	-	-	-	-	-	-	-	-	-
Dolomite	C	C	-	C	C	C	C	-	C
Gossan	-	-	-	-	-	-	-	-	-
Limestone	-	-	C	-	-	-	-	C	-
Shale	-	-	-	-	-	-	-	-	-
Springs deposit	-	-	-	-	-	C	-	-	-
Mineral:									
Albite	-	-	-	-	-	-	-	-	-
Andesine	-	-	-	-	-	-	-	-	-
Augite	-	-	-	-	-	-	-	-	-
Biotite	-	-	-	-	-	-	-	-	-
Calcite	M	-	P	-	T	T	T	P	-
Carbon	-	-	-	-	-	-	-	-	-
Chlorite	-	-	S	-	-	-	-	-	-
Cinnabar	-	-	T	-	T	M	T	-	T
Dolomite	P	P	M	P	P	A	P	-	P
Illite	-	-	S	-	-	-	-	-	-
Kaolin minerals	-	-	M	-	-	-	-	-	-
K-feldspar	-	-	-	-	-	-	-	-	-
Limonite	-	-	-	-	-	-	-	F	-
Magnetite	-	-	-	-	-	-	-	-	-
Mesitite	-	-	-	-	-	-	-	-	-
Muscovite	-	-	-	-	-	-	-	-	-
Pyrite	-	-	-	-	-	-	-	-	-
Quartz	-	-	T	-	-	P	T	M	-
Sanidine	-	-	-	-	-	-	-	-	-
Siderite	-	-	-	-	-	-	-	-	-

	Sample								
	165-2	168-2	170-2	172-2	173-2	175-2	178-2	182-2	183-2
Trench	25	25	11	11	11	11	11	12	12
Rock classification:									
Altered volcanic	-	-	-	-	-	-	-	-	-
Clay	-	-	-	-	-	-	-	-	-
Dolomite	-	-	C	-	C	C	-	-	C
Gossan	-	-	-	-	-	-	-	-	-
Limestone	-	-	-	-	-	-	-	C	-
Shale	-	-	-	C	-	-	C	-	-
Springs deposit	C	C	-	-	-	-	-	-	-
Mineral:									
Albite	-	-	-	-	-	-	-	-	-
Andesine	-	-	-	-	-	-	-	-	-
Augite	-	-	-	-	-	-	-	-	-
Biotite	-	-	-	-	-	-	-	-	-
Calcite	-	-	A	S	F	F	-	A	S
Carbon	-	-	-	-	-	-	-	-	-
Chlorite	-	-	-	A	-	-	A	S	-
Cinnabar	T	-	-	-	-	M	-	-	-
Dolomite	-	M	P	-	P	P	-	-	P
Illite	-	-	-	P	-	-	P	A	-
Kaolin minerals	-	S	-	-	-	-	-	-	-
K-feldspar	-	-	-	-	-	-	-	-	-
Limonite	-	S	F	S	-	-	F	M	F
Magnetite	-	-	-	-	-	-	-	-	-
Mesitite	-	-	-	-	-	-	-	-	-
Muscovite	-	T	-	-	-	-	-	-	-
Pyrite	-	-	-	-	-	-	-	-	-
Quartz	P	P	-	-	T	-	A	-	-
Sanidine	-	-	-	-	-	-	-	-	-
Siderite	-	-	-	-	-	-	-	-	-

	Sample								
	186-2	187-2	189-2	190-2	192-2	193-2	195-2	196-2	200-2
Trench	12	12	13	13	13	13	20	21	6
Rock classification:									
Altered volcanic	-	-	-	C	-	-	-	C	-
Clay	-	-	-	-	-	-	-	-	-
Dolomite	C	C	-	-	C	C	-	-	C
Gossan	-	-	-	-	-	-	-	-	-
Limestone	-	-	-	-	-	-	-	-	-
Shale	-	-	C	-	-	-	C	-	-
Springs deposit	-	-	-	-	-	-	-	-	-
Mineral:									
Albite	-	-	-	-	-	-	-	-	-
Andesine	-	-	-	-	-	-	-	-	-
Augite	-	-	-	-	-	-	-	-	-
Biotite	-	-	-	-	-	-	-	-	-
Calcite	M	A	S	A	-	A	S	A	F
Carbon	-	-	-	-	-	-	-	-	-
Chlorite	-	-	A	A	-	A	-	A	-
Cinnabar	-	-	-	-	-	-	-	-	F
Dolomite	P	P	-	-	P	P	S	T	P
Illite	-	-	P	-	A	-	P	-	-
Kaolin minerals	-	-	-	-	-	-	-	-	-
K-feldspar	-	-	-	-	-	-	-	-	-
Limonite	-	T	-	A	M	T	-	A	-
Magnetite	-	-	-	-	-	-	-	-	-
Mesitite	-	-	-	-	-	-	-	-	-
Muscovite	-	-	-	-	-	-	-	-	-
Pyrite	-	-	-	-	-	-	-	-	-
Quartz	-	-	-	M	-	-	-	-	-
Sanidine	-	-	-	S	-	-	-	A	-
Siderite	-	-	-	-	-	-	-	-	-

	Sample								
	201-2	205-2	206-2	209-2	209T-2	211-2	213-2	215-2	218-2
Trench	6	7	7	19	20	20	7	26	23
Rock classification:									
Altered volcanic	-	C	-	C	-	C	-	-	-
Clay	-	-	-	-	-	-	C	-	-
Dolomite	-	-	C	-	-	-	-	C	C
Gossan	-	-	-	-	-	-	-	-	-
Limestone	C	-	-	-	-	-	-	-	-
Shale	-	-	-	-	C	-	-	-	-
Springs deposit	-	-	-	-	-	-	-	-	-
Mineral:									
Albite	-	-	-	-	-	-	-	-	-
Andesine	-	-	-	-	-	-	-	-	-
Augite	-	-	-	-	-	-	-	-	-
Biotite	-	-	-	-	-	-	-	-	-
Calcite	P	A	A	S	A	A	T	-	F
Carbon	-	-	-	-	-	-	-	-	-
Chlorite	-	S	-	A	-	S	A	-	A
Cinnabar	-	-	-	-	-	-	-	T	-
Dolomite	-	-	A	M	M	-	-	P	P
Illite	-	-	-	-	P	-	A	-	-
Kaolin minerals	-	-	-	-	-	-	P	-	-
K-feldspar	-	-	-	-	-	-	-	-	-
Limonite	-	A	M	A	-	S	M	-	S
Magnetite	-	-	-	-	-	-	-	-	-
Mesitite	-	-	-	-	-	-	-	-	-
Muscovite	-	-	-	P	-	-	-	-	-
Pyrite	-	-	-	-	-	-	-	-	-
Quartz	F	-	-	-	-	-	S	S	M
Sanidine	-	A	-	-	-	A	-	-	-
Siderite	-	-	-	-	-	-	-	-	-

	Sample								
	220-2	224-2	225-2	225A-2	226-2	226A-2	227A-2	228-2	228A-2
Trench	23	23	23	30	23	30	30	23	30
Rock classification:									
Altered volcanic	-	-	-	C	-	-	-	-	-
Clay	-	-	-	-	-	-	-	-	-
Dolomite	C	C	C	-	C	C	C	C	C
Limestone	-	-	-	-	-	-	-	-	-
Shale	-	-	-	-	-	-	-	-	-
Springs deposit	-	-	C	-	-	-	-	-	-
Mineral:									
Albite	-	-	-	-	-	-	-	-	-
Andesine	-	-	-	-	-	-	T	-	-
Augite	-	-	-	-	-	-	-	-	-
Biotite	-	-	-	-	-	-	-	-	-
Calcite	M	S	-	-	A	M	-	F	-
Carbon	-	-	-	-	-	-	-	-	-
Chlorite	-	-	-	S	-	-	-	-	-
Cinnabar	S	A	S	-	T	P	P	T	S
Dolomite	P	P	A	-	P	A	S	P	A
Illite	-	-	-	P	-	-	-	-	-
Kaolin minerals	-	-	-	-	-	-	-	-	-
K-feldspar	-	-	-	-	-	-	-	-	-
Limonite	-	-	-	-	-	A	S	F	A
Magnetite	-	-	-	-	-	-	-	-	-
Mesitite	-	-	-	-	-	-	-	-	-
Muscovite	-	-	-	-	-	-	-	-	-
Pyrite	-	-	-	-	-	-	-	-	-
Quartz	T	-	P	-	S	-	-	-	A
Sanidine	-	-	-	-	-	-	-	-	-
Siderite	-	-	-	-	-	-	-	-	-

	Sample								
	229A-2	230A-2	231A-2	232-2	234-2	237-2	238-2	239-2	240A-2
Trench	30	30	30	30	30	30	30	30	30
Rock classification:									
Altered volcanic	C	C	C	C	C	-	-	C	C
Clay	-	-	-	-	-	-	-	-	-
Dolomite	-	-	-	-	-	C	-	-	-
Gossan	-	-	-	-	-	-	-	-	-
Limestone	-	-	-	-	-	-	C	-	-
Shale	-	-	-	-	-	-	-	-	-
Springs deposit	-	-	-	-	-	-	-	-	-
Mineral:									
Albite	-	-	-	-	-	-	-	-	-
Andesine	-	-	-	-	-	-	-	-	-
Augite	-	-	-	-	-	-	-	-	-
Biotite	P	P	-	-	-	-	-	-	-
Calcite	-	-	S	A	A	-	P	A	-
Carbon	-	-	-	-	-	-	M	-	-
Chlorite	A	A	A	P	A	S	-	-	M
Cinnabar	F	-	T	-	-	-	-	-	T
Dolomite	M	-	-	-	-	P	-	-	-
Illite	-	-	-	-	-	-	-	-	-
Kaolin minerals	-	-	-	-	-	-	-	-	-
K-feldspar	-	-	-	-	-	-	-	-	-
Limonite	A	S	S	S	S	S	T	-	M
Magnetite	-	-	-	-	-	-	-	-	-
Mesitite	-	-	-	-	-	-	-	S	-
Muscovite	A	A	A	-	S	-	-	A	A
Pyrite	-	-	T	T	-	-	-	T	-
Quartz	-	-	-	-	-	-	-	-	-
Sanidine	-	-	-	A	A	-	-	A	P
Siderite	-	-	-	-	-	-	-	S	-

	Sample				
	240B-2	91-3	92-3	93-3	94-3
Trench	30	51	52	42	41
Rock classification:					
Altered volcanic	C	-	-	-	-
Clay	-	-	-	-	-
Dolomite	-	-	C	-	-
Gossan	-	-	-	-	-
Limestone	-	C	-	-	-
Shale	-	-	-	C	C
Springs deposit	-	-	-	-	-
Mineral:					
Albite	-	-	-	-	-
Andesine	-	-	-	-	-
Augite	-	-	-	-	-
Biotite	-	-	-	-	-
Calcite	A	P	-	S	M
Carbon	-	-	-	-	-
Chlorite	-	A	T	P	P
Cinnabar	-	-	-	-	-
Dolomite	-	-	P	-	T
Illite	-	S	T	A	A
Kaolin minerals	-	-	-	-	-
K-feldspar	-	-	-	-	-
Limonite	S	M	T	-	F
Magnetite	-	-	-	-	-
Mesitite	-	-	-	-	-
Muscovite	A	-	-	-	-
Pyrite	T	-	-	-	-
Quartz	-	-	-	-	S
Sanidine	A	-	-	-	-
Siderite	-	-	-	-	-

APPENDIX C.--LOGS OF DIAMOND-DRILL HOLES

The detailed logs of drillholes are arranged in chronological order of drilling. Hole location coordinates and collar elevations were determined by transit, chain, and stadia surveys. The original bearing of the traverse was a compass bearing between two semipermanent hubs near the airstrip and drillhole 1; the original elevation was based on interpolation from a Geological Survey map (4). The hole drilling dates are for elapsed time from the date the hole started to completion date including Sundays (none worked), and also include maintenance work on drill and accessory equipment that was necessary while a hole was in progress. Holes 6, 7, and 13 were BX size; all others were AX size, except for a short BX interval at the start. The column "C" stands for chemical and "P" for petrographic analyses. Sample numbers listed under these columns are in chronological number by year; that is, 7-1 means sample 7 taken in 1961, while 7-2 means sample 7 taken in 1962. Analyses of samples listed in the columns are found with the logs or in appendix D or E. Holes 1 to 8 were drilled in 1961, holes 9 to 14 in 1962. The core interval sampled does not always coincide with the drill run; the core was sampled when mineralization occurred. In calculating assays for the entire run as found in appendix D that section of core not assayed was assumed to contain no mercury.

Diamond-drill hole 1

Location: N 9,705.5, E 11,102.0
Elevation of collar: 2,098.9
Depth: 149.3 feet
Dip: -44°23'
Bearing: S 76°13' W

Date begun: June 23, 1961
Date finished: June 27, 1961
Core sizes: 0.0 - 13.0, BX
13.0 - 149.3, AX

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
0.0	5.0	5.0	100	-	-	Overburden of brown, broken dolomite.	-
5.0	9.5	4.5	62	-	-	Black, broken dolomite, partially cemented with yellow, friable dolomite, few small quartz stringers and considerable iron stain.	-
9.5	11.6	2.1	85	-	-	Same as 5.0 to 9.5 feet, but more iron stain.	-
11.6	13.0	1.4	36	-	-	Broken and shattered siliceous tan dolomite, fractures partially filled with soft, yellow, friable dolomite, minor iron stain.	-
13.0	14.0	1.0	90	-	-	Dark gray, cherty, recemented dolomite, iron stain.	-
14.0	16.8	2.8	86	-	-	Dark gray, dense dolomite, minor iron.	-

Diamond-drill hole 1--Continued

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
16.8	21.1	4.3	33	-	-	Broken, gray dolomite, limonite stain.	-
21.1	29.2	8.1	38	-	-	Medium gray dolomite, minor limonite.	-
29.2	29.9	.7	86	-	-	Medium gray dolomite, shattered, recemented.	-
29.9	39.4	9.5	79	-	-	Medium gray dolomite, soft yellow dolomite on fractures, few calcite stringers, minor iron stain.	-
39.4	39.5	.1	100	-	-	Limestone, light and dark gray, thin alternating beds, folded and deformed.	-
39.5	41.6	2.1	100	-	-	Same as 29.9 to 39.4 feet.....	-
41.6	43.7	2.1	100	-	-	Medium to light gray dolomite, much iron stain.	
43.7	44.3	.6	100	-	-	Light gray, soft, thin-bedded limestone, limonite coating on bedding planes which are 45° to axis of core.	-
44.3	49.6	5.3	47	-	-	Gray, broken, soft dolomite, much limonite coating on fractures.	-
49.6	55.0	5.4	29	-	-	Light gray, fairly soft dolomite with a few vugs, yellow dolomite coating on fractures.	-
55.0	55.5	.5	100	1-1	-	Gray, hard, cherty dolomite.....	0.10
55.5	58.2	2.7	19	2-1	-	Medium to dark gray, hard, cherty dolomite, few small blebs cinnabar.	.22
58.2	63.2	5.0	30	3-1	-	Dark gray dolomite with dark brown angular inclusions of limonitic dolomite giving it the appearance of conglomerate, vuggy.	.07
63.2	68.2	5.0	30	4-1	-	Light gray dolomite, broken, cherty, limonite coating on fracture surfaces.	.10
68.2	69.2	1.0	100	5-1	-	.....do.....	.14
69.2	74.9	5.7	75	-	-	Medium to light gray, fine-grained dolomite, broken, minor limonite.	-
74.9	75.2	.3	75	6-1	-	Medium gray to yellow dolomite, brecciated, slightly vuggy, few small lenses of cinnabar.	.70

Diamond-drill hole 1--Continued

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
75.2	76.2	1.0	84	-	-	Same as 74.9 to 75.2 feet, but no cinnabar.	-
76.2	76.5	.3	84	7-1	-	.....do.....	0.01
76.5	81.8	5.3	84	-	-	Light gray dolomite with an occasional small inclusion of a darker gray dolomite, minor limonite.	-
81.8	83.8	2.0	84	8-1	-	Light gray dolomite, broken, brecciated, much limonite.	.01
83.8	86.0	2.2	90	-	-	Light gray dolomite, broken, slightly harder than previous core.	-
86.0	86.4	.4	100	9-1	-	Medium gray dolomite, no mineralization.	.005
86.4	87.0	.6	95	-	-	Medium gray dolomite, much red limonite.	-
87.0	88.5	1.5	95	10-1	-	.....do.....	.005
88.5	88.9	.4	95	11-1	-	Medium gray dolomite, much red limonite, few small blebs cinnabar.	.65
88.9	92.7	3.8	95	-	-	Medium gray dolomite, minor red limonite.	-
92.7	92.9	.2	100	-	-	Gray dolomite, tan chert.....	-
92.9	93.3	.4	95	-	-	.....do.....	-
93.3	95.2	1.9	95	-	-	Tan chert, gray dolomite.....	-
95.2	97.5	2.3	95	-	-	Gray dolomite, minor red limonite.	-
97.5	104.0	6.5	94	-	-	Tan dolomite, red limonite.....	-
104.0	104.7	.7	94	12-1	-	Tan dolomite, red limonite, broken.	.01
104.7	106.5	1.8	90	-	-	Tan dolomite, red limonite.....	-
106.5	107.0	.5	87	13-1	-	Yellow, soft dolomite, limonite stringers.	.01
107.0	108.4	1.4	87	-	-	Tan dolomite, red limonite, broken.	-
108.4	111.8	3.4	87	-	-	Medium to light gray dolomite...	-
111.8	112.3	.5	87	14-1	-	Medium to light gray dolomite with one 1/16-inch stringer cinnabar and few small 1/16-inch-diameter blebs cinnabar.	.42
112.3	118.5	6.2	90	-	-	Medium gray dolomite.....	-
118.5	120.0	1.5	100	15-1	-	Yellow to gray dolomite, very small quartz stringers.	.05
120.0	120.5	.5	100	16-1	-	Same as 118.5 to 120.0 feet, but with small blebs of cinnabar.	.43

Diamond-drill hole 1--Continued

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
120.5	125.7	5.2	95	-	-	Light to medium gray dolomite, broken from 122.9 to 125.7 feet.	-
125.7	127.0	1.3	83	-	-	Medium gray dolomite with dark gray bands of shale.	-
127.0	129.3	2.3	83	-	-	Light gray dolomite, 0.5-foot-long inclusion of shale parallel to long axis at 128 feet.	-
129.3	139.5	10.2	16	17-1	-	Light and dark gray dolomite, broken at 129.3 and 129.6 feet, dolomite has a platy structure.	0.01
139.5	149.3	9.8	18	18-1	-	Light gray dolomite, broken, last 0.5 foot is cherty and semibrecciated.	<.005

Diamond-drill hole 2

Location: N 9,757.2, E 10,228.2
Elevation of collar: 2,113.4
Depth: 140 feet
Dip: -60°
Bearing: N 83°52' E

Date begun: July 5, 1961
Date finished: July 10, 1961
Core sizes: 0.0 - 16.5, BX
16.5 - 140.0, AX

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
0.0	11.1	11.1	50	-	-	Yellow dolomite, broken, friable, minor limonite.	-
11.1	15.4	4.3	100	-	-	Light yellow dolomite, vuggy, with some dark yellow iron stain on vugs.	-
15.4	33.6	18.2	92	-	-	Light gray dolomite, fairly soft.	-
33.6	35.8	2.2	100	19-1	-	Gray and yellow dolomite, very vuggy, small quartz crystals and sulphur in vugs.	0.03
35.8	36.1	.3	100	-	-	Medium gray dolomite.....	-
36.1	36.8	.7	100	20-1	-	Dark gray dolomite, vuggy, occasional bleb of cinnabar.	.06
36.8	37.2	.4	100	21-1	-	Same as 36.1 to 36.8 feet, but with a 1/4-inch lens of cinnabar in vug.	.45
37.2	37.5	.3	100	22-1	-	Gray dolomite, blebs cinnabar...	.02
37.5	39.2	1.7	100	23-1	-	Medium gray dolomite.....	.04
39.2	43.5	4.3	80	-	-	Medium gray dolomite, fairly soft.	-

Diamond-drill hole 2--Continued

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
43.5	44.3	0.8	80	24-1	-	Light gray to yellow dolomite, small lens of cinnabar.	1.95
44.3	45.2	.9	80	-	-	Medium gray dolomite, hard, minor limonite coating on fracture planes.	-
45.2	46.0	.8	80	25-1	-	Gray dolomite, small lens of cinnabar.	.45
46.0	51.3	5.3	84	-	-	Medium gray dolomite, broken, with dark brown angular inclusions of limonitic dolomite similar to 58.2 to 63.2 feet in hole 1.	-
51.3	52.4	1.1	91	26-1	-	Dark gray dolomite, vuggy, small lens of cinnabar, minor amount broken, siliceous dolomite.	2.19
52.4	63.2	10.8	75	-	-	Light gray to light tan dolomite, few vugs.	-
63.2	68.3	5.1	50	27-1	-	Dark gray dolomite, cherty.....	.03
68.3	69.3	1.0	40	28-1	-	Dark gray dolomite, cherty, broken.	.01
69.3	76.7	7.4	5	-	-	Black dolomite, broken, limonite coating on fracture surfaces. Sludge = 0.08 percent Hg.	-
76.7	80.0	3.3	9	-	-	Dark gray dolomite, siliceous, indications are it is vuggy, broken. Sludge = 0.05 percent Hg.	-
80.0	89.1	9.1	35	29-1	-	Medium gray dolomite, broken, siliceous, and abrasive. Sludge = 0.13 percent Hg.	.05
89.1	89.4	.3	77	-	-	Medium gray dolomite.....	-
89.4	90.6	1.2	100	30-1	-	Light gray dolomite, very vuggy, occasional dark brown limonite stringer.	.01
90.6	99.3	8.7	75	-	-	Light gray dolomite, occasional dark brown limonite stringer.	-
99.3	102.7	3.4	33	31-1	-	Light gray dolomite, much limonite.	.01
102.7	109.4	6.7	33	32-1	-	Dark gray dolomite, broken, limonite coating on fracture surfaces.	.005
109.4	109.7	.3	100	32A-1	-	Dark gray dolomite, small lens cinnabar.	.03
109.7	120.0	10.3	60	33-1	-	Dark gray dolomite, broken.....	.005
120.0	130.0	10.0	26	34-1	-	.....do.....	.005
130.0	140.0	10.0	15	35-1	-	Very dark gray dolomite, dark brown limonite coating on fractures. Sludge = 0.02 percent Hg.	.005

Diamond-drill hole 3

Location: N 9,781.5, E 10,205.2
Elevation of collar: 2,115.2
Depth: 143 feet
Dip: -47°07'
Bearing: S 66°03' W

Date begun: July 15, 1961
Date finished: July 21, 1961
Core sizes: 0.0 - 8.2, BX
8.2 - 143.0, AX

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
0.0	5.0	5.0	100	-	-	Overburden.....	-
5.0	8.2	3.2	100	-	-	Light gray dolomite.....	-
8.2	10.1	1.9	96	-	-	Gray dolomite, soft, minor limonite.	-
10.1	10.4	.3	96	-	-	Gray dolomite, broken, much tan limonite.	-
10.4	38.2	27.8	77	-	-	Medium to light gray dolomite...	-
38.2	38.8	.6	100	-	-	Light gray dolomite, vuggy.....	-
38.8	39.3	.5	100	-	-	Light gray dolomite.....	-
39.3	40.5	1.2	100	-	-	Light gray dolomite, few vugs and minor limonite.	-
40.5	43.1	2.6	100	-	-	Light gray dolomite.....	-
43.1	48.4	5.3	72	-	-	Gray dolomite, broken, brecciated, few small vugs.	-
48.4	58.0	9.6	33	-	-	Light cream to gray dolomite, broken, brecciated, minor limonite.	-
58.0	66.7	8.7	100	-	-	Light gray dolomite, slightly brecciated, minor limonite.	-
66.7	67.8	1.1	100	-	-	Gray dolomite, reddish limonite.	-
67.8	78.0	10.2	100	-	-	Same as 66.7 to 67.8 feet, but more limonite and a few vugs.	-
78.0	88.0	10.0	40	-	-	Light and dark gray dolomite, broken.	-
88.0	92.5	4.5	24	-	-	Light gray dolomite, broken.....	-
92.5	113.0	20.5	4	-	-	Dark gray dolomite, broken.....	-
113.0	116.0	3.0	1.5	-	-	Light gray dolomite, broken.....	-
116.0	126.0	10.0	0	-	-	No core, no mercury in sludge...	-
126.0	136.8	10.8	10	-	-	Gray dolomite, broken.....	-
136.8	142.8	6.0	31	-	-	Tan dolomite, broken, considerable limonite.	-
142.8	143.0	.2	100	-	-	Dark yellowish gray shale, broken. Note: Negative mercury assay for all of hole 3 sludges.	-

Diamond-drill hole 4

Location: N 9,718.0, E 10,158.5
Elevation of collar: 2,118.4
Depth: 150.2 feet
Dip: -46°39'
Bearing: N 77°34' E

Date begun: July 25, 1961
Date finished: August 1, 1961
Core sizes: 0.0 - 19.5, BX
19.5 - 150.2, AX

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
0.0	10.0	10.0	0	-	-	Overburden.....	-
10.0	12.0	2.0	55	36-1	-	Gray dolomite, brown chert, broken.	0.01
12.0	12.3	.3	67	37-1	-	Light gray dolomite, much limonite.	.005
12.3	14.5	2.2	32	38-1	-	Light yellow dolomite, broken, friable, small lens of cinnabar.	.22
14.5	14.9	.4	88	39-1	-	Light yellow to gray dolomite...	<.005
14.9	15.4	.5	100	40-1	-	Light yellow to gray dolomite, small blebs of cinnabar.	<.005
15.4	16.7	1.3	100	41-1	-	Light yellow to gray dolomite...	.005
16.7	19.5	2.8	100	42-1	-	Deep yellow dolomite, broken, soft, friable, few small blebs cinnabar.	.16
19.5	21.5	2.0	53	-	-	Yellow dolomite with a few small inclusions of black dolomite, appears to have been recemented, soft, and friable.	-
21.5	22.4	.9	100	43-1	-	Dark gray to yellow dolomite, brecciated, limonite stringers.	.05
22.4	22.8	.4	88	44-1	-	Same as 21.5 to 22.4 feet, with small blebs cinnabar.	1.60
22.8	23.1	.3	100	45-1	-	Same as 21.5 to 22.4 feet, with no visible cinnabar.	.18
23.1	29.5	6.4	53	-	-	Light gray dolomite with a yellow cast, broken.	-
29.5	33.6	4.1	100	46-1	-	Light gray to yellow dolomite with occasional small bleb cinnabar.	.07
33.6	35.0	1.4	97	-	-	Light gray to yellow dolomite...	-
35.0	44.2	9.2	66	-	-	Yellow dolomite, broken.....	-
44.2	55.0	10.8	45	47-1	-	Yellow dolomite, broken, brecciated, occasional small piece of black dolomite, minor amount gray dolomite, brecciated.	.01
55.0	69.7	14.7	38	48-1	-	Dark gray dolomite with shale inclusions, broken.	.005
69.7	80.0	10.3	60	49-1	-	Light yellow dolomite, broken, few vugs.	.01
80.0	90.6	10.6	42	-	-	Medium to light gray dolomite, broken.	-

Diamond-drill hole 4--Continued

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
90.6	93.0	2.4	100	50-1	-	Gray to yellow dolomite, with inclusions of dark gray dolomite, limonite.	<0.005
93.0	103.0	10.0	40	51-1	-	Gray to black dolomite, vuggy, abrasive, much limonite, broken.	.01
103.0	110.5	7.5	24	52-1		Gray to brownish dolomite, broken, much limonite.	.11
110.5	130.5	20.0	93	-	-	Light gray to yellow dolomite, brecciated, foliated.	-
130.5	140.5	10.0	9	53-1	-	Gray to yellow dolomite, broken, cherty, limonite.	.01
140.5	150.2	9.7	18	54-1	-	Dark gray dolomite, broken.....	.01

Diamond-drill hole 5

Location: N 9,653.0, E 10,225.4
Elevation of collar: 2,102.7
Depth: 40 feet
Dip: -31°03'
Bearing: S 86°33' W

Date begun: August 5, 1961
Date finished: August 7, 1961
Core sizes: 0.0 - 2.5, BX
2.5 - 40.0, AX

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
0.0	2.5	2.5	44	55-1	-	Dark gray dolomite, broken, very hard.	0.06
2.5	12.5	10.0	2	56-1	-	Dark gray dolomite, broken, very hard. Sludge = 0.04 percent Hg.	.01
12.5	15.0	2.5	8	57-1	-	Dark gray dolomite, broken, very hard. Sludge = 0.03 percent Hg.	.02
15.0	16.5	1.5	73	58-1	-	.....do.....	.02
16.5	19.5	3.0	100	59-1	-	Dark gray dolomite, broken, very hard. Sludge = 0.01 percent Hg.	<.005
19.5	23.5	4.0	8	60-1	-	Dark gray dolomite, broken, very hard. Sludge = 0.03 percent Hg.	<.005
23.5	27.5	4.0	12	61-1	-	.....do.....	.03
27.5	31.9	4.4	10	62-1	-	Dark gray dolomite, broken, very hard. Sludge = 0.04 percent Hg. Minor amount of light yellow chert.	.01
31.9	40.0	8.1	62	63-1	-	Yellow dolomite, soft, friable, hole ended in what is probably a large underground cavern. Strong blast of air blew from the collar of this hole for 2 days after the cavern was penetrated.	.005

Diamond-drill hole 6

Location: N 9,712.3, E 10,255.2
Elevation of collar: 2,100.7
Depth: 31.5 feet
Dip: -24°18'
Bearing: N 38°47' W

Date begun: August 8, 1961
Date finished: August 9, 1961
Core sizes: 0.0 - 31.5, BX

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
0.0	10.0	10.0	0	-	-	Overburden, sludge.....	-
10.0	13.0	3.0	0	-	-	No core, sludge.....	-
13.0	14.5	1.5	73	64-1	-	Dark gray dolomite, very hard, broken, few small shale inclusions, very few small blebs cinnabar.	0.20
14.5	19.8	5.3	47	65-1	-	Gray dolomite, broken, very hard, few shale inclusions.	.10
19.8	22.8	3.0	37	66-1	-	Gray dolomite, porous, broken, few small lenses cinnabar.	.57
22.8	25.5	2.7	22	67-1	-	Light gray, porous dolomite.....	.12
25.5	27.0	1.5	40	68-1	-	Light gray, porous dolomite, small blebs cinnabar.	.23
27.0	31.5	4.5	93	69-1	-	Light gray, porous dolomite to 29.2 feet, from 29.2 to 31.5 feet, yellow dolomite, soft, friable.	.04

Diamond-drill hole 7

Location: N 9,725.6, E 10,255.2
Elevation of collar: 2,104.0
Depth: 25 feet
Dip: Vertical
Bearing: --

Date begun: August 10, 1961
Date finished: August 15, 1961
Core sizes: 0.0 - 25.0, BX

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
0.0	5.0	5.0	0	-	-	No core. Sludge = 3.04 percent Hg.....	-
5.0	8.5	3.5	0	-	-	No core. Sludge = 4.32 percent Hg.....	-
8.5	12.0	3.5	6	70-1	-	Gray dolomite, hard, brittle, broken, small lens of cinnabar. Core sample lost. Sludge = 5.13 percent Hg.	-
12.0	13.5	1.5	33	71-1	-	Gray dolomite, porous, broken lens of cinnabar. Sludge = 1.95 percent Hg.	3.38
13.5	16.0	2.5	5	-	-	Gray dolomite, chert, lens cinnabar. Sludge = 6.53 percent Hg.	-
16.0	17.5	1.5	5	-	-	Same as 12.0 to 13.5 feet. Sludge = 3.55 percent Hg.	-
17.5	21.5	4.0	2	-	-	Gray dolomite, porous, hard, cherty. Sludge = 10.98 percent Hg.	-
21.5	24.0	2.5	0	-	-	Sludge = 2.69 percent Hg.....	-
24.0	25.0	1.0	0	-	-	Sludge = 0.56 percent Hg. Bottom of hole is apparently all broken chert.	-

Diamond-drill hole 8

Location: N 9,700.8, E 10,263.3
Elevation of collar: 2,099.8
Depth: 203.7 feet
Dip: -73°42'
Bearing: N 67°18' W

Date begun: August 17, 1961
Date finished: August 24, 1961
Core sizes: 0.0 - 7.0, BX
7.0 - 203.7, AX

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
0.0	7.0	7.0	0	-	-	Overburden.....	-
7.0	13.0	6.0	100	72-1	-	Gray to yellow dolomite, few vugs.	0.03
13.0	15.5	2.5	80	73-1	-	Gray to yellow dolomite.....	<.005
15.5	19.5	4.0	100	74-1	-	.....do.....	.01
19.5	24.5	5.0	100	75-1	-	Light gray to yellowish gray dolomite.	<.005
24.5	28.8	4.3	94	76-1	-	Light gray dolomite, minor amount of yellow dolomite, few vugs.	<.005
28.8	29.5	.7	94	77-1	-	Light gray dolomite, small lens cinnabar.	.35
29.5	30.3	.8	98	78-1	-	.....do.....	.13
30.3	31.2	.9	98	79-1	-	Medium gray dolomite, minor limonite coating.	.02
31.2	31.5	.3	100	80-1	-	Medium gray dolomite, small blebs cinnabar.	1.52
31.5	34.5	3.0	98	81-1	-	Medium gray dolomite, broken, vuggy.	<.005
34.5	37.7	3.2	63	82-1	-	Light gray dolomite, very hard, broken.	.01
37.7	42.5	4.8	100	83-1	-	Medium gray dolomite, much limonite coating.	.01
42.5	49.2	6.7	100	-	-	Medium gray to yellow dolomite, broken, few vugs, minor limonite.	-
49.2	49.8	.6	100	84-1	-	Light yellow to gray dolomite, soft, vuggy, few small blebs cinnabar.	<.005
49.8	55.1	5.3	75	-	-	Medium to light gray dolomite, minor limonite.	-
55.1	56.0	.9	90	85-1	-	Light gray dolomite, hard, few vugs, small blebs cinnabar.	<.005
56.0	61.6	5.6	95	-	-	Light gray dolomite, minor limonite.	-
61.6	62.7	1.1	100	86-1	-	Light gray dolomite, single small bleb cinnabar.	.005
62.7	64.5	1.8	95	87-1	-	Greenish yellow dolomite, soft, broken.	.005
64.5	66.0	1.5	93	88-1	-	.....do.....	.005

Diamond-drill hole 8--Continued

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
66.0	70.5	4.5	100	-	-	Gray dolomite, much limonite...	-
70.5	74.0	3.5	100	89-1	-	Greenish yellow dolomite, soft, broken.	.01
74.0	80.0	6.0	100	90-1	-	.....do.....	.005
80.0	83.5	3.5	75	91-1	-	Yellow to gray dolomite, much limonite.	.005
83.5	89.3	5.8	85	92-1	-	Gray to yellow dolomite, broken.	.005
89.3	91.5	2.2	100	93-1	-	Light yellow dolomite, broken, occasional bleb of cinnabar.	.01
91.5	91.9	.4	100	94-1	-	Light yellow dolomite, broken, small blebs cinnabar.	.11
91.9	93.5	1.6	100	95-1	-	Light yellow dolomite, broken, limonite, occasional bleb cinnabar.	.14
93.5	98.0	4.5	90	96-1	-	Dark brown, limonite-stained dolomite, small lens of cinnabar at 97 feet.	.25
98.0	98.5	.5	90	97-1	-	Light gray dolomite, broken....	.16
98.5	99.0	.5	100	98-1	-	.....do.....	.07
99.0	103.3	4.3	23	99-1	-	.....do.....	.02
103.3	104.0	.7	43	100-1	-	.....do.....	.13
104.0	108.0	4.0	75	101-1	-	Light gray dolomite, broken, dark gray angular inclusions of dolomite.	.02
108.0	117.0	9.0	22	102-1	-	Light gray dolomite.....	.02
117.0	118.6	1.6	100	103-1	-	Light gray dolomite, vuggy, limonite coating on fracture surfaces, broken, 117.0 to 117.5 feet, dark gray dolomite.	.02
118.6	119.6	1.0	100	104-1	-	Light gray dolomite, much limonite.	.02
119.6	121.3	1.7	100	105-1	-	Light gray to yellow dolomite, fine-grained, limonite stain.	.005
121.3	123.8	2.5	91	106-1	-	Yellow to gray dolomite, soft (almost mud-like in places), limonite lens.	.01
123.8	125.0	1.2	100	107-1	-	Light gray dolomite.....	.01
125.0	128.0	3.0	100	108-1	-	Light gray dolomite, soft (mud-like), numerous limonite stringers.	.93
128.0	138.0	10.0	46	109-1	-	Light gray dolomite, broken, much limonite.	.01
138.0	148.0	10.0	20	110-1	-	Same as 128.0 to 138.0, but minor limonite.	.01

Diamond-drill hole 8--Continued

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
148.0	157.9	9.9	40	111-1	-	Light gray dolomite, broken, minor limonite.	<0.005
157.9	167.8	9.9	47	112-1	-	Light gray dolomite, broken, much limonite.	.005
167.8	177.9	10.1	100	113-1	-	Light gray dolomite, trace limonite.	<.005
117.9	185.0	7.1	70	114-1	-	Light gray dolomite, trace limonite, broken.	.005
185.0	192.0	7.0	71	115-1	-	Light gray dolomite, no iron, broken.	-
192.0	203.7	11.7	90	116-1	-	Light gray dolomite.....	.005

Diamond-drill hole 9

Location: N 11,357.9, E 11,357.9
Elevation of collar: 2,199.4
Depth: 110.5 feet
Dip: -45°
Bearing: S 79° W

Date begun: June 7, 1962
Date finished: June 11, 1962
Core sizes: 0.0 - 8.8, BX
8.8 - 110.5, AX

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
0.0	7.4	7.4	0	-	-	Overburden.....	-
7.4	8.8	1.4	79	1-2	-	Black limestone, small calcite stringers, minor amount medium gray, porous sandstone, limonite.	<0.01
8.8	9.9	1.1	91	2-2	-	Same as 7.4 to 8.8 feet, but more iron, and more siliceous.	.01
9.9	13.0	3.1	35	3-2	3-2	Black limestone, fine-grained, small calcite stringers, minor limonite.	.01
13.0	15.0	2.0	75	4-2	-	Dark gray, sandy limestone, thin bedded, small fault gouge stringer at 14.0 feet, is 60° to long axis of core.	<.01
15.0	19.2	4.2	29	5-2	-	Dark gray to black limestone, calcite stringers, minor limonite, broken.	.01
19.2	23.2	4.0	93	6-2	-	Same as 15.0 to 19.2 feet, not as broken.	.01
23.2	28.5	5.3	40	7-2	7-2	Black, sandy, thin-bedded shale, black limestone, limonite stain.	.01

Diamond-drill hole 9--Continued

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
28.5	35.6	7.1	50	8-2	-	Gray to dark gray to black limestone, calcite stringers, yellow limonite, broken.	<0.01
35.6	36.3	.7	86	9-2	-	Dark gray to yellow dolomite, fractured.	<.01
36.3	38.3	2.0	100	10-2	-	Same as 35.6 to 36.3 feet, but with a rough texture, few blebs cinnabar (Note: Section from 37.1 to 37.5 feet removed and reported in sample 11-2).	.12
				11-2	11-2	Same as 35.6 to 36.3 feet, but with more blebs cinnabar.	3.09
38.3	38.8	.5	80	12-2	-	Gray to yellow dolomite.....	.01
38.8	40.0	1.2	17	13-2	-	Blue clay fault gouge.....	<.01
40.0	40.6	.6	100	14-2	-	Yellow to brown dolomite, broken.	.01
40.6	43.2	2.6	85	15-2	15-2	Light gray dolomite, hard, siliceous, minor limonite, few calcite stringers.	.02
43.2	50.6	7.4	15	16-2	-	Light gray to yellow dolomite, broken.	<.01
50.6	55.6	5.0	96	17-2	-	Gray to dark gray dolomite, hard, siliceous, numerous calcite stringers.	<.01
55.6	58.2	2.6	81	18-2	18-2	Brown shale with few small inclusions of gray shale, minor calcite and pyrite.	<.01
58.2	65.5	7.3	49	19-2	-	Brown to light brown shale to 60.2 feet. From 60.2 to 65.5 feet, gray, siliceous dolomite with limonite stain, minor calcite stringers.	<.01
65.5	70.5	5.0	100	20-2	-	Rusty limestone with gray patches, calcite stringers. From 69.0 to 70.5 feet is dark gray limestone.	<.01
70.5	75.5	5.0	88	21-2	21-2	Gray to dark gray limestone, brecciated, limonite veinlets give core a mottled appearance, calcite stringers, foliation between 70.5 to 71.5 feet.	<.01

Diamond-drill hole 9--Continued

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
75.5	80.5	5.0	50	22-2	22-2	Light gray, altered volcanic or hydrothermal rock, small green particles on blebs, siliceous, broken, considerable limonite.	<0.01
80.5	82.5	2.0	40	23-2	-	Dark gray to black limestone, fine-grained, calcite stringers, broken.	<.01
82.5	90.5	8.0	10	24-2	24-2	Black limestone, fine-grained, broken.	.01
90.5	95.5	5.0	18	25-2	-	Black limestone, fine-grained, broken, vuggy near 90.5-foot end.	<.01
95.5	100.5	5.0	54	26-2	-	Black limestone, fine-grained, broken, cherty, minor calcite.	<.01
100.5	105.5	5.0	33	27-2	-	.....do.....	<.01
105.5	110.5	5.0	0	-	-	No core.....	-

Diamond-drill hole 10

Location: N 11,353.1, E 11,401.5
Elevation of collar: 2,199.5
Depth: 121.0 feet
Dip: -60°
Bearing: S 79° W

Date begun: June 12, 1962
Date finished: June 19, 1962
Core sizes: 0.0 - 10.0, BX
10.0 - 121.0, AX

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
0.0	10.0	10.0	0	-	-	No core.....	-
10.0	15.4	5.4	15	28-2	-	Gray limestone, sandy, siliceous, broken, limonite stain, calcite stringers.	<0.01
15.4	20.2	4.8	27	29-2	-	Same as 10.0 to 15.4 feet, thin bedded.	<.01
20.2	25.4	5.2	54	30-2	-	20.2 to 21.0 feet is gray limestone, sandy, thin bedded (bedding planes 60° to long axis), and light tan to gray limestone with minor calcite stringers. 21.0 to 25.4 feet is gray to dark gray limestone, siliceous.	.01
25.4	30.4	5.0	34	31-2	-	Dark gray limestone, siliceous, broken calcite.	<.01

Diamond-drill hole 10--Continued

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
30.4	35.4	5.0	34	32-2	32-2	From 30.4 to 32.9 feet, same as 25.4 to 30.4 feet. From 32.9 to 35.4 feet, dark gray to black phyllite interbedded with dark gray shale and limestone, a few calcite stringers (between bedding), bedding 60° to long axis, minor foliation at 35.4 feet.	<0.01
35.4	40.9	5.5	31	33-2	-	Same as 25.4 to 30.4 feet...	<.01
40.9	43.0	2.1	57	34-2	-	Same as 36.3 to 38.8 feet in hole 9, or a dark gray to yellow dolomite with a rough surface or texture. No cinnabar.	<.01
43.0	43.7	.7	57	35-2	-	Gray to yellow dolomite, same as 38.3 to 38.8 feet in hole 9.	<.01
43.7	45.4	1.7	71	36-2	-	Dark gray to yellow dolomite, siliceous, broken, calcite and quartz stringers.	<.01
45.4	46.2	.8	75	37-2	-	Light tan shale, siliceous..	<.01
46.2	49.5	3.3	75	38-2	38-2	Light gray shale, soft, shattered.	<.01
49.5	50.5	1.0	75	39-2	-	Light tan shale, reddish cast, limonite.	<.01
50.5	55.5	5.0	71	40-2	40-2	Light gray to tan dolomite, siliceous, minor calcite stringers, red chert at 53.5 feet.	<.01
55.5	58.8	3.3	79	41-2	- 42-2 43-2	Rusty-gray, altered volcanic rock (43-2), broken at 58.0 to 58.2 feet, is a greenish gray altered volcanic (42-2) whose contact is 60° with the rusty-gray volcanic.	<.01
58.8	65.8	7.0	92	44-2	44-2	Medium gray, altered volcanic, greenish cast, hard, small dark green inclusions.	<.01

Diamond-drill hole 10--Continued

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
65.8	70.8	5.0	94	45-2	45-2 46-2	Light tan, altered volcanic with small calcite inclusions and 1/16-inch-diameter dark gray angular fragments. 45-2 at 70.8 feet has gradually changed to a dark gray, hard, very siliceous, altered volcanic (46-2).	<0.01
70.8	75.8	5.0	94	47-2	47-2 47A-2 48-2	Light tan to gray, altered volcanic similar to 65.8 to 70.8 feet except slightly more tan color, shale fragments. 47-2 at 72.0 feet, 47A-2 shale fragments, 48-2 at 75.0 feet.	<.01
75.8	80.2	4.4	57	49-2	-	Light tan to gray, altered volcanic or hydrothermal rock, calcite stringers, very similar to 70.8 to 75.8 feet, minor limonite.	<.01
80.2	85.2	5.0	54	-	50-2	Gray to green, altered volcanic, gradually grades from very hard with no pyrite at 80.2 feet to softer with pyrite at 85.2 feet, 50-2 at 85.0 feet. Similar to 70.8 to 75.8 feet.	-
85.2	90.2	5.0	57	51-2	51-2	Same as 80.2 to 85.2 feet, altered volcanic with both hard and soft sections both containing much pyrite. End at 90.0 feet is gray limestone with calcite and pyrite.	<.01
90.2	91.5	1.3	100	52-2	52-2	Dark gray to black limestone, fine grained, minor calcite and pyrite.	<.01
91.5	102.3	10.8	7	53-2	-	Same as 90.2 to 91.5 feet, broken.	<.01
102.3	110.9	8.6	33	54-2	-	.....do.....	<.01
110.9	116.3	5.4	54	55-2	-	Dark gray limestone, thin-bedded, fine-grained.	<.01
116.3	121.0	4.7	53	56-2	-	Black limestone, thin-bedded, fine-grained.	<.01

Diamond-drill hole 11

Location: N 11,355.4, E 11,396.0
Elevation of collar: 2,200.5
Dip: -30°
Depth: 33.8 feet
Bearing: S 31° W

Date begun: June 20, 1962
Date finished: June 25, 1962
Core sizes: 0.0 - 7.0, BX
7.0 - 33.8, AX

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
0.0	7.0	7.0	0	-	-	Overburden.....	-
7.0	17.6	10.6	12	57-2	57-2 57A-2	Black, limy dolomite, limestone, fine-grained, broken, calcite stringers, tan limonite (57A-2).	<0.01
17.6	24.8	7.2	42	58-2	58-2	Black to dark gray limestone and shale, thin bedded, calcite stringers, limonite, broken.	<.01
24.8	29.8	5.0	46	59-2	-	.....do.....	<.01
29.8	31.8	2.0	35	60-2	-	.....do.....	<.01
31.8	33.8	2.0	15	61-2	-	.....do.....	<.01

Diamond-drill hole 12

Location: N 11,355.9, E 11,398.3
Elevation of collar: 2,200.2
Depth: 112.8 feet
Dip: -45°
Bearing: S 31° W

Date started: June 26, 1962
Date finished: July 1, 1962
Core sizes: 0.0 - 7.0, BX
7.0 - 112.8, AX

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
0.0	7.0	7.0	0	-	-	Overburden, no core.....	-
7.0	15.8	8.8	8	62-2	-	Black, sandy limestone, broken, calcite stringers.	<0.01
15.8	20.0	4.2	31	63-2	-	.....do.....	<.01
20.0	25.8	5.8	57	64-2	64-2	Gray, black, tan, shale, banded, thin bedded (bedding 60° to long core axis) minor foliation, calcite stringers.	<.01
25.8	35.5	9.7	69	65-2	-	Gray to black limestone, siliceous, sandy, fine-grained, calcite stringers, few tan limonite stringers.	<.01
35.5	45.5	10.0	67	66-2	-	Gray to dark gray, limy shale, thin bedded, minor foliation, tan to yellow limonite.	<.01

Diamond-drill hole 12--Continued

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
45.5	46.5	1.0	100	67-2	-	Dark gray to black limestone, fine-grained, siliceous, calcite stringers.	<0.01
46.5	48.6	2.1	100	68-2	68-2	Light gray dolomite, reddish cast, limonite, few calcite stringers. From 46.5 to 46.6 feet is similar to 36.3 to 38.3 feet in hole 9.	<.01
48.6	55.5	6.9	5	-	-	Gray dolomite, broken, no core, sample sludge = 0.02 percent Hg.	-
55.5	60.0	4.5	36	70-2	70-2	Dark gray dolomite, broken, calcite, limonite, quartz.	<.01
60.0	72.8	12.8	0	-	-	No core. Sludge, 60.0 to 66.8 feet = 0.02 percent Hg; 66.8 to 72.8 feet = <0.01 percent Hg.	-
72.8	78.8	6.0	16	71-2	-	Dark gray to black, sandy limestone, small lens and stringers calcite.	<.01
78.8	85.0	6.2	19	72-2	72-2	Dark gray to rusty hydrothermal rock, vuggy, small pyrite crystals, quartz, minor limonite, broken.	<.01
85.0	95.8	10.8	28	73A-2	-	Black to dark gray shale, small pyrite crystals, minor calcite and limonite stringers, broken, siliceous.	<.01
95.8	105.8	10.0	4	73-2	73-2	Dark gray shale, fine-grained, siliceous, broken, calcite stringers. Sludge = 0.01 percent Hg.	<.01
105.8	112.8	7.0	32	74-2	-	.....do.....	<.01

Diamond-drill hole 13

Location: N 11,398.3, E 11,397.2
Elevation of collar: 2,211.1
Depth: 35.0 feet
Dip: -42°
Bearing: S 77° W

Date begun: July 2, 1962
Date finished: July 4, 1962
Core sizes: 0.0 - 35.0, BX

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
0.0	6.0	6.0	0	-	-	Overburden, no core.....	-
6.0	10.0	4.0	75	75-2	-	Dark gray to black dolomite, fine-grained, siliceous, calcite stringers, minor limonite coating on fractures.	<0.01
10.0	15.0	5.0	44	76-2	76-2	Dark gray to black dolomite, siliceous, calcite stringers, considerable limonite.	.01
15.0	20.3	5.3	66	77-2	-	Same as 10.0 to 15.0 feet, but with minor calcite and limonite, broken.	.01
20.3	25.3	5.0	14	78-2 79-2	- -	Same as 10.0 to 15.0 feet with segments of light yellow, soft dolomite, 72-2 is of such a segment, broken.	.01
25.3	30.0	4.7	26	80-2	80-2	Light gray to yellow dolomite, minor calcite stringers, minor red chert.	<.01
30.0	35.0	5.0	48	81-2	-	Light yellow dolomite with thin-bedded gray limestone, minor calcite stringers, minor red chert.	<.01

Diamond-drill hole 14

Location: N 8,262.0, E 9,311.4
Elevation of collar: 2,046.4
Depth: 232.5 feet
Dip: -80°
Bearing: S 59° E

Date begun: July 19, 1962
Date finished: July 28, 1962
Core sizes: 0.0 - 6.0, BX
6.0 - 232.5, AX

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
0.0	6.0	6.0	0	-	-	Overburden, no core.....	-
6.0	10.5	4.5	100	82-2	-	Light gray dolomite, broken, slightly vuggy, occasional bleb cinnabar.	0.10
10.5	15.0	4.5	11	83-2	-	Medium gray dolomite, broken, siliceous.	.10

Diamond-drill hole 14--Continued

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
15.0	20.6	5.6	9	84-2	-	Light gray dolomite, yellow dolomite. Sludge = 0.17 percent Hg.	0.14
20.6	25.6	5.0	74	85-2	85-2	Light gray dolomite, broken, few vugs. Sludge = 0.11 percent Hg.	.03
25.6	31.4	5.8	21	86-2	-	Same as 20.6 to 25.6 feet. Sludge = 0.02 percent Hg.	.01
31.4	38.4	7.0	60	87-2	-	Same as 20.6 to 25.6 feet, but more vugs, occasional bleb cinnabar.	.01
38.4	43.8	5.4	5	-	-	Light gray to gray dolomite, broken, siliceous.	-
43.8	51.4	7.6	21	88-2	88-2	Light gray to yellow dolomite, broken, minor red chert. Sludge = 0.02 percent Hg.	.15
51.4	58.0	6.6	12	89-2	-	Light gray to yellow dolomite. Sludge = 0.03 percent Hg.	.02
58.0	64.4	6.4	16	90-2	-	Light gray to yellow dolomite, minor red chert, brittle.	.01
64.4	71.4	7.0	14	91-2	-	Light gray to yellow dolomite, slightly vuggy. Sludge = 0.03 percent Hg.	.19
71.4	78.0	6.6	45	92-2	-	Light gray to yellow dolomite, occasional darker gray bands, slightly vuggy.	.01
78.0	84.4	6.4	11	93-2	-	Light gray to yellow dolomite...	.04
84.4	86.3	1.9	93	94-2	-	Light gray to yellow dolomite, siliceous.	.03
86.3	87.3	1.0	93	95-2	-	Light gray to yellow dolomite, slightly soft and few vugs, few blebs cinnabar.	.23
87.3	88.2	.9	93	96-2	-	Light gray to yellow dolomite, very few blebs cinnabar, siliceous.	.03
88.2	91.4	3.2	93	97-2	-	Light gray to yellow dolomite, slightly darker gray dolomite.	.01
91.4	98.4	7.0	54	98-2	-	Gray to light gray dolomite, siliceous, minor yellow limonite.	.01
98.4	105.4	7.0	94	99-2	-	Gray to light gray dolomite, siliceous, minor yellow limonite, broken.	.01

Diamond-drill hole 14--Continued

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
105.4	110.4	5.0	90	100-2	100-2	Gray dolomite, calcite stringers, siliceous, minor yellow limonite coating on fractures.	<0.01
110.4	115.8	5.4	37	101-2	-	Same as 105.4 to 110.4 feet, small blebs and stringers cinnabar, mostly from 112.0 to 113.0 feet.	.07
115.8	116.2	.4	100	102-2	-	Gray dolomite, broken...	.01
116.2	117.8	1.6	19	103-2	-	Gray dolomite, broken. Sludge = 0.04 percent Hg.	.01
117.8	118.4	.6	0	-	-	No core. Sludge = 0.02 percent Hg.	-
118.4	122.4	4.0	50	104-2	-	Light gray to gray dolomite, siliceous, vuggy.	<.01
122.4	126.8	4.4	96	105-2	-	Light gray to gray dolomite, siliceous.	<.01
126.8	133.4	6.6	84	106-2 107-2	- -	Light gray to gray dolomite, siliceous, cinnabar paint from 131.7 to 132.3 feet (107-2). Sludge = 0.12 percent Hg.	<.01 <.01
133.4	140.4	7.0	82	108-2	-	Light gray to gray dolomite, siliceous, calcite lenses, broken, vuggy from 139.4 to 140.4 feet. Sludge = 0.07 percent Hg.	<.01
140.4	142.0	1.6	75	109-2	109-2	Gray dolomite, formation starting to change, softer than previously.	-
142.0	147.4	5.4	43	110-2 110A-2	110-2 110A-2	110-2 light gray to yellow hydrothermal rock with dark gray dolomite inclusions (110A-2), calcite, soft.	<.01
147.4	154.4	7.0	3	-	111-2	Light yellow dolomite with black shale inclusions, calcite.	-

Diamond-drill hole 14--Continued

From	To	Length, feet	Core recovery, percent	Sample C	Sample P	Description	Percent mercury
154.4	163.4	9.0	26	-	112-2	Black shale, fine-grained, broken, few small scattered pyrite crystals, bedding 75° to 80° to long axis or almost normal to long axis, in places bedding has been crushed as have pyrite crystals.	<0.01
163.4	170.4	7.0	100	113-2	-	Same as 154.4 to 163.4 feet, but less pyrite.	<.01
170.4	177.3	6.9	10	114-2	-	Same as 163.4 to 170.4 feet, slaty, breaks easily. Sludge = 0.02 percent Hg.	<.01
177.3	184.4	7.1	100	115-2	-	Same as 163.4 to 170.4 feet.	<.01
184.4	189.0	4.6	87	116-2	-	.....do.....	<.01
189.0	193.6	4.6	87	117-2	117-2	Light gray to gray dolomite, siliceous, minor calcite, few small shale inclusions.	<.01
193.6	200.4	6.8	56	118-2	-	.....do.....	<.01
200.4	206.6	6.2	76	119-2	-	Light gray dolomite, fine-grained.	<.01
206.6	214.4	7.8	86	120-2	-	Light gray dolomite, very siliceous, few dark gray bands dolomite, at 60° to long axis of core.	<.01
214.4	224.8	10.4	30	121-2	-	.....do.....	<.01
224.8	226.4	1.6	100	122-2	-	Dark gray to black dolomite, fine-grained, very hard, siliceous, more calcite, broken.	<.01
226.4	232.5	6.1	26	123-2	123-2	.....do.....	<.01

APPENDIX D.--ASSAYS AND DRILLING DATA ON DIAMOND-DRILL HOLES

Hole 1

Footage		Distance drilled, feet	Core obtained, feet	Weight, grams		Recovery, percent			Analyses, percent			
									Core,	Sludge		
From	To			Core	Sludge	Core	Sludge	Water	mer-cury	Mer-cury	Anti-mony	Arse-nic
0.0	5.0	5.0	5.0	3750	-	100	-	100	0.01	-	-	-
5.0	8.0	3.0	1.8	1335	2043	60	60	60	.01	0.01	<0.01	0.02
8.0	13.0	5.0	3.2	2400	2502.6	64	45	60	.01	.01	<.01	.01
13.0	15.8	2.8	2.4	892	1678.4	86	85	100	.01	.01	<.01	.02
15.8	20.5	4.7	1.9	684	1612.6	40	40	60	.01	.005	<.01	.01
20.5	29.5	9.0	3.9	1410	4019.6	43	49	60	.01	.01	<.01	.02
29.5	39.4	9.9	7.9	2908	3596.8	80	50	60	.01	<.005	<.01	.02
39.4	49.6	10.2	7.7	2734	4621.2	75	70	100	.01	.01	<.01	.04
49.6	55.5	5.9	1.7	678	5234.8	29	90	100	.01	.02	<.01	.08
55.5	58.2	2.7	.5	186	2232.8	19	85	100	.22	.06	.01	.04
58.2	68.2	10.0	3.0	1291	4296.8	30	40	50	.08	.08	.01	.06
68.2	75.2	7.0	5.2	1590	1477.4	74	34	50	.06	.08	<.01	.02
75.2	85.2	10.0	8.4	4265	1563.6	84	13	50	.01	.03	-	-
85.2	95.2	10.0	9.5	5160	1050.4	95	10	50	.03	.06	-	-
95.2	105.2	10.0	9.4	4470	1150.4	94	13	50	.01	.04	-	-
105.2	115.2	10.0	8.7	4060	1519.2	87	17	50	.03	.04	-	-
115.2	125.2	10.0	9.6	4850	1430.8	96	15	50	.04	.04	-	-
125.2	129.3	4.1	3.4	1970	511	83	11	50	.01	.04	-	-
129.3	139.3	10.0	1.6	723	2487	16	21	50	.01	.02	-	-
139.3	149.3	10.0	1.8	971	2870	18	20	50	<.005	.01	-	-

Hole 2

Footage		Distance drilled, feet	Core obtained, feet	Weight, grams		Recovery, percent			Analyses, percent			
									Core,	Sludge		
From	To			Core	Sludge	Core	Sludge	Water	mer-cury	Mer-cury	Anti-mony	Arse-nic
0.0	7.0	7.0	1.7	1700	-	24	-	100	-	-	-	-
7.0	11.5	4.5	4.5	4510	1990	100	39	50	<0.01	<0.005	<0.01	0.01
11.5	16.5	5.0	5.0	5050	1900	100	33	50	<.01	<.005	<.01	.01
16.5	20.5	4.0	3.0	1520	1130	75	28	50	<.01	<.005	<.01	.01
20.5	30.5	10.0	9.5	4800	2020	95	22	50	<.01	.005	<.01	.01
30.5	40.5	10.0	10.0	4700	2780	100	31	50	.03	.15	.02	.01
40.5	49.3	8.8	7.0	3740	3249	80	35	50	.21	.25	.08	.01
49.3	59.3	10.0	9.1	4635	3309	91	35	50	.25	.26	.08	.01
59.3	68.3	9.0	4.5	2380	4584	50	42	50	.02	.09	.03	.02
68.3	69.3	1.0	.4	180	509	40	47	50	.01	.09	.03	.02
69.3	70.0	.7	.0	0	650	0	71	50	.01	.08	.01	.01
70.0	76.7	6.7	.4	180	6193	6	77	100	.01	.08	.01	.01
76.7	80.0	3.3	.3	135	2865	9	71	100	<.01	.05	<.01	.01
80.0	89.1	9.1	3.2	1151	8652	35	109	100	.05	.13	<.01	.02
89.1	99.3	10.2	7.9	3890	2103	77	21	50	.01	.02	-	-
99.3	109.4	10.1	3.3	1282	1819	33	19	50	<.01	.02	-	-
109.4	120.0	10.6	6.3	2880	2287	60	22	50	.005	.01	-	-
120.0	130.0	10.0	2.6	1109	1793	26	16	50	.005	.02	-	-
130.0	140.0	10.0	1.5	850	1966	15	13	50	<.005	.02	-	-

Hole 3

Footage		Distance drilled, feet	Core obtained, feet	Weight, grams		Recovery, percent			Analyses, percent	
From	To			Core	Sludge	Core	Sludge	Water	Core, mercury	Sludge, mercury
0.0	5.0	5.0	0.0	-	-	-	-	-	-	-
5.0	8.2	3.2	3.2	1760	1651	100	83	100	-	<0.005
8.2	18.2	10.0	9.6	5630	1774	96	16	50	-	<.005
18.2	28.2	10.0	4.6	2555	472	46	4	50	-	.005
28.2	38.2	10.0	10.0	5560	1976	100	22	50	-	.005
38.2	48.4	10.2	8.6	4650	1948	84	16	50	-	<.005
48.4	58.0	9.6	3.2	1700	564	33	4	50	-	<.005
58.0	67.8	9.8	9.8	5740	1265	100	12	50	-	<.005
67.8	78.0	10.2	10.0	5350	710	98	7	50	-	.01
78.0	88.0	10.0	4.0	2180	1559	40	12	50	-	<.005
88.0	92.5	4.5	1.1	588	482	24	8	50	-	.005
92.5	103.0	10.5	.5	264	1131	5	8	50	-	.005
103.0	113.0	10.0	.3	176	1254	3	8	50	-	.005
113.0	116.0	3.0	.2	112	939	6	5	50	-	<.005
116.0	126.0	10.0	.0	0	1008	0	10	50	-	<.005
126.0	136.0	10.0	1.0	567	1943	10	13	50	-	<.005
136.0	143.0	7.0	2.2	1110	1229	31	14	50	-	<.005

Hole 4

Footage		Distance drilled, feet	Core obtained, feet	Weight, grams		Recovery, percent			Analyses, percent	
From	To			Core	Sludge	Core	Sludge	Water	Core, mercury	Sludge, mercury
0.0	10.0	10.0	0.0	-	-	-	-	100	-	-
10.0	14.5	4.5	1.8	1316	741	40	13	50	0.06	0.03
14.5	19.5	5.0	5.0	4560	1179	100	15	50	.03	.06
19.5	29.5	10.0	5.3	3060	987	53	8	50	.07	.04
29.5	39.9	10.4	10.1	5130	1655	97	17	50	.03	.05
39.9	50.0	10.1	5.0	2862	1787	50	14	50	.01	.02
50.0	60.0	10.0	3.8	1600	2428	38	24	50	<.01	.01
60.0	69.7	9.7	2.7	1125	2312	38	32	50	.005	<.005
69.7	80.0	10.3	6.2	2469	2400	60	27	50	.01	.01
80.0	90.6	10.6	4.5	1740	949	42	9	50	-	.01
90.6	93.0	2.4	2.4	1167	0	100	0	None	<.005	-
93.0	103.0	10.0	4.0	1453	0	40	0	None	.01	-
103.0	110.5	7.5	1.8	547	0	24	0	None	.11	-
110.5	120.5	10.0	9.4	5160	0	94	0	None	.01	-
120.5	130.5	10.0	9.2	5040	0	92	0	None	.01	-
130.5	140.5	10.0	.9	442	0	9	0	None	.01	-
140.5	150.2	9.7	1.7	726	0	18	0	None	.01	-

Hole 5

Footage		Distance drilled, feet	Core obtained, feet	Weight, grams		Recovery, percent			Analyses, percent	
From	To			Core	Sludge	Core	Sludge	Water	Core, mercury	Sludge, mercury
0.0	2.5	2.5	1.1	627	-	44	-	60	0.06	-
2.5	12.5	10.0	.2	85	2640	2	23	50	.01	0.04
12.5	15.0	2.5	.2	72	839	8	35	50	.02	.03
15.0	16.5	1.5	1.0	419	146	75	13	50	.02	.03
16.5	19.5	3.0	3.0	1287	786	100	40	50	<.005	.01
19.5	23.5	4.0	.3	122	6791	8	165	100	<.005	.03
23.5	27.5	4.0	.5	220	4991	12	165	100	.03	.03
27.5	31.9	4.4	.5	223	1525	10	41	50	.005	.04
31.9	40.0	8.1	5.0	2123	3436	62	46	50	.20	.02

Hole 6

Footage		Distance drilled, feet	Core obtained, feet	Weight, grams		Recovery, percent			Analyses, percent	
From	To			Core	Sludge	Core	Sludge	Water	Core, mercury	Sludge, mercury
0.0	5.0	5.0	0.0	-	1326	-	16	30	-	0.48
5.0	10.0	5.0	.0	-	18864	-	225	100	-	.69
10.0	13.0	3.0	.0	-	7748	-	157	100	-	.56
13.0	14.5	1.5	1.1	801	1815	73	118	100	0.20	12.26
14.5	19.8	5.3	2.5	1572	2365	47	43	50	.10	.12
19.8	22.8	3.0	1.1	765	4232	37	116	100	.57	.21
22.8	25.5	2.7	.6	217	1456	22	77	100	.12	.14
25.5	27.0	1.5	.6	315	3174	40	233	100	.23	.17
27.0	31.5	4.5	4.2	2150	4751	93	171	100	.04	.12

Hole 7

Footage		Distance drilled, feet	Core obtained, feet	Weight, grams		Recovery, percent			Analyses, percent	
From	To			Core	Sludge	Core	Sludge	Water	Core, mercury	Sludge, mercury
0.0	5.0	5.0	0.0	-	2348	-	46	50	-	3.04
5.0	8.5	3.5	.0	-	1735	-	48	50	-	4.32
8.5	12.0	3.5	.2	94	8931	6	458	100	-	5.13
12.0	13.5	1.5	.5	243	6193	33	468	100	3.38	1.60
13.5	16.0	2.5	.3	77	5786	12	450	100	-	6.53
16.0	17.5	1.5	.3	-	5324	20	380	100	-	3.55
17.5	21.5	4.0	.2	-	18443	5	440	100	-	10.98
21.5	24.0	2.5	.0	-	7928	-	310	100	-	2.69
24.0	25.0	1.0	.0	-	2214	-	260	100	-	.56

Hole 8

Footage		Distance drilled, feet	Core obtained, feet	Weight, grams		Recovery, percent			Analyses, percent	
From	To			Core	Sludge	Core	Sludge	Water	Core, mercury	Sludge, mercury
0.0	7.0	7.0	0.0	-	-	-	-	50	-	-
7.0	13.0	6.0	6.0	5663	1107	100	11	50	0.03	0.62
13.0	15.5	2.5	2.0	1823	1622	80	36	50	<.005	.06
15.5	19.5	4.0	4.0	4700	805	100	10	50	.01	.11
19.5	24.5	5.0	5.0	2606	2226	100	48	50	<.005	.07
24.5	29.5	5.0	4.7	2502	2346	94	48	50	.05	.07
29.5	34.5	5.0	4.9	2459	1566	98	35	50	.35	.11
34.5	37.7	3.2	2.0	838	2723	63	95	100	.01	.04
37.7	42.5	4.8	4.8	2315	2685	100	65	100	.01	.13
42.5	47.5	5.0	5.0	2225	2443	100	62	100	<.005	.02
47.5	54.5	7.0	5.0	2140	2706	71	44	60	<.005	.03
54.5	59.5	5.0	4.5	2078	1915	90	44	60	.005	.03
59.5	64.5	5.0	4.9	3030	1956	98	35	60	.005	.04
64.5	66.0	1.5	1.4	605	658	93	55	60	.005	.03
66.0	70.5	4.5	4.5	2475	1603	100	37	60	.01	.03
70.5	74.0	3.5	3.5	2100	1217	100	33	50	.005	.02
74.0	79.0	5.0	5.0	3050	987	100	18	50	.005	.01
79.0	83.5	4.5	3.3	1660	1885	73	41	50	.005	.03
83.5	89.3	5.8	4.9	2530	2104	85	20	50	.005	.04
89.3	93.5	4.2	4.2	1865	1258	100	38	50	.12	.04
93.5	98.5	5.0	4.5	2002	0	90	-	-	.24	-
98.5	100.0	1.5	1.2	409	1874	80	186	100	.04	.04
100.0	103.3	3.3	1.1	418	5225	33	169	100	.02	.05
103.3	104.0	.7	.4	108	3249	57	775	100	.13	.05
104.0	108.0	4.0	3.0	1276	1809	75	53	70	.02	.04
108.0	117.0	9.0	2.5	1176	9445	28	90	100	.02	.04
117.0	128.0	11.0	9.3	3418	4370	85	57	60	.34	.18
128.0	138.0	10.0	4.6	1584	2973	46	37	60	.01	.10
138.0	148.0	10.0	2.0	870	1482	20	13	60	.01	.06
148.0	157.9	9.9	4.1	1765	3398	41	33	60	<.005	.08
157.9	167.8	9.9	4.6	1970	3782	41	33	60	.005	.09
167.8	177.9	10.1	10.1	4540	4480	100	56	60	<.005	.11
177.9	185.0	7.1	5.0	2101	2316	71	38	60	.005	.08
185.0	192.0	7.0	5.0	2282	4587	63	58	60	.005	.09
192.0	203.7	11.7	10.7	5165	3611	90	34	60	.005	.09

Hole 9

Footage		Distance drilled, feet	Core obtained, feet	Weight, grams		Recovery, percent			Analyses, percent	
From	To			Core	Sludge	Core	Sludge	Water	Core, mercury	Sludge, mercury
0.0	7.4	7.4	1.2	-	-	-	-	100	-	-
7.4	8.8	1.4	1.1	739	-	79	-	100	<0.01	-
8.8	9.9	1.1	1.0	803	-	91	-	100	.01	-
9.9	13.0	3.1	1.1	605	452	35	11	50	.01	0.06
13.0	15.0	2.0	1.5	661	690	75	39	50	.01	.01
15.0	19.2	4.2	1.2	574	1454	29	30	50	<.01	.25
19.2	23.2	4.0	3.7	1897	750	93	20	50	.01	.02
23.2	28.5	5.3	2.0	787	908	40	19	50	.01	.01
28.5	35.6	7.1	3.5	1647	955	50	13	50	<.01	.07
35.6	38.8	3.2	3.2	1642	567	100	19	50	.42	.02
38.8	43.2	4.4	3.2	1637	502	73	11	50	.01	.01
43.2	50.6	7.4	1.1	480	5367	15	64	80	.01	.01
50.6	55.6	5.0	4.8	2422	2363	91	48	50	<.01	.02
55.6	58.2	2.6	2.1	928	472	81	21	50	<.01	.01
58.2	65.5	7.3	3.6	1685	2950	49	37	50	<.01	.02
65.5	70.5	5.0	5.0	2430	1542	100	36	50	<.01	.03
70.5	75.5	5.0	4.4	2150	2669	88	58	60	<.01	.01
75.5	80.5	5.0	2.5	1198	2260	50	43	60	<.01	.01
80.5	82.5	2.0	.8	518	2981	40	92	100	<.01	.02
82.5	90.5	8.0	.8	356	2280	10	24	60	.01	.02
90.5	95.5	5.0	.9	360	2648	18	51	60	<.01	.01
95.5	100.5	5.0	1.0	505	3501	20	54	60	<.01	.02
100.5	105.5	5.0	.7	362	2267	14	33	60	<.01	.02
105.5	110.5	5.0	.0	-	2106	-	-	-	-	.02

Hole 10

Footage		Distance drilled, feet	Core obtained, feet	Weight, grams		Recovery, percent			Analyses, percent	
From	To			Core	Sludge	Core	Sludge	Water	Core, mercury	Sludge, mercury
0.0	10.0	10.0	0.0	-	-	-	-	100	-	-
10.0	15.4	5.4	.8	317	2455	15	44	60	<0.01	<0.01
15.4	20.2	4.8	1.3	491	2187	27	48	60	<.01	.01
20.2	25.4	5.2	2.8	1070	1462	54	33	60	.01	.01
25.4	30.4	5.0	1.7	799	2107	34	38	60	<.01	.01
30.4	35.4	5.0	1.7	795	1727	34	30	60	<.01	<.01
35.4	40.9	5.5	1.6	788	1525	29	23	60	<.01	.01
40.9	43.4	2.5	1.6	653	1265	64	58	60	<.01	.01
43.4	45.4	2.0	1.2	542	771	60	39	60	<.01	.03
45.4	50.5	5.1	3.8	1796	1963	75	40	60	<.01	.01
50.5	55.5	5.0	3.9	2010	2760	78	49	60	<.01	.01
55.5	58.8	3.3	2.6	1130	871	79	31	50	<.01	.01
58.8	65.8	7.0	6.4	3292	2363	92	36	50	<.01	.01
65.8	70.8	5.0	4.7	2282	1304	94	29	50	.01	<.01
70.8	75.8	5.0	4.7	2290	1057	94	24	50	<.01	<.01
75.8	80.2	4.4	2.5	1212	2224	57	47	50	<.01	<.01
80.2	85.2	5.0	2.7	1360	2042	54	36	50	<.01	.01
85.2	90.2	5.0	2.8	1417	2142	57	37	50	<.01	.01
90.2	91.5	1.3	1.3	744	3879	100	291	100	<.01	<.01
91.5	102.3	10.8	.7	264	3498	7	34	50	<.01	<.01
102.3	110.9	8.6	2.8	1237	3492	33	38	50	<.01	<.01
110.9	116.3	5.4	2.9	1358	2947	54	52	50	<.01	<.01
116.3	121.0	4.7	2.5	1062	2050	53	45	50	<.01	<.01

Hole 11

Footage		Distance drilled, feet	Core obtained, feet	Weight, grams		Recovery, percent			Analyses, percent	
From	To			Core	Sludge	Core	Sludge	Water	Core, mercury	Sludge, mercury
0.0	7.0	7.0	0.0	-	-	-	-	50	-	-
7.0	12.5	5.5	.6	400	1150	11	12	50	<0.01	0.02
12.5	17.6	5.1	.7	380	1048	14	15	50	<.01	.02
17.6	24.8	7.2	3.0	1182	1932	42	29	50	<.01	<.01
24.8	29.8	5.0	2.3	936	2549	46	54	50	<.01	.01
29.8	31.8	2.0	.7	351	747	35	31	50	<.01	<.01
31.8	33.8	2.0	.3	117	881	15	43	50	<.01	<.01

Hole 12

Footage		Distance drilled, feet	Core obtained, feet	Weight, grams		Recovery, percent			Analyses, percent	
From	To			Core	Sludge	Core	Sludge	Water	Core, mercury	Sludge, mercury
0.0	7.0	7.0	0.0	-	-	-	-	50	-	-
7.0	15.8	8.8	.7	329	1759	8	16	50	<0.01	<0.01
15.8	20.0	4.2	1.3	581	2909	31	63	60	<.01	<.01
20.0	25.8	5.8	3.3	1648	2446	57	62	60	<.01	<.01
25.8	35.5	9.7	6.7	2857	4085	69	47	60	<.01	<.01
35.5	45.5	10.0	6.7	2885	1620	67	18	50	<.01	.02
45.5	55.5	10.0	3.4	1621	5038	34	43	50	<.01	.05
55.5	60.0	4.5	1.6	745	1750	36	35	50	<.01	.02
60.0	66.8	6.8	.0	-	5565	-	70	100	<.01	.02
66.8	72.0	5.2	.0	-	5729	-	92	100	<.01	<.01
72.0	78.8	6.8	1.1	665	4543	16	42	60	<.01	<.01
78.8	85.0	6.2	1.2	446	3955	19	65	60	<.01	<.01
85.0	95.8	10.8	3.0	1298	4405	28	39	50	<.01	<.01
95.8	105.8	10.0	.4	191	4523	4	35	50	<.01	<.01
105.8	112.8	7.0	2.2	979	1925	32	26	50	<.01	<.01

Hole 13

Footage		Distance drilled, feet	Core obtained, feet	Weight, grams		Recovery, percent			Analyses, percent	
From	To			Core	Sludge	Core	Sludge	Water	Core, mercury	Sludge, mercury
0.0	6.0	6.0	0.0	-	-	-	-	50	-	-
6.0	10.0	4.0	3.0	2591	-	75	-	-	<0.01	-
10.0	15.0	5.0	2.2	973	1300	44	35	50	.01	0.01
15.0	20.3	5.3	3.5	1550	3573	66	108	100	.01	.03
20.3	25.3	5.0	.7	287	2944	14	77	80	.01	.03
25.3	30.0	4.7	1.2	529	287	26	8	20	<.01	.14
30.0	35.0	5.0	2.4	967	-	48	-	-	<.01	-

Hole 14

Footage		Distance drilled, feet	Core obtained, feet	Weight, grams		Recovery, percent			Analyses, percent	
From	To			Core	Sludge	Core	Sludge	Water	Core, mercury	Sludge, mercury
0.0	6.0	6.0	0.0	-	-	-	-	100	-	-
6.0	10.5	4.5	4.5	4619	-	100	-	100	0.10	-
10.5	15.0	4.5	.5	281	-	11	-	100	.10	-
15.0	20.6	5.6	.5	204	2351	9	39	40	.14	0.17
20.6	25.6	5.0	3.7	1622	282	74	8	40	.03	.11
25.6	31.4	5.8	1.2	503	1025	21	17	40	.01	.02
31.4	38.4	7.0	3.0	1268	684	60	18	40	.01	.03
38.4	43.8	5.4	.1	45	1944	5	30	40	.01	.01
43.8	51.4	7.6	1.6	696	1795	21	20	40	.15	.02
51.4	58.0	6.6	.8	333	2772	12	38	40	.02	.03
58.0	64.4	6.4	1.0	379	1726	16	28	40	.01	.02
64.4	71.4	7.0	1.0	441	2041	14	25	40	.19	.03
71.4	78.0	6.6	3.0	1457	1254	45	17	40	.01	.02
78.0	84.4	6.4	.7	357	2015	11	24	40	.04	.04
84.4	91.4	7.0	6.5	1018	621	93	31	40	.09	.05
91.4	98.4	7.0	3.8	1921	1786	54	22	40	.01	.03
98.4	105.4	7.0	3.3	1611	1012	47	13	40	.01	.03
105.4	110.4	5.0	4.5	2163	927	90	21	40	<.01	.03
110.4	115.8	5.4	2.0	1158	1816	37	24	40	.07	.02
115.8	116.2	.4	.4	197	-	100	-	-	<.01	-
116.2	117.8	1.6	.3	177	372	19	15	40	<.01	.04
117.8	118.4	.6	.0	-	1174	-	120	100	<.01	.02
118.4	122.4	4.0	2.0	992	954	50	21	40	<.01	.08
122.4	126.8	4.4	4.2	2429	605	96	14	10	<.01	.12
126.8	133.4	6.6	5.2	2203	510	84	10	10	<.01	.07
133.4	140.4	7.0	5.7	3065	198	82	3	10	<.01	.04
140.4	147.4	7.0	3.0	1408	-	43	-	10	<.01	-
147.4	154.4	7.0	.2	79	-	3	-	10	<.01	-
154.4	157.0	2.6	.0	-	101	-	3	20	<.01	.02
157.0	163.4	6.4	2.3	1012	772	36	11	30	<.01	.02
163.4	170.4	7.0	7.0	3339	444	100	7	20	<.01	.02
170.4	177.3	6.9	.7	312	681	10	8	20	<.01	.02
177.3	184.4	7.1	7.1	3639	-	100	-	10	<.01	.02
184.4	193.6	9.2	8.0	2350	324	87	6	10	<.01	<.01
193.6	200.4	6.8	3.8	1514	513	56	9	10	<.01	.01
200.4	206.6	6.2	4.7	2267	183	76	3	5	<.01	.01
206.6	214.4	7.8	6.7	3825	15	86	-	5	<.01	-
214.4	226.4	12.0	4.6	618	-	38	-	-	<.01	-
226.4	232.5	6.1	1.6	816	-	26	-	-	<.01	-

APPENDIX E.--PETROGRAPHIC ANALYSES OF DIAMOND-DRILL CORES

The same numbering system is used here as in appendix C. The following legend applies to all petrographic samples in appendix E:

P--Predominant..... Over 50 percent.

A--Abundant..... 10 - 50 percent.

S--Subordinate..... 2 - 10 percent.

M--Minor..... 0.5 - 2 percent.

F--Few..... 0.1 - 0.5 percent.

T--Trace..... Less than 0.1 percent.

C--Rock classification.

	Sample											
	3-2	7-2	11-2	15-2	18-2	21-2	22-2	24-2	32-2	38-2	40-2	42-2
Diamond-drill hole..	9	9	9	9	9	9	9	9	10	10	10	10
Rock classification:												
Altered volcanic..	-	-	-	-	-	-	-	-	-	-	-	C
Dolomite.....	-	-	C	C	-	-	-	-	-	-	C	-
Hydrothermal rock.	-	-	-	-	-	-	C	-	-	-	-	-
Limestone.....	C	-	-	-	-	C	-	C	-	-	-	-
Phyllite.....	-	-	-	-	-	-	-	-	C	-	-	-
Shale.....	-	C	-	-	C	-	-	-	-	C	-	-
Vein calcite.....	-	-	-	-	-	C	C	-	-	-	C	-
Mineral:												
Ankerite.....	-	-	-	-	-	-	-	-	-	-	-	-
Biotite.....	-	-	-	-	-	-	-	-	-	-	-	A
Calcite.....	P	-	-	S	A	P	S	P	-	-	-	F
Carbon.....	-	-	-	-	-	-	-	S	-	-	-	-
Chlorite.....	-	A	-	-	P	-	A	A	-	P	-	-
Cinnabar.....	-	-	S	-	-	-	-	-	-	-	-	-
Dolomite.....	-	-	P	P	T	-	-	S	-	-	P	S
Illite.....	-	A	-	-	A	-	A	A	P	A	-	A
Kaolin.....	-	-	-	-	S	-	-	-	-	-	-	S
Limonite.....	-	M	F	-	S	M	S	-	M	-	M	-
Manganese dioxide.	-	-	-	-	-	S	-	-	-	-	-	-
Pyrite.....	-	-	-	-	T	-	-	-	-	-	-	F
Quartz.....	S	A	M	F	-	-	-	-	-	-	M	-
Sanidine.....	-	-	-	-	-	-	-	-	-	-	-	-
Zeolite.....	-	-	-	-	-	-	-	-	-	-	-	-

	Sample										
	43-2	44-2	45-2	46-2	47-2	47A-2	48-2	50-2	51-2	52-2	57-2
Diamond-drill hole.....	10	10	10	10	10	10	10	10	10	10	11
Rock classification:											
Altered volcanic.....	C	C	C	C	-	-	C	C	-	-	-
Dolomite.....	-	-	-	-	-	-	-	-	-	-	C
Hydrothermal rock.....	-	-	-	-	C	-	-	-	-	-	-
Limestone.....	-	-	-	-	-	-	-	-	C	C	-
Phyllite.....	-	-	-	-	-	-	-	-	-	-	-
Shale.....	-	-	-	-	-	C	-	-	-	-	-
Vein calcite.....	-	-	-	-	-	-	-	-	-	-	-
Mineral:											
Ankerite.....	-	-	-	S	A	-	-	-	-	-	-
Biotite.....	-	A	S	M	-	-	A	A	-	-	-
Calcite.....	M	S	S	-	-	-	S	A	P	P	A
Carbon.....	-	-	-	-	-	-	-	-	M	M	-
Chlorite.....	P	-	A	M	-	A	-	-	-	-	-
Cinnabar.....	-	-	-	-	-	-	-	-	-	-	-
Dolomite.....	-	F	-	-	-	-	A	F	A	-	A
Illite.....	A	A	A	A	A	A	A	A	-	-	-
Kaolin.....	-	-	-	-	A	-	-	-	-	-	-
Limonite.....	A	A	A	S	S	A	M	-	T	-	F
Manganese dioxide.....	-	-	-	-	-	-	-	-	-	-	-
Pyrite.....	-	-	-	T	-	-	-	S	T	-	T
Quartz.....	-	S	-	A	A	M	-	-	A	-	-
Sanidine.....	-	-	F	-	-	-	-	-	-	-	-
Zeolite.....	-	-	-	-	-	-	-	-	-	-	-

	Sample										
	57A-2	58-2	64-2	68-2	70-2	72-2	73-2	76-2	80-2	85-2	88-2
Diamond-drill hole.....	11	11	12	12	12	12	12	13	13	14	14
Rock classification:											
Altered volcanic.....	-	-	-	-	-	-	-	-	-	-	-
Dolomite.....	-	-	-	C	C	-	-	C	C	C	C
Hydrothermal rock.....	-	-	-	-	-	C	-	-	-	-	-
Limestone.....	C	-	-	-	-	-	-	-	-	-	-
Phyllite.....	-	-	-	-	-	-	-	-	-	-	-
Shale.....	-	C	C	-	-	-	C	-	-	-	-
Vein calcite.....	-	-	-	-	-	-	C	-	-	-	-
Mineral:											
Ankerite.....	-	-	-	-	-	-	-	-	-	-	-
Biotite.....	-	-	-	-	-	-	-	-	-	-	-
Calcite.....	P	S	-	S	S	-	A	A	S	S	M
Carbon.....	-	-	-	-	-	-	-	-	-	-	-
Chlorite.....	-	-	A	-	-	S	-	-	-	-	-
Cinnabar.....	-	-	-	-	-	-	-	-	-	-	F
Dolomite.....	-	-	-	P	P	S	-	P	P	P	P
Illite.....	-	P	P	-	-	M	A	-	-	-	-
Kaolin.....	-	-	-	-	-	-	-	-	-	-	-
Limonite.....	T	M	M	M	M	S	-	F	-	-	-
Manganese dioxide.....	-	-	-	-	-	-	-	-	-	-	-
Pyrite.....	-	-	-	-	-	S	S	-	-	-	-
Quartz.....	-	-	-	-	A	P	-	-	-	-	S
Sanidine.....	-	-	-	-	-	-	-	-	-	-	-
Zeolite.....	-	A	A	-	-	-	-	-	-	-	-

	Sample								
	98-2	100-2	109-2	110-2	110A-2	111-2	112-2	117-2	123-2
Diamond-drill hole.....	14	14	14	14	14	14	14	14	14
Rock classification:									
Altered volcanic.....	-	-	-	-	-	-	-	-	-
Dolomite.....	C	C	C	-	C	C	-	C	C
Hydrothermal rock....	-	-	-	C	-	-	-	-	-
Limestone.....	-	-	-	-	-	-	-	-	-
Phyllite.....	-	-	-	-	-	-	-	-	-
Shale.....	-	-	-	-	-	-	C	-	-
Vein calcite.....	-	C	-	-	-	C	-	-	C
Mineral:									
Ankerite.....	-	-	-	-	-	-	-	-	-
Biotite.....	-	-	-	-	-	-	-	-	-
Calcite.....	T	P	S	A	T	S	-	F	S
Carbon.....	-	-	-	-	-	F	-	T	T
Chlorite.....	-	-	-	S	-	-	-	-	-
Cinnabar.....	-	T	-	-	-	-	-	-	-
Dolomite.....	P	A	P	-	P	P	-	P	P
Illite.....	-	-	-	-	-	-	P	-	-
Kaolin.....	-	-	-	-	-	-	-	-	-
Limonite.....	T	-	-	S	-	T	-	-	-
Manganese dioxide....	-	-	-	-	-	-	-	-	-
Pyrite.....	-	-	-	-	-	-	M	-	-
Quartz.....	-	-	-	A	-	S	S	A	-
Sanidine.....	-	-	-	-	-	-	-	-	-
Zeolite.....	-	-	-	-	-	-	-	-	-

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