UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

Region I - Alaska

Open-File Report

EXAMINATION

OF

HANNUM LEAD PROSPECT

Fairhaven District, Seward Peninsula, Alaska

By

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Alaska Mining Experiment Station
Juneau, Alaska
November, 1957

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CONTENTS

ILLUSTRATIONS

TABLES

1/ Mine examination and exploration engineer, Bureau of Mines, Region I, Juneau, Alaska.

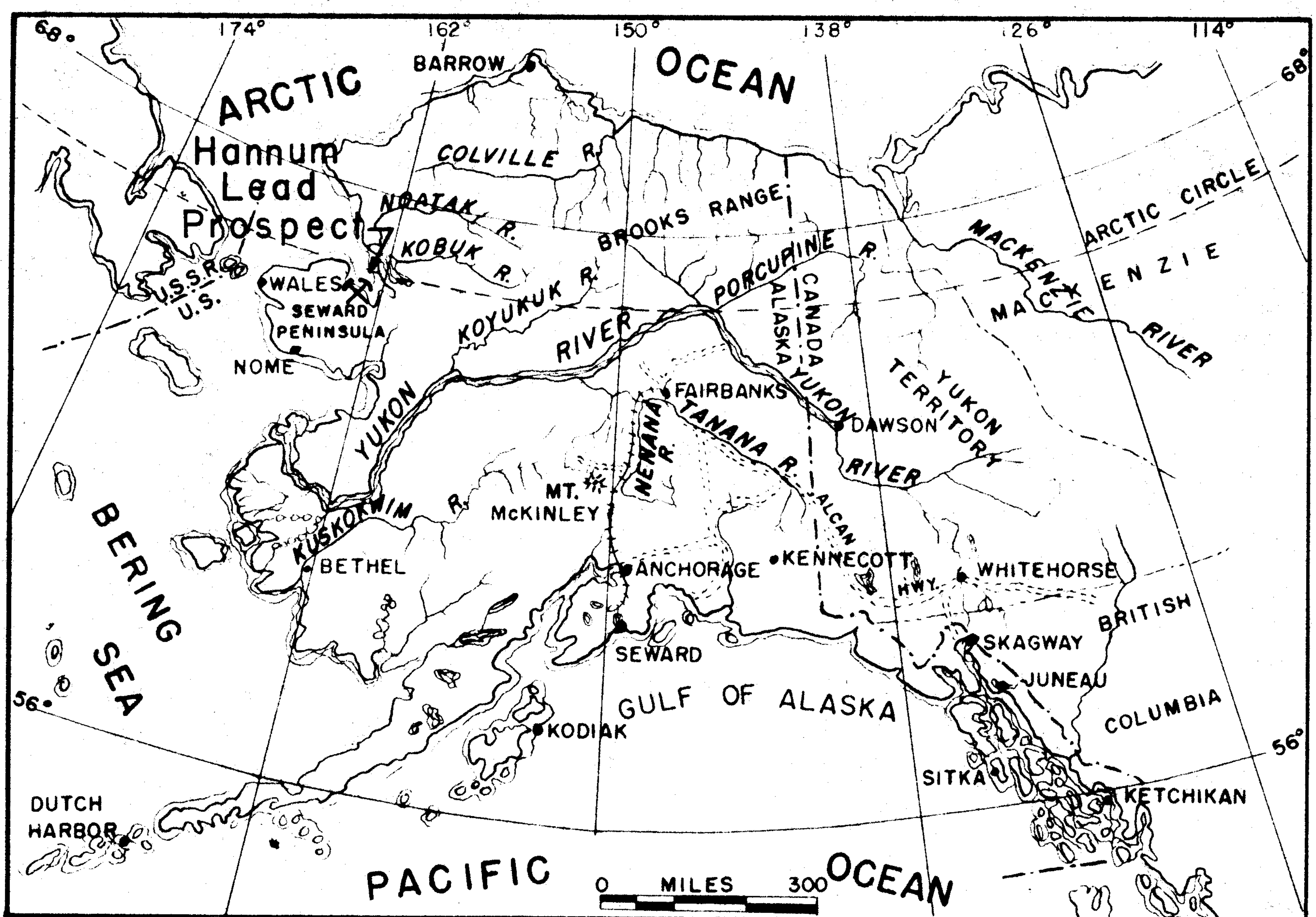

Figure I.— Index map of Alaska.

EXAMINATION REPORT

HANNUM LEAD

INTRODUCTION AND SUMMARY

The Hannum lead prospect is on Harrys Creek, a small headwater tributary of Hannum Creek which is in turn a tributary of the Inmachuk River in the Fairhaven district, Seward Peninsula, Alaska. Silver-bearing galena was discovered here in the early 1900's by gold placer miners. At the request of the present claim owner the prospect was examined on August 6-13, 1956.

The examination included bulldozer trenching followed by hand trenching and sampling. About 80 samples were taken. Five bulldozer trenches were started; one proved to be off the structure, one could not be continued to bedrock because the overburden was too deep, and three uncovered a frostbroken highly-oxidized outcrop of lead minerals. The trenches were stopped in a zone of partially-oxidized bedrock and detached oxidized fragments of bedrock in a matrix of frozen claylike soil. Fresh unaltered bedrock could not be exposed with the equipment available.

The formations exposed in the trenches are a series of thin bedded metamorphosed limestones and calcareous sandstones. Oxidation and frost breaking of the exposed outcrops obscured the dip and strike of individual beds but the general strike appeared to be N. 70° to 85° W. with a dip of 15° to 35° to the northeast.

The deposit contains galena and pyrite associated with quartz. The outcrop is traceable for over 400 feet; it is frostbroken, highly oxidized, and possibly enriched by surficial concentration. The mineralization is irregular; massive galena occurs in two trenches but only traces of galena were found in a trench between these two. The attitude of the deposit was not established. Inconclusive evidence indicates that the galena-bearing quartz is aligned along a bed in the country rock, has a strike of N. 70° to 85° W., a dip of 15° to 35° northeast and a normal width of 4 to 10 feet. However, a deposit aligned along a steeply dipping fault cutting the beds could produce a similar outcrop. The samples assayed for silver averaged 0.15 ounce of silver per ton per percent of lead. The size and grade of the deposit could not be estimated.

LOCATION

The Hannum lead prospect is on Harrys Creek about 1,500 feet upstream from its intersection with Cunningham Creek, a headwater tributary of Hannum Creek. Hannum Creek is a tributary of the Inmachuk River in the Fairhaven district, Seward Peninsula, Alaska. The prospect is about 120 miles northeast of Nome and about 25 miles southwest of Deering.

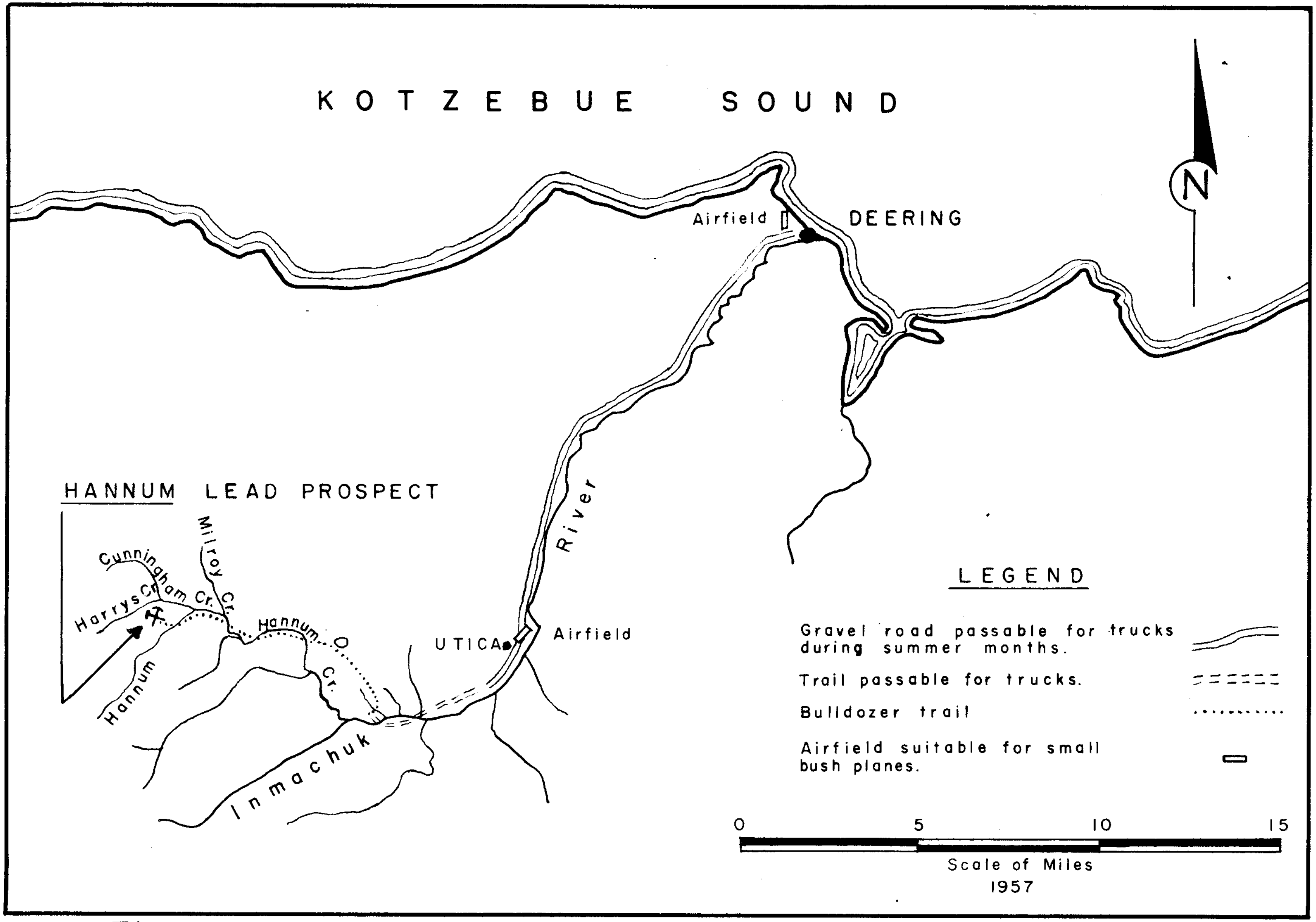

Figure 2.—Location map, Hannum lead prospect.

Deering is the nearest permanent settlement; it has a population of about 150 people. During the placer mining season, there are usually a few people at Utica (fig. 2-A), 17 miles by road and trail from the prospect.

The location of the prospect is shown on figures 2 and 3.

ACCESSABILITY

Heavy freight for the Hannum Creek area is landed on the beach at Deering. There are no facilities of any kind for handling freight. From Deering it is hauled 19 miles by truck over a gravel road to Utica. A trail passable by trucks during the dry weather, extends 5 miles beyond Utica to Discovery Gulch. From Discovery Gulch it is 12 miles by tractor trail to the Hannum lead prospect.

There are no airfields in the area suitable for DC-3 or similar heavy aircraft; bush planes transport light freight, passengers, and mail. The larger bush planes carry a maximum payload of about one ton. These planes operate out of Nome or Kotzebue and land at Utica where there is a gravel airfield about 1,500 feet long. There also is a gravel airfield at Deering, similar to the airfield at Utica, and a small airfield about 2 miles south of the prospect that can be used by very light planes.

There are no roads in the area except the Deering-Utica road. One of the proposed routes for the Fairbanks-Nome highway would pass near the prospect.

HISTORY AND OWNERSHIP

In about 1903 gold placer miners working on Cunningham Creek discovered silver-bearing galena in their sluice boxes and traced it to the source on Harrys Creek. The general location of this discovery was reported by the Geological Survey in 1905. A number of small test pits observed at the prospect showed obvious signs of being very old and probably date from this period. Apparently these pits did not uncover the outcrop. There is no evidence that any significant work was done on the deposit between that time and 1947 when an attempt was made to expose the outcrop with a small bulldozer. Several trenches were started in that year but none reached firm bedrock; results of this work are not available. The claims were abandoned until the prospect was restaked by the present owner.

As now constituted, the Hannum lead property consists of 9 unpatented lode claims owned by N. W. Foster of Nome, Alaska. There are no buildings or equipment on the property. The nearest habitable structure is a 12'x 16' cabin located at the intersection of Cunningham and Hannum Creeks (fig. 2-C) about 1 mile from the prospect. Figure 3 is a sketch map of the claims.

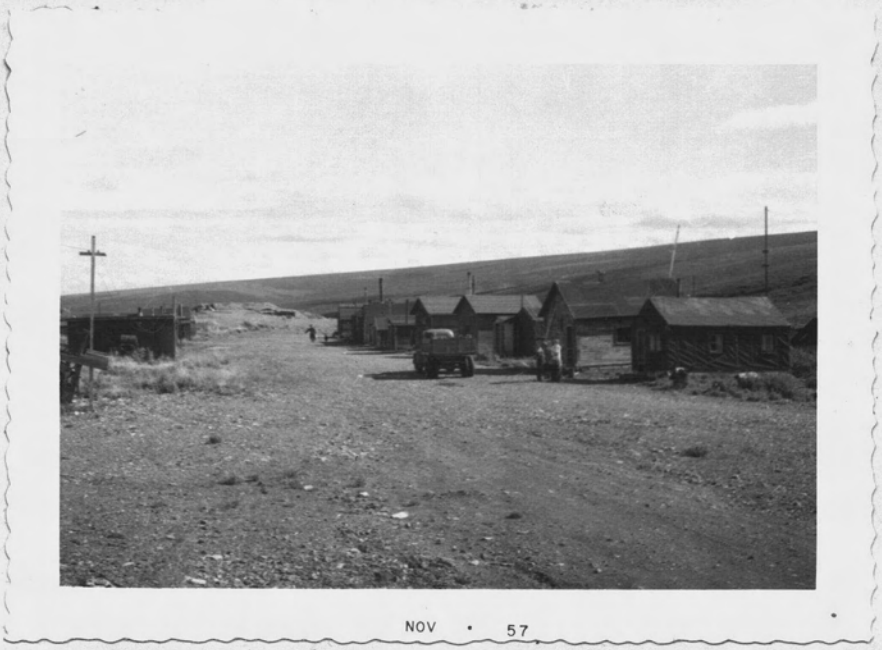

Fig. 2-A. - Utica, Alaska

Fig. 2-B. - Hannum Creek - Looking Upstream

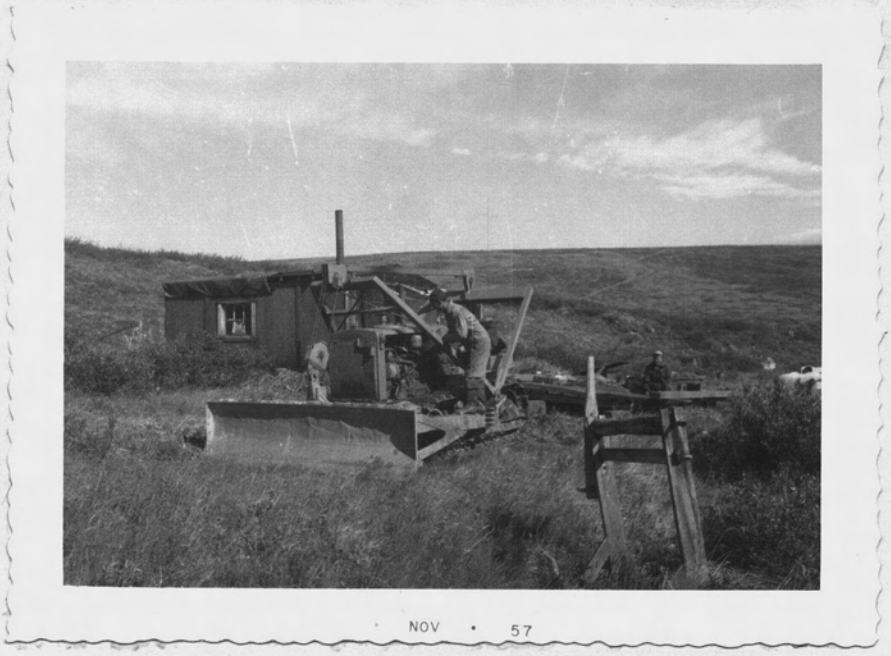

Fig. 2-C. - Cabin Where Cunningham Creek Enters Hannum Creek

Fig. 2-D. - Harrys Creek - No Water

Fig. 2-E. - Old Prospect Pit and Trenches at Hannum Lead Prospect

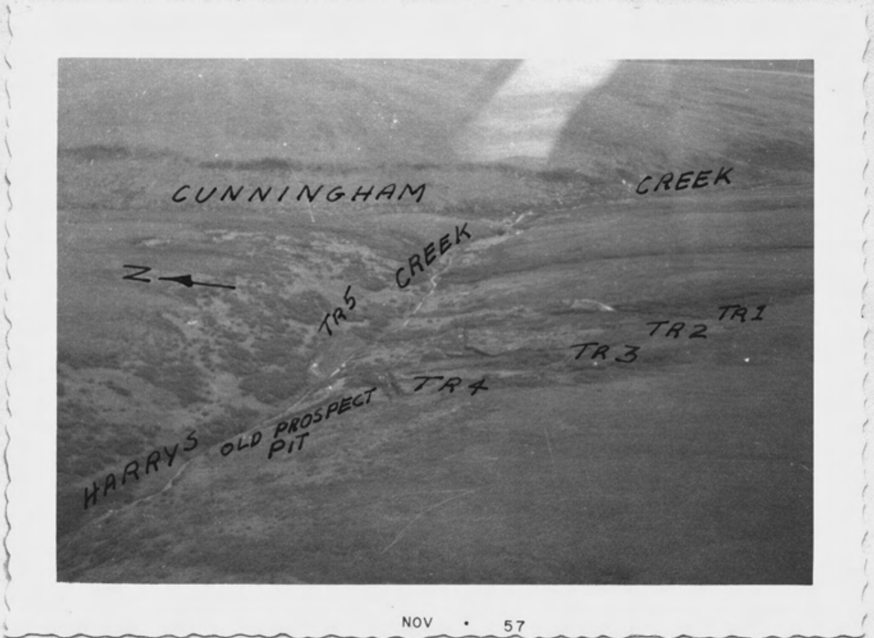

Fig. 2-F. - Hannum Lead Prospect As Seen From The Air

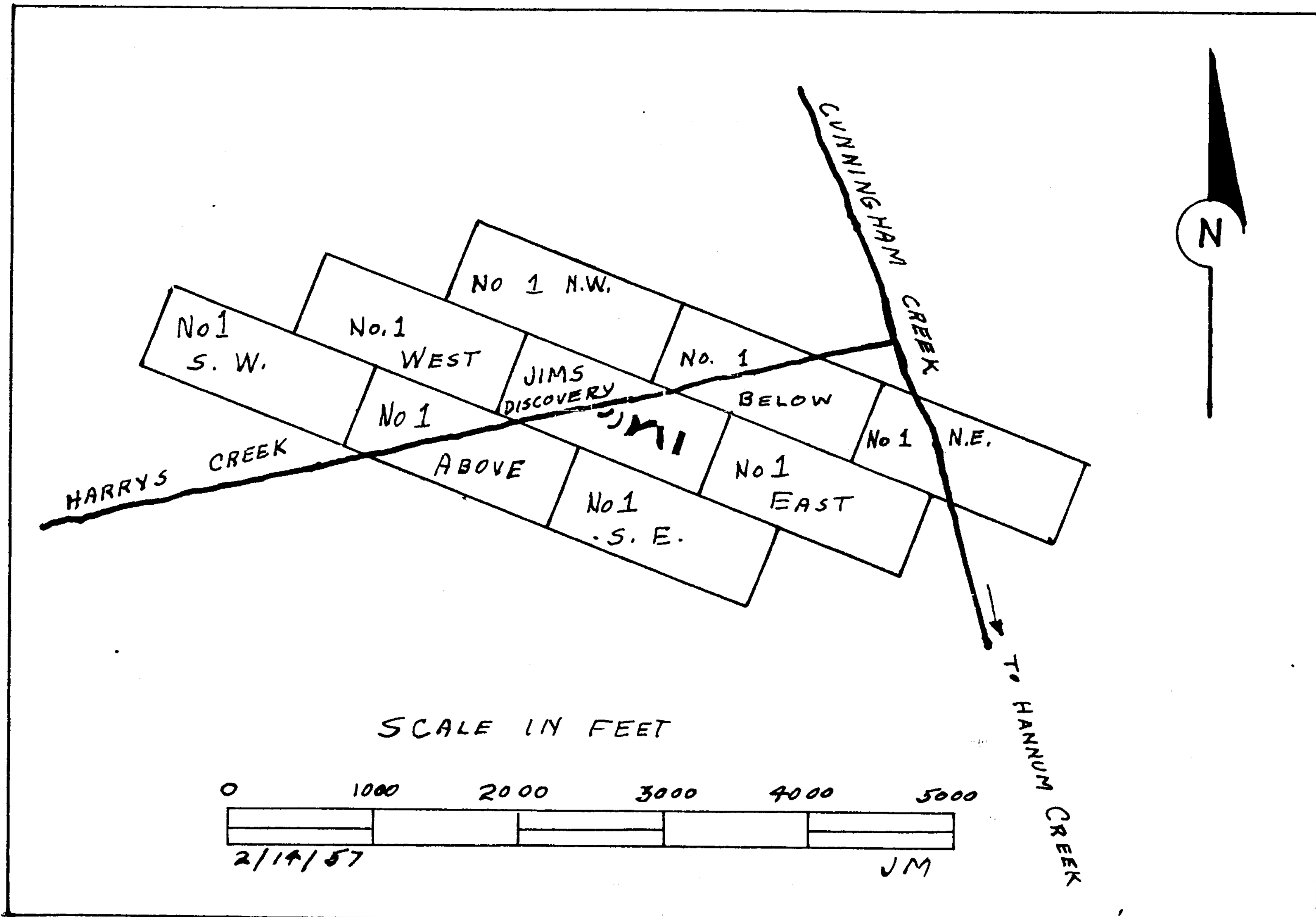

Figure 3.—Sketch map of claims, Hannum lead prospect.

PHYSICAL FEATURES AND CLIMATE

The Inmachuk River - Hannum Creek drainage area is characterized by low rolling rounded hills and shallow broad valleys (figs. 2-B and 2-D). The prospect is near the margin of an area overlain by recent lava flows. Stream erosion has cut through the flows so that the lava appears as a capping on the hills. Where not covered by lava, the overburden supports some small brush and a rich tundra vegetation which makes good reindeer pasture.

Climatological data for Deering and the Hannum Creek area is not available. The following data for Shishmaref, Alaska was compiled by the U. S. Weather Bureau at Anchorage. Shishmaref is about 75 miles west of the prospect.

TABLE 1. - Climatological data, Shishmaref, Alaska

Average annual temperature	20.2° F.
Average annual precipitation	8.02 inches
Average annual snowfall	32.6 inches
Prevailing wind direction	North
Average breakup (Arctic Ocean)	June 18
Average freeze-up (Arctic Ocean)	November 6
Highest recorded temperature	78° F.
Lowest recorded temperature	-48° F.

A serious problem for any mining operation in the area is the scarcity of water. This is particularly true in winter. For comparative purposes, Palm Springs, California reports 5.60 inches of rainfall per year and Winnemucca, Nevada reports 8.20 inches per year. Both of these weather reporting stations are in desert areas.

A spring was observed on the south bank of Hannum Creek about 1/4 mile above the mouth of Cunningham Creek and about 1 mile from the prospect. It is reported to flow all winter. The rate of flow is not known but local residents report that it is enough for a small hand-sluicing operation.

DESCRIPTION OF THE DEPOSIT

General Geology

The country rock is a series of highly metamorphosed thin-bedded limestones and calcareous sandstones. It is overlain and obscured by a cover of frozen detritus, peat and tundra vegetation. As exposed in the trenches the beds are frostbroken and partially overturned by down-hill creep. Reliable dips and strikes were not obtainable. The general strike of the bedding appeared to be about N. 70° to 85° W.; the apparent dip varied from 15° to 35° N.E. There is some evidence to indicate that the deposit may be located near the crest of a northward pitching anticline but exposures were too few to definitely prove or disprove the presence of such a structure. The general geology of the area is shown in figure 4.

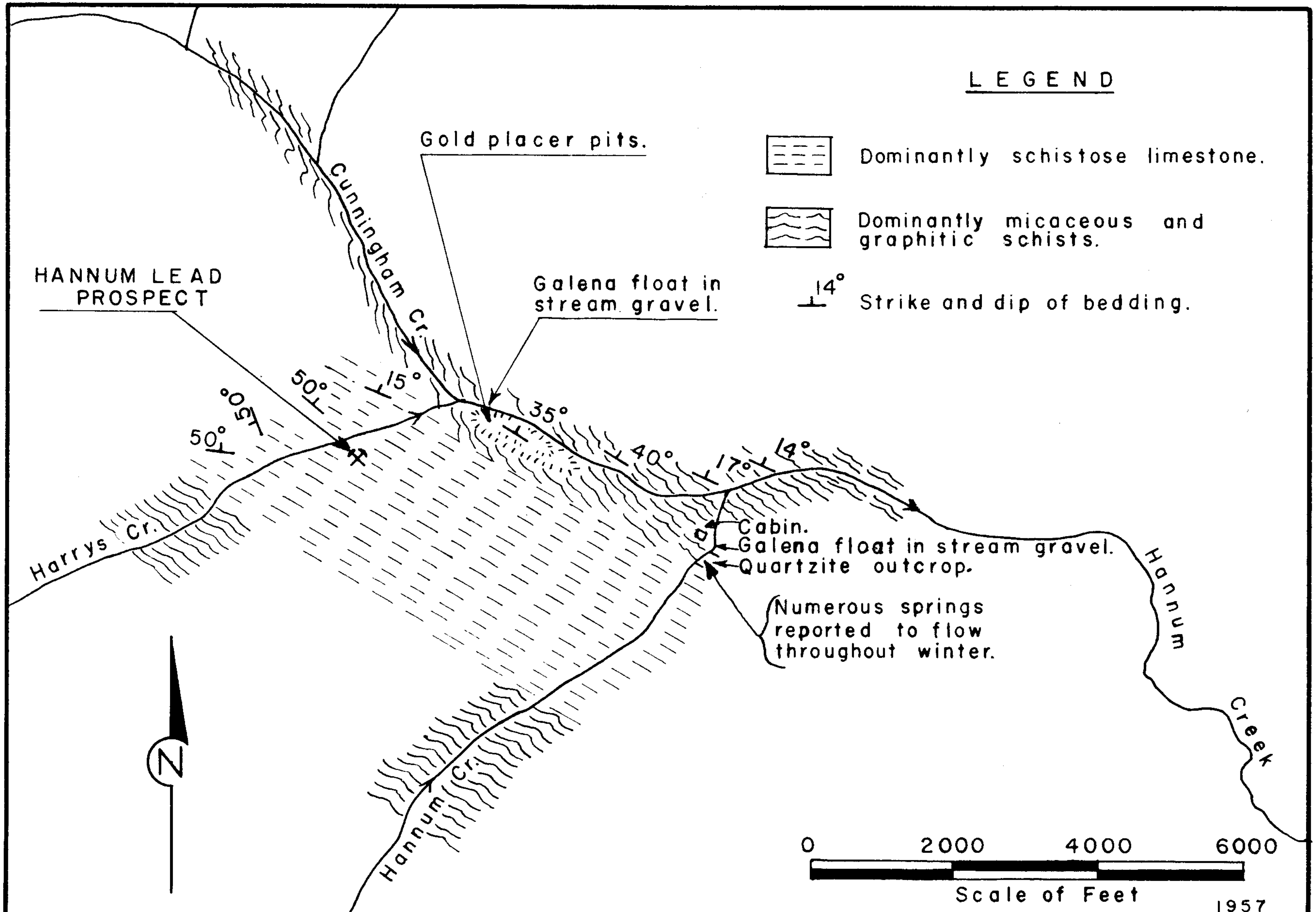

Figure 4.– General geology, Hannum lead prospect.

The Deposit

The deposit consists of irregular segregations of argentiferous galena associated with quartz. The overall strike and dip of such segregations appeared to coincide with the general strike and dip of the country rock which would suggest alignment along a bedding plane or within a favorable bed. As exposed by trenches and indicated by float the outcrop is over 400 feet long and probably has a normal width of from 4 to 10 or more feet. Mineralization occurs as segregations of massive galena and zones of strongly mineralized quartz. The outcrop also contains zones of practically barren quartz. The number of exposures is too small to determine what part of the whole outcrop is made up of barren quartz.

As observed in the trenches the outcrop is a mixture of gossan, ice and overburden. Only a few relatively unweathered specimens were recovered. In most cases it was not possible to clearly distinquish the walls of the deposit because of the intense weathering. The sample data can have only semi-quantitative value because there is no way to estimate the combined effects of oxidation, leaching, residual concentration and downfill flow.

WORK PERFORMED BY THE BUREAU OF MINES

The examination was started on August 6 and completed on August 12, 1956. Transportation to the area was by plane from Nome to Utica, Alaska. At Utica an RD-6 caterpillar angledozer was rented from the Alaska Road Commission. It was used for transportation from Utica to the prospect and for trenching the outcrop. The Bureau engineer was accompanied by the property owner and the bulldozer operator. During the examination the party camped in an abandoned cabin near the prospect.

The examination included a reconnaissance of the area followed by bulldozer trenching, hand trenching and sampling. Five bulldozer trenches were put down. One trench was off the structure; one trench could not be continued to bedrock because the overburden was too deep; three trenches exposed a frostbroken outcrop of oxidized lead minerals. Most of the samples were taken from hand-dug trenches in the bottom of the bulldozer trenches. In all about 80 samples were taken.

The samples were shipped to Juneau, Alaska. Representative composite samples were submitted for spectrographic analyses to determine the elements present. This was followed by chemical analyses of the individual samples. Typical specimens were submitted for petrographic analyses and paragenetic studies. Chemical analyses were made at the Bureau of Mines laboratory in Juneau; spectrographic analyses, petrographic analyses and paragenetic studies were made at the Bureau laboratory in Albany, Oregon.

Trench and sample locations are shown in figures 5 to 9 and in figures 2-E and 2-F. Sample descriptions and analyses data are given in tables 2 to 6 inclusive.

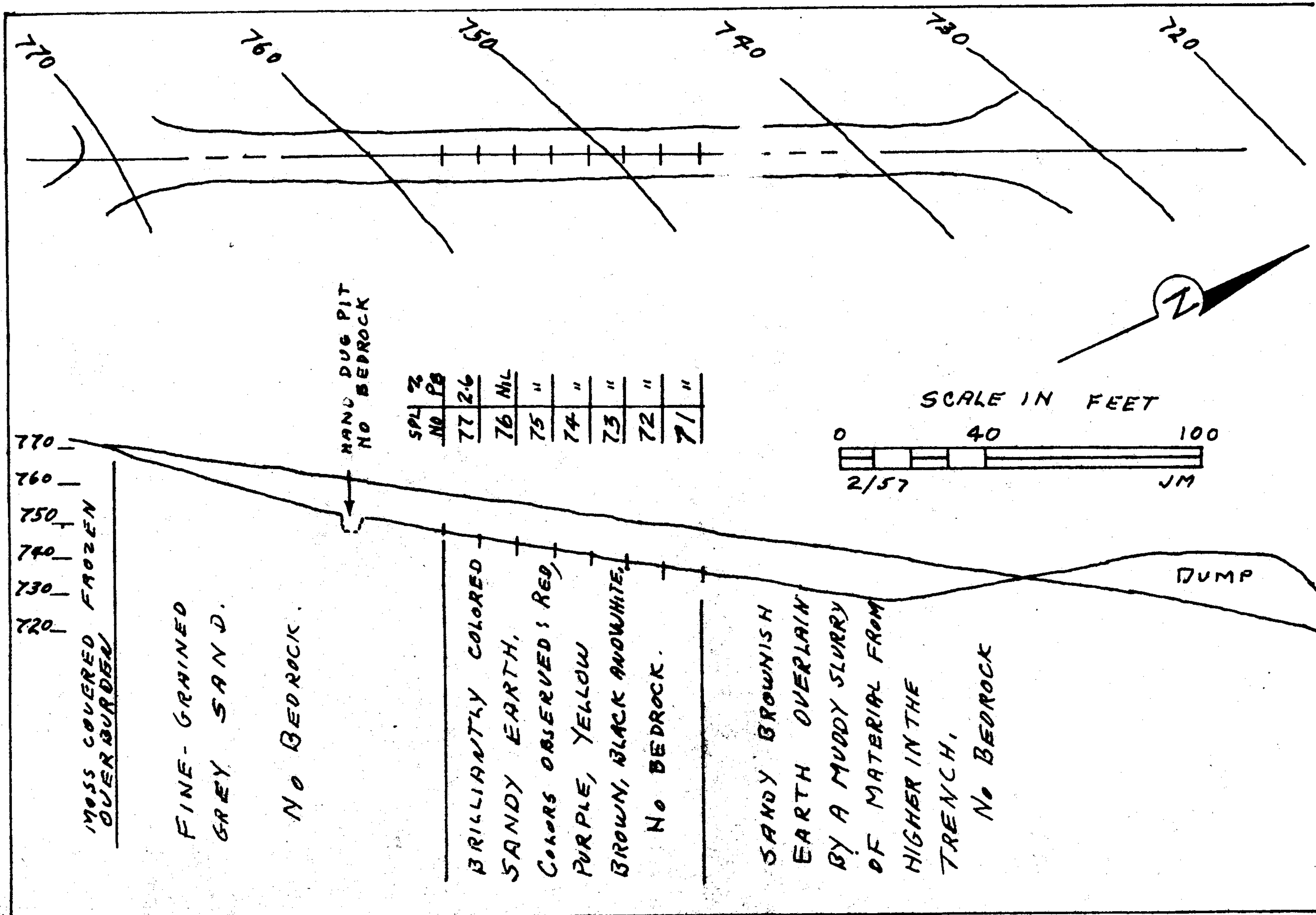

Figure 6.— Plan and cross section, Trench I, Hannum lead prospect.

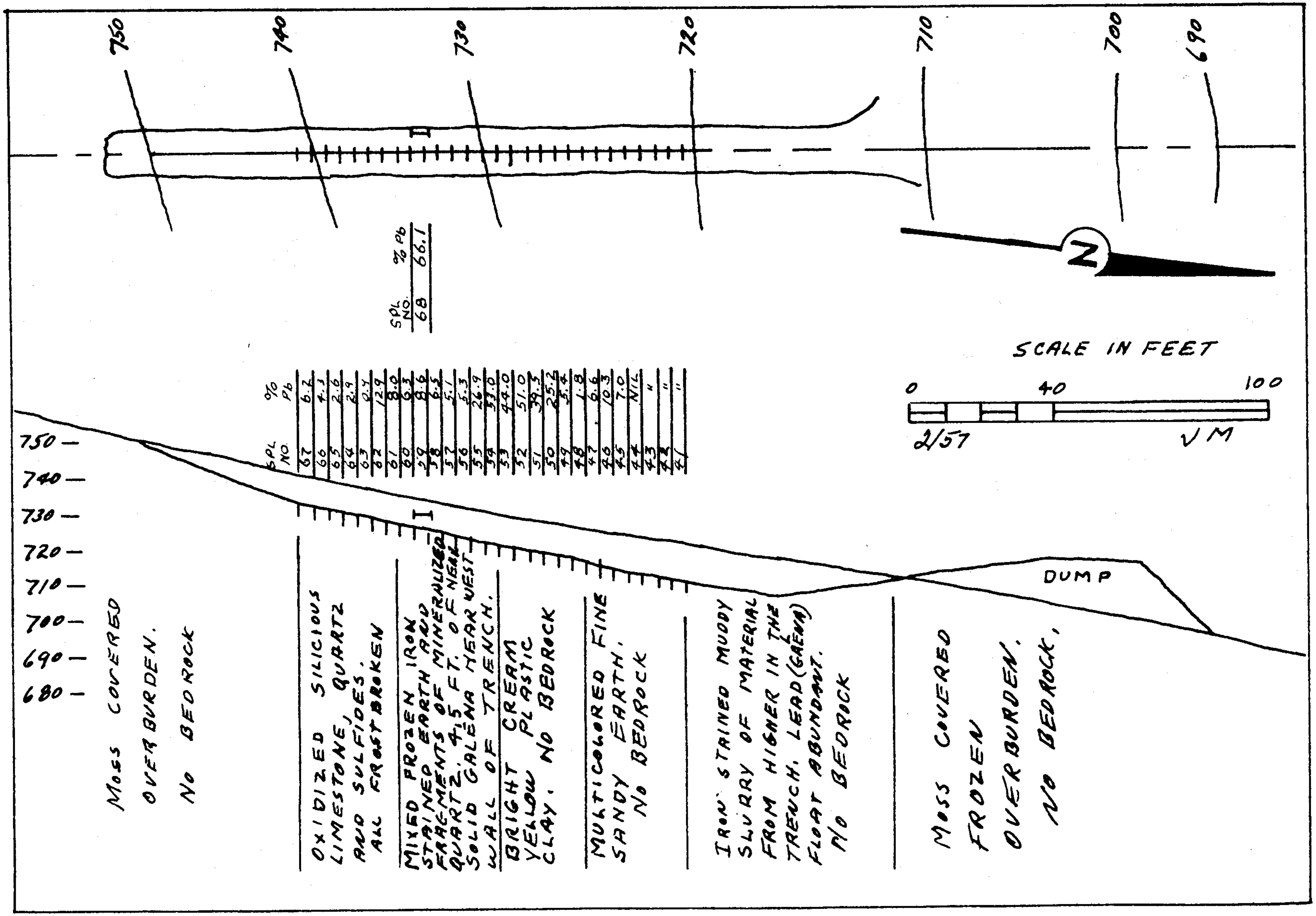

Figure 7.— Plan and cross section, Trench 2, Hannum lead prospect.

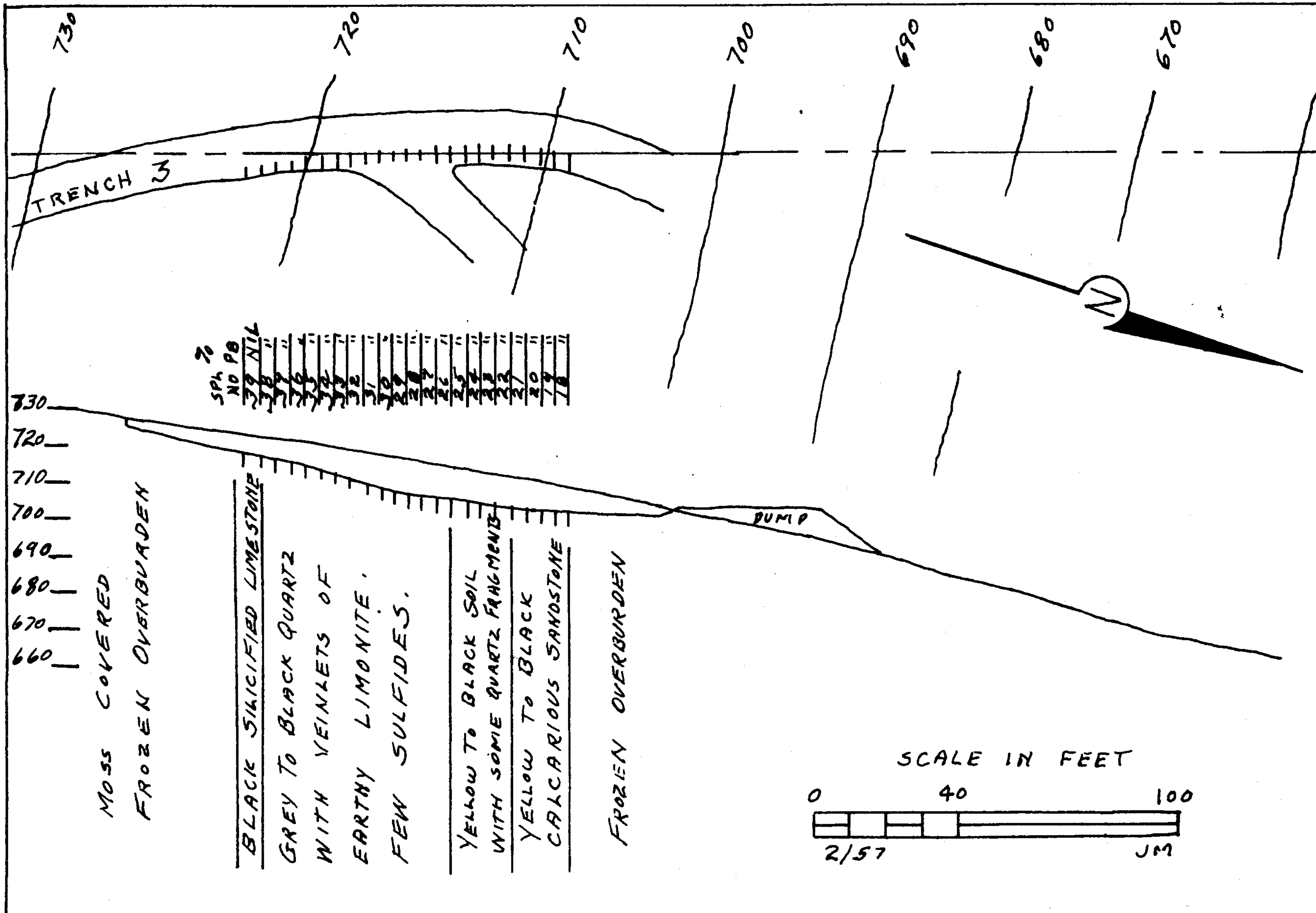

Figure 8.— Plan and cross section, Trench 3, Hannum lead prospect.

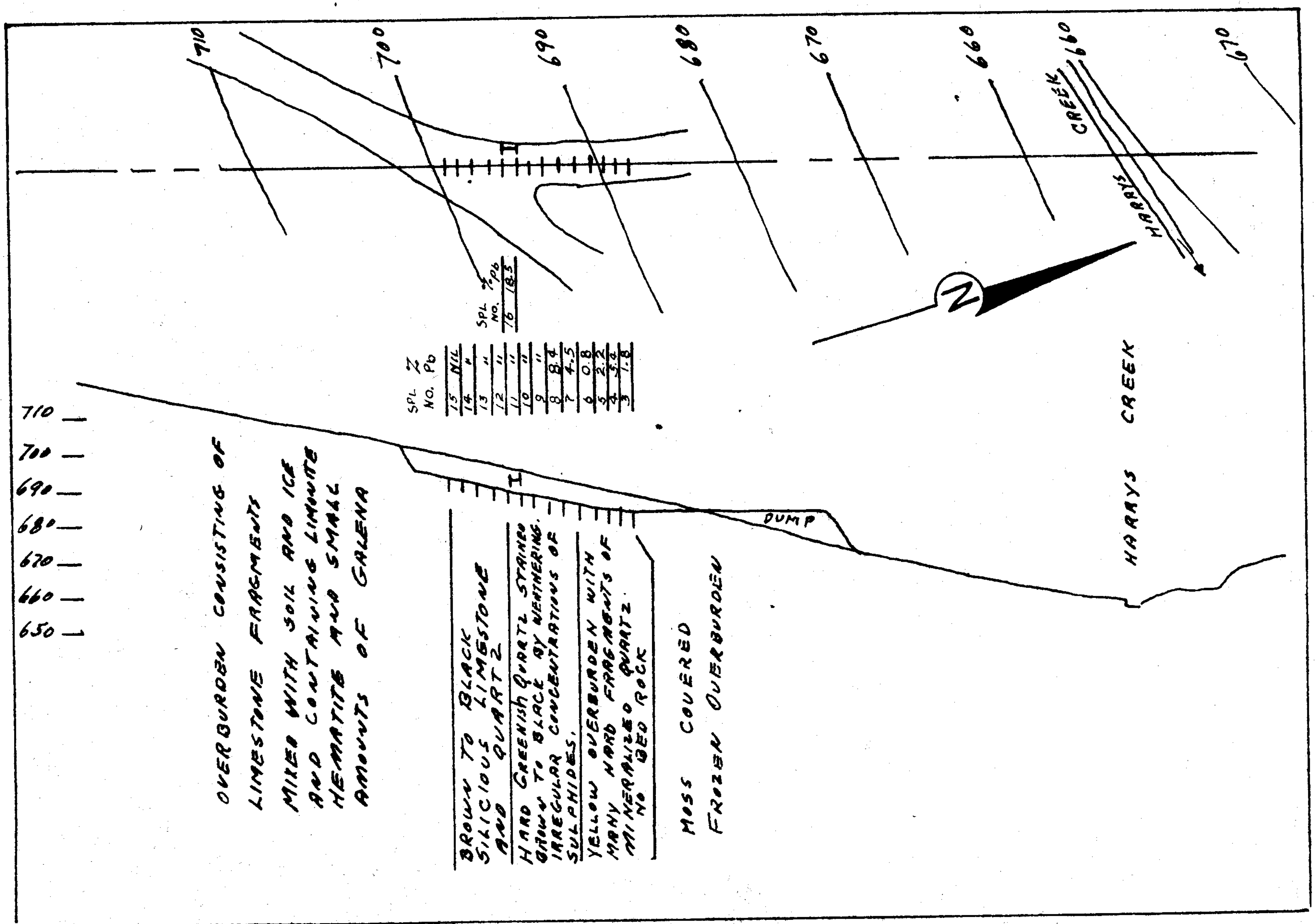

Figure 9.— Plan and cross section, Trench 4, Hannum lead prospect.

TABLE 2. - Petrographic analyses and paragenetic studies

Samples HL-17-A and HL-78 were specimens selected because they were relatively unweathered. HL-17-A was taken from trench 4; HL-78 was taken from the old prospect pit (same place as sample HL-2). Results of paragenesis and mineral identification study were reported as follows:

Sample HL-17-A consists essentially of quartz with some associated siderite and galena, less sphalerite, and small amounts of limonite, ankerite, cerrussite, pyrite, dufrenoysite, anglesite, guitermanite(?), boulangerite, biotite, and sericite.

Comprehensive study of thin sections and polished surfaces suggest that the host rock is a sulfide-enriched quartzite with the following paragenesis: The siderite and ankerite were formed first partially replacing the quartz grains in the quartzite. This is evidenced by rhombohedrons of these carbonates cutting across the equant grains of quartz.

At this point in the paragenetic sequence, evidence exhibited suggests that two alternatives are possible. No conclusive evidence is present to support one alternative over the other.

Alternative one indicates that a period of leaching followed deposition of the siderite and ankerite in which part of the quartz and carbonates were removed. This was followed by a long continued deposition of quartz probably at lower temperatures. Pyrite, sphalerite, and galena, followed by guitermanite (?), dufrenoysite, and boulangerite, in that order, were deposited.

The second alternative indicates two stages of sulfide mineralization. During the first stage at moderate temperatures pyrite, sphalerite, and galena have partially replaced the carbonates and quartz, and the galena is observed to have replaced part of the sphalerite. After an interval of leaching, low-temperature quartz was introduced with the deposition being long and continued. During the quartz deposition, sphalerite, galena, guitermanite (?), dufrenoysite, and boulangerite were deposited as the second stage of sulfide mineralization, essentially in that order but with some overlapping. The presence of the complex sulfantimonides and sulfarsenides are commonly regarded as diagnostic of epithermal or low-temperature deposition. The secondary minerals, cerussite, anglesite, and limonite were formed essentially contemporaneously as alteration products of the lead and iron minerals.

The identification of the boulangerite and dufrenoysite was accomplished by x-ray diffraction analysis combined with appropriate microchemical tests to determine the elemental constituents. The extreme fine-grained nature and the mode of occurrence of these minerals prevented positive identification by polished surface study alone.

TABLE 2. - Petrographic analyses and paragenetic studies (cont.)

Sample HL-78 is mineralogically similar to sample HL-17-A but is more highly altered and contains much more galena and carbonate minerals. In addition, this sample appears to represent only the low temperature or epithermal phase of mineralization. Because of the lack of positive evidence indicating otherwise, it is assumed that the host rock before alteration was similar to that of sample HL-17-A. The suggested paragenetic sequence is listed as follows: Subsequent to a period of leaching, low-temperature quartz deposition began and continued for a long period of time overlapping the subsequent deposition of the sulfides and sulfosalts. Pyrite is the earliest sulfide deposited. Sphalerite was formed next and appears to overlap the galena and the essentially contemporaneous guitermanite (?), boulangerite, and dufrenoysite.

Samples HL-68 and HL-69 were selected specimens (locations shown in figure 4.). Results of mineral identification study were reported as follows:

Sample HL-68 consists essentially of galena and quartz with less associated cerussite, some limonite, sphalerite, and anglesite. Also present are small amounts of goethite, sericite, pyromorphite, and a very small amount of pyrite.

Sample HL-69 consists essentially of galena, quartz, and cerussite with some associated limonite, relatively small amounts of anglesite, siderite, and sphalerite, and small amounts of wad, goethite, and sericite.

Sample HL-79 is a selected specimen found about 100 feet south of the old prospect pit. The relationship between the mineralization at this point and the outcrop exposed in the trenches is not evident.

Sample HL-79 is composed chiefly of manganoan siderite with galena, sphalerite and pyrite dispersed throughout the sample. Irregular crusts contain a wad composed of iron, manganese and zinc oxides. Limonite stains cover most of the samples fragments. A trace of quartz is present.

An examination of part of a second rock fragment from the same location revealed only the same mineral components approximately in the same proportions. Upon leaching this second fraction with 1:1 HCl no trace of rhodonite could be detected.

Chemical analyses of the specimen were reported as follows:

	Fe	Mn	Zn	Pb
On a composite	22.6	9.7	.4	1.5
On an examined fraction	29.0	11.1	1.8	.7

TABLE 3. - Spectrographic analyses

Semi-quantitative spectrographic analyses were made on seven composite samples prepared as follows:

Composite	Samples
1	HL 1 to HL 10, inclusive
2	HL 11 to HL 17, inclusive
3	HL 18 to HL 25, inclusive
4	HL 26 to HL 39, inclusive
5	HL 41 to HL 50, inclusive
6	HL 51 to HL 60, inclusive
7	HL 61 to HL 66, inclusive

Spectrographic analysis

Comp.	Ag	Al	Au	B	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Ge	In	Li	Mg	Mn
1	F	C	-	-	E	G	-	C	E	-	F	F	A	-	-	-	-	D	C
2	F	C	-	-	E	G	-	C	E	-	F	F	A	-	-	-	-	D	C
3	F	C	-	-	E	G	-	B	E	-	F	F	B	-	-	-	-	D	C
4	F	C	-	-	E	G	-	A	F	-	-	F	C	-	-	-	-	A	C
5	F	C	-	-	E	G	-	D	E	-	F	F	B	-	-	-	-	E	C
6	F	C	-	-	E	G	-	E	E	-	F	F	C	-	-	-	-	E	C
7	F	B	-	-	E	G	-	D	E	-	F	F	B	-	-	-	-	E	C

Comp.	Mo	Na	Nb	Ni	P	Pb	Pd	Pt	Sb	Si	Sn	Sr	Ta	Te	Ti	V	W	Zn	Zr
1	E	-	-	E	-	C	-	-	D	A	E	-	-	-	D	E	-	D	-
2	E	-	-	E	-	C	-	-	D	A	E	-	-	-	D	E	-	D	-
3	E	-	-	E	-	C	-	-	D	A	E	-	-	-	D	E	-	D	-
4	-	-	-	E	-	C	-	-	D	C	E	-	-	-	D	E	-	D	-
5	E	-	-	E	D	C	-	-	C	A	E	-	-	-	D	E	-	D	-
6	E	-	-	E	D	B	-	-	C	A	E	-	-	-	E	E	-	D	-
7	E	-	-	E	-	B	-	-	C	A	E	-	-	-	D	E	-	D	-

Legend:
A - more than 10 percent
B - 5 to 10 percent
C - 1 to 5 percent
D - 0.1 to 1 percent
E - 0.01 - 0.1 percent
F - 0.001 to 0.01 percent
G - less than 0.001 percent
- - not detected

TABLE 4. - Sample descriptions, chemical analyses, radioactivity and fluorescence

Sample No.	Description	Pb	Zn	Ag	Au	Fe	eU 1/	Scheelite 2/
HL- 1	Float	*0.05		0.26			Nil	Nil
HL- 2	Dump sample	13.3	3.53	2.08	*0.02	19.5	Nil	Nil
HL- 3	Yellow overburden	1.8					.002	Nil
HL- 4	" "	5.4					Nil	Nil
HL- 5	" "	2.2					Nil	Nil
HL- 6	" "	0.8					.001	Nil
HL- 7	Brown weathered zone TR 4	4.5					Nil	Nil
HL- 8	" " " "	8.4					Nil	Nil
HL- 9	" " " "	*0.05					Nil	Nil
HL-10	" " " "	*0.05					Nil	Nil
HL-11	" " " "	*0.05					.005	Nil
HL-12	" " " "	*0.05					Nil	Nil
HL-13	" " " "	*0.05					Nil	Nil
HL-14	" " " "	*0.05					Nil	Nil
HL-15	" " " "	*0.05					.002	Nil
HL-16	2.5 feet exposed vein TR 4	18.5	2.57	4.58	*0.02	6.7	Nil	Nil
HL-17	Selected specimens TR 4	27.3	1.66	6.86	*0.02	3.8	.001	Nil
HL-18	Altered wallrock TR 3	*0.05					Nil	Nil
HL-19	" " "	*0.05					.002	Nil
HL-20	" " "	*0.05					Nil	Nil
HL-21	" " "	*0.05					Nil	Nil
HL-22	Weathered zone TR 3	*0.05					Nil	Nil
HL-23	" " "	*0.05					.006	Nil
HL-24	" " "	*0.05					Nil	Nil
HL-25	" " "	*0.05					Nil	Nil
HL-26	Oxidized dike TR 3	*0.05				14.1	Nil	Nil
HL-27	" " "	*0.05				12.2	Nil	Nil
HL-28	" " "	*0.05				8.6	.008	Nil
HL-29	" " "	*0.05				9.3	.003	Nil
HL-30	" " "	*0.05				4.6	Nil	
HL-31	" " "	*0.05				14.7		
HL-32	" " "	*0.05				6.2		
HL-33	" " "	*0.05				12.1		
HL-34	" " "	*0.05				3.3		
HL-35	" " "	*0.05				7.2		
HL-36	" " "	*0.05				11.0		
HL-37	" " "	*0.05				2.2		
HL-38	" " "	*0.05				2.5		
HL-39	Altered wallrock TR 3	*0.05				5.7		

1/ Radiometric
2/ By mineralight
* Less than

Table 4. - Sample descriptions, chemical analyses, radioactivity and fluorescence (continued)

Sample No.	Description	Pb	Zn	Ag	Au	Fe	eU 1/	Scheelite 2/
HL-40	Selected specimens TR 3	32.7	1.46	5.12	*0.02	22.0	Nil	Nil
HL-41	Sandy float TR 2	*0.05					.003	Nil
HL-42	" " "	*0.05					.01	Nil
HL-43	" " "	*0.05					.01	Nil
HL-44	" " "	*0.05					.003	Nil
HL-45	" " "	7.0					.01	Nil
HL-46	" " "	10.3					Nil	Nil
HL-47	" " "	6.6					.012	Nil
HL-48	" " "	1.8					.003	Nil
HL-49	Yellow clay-like float TR 2	5.4					.019	Nil
HL-50	" " " " "	25.2					.005	Nil
HL-51	" " " " "	39.5					.004	Nil
HL-52	" " " " "	51.0					.003	Nil
HL-53	" " " " "	44.0					.003	Nil
HL-54	Oxidized dike TR 2	53.0	0.15	9.34		4.5	Nil	Nil
HL-55	" " "	26.9	0.91	4.34		2.0	.003	Nil
HL-56	" " "	5.3	*0.10	0.36		3.4	.003	Nil
HL-57	" " "	5.1	0.50	0.52		9.9	.003	Nil
HL-58	" " "	6.5	0.55	1.08		8.1	Nil	Nil
HL-59	" " "	8.6	0.25	1.24		8.2	.006	Nil
HL-60	" " "	6.3	0.81	0.82		20.7	.004	Nil
HL-61	Alt. dike and sediments TR2	8.0					.009	Nil
HL-62	" " " " "	12.9					.011	Nil
HL-63	" " " " "	0.9					-0-	Nil
HL-64	" " " " "	2.9					Nil	Nil
HL-65	" " " " "	2.6					.001	Nil
HL-66	" " " " "	4.3					Nil	Nil
HL-67	" " " " "	6.2					Nil	Nil
HL-68	4.5 ft. hi-grade TR 2	66.1	*0.10	6.72	*0.02	1.5	.003	Nil
HL-69	Selected specimens TR 2	64.0	1.01	7.12	*0.02	5.3	Nil	Nil
HL-71	Multicolored Earth TR 1	*0.05					-0-	Nil
HL-72	" " "	*0.05					.002	Nil
HL-73	" " "	*0.05					Nil	Nil
HL-74	" " "	*0.05					.007	Nil
HL-75	" " "	*0.05					Nil	Nil
HL-76	" " "	*0.05					Nil	Nil
HL-77	" " "	2.6					.002	Nil

1/ Radiometric
2/ By mineralight
* Less than

TABLE 5. - Average silver-lead ratio

Sample No.	Pb percent	Ag Oz. /T	Oz. Ag/T / % Pb
HL- 2	13.3	2.08	0.16
HL-16	18.5	4.58	.25
HL-17	27.3	6.86	.25
HL-40	32.7	5.12	.16
HL-54	53.0	9.34	.18
HL-55	26.9	4.34	.16
HL-56	5.3	.36	.07
HL-57	5.1	.52	.10
HL-58	6.5	1.08	.17
HL-59	8.6	1.25	.14
HL-60	6.3	.82	.13
HL-68	66.1	6.72	.10
HL-69	64.0	7.12	.11
	333.6	50.18	1.98

$$\frac{50.18}{333.6} = 0.15 \text{ Oz. Ag/Ton/\% Pb}$$

Examples:

60% Conc. would have: 0.15 x 60 = 9.00 Oz. Ag/Ton
50% Conc. would have: 0.15 x 50 = 7.50 Oz. Ag/Ton

TABLE 6. - Placer sample

HL-70, a sample of gravel taken from near bedrock on Harrys Creek (in TR 5) was estimated to contain 1/100 of a cubic yard of gravel. The sample was panned to a concentrate and submitted for analysis. This was the only placer sample taken and may not be representative of all the gravel.

	Weight pounds	Assay percent, lead	Oz. per ton Gold	Oz. per ton Silver
HL-70	.049	72.0	0.02	11.6

Obviously the gold in the gravel has almost negligible value.

The lead calculations follow:

100 x .049 x .72 = 3.528 lbs. lead/cu. yd.
= 3.5 lbs. lead/cubic yard of gravel

The silver content of the concentrate is approximately what would have been calculated from the average silver-lead ratio in Table 5:

72% Pb x 0.15 oz. Ag/ton/% Pb = 10.8 oz. Ag/ton

This would suggest that the argentiferous galena in the placer deposit was derived from the outcrop sampled.

EXAMINATION OF HANNUM LEAD PROSPECT FAIRHAVEN DISTRICT, SEWARD PENINSULA, ALASKA

by John J. Mulligan

* open-file report supplement

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

BUREAU OF MINES
Frank C. Memmott, Acting Director

CONTENTS

ILLUSTRATIONS

TABLES

EXAMINATION OF HANNUM LEAD PROSPECT FAIRHAVEN DISTRICT, SEWARD PENINSULA, ALASKA

by

John J. Mulligan[1]

ABSTRACT

A Bureau of Mines engineer examined a reported lead occurrence near the head of Hannum Creek in 1956; a bulldozer was used to expose a lead-silver outcropping in limestone. The deposit is described in the report entitled "Examination of Hannum Lead Prospect," which was placed on open file in 1957. Lead, silver, and manganese, but no gold were found on this outcropping.

Subsequently, the claim owner prospected for extensions of the lode deposit and mined placer gold from the creeks draining the prospect area. The combined results of lode prospecting and placer mining indicates that the deposit found in 1956 is adjacent to an irregularly mineralized limestone-schist contact zone on the south side of Cunningham Creek. The mineralized zone extends at least 4,000 feet S 60° E from Harrys Creek to cross Hannum Creek about 1,000 feet upstream from the mouth of Cunningham Creek. Gold, silver, lead, and manganese minerals occur in and near this

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

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zone but neither grade nor continuity could be determined. The limestone-schist contact is not abrupt but is rather an interlayering of beds which grades downward from dominantly schist beds into dominantly limestone beds. A spring that flows all winter issues from the contact zone on the southeast (right limit) bank of Hannum Creek. Geologic and geographic conditions appear to favor the use of soil sampling and geophysical techniques to delineate lode outcroppings.

BUREAU OF MINES WORK

The Hannum lead prospect is near the headwaters of Hannum Creek, a tributary of the Inmachuk River in the Fairhaven district, Seward Peninsula, Alaska (figs. 1 and 2). Silver-bearing galena was discovered here in the early 1900's by gold-placer miners. At the request of the present claim owner, the prospect was examined on August 6-13, 1956. The open-file report, "Examination of Hannum Lead Prospect, Fairhaven District, Seward Peninsula, Alaska," by John J. Mulligan describes the 1956 examination.

The 1956 examination included bulldozer trenching followed by hand trenching and sampling. About 80 samples were taken. Five bulldozer trenches were started; one proved to be off the structure, one could not be continued to bedrock because the overburden was too deep, and three uncovered a frostbroken highly oxidized outcrop of lead minerals. The trenches were stopped in a zone of partially oxidized bedrock and detached oxidized fragments of bedrock in a matrix of frozen claylike soil. Fresh unaltered bedrock could not be exposed with the equipment available.

The Hannum lead prospect was reexamined on June 24 and 25, 1959, and again on October 9-10, 1963, to see what had been revealed by the owner's work subsequent to the Bureau examination in 1956. At the time of the last visit, a fresh fall of snow about knee deep covered the area. The workings on Hannum Creek, Cunningham Creek, and Harrys Creek were visited on both occasions. Time limitations prevented mapping, but sketches were made and specimens were taken for analyses. The specimens were sent to the Bureau of Mines, Area VIII Mineral Resource Office for analyses. Petrographic and paragenetic studies were made at Juneau. Spectrographic analyses were made at the Bureau of Mines, Albany Metallurgy Research Center at Albany, Oregon.

Descriptions and analyses of specimens taken in 1959 are in tables 1 through 4; specimens taken in 1963 are in tables 5 through 7. Sample locations are on figure 3.

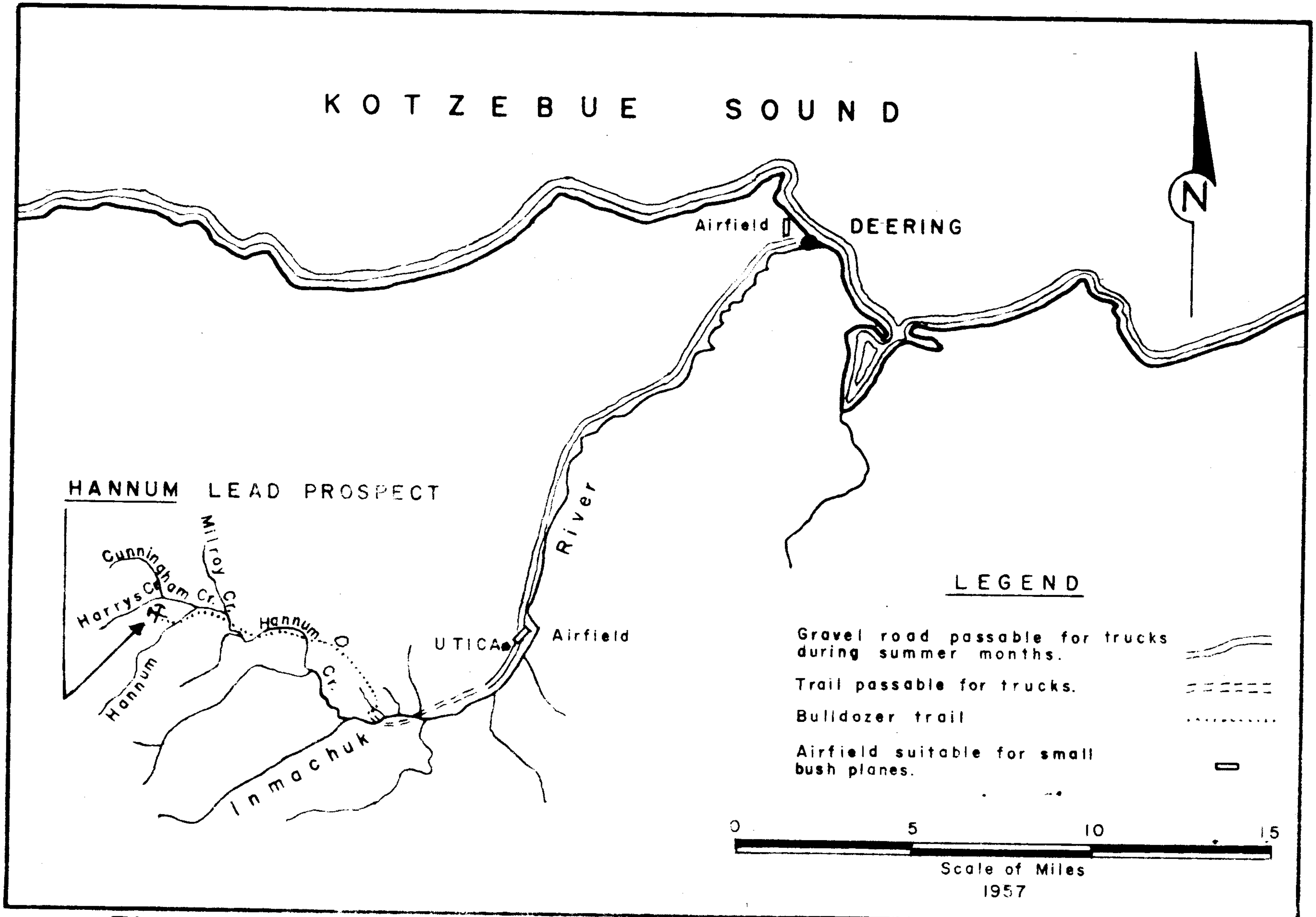

Figure 2.—Location map, Hannum lead prospect.

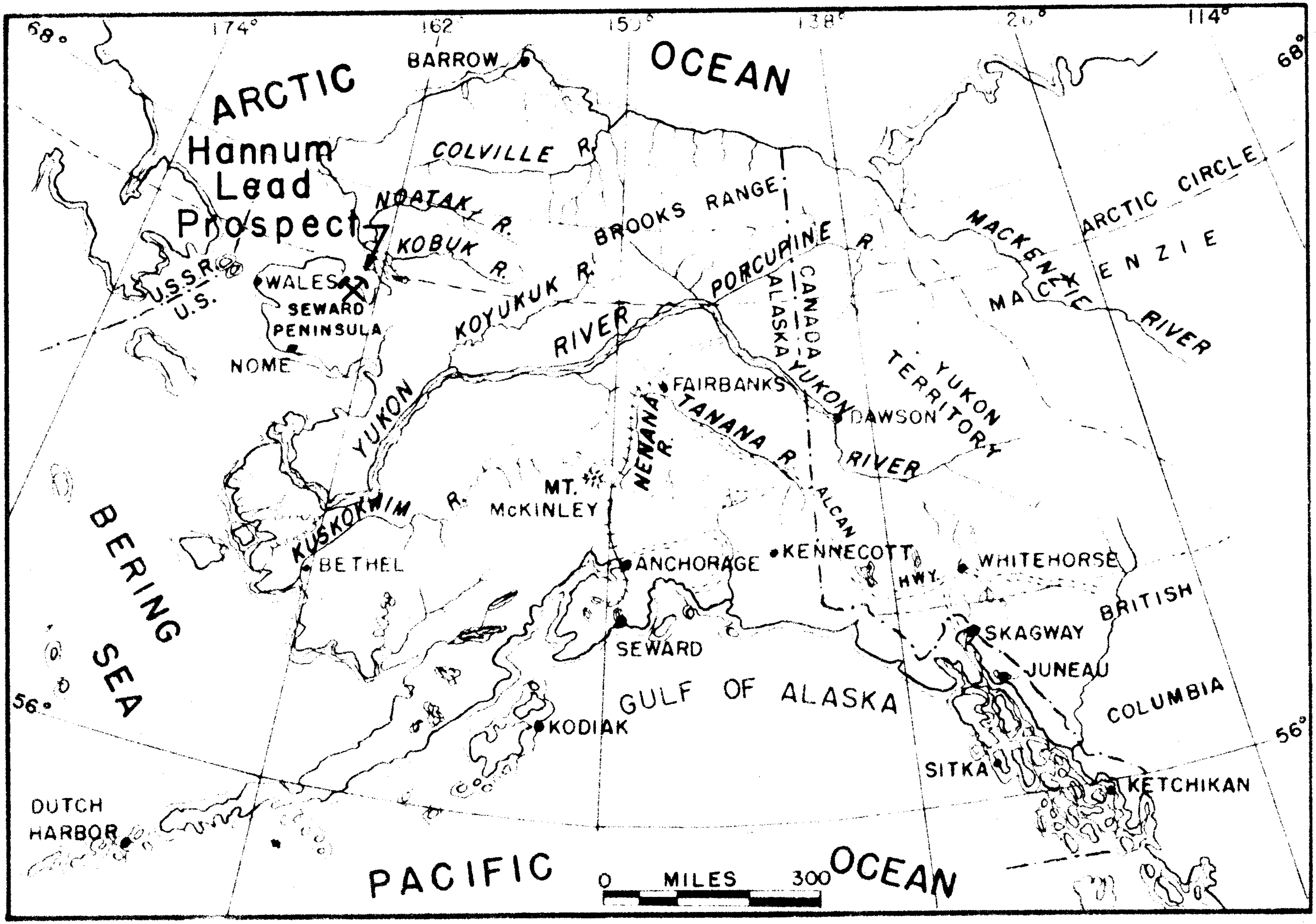

Figure I.— Index map of Alaska.

TABLE 1. - Specimen descriptions, 1959

Hannum lead specimens, 1959		
Number	Description	Type of analyses
H-A	Specimen of lava capping the hill south of the mouth of Cunningham Creek.	Petrographic.
H-B	Panned stream concentrate from Hannum Creek 500 feet upstream from mouth of Cunningham Creek.	Petrographic; spectrographic.
H-C	Specimen of mineralized quartz from north bank of Hannum Creek 100 feet downstream from mouth of Cunningham Creek.	Petrographic; spectrographic.
H-D	Typical dominantly quartz float in Cunningham Creek.	Petrographic.
H-E	Dominantly quartz float with green coating from placer pit on Cunningham Creek.	Petrographic.
H-F	Panned placer concentrates from south side of Cunningham Creek 500 feet downstream from Harrys Creek.	Petrographic; spectrographic.
H-G	Specimen from the schist side of the mineralized schist-limestone contact zone on the south bank of Cunningham Creek.	Spectrographic.
H-I	Specimen of mineralized sandstone at the schist-limestone contact zone. Occasional beds of sandstones in varying stages of alteration occur interbedded in the dominantly metalimestone series.	Petrographic; spectrographic.
H-J	Specimen of mineralized sandstone from the limestone side of the same contact zone.	Petrographic; spectrographic.
H-K	Fresh outcropping of mineralized rock exposed in extension of trench 4 about 100 feet southwest of the surface trace of the lead-silver vein.	Petrographic; paragenesis studies.

TABLE 2. - Petrographic identification, Hannum lead specimens, 1959 1/ 2/

	Samples								
	H-A	H-B	H-C	H-D	H-E	H-F	H-I	H-J	H-K
Rocks:									
Basalt	X	-							
Carbonate vein									X
Epidosite				X					
Muscovite schist						X			
Phyllite						X			
Sandstones							X	X	
Vein quartz			X		X				
Minerals:									
Ankerite			S						
Augite	A								
Calcite									S
Cerussite		A				M			
Chlorite					T	M			
Epidote				A		T			
Galena		P				M			
Garnet, tourmaline						T			
Gold						T			
Hornblende	T			F					
Ilmenite, orthoclase, andesine	M								
Labradorite	P								
Limonite	T	M	M	T	F	M	F	M	S
Manganese dioxide							P	A	
Muscovite						S			
Pyrite			A						S
Pyromorphite					X	F^f			
Quartz	-	S	P	P	P	P	A	P	S
Rhodochrosite									P
Scheelite						T^f			
Sphalerite			M		F				
Zircon						F^f			

1/ P - Predominant Over 50 percent
A - Abundant 10 - 50 percent
S - Subordinate 2 - 10 percent
M - Minor .5 - 2 percent
F - Few .1 - .5 percent
T - Trace less than .1 percent
X - Detected in sample
\- Sought but not detected
f - Fluorescent
R - Radioactive
Numerals - Percent

2/ No trace of radioactivity could be detected in these samples. Only H-F had fluorescent minerals. Traces of zinc are present in all samples. The green mineral of H-E is pyromorphite. The quartz grains of H-I and H-J are very rounded. Chemical analyses indicated that H-B contains 66 percent lead.

TABLE 3. - Paragenesis studies of specimen H-K, Hannum lead deposit, 1959

The sample appears to be a carbonate breccia composed predominantly of rhodochrosite with subordinate amounts of pyrite, calcite, quartz, and limonite.

Tentatively the sequence of mineral formation may have been as follows: (1) Carbonate formation with probably pyrite; (2) brecciation of rock including pyrite (tentatively); (3) some post pyrite recrystallization may have taken place; (4) incipient low temperature poikiloblastic quartz growth; and (5) weathering of some pyrite to limonite.

Although most of the pyrite is in the brecciated areas some pyrite grains exist at random from brecciated areas into carbonate fragments. There are areas of pyrite grain concentration in certain brecciated zones. These zones of pyrite concentration may be due to original pyrite later disseminated locally during brecciation. Post brecciation growth of pyrite may be indicated by pyrite grains on the border of carbonate fragments appearing to extend into both the matrix and the carbonate fragment.

Two grains tentatively identified as sphalerite occur. One is embedded entirely in a carbonate fragment. The other is contained entirely within the breccia matrix.

Galena was not detected.

TABLE 4. - Spectrographic analyses of specimens, Hannum lead deposit, 1959[1]

Sample No.	Ag	Al	As	Au	B	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Ge
H-B	E	D	D	-	-	-	G	-	E	E	-	-	F	A	-	-
H-C	G	D	-	-	F	-	-	-	D	E	F	F	F	A	F	-
H-F	E	C	D	F	F	-	G	-	D	E	-	-	F	A	F	-
H-G	G	B	-	-	F	-	-	-	A	-	-	F	F	A	F	-
H-I	F	D	-	-	-	D	G	-	E	-	F	-	F	A	-	-
H-J	F	D	-	-	-	D	G	-	E	-	F	F	F	A	-	-

Sample No.	Hf	Hg	In	Ir	Li	Mg	Mn	Mo	Na	Nb	Ni	Os	P	Pb	Pd	Pt
H-B	-	-	-	-	-	E	C	-	-	-	-	-	-	A	-	-
H-C	-	-	-	-	-	D	E	-	E	-	E	-	-	E	-	-
H-F	-	-	-	-	-	D	D	-	D	-	E	-	D	A	-	-
H-G	-	-	-	-	-	C	D	-	E	-	F	-	-	E	-	-
H-I	-	-	-	-	-	E	A	F	-	-	D	-	-	E	-	-
H-J	-	-	-	-	-	E	A	F	-	-	D	-	-	E	-	-

Sample No.	Sb	Si	Sn	Sr	Ta	Te	Ti	Tl	V	W	Zn	Zr	Sc	Y
H-B	B	B	D	-	-	-	E	-	-	-	D	-	-	-
H-C	-	A	D	-	-	-	E	-	F	-	C	F	-	-
H-F	E	A	D	-	-	-	D	-	F	-	E	F	-	F
H-G	-	A	E	-	-	-	C	-	E	-	E	F	-	-
H-I	D	A	-	-	-	-	E	-	F	-	D	-	-	-
H-J	E	A	-	-	-	-	E	-	F	-	D	F	-	-

1/ A More than 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 Less than 0.001 percent
\- Not detected.

TABLE 5. - Specimen descriptions, 1963

Number	Description	Type of analyses
H-L	Specimen from very poorly exposed limestone-schist contact that dips northward.	Petrographic.
H-M	Hard fragments in iron-stained earthy clay from limestone-schist contact on left limit of Hannum Creek.	Petrographic; chemical.
H-N	Earthy material from same zone as H-M.	Chemical.
H-O	Iron-stained earthy clay with quartz and schist fragments from limestone-schist contact zone on right limit of Harrys Creek.	Chemical.
H-P	Panned concentrate (with gold removed) from bedrock in Hannum Creek about 800 feet upstream from the mouth of Cunningham Creek.	Petrographic.
H-R	Panned concentrate (with gold removed) from placer pits on Cunningham Creek.	Petrographic.

TABLE 6. - Petrographic identification, Hannum lead specimens, 1963[1/]

Sample No.	H-L	H-M	H-P	H-R
Rocks:				
Vein quartz	C	C		
Minerals:				
Albite				-
Apatite				T
Chalcopyrite	-	-		T
Chlorite	T	T	S	S
Chloritoid			S	
Covellite				T
Diopside			T	
Galena	-	-	X	T
Garnet			T	
Goethite-limonite	T	T	S	A
K-feldspar				-
Muscovite	T	T	T	S
Pyrite	-	S	F	A
Pyromorphite				F
Pyrrhotite				-
Quartz	P	P	P	A
Scheelite f	-	-	T	T
Sphalerite		A		
Tourmaline			F	
Zircon f				-

1/ P - Predominant Over 50 percent
A - Abundant 10 - 50 percent
S - Subordinate 2 - 10 percent
M - Minor .5 - 2 percent
F - Few .1 - .5 percent
T - Trace less than .1 percent
X - Detected in sample
\- Sought but not detected

Numerals - Percent
H - Highly magnetic
W - Weakly magnetic
f - Fluorescent
R - Radioactive
C - Rock classification
N - Notable amounts less than .1 percent.

TABLE 7. - Chemical analyses of specimens, Hannum lead, 1963

Sample Number	Analyses		
	Percent lead	Ounce per ton	
		Silver	Gold
H-M	0.73	<0.01	1.12
H-N	.03	<.01	<.01
H-O	.09	<.01	<.01

Between 1959 and 1963 the owner extended the placer-gold mining pits along the right limit bank of Cunningham Creek towards the mouth of Cunningham Creek (fig. 3). Lode prospecting included bulldozer trenches put down on the left and right limit banks of Hannum Creek. A zone of iron-stained earthy material at the limestone-schist contact was exposed about 1,000 feet upstream from the mouth of Cunningham Creek on the northwest (left limit) bank of Hannum Creek. The iron-stained zone was at least 60 feet wide. A trench on the southeast side of Hannum Creek about 250 feet above the stream slightly exposed a similar zone. Neither trench penetrated to bedrock; and, at the time of the examination, both were full of snow. However, five specimens were taken.

The upstream limit of gold placer mining pits is just below the limestone-schist contact zone. Gravel samples from Hannum Creek, Cunningham Creek, and Harrys Creek were panned. Downstream from the limestone-schist contact zone both gold and galena were found. Upstream from the contact zone galena was found but gold was scarce. The claim owner reports that galena can be found on Hannum Creek at least to the first left limit tributary above Cunningham Creek. This could not be checked in the time available. Galena and a scant trace of gold were found in Harrys Creek from the mouth 1,500 feet upstream to the previously mentioned lead prospect; neither gold nor galena were found upstream from this prospect.

Description of Deposit

The work subsequent to the Bureau's examination in 1956 indicates that the description of the lead-silver deposit on Harrys Creek in the

CLAIM OWNER'S WORK

Nature and Extent

The principal work done between the Bureau examination in 1956 and in 1959 was bulldozer trenching. Trenching north of the galena outcrop on Harrys Creek (fig. 3) revealed only scattered minor amounts of galena apparently derived from one or more deposits having no obvious structural connection with the original exposures. Three trenches at about 100-foot intervals to the southeast of Bureau trench 1[2/] failed to reach bedrock, but oxide minerals in the exposed overburden indicate that the Hannum lead deposit probably continues through all three. Trench 4 was continued about 100 feet to the southwest where it exposed a relatively fresh outcropping of rhodochrosite. A trench intersecting the schist-limestone contact was put down on the right limit bank of Cunningham Creek about 150 feet downstream from Harrys Creek. This trench exposed manganese minerals in sandstone at the contact between the dominantly schist series and the dominantly limestone series of metasediments.

The owner stopped trenching because he lacked equipment to expose bedrock under the deep overburden. At the time of the examination in 1959 he was mining placer gold on the right limit of Cunningham Creek a few hundred feet downstream from the mouth of Harrys Creek. The placer gold is coarse, relatively unworn, and associated with large amounts of galena and pyrite. The gold and galena also occur in the detritus in the right limit bank of the placer pits.

2/ Trench numbers refer to figure 5 in open-file report, "Examination of Hannum Lead Prospect, Fairhaven District, Seward Peninsula, Alaska."

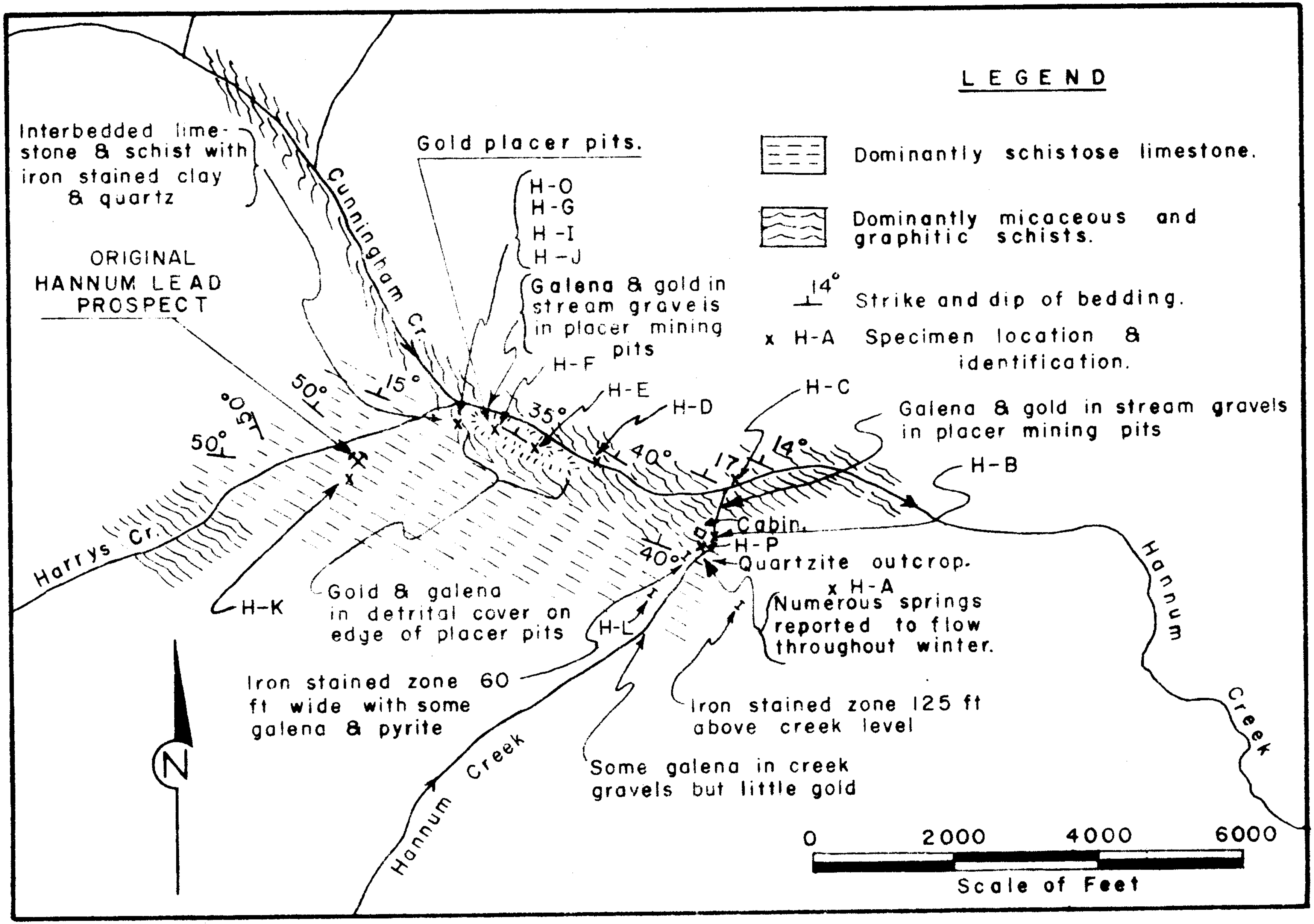

FIGURE 3.– Specimen Locations, Hannum Lead Prospect, 1959, 1963.

open-file examination report essentially is correct. However, three trenches put down at about 100-foot intervals southeast of trench 1 expose iron staining and lead oxides but no bedrock. Evidently the lead-silver vein exposed in trenches 2, 3, and 4 extends at least 300 feet S 60° E of trench 1. The nature and attitude remain uncertain, but the additional evidence strongly suggests that the deposit is alined with a sandstone member of the metasedimentary series striking N 60° to 70° W and dipping to the northeast. The angle of dip probably varies from 35° to 55° with the dip being less to the northwest and steepening towards the southeast. Trenching on the northwest bank of Harrys Creek revealed only scattered minor amounts of galena float apparently derived from deposits having no demonstrable structural connection with the vein in trenches 2, 3, and 4.

The few bedrock exposures in the prospect area dip generally to the northeast although there are some exceptions. Throughout most of the surrounding area the hilltops are capped with lava and the hillsides are covered with detritus and tundra vegetation. Bedrock exposures are scarce but occasional exposures along streambanks and steep slopes usually make it possible to determine the general attitude of the metasediments. Except in the prospect area the attitude was not determined because of a lack of time. However, scant and inconclusive evidence suggests that the Hannum lead prospect is on the east limb of an anticline near the crest; the anticlineal axis apparently strikes slightly west of north and plunges slightly northward.

The intimate association of lead minerals and gold in the placers suggests a generally related origin. Coarse gold in the placer deposits on the right limits of Cunningham Creek and on Hannum Creek below the limestone-schist contact, and the scarcity of gold upstream from the limestone-schist contact zone, suggests that the placer gold was derived from the limestone-schist contact zone. Lode sampling to date is not adequate to estimate either the overall grade of the contact zone or the grade and size of individual deposits in the zone.

The limestone-schist contact is a transitional zone in which schists, sandstones, and limestones are interlayered. The overlying series dominantly composed of schists grades into an underlying series dominantly composed of limestones. A prominent warm spring issues from the contact zone on the southeast (right limit) bank of Hannum Creek about 1,000 feet upstream from the mouth of Cunningham Creek. Residents report that it flows all winter.

Manganese minerals apparently are more widespread and abundant than had been realized. During the Bureau examination manganese minerals were found with the lead-silver minerals, and also about 100 feet southwest of the original discovery pit. Subsequent work uncovered an outcropping of rhodochrosite about 100 feet southwest of the lead-silver vein in trench 4. Manganese minerals also were found in the zone of contact between dominantly schistose and dominantly calcareous metasediments which parallel the west bank of Cunningham Creek. The manganese minerals apparently occur with the lead-silver minerals but the higher grade lead-silver zones contain relatively little manganese and vice versa.

CONCLUSIONS

Both the lead-silver deposits and the source of placer gold appear to be generally alined along the limestone-schist contact but this has not been proven. The abundance of cerussite-coated galena "nuggets" in the stream gravels of Hannum Creek and Cunningham Creek indicates that the overburden probably contains similar galena fragments. The lode outcroppings therefore probably can be outlined, at least roughly, by soil sampling. The soil samples should be taken below the cover of tundra vegetation. This zone is thawed between late June and mid-September.

A magnetometer has been used in the Lost River area to plot faults, veins, contacts, and similar structural features that influence ore deposition. A magnetometer survey of favorable areas indicated by soil sampling may also be of value here.

Self-potential also has been used in the Lost River area to plot the outcroppings of mineralized zones. A plot of the self-potential of favorable areas that might be indicated by soil sampling and the magnetometer might help in picking sites for trenching or drilling.

Exploration should be directed towards delineating mineralized zones amenable to large scale mining and milling practices rather than to delineating small high-grade outcroppings. The relatively low ratio of silver to lead makes it unlikely that a small lode mine could operate profitably.