GEOLOGIC AND ECONOMIC REPORT ON THE FORTY NINE PROPERTY

An essay submitted during the Third Year of the course in Applied Science at the University of British Columbia.

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October 31, 1957

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October 31, 1957.

Dr. H. C. Gunning, Dean,
Faculty of Applied Science,
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Dear Sir:

I hereby submit for your approval an essay entitled "Geologic and Economic Report on the Forty Nine Property" in fulfilment of the Geology 398 Course.

Yours truly,

Robert J Young

Robert J. Young

Matter - 17/25

Presentation - 27/35

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Total 76

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PREFACE

The material contained in the foregoing essay is derived, for the most part, from my own observations in the field. I consulted the report by George Hansen on the Portland Canal area (Memoir 175 of the Canada Department of Mines) for notes on the general geology of the region.

My recognition of the different rock types and ore bodies is based entirely on the Geology 200 course. I was not working under a geologist or engineer and therefore had to make my own decisions in classifying the different rock types that I encountered.

The maps enclosed were done by myself with the exception of the one showing the overall geology and the general location of the area. That one I copied from one of the maps contained in Mr. Hansen's report.

This essay may seem to be superficial when compared with the observations of a full summer's employment. This is because I was in no one place for longer than three weeks this previous summer. I chose to write on the Forty Nine property because the rock surfaces were very well exposed in this area.

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GEOLOGIC AND ECONOMIC REPORT ON THE FORTY NINE MINING PROPERTY

Introduction

The foregoing essay is a description of a mining property. Its main purpose is to give the reader an understanding of the surface geology of the property. It is also intended to impart to the reader an appreciation of the further work needed, and the problems to be overcome before an accurate estimate of the economic value of the property can be made.

The essay covers descriptions of the general geology of the region, the geology of the two tunnels located on the property and the surface geology in the vicinity of the open cuts which were sampled during the course of the examination. It also deals briefly with the problem of transportation and communication to and from the property. Also included are a number of suggestions and recommendations relating to the further evaluation of the property.

General Geology

The rocks of Mt. Dilsworth, upon whose westerly slope the Forty Nine property is located, and adjacent areas are of the Hazelton Group. They occur in both sedimentary and igneous forms. Both forms are cut by a wide band of dykes the main body of which passes on the southerly slope of Mr. Dilsworth and the northern half of the Big Missouri ridge.

The sedimentary rocks of this area occur in two northerly striking bands. The easterly of these two bands runs from Mt. Bunting in the south to Mitre Mtn. in the north. The rocks in this band consist, mainly, of black argillites together with minor occurrences of conglomerate and greywacke. The westerly band begins on the easterly side of the Salmon River Glacier on the westerly slope of Mt. Bunting then runs northwesterly in a widening band the extent of which has not been determined. The rocks in this band consist almost exclusively of grey and black argillites.

The igneous rocks of the area occur between the bands of sedimentaries described above. They cover the westerly of Mr. Dilsworth where the Forty Nine property is located. They consist almost entirely of massive rhyolites and dacites together with small amounts of related types.

The dykes are of two distinct types; those that occur in the main belt of dykes and those that do not. The main dyke belt is approximately 1½ miles wide. The dykes of this belt are composed of quartz, quartz-diorite, and diorite. They all strike in a northwesterly direction and dip very steeply to the southwest. Most of the dykes outside the main belt are, apparently,derived from a source separate from that of the main belt. They consist of diorites, quartz-diorites, gabbros, quartz porphyry and feldspar porphyry. They all dip at very steep angles but are not consistent in strike as are those of the main belt. Both types occur more frequently as outcrops in the igneous rocks than in the sedimentary rocks.

The age of the Hazelton Group in this area as determined from fossils is from Triassic to Jurassic and is probably, for the most part, in the upper portion of this interval. The dykes of the main belt cut through the Hazelton Group and are, therefore, younger than the Hazelton Group. The secondary dykes cut both and are therefore the youngest of the rocks in the area.

The rocks of the Hazelton Group in this area lie in several southerly trending folds. There is an anticline in Long Lake valley followed by a syncline on Mt. Dilsworth. To the west, there is another anticline on the Big Missouri ridge and another syncline to the west of the ridge. This series of folds terminates in the Salmon River valley in a greatly disturbed anticline.

Particular Geology and Sampling

The Oxedental Tunnel

The Oxedental Tunnel is located on the Oxedental mineral claim. It was driven, apparently, to investigate a quartz vein which is moderately well mineralized with sulfides, chiefly pyrite. It also contains some galena and a small amount of tetrahedrite. This quartz vein strikes northwest and dips eighty degrees southwest. It traverses a bed of siliceous tuff which is mineralized with highly disseminated pyrite.

The tunnel enters the bed of tuff from the southerly side of a deep gulley as shown on the sketch plan of the workings. It cuts through the tuff encountering the vein on the left side of the tunnel twenty feet from the portal. The tunnel cuts diagonally across the vein then leaves it twenty feet from where it was first encountered. A small foot explores the vein for a few feet where it enters the right wall of the tunnel.

The quartz vein averages fourteen inches in width where it occurs in the tunnel. It is well mineralized. The chief mineral is pyrite which occurs in narrow, massive stringers and as disseminated material. Small amounts of galena and tetrahedrite are also present in the vein.

Leaving the quartz vein the tunnel continues through the tuff to a total depth of fifty-five feet where it makes an eighty degree turn to the right, evidentally in an attempt to relocate the quartz vein. It re-intersects the quartz vein, cuts through it again then turns to resume its original course through the tuff. At the intersection the quartz vein displays the same characteristics as before. After resuming its course the tunnel cuts through the tuff for a distance of twenty-five feet, encountering a fault at this point.

The fault strikes northeast and dips sixty degrees to the northwest. The fault zone contains six inches of gouge and four inches of fault breccia. It is sparsely mineralized with sulfides, mostly pyrite. It is followed for a distance of twelve feet to the right by a small foot. Nothing of importance is showing in the fault zone so the tunnel cuts past it driving further into the tuff.

Leaving the fault, the tunnel continues through the tuff a distance of fifteen feet past the fault zone. The face is in the tuff and there is no indication of further concentrations of ore minerals at this point.

Four channel samples were cut in the Oxedental Tunnel. They were taken from the numbered positions shown in the sketch. These samples were assayed for gold and silver content only. Results were as follows.

No. of sample	Au value per ton	Ag value per ton
1 .	$5.60	$11.25
2 .	$7.00	$18.75
3 .	$6.30	$16.50
4 .	$4.20	$ 5.25

The Forty Nine Tunnel

The Forty Nine Tunnel is located on the Forty Nine mineral claim. It has a total length in excess of three hundred feet including cross cuts, a raise and a winze. The purpose of the tunnel was, evidently, to investigate, underground, a good surface showing occurring in one of the beds of tuff present on the property.

The portal of the tunnel is driven into a highly silicified portion of the tuffaceous material. This silicified portion of the tuff is well mineralized with pyrite and arsenopyrite which occur, mainly, as disseminated material, although locally massive in small pockets. The tunnel breaks through the tuff approximately twelve feet beyond the portal.

Leaving the bed of tuff the tunnel enters a body of highly silicified material which has a very cherty appearance. This body of material is sparsely and evenly mineralized with highly disseminated pyrite. Locally the pyrite has concentrated in fractures in the rock. These resemble small veinlets of massive pyrite. The tunnel continues through the tuff encountering a small quartz vein at the first turn in the tunnel.

The quartz vein averages 2½ feet in width. It strikes north fifty west and dips eighty-five degrees southwest. It is well mineralized with sulfides, pyrite being the most abundant. A small amount of galena is present along with traces of sphalerite and tetrahedrite. The tunnel follows the vein for a short distance then drifts away from it and back into the siliceous material.

The tunnel continues in the siliceous material to a depth of 112 feet where it encounters a dyke. The dyke material is a fine-grained diorite which contains no metallic mineralization whatever. This dyke also appears on the surface above the tunnel. The tunnel cuts through the dyke which is approximately fifteen feet thick, re-enters the siliceous material, then forms a tee with cross cuts going to both right and left.

The right cross cut drives through the cherty material for a distance of thirty-five feet then again cross cuts to the right and left. The right-hand branch continues twenty feet through the siliceous material, terminates in it, and does not re-enter the dyke. The left-hand branch also cuts through the siliceous material right up to the face, a distance of thirty feet. Seven feet from the face a fault is encountered. This fault strikes north twenty east and dips sixty-five degrees to the west. The fault zone averages three inches in width and contains a small amount of gouge and fault breccia. It is sparsely mineralized with small massive stringers of pyrite. A foot driven into the left-hand side of the branch along the fault for a distance of twelve feet fails to disclose anything of importance.

The left-hand cross cut follows the hanging wall of the dyke to the left. Twenty feet from the tee there is a foot driven into the right wall to investigate a narrow, irregular quartz vein moderately mineralized with pyrite. The foot is filled with loose rock, therefore it was impossible to enter it for examination purposes. Forty feet past the tee there is a raise on the right-hand side and a winze on the left-hand side of the tunnel. Those were driven to investigate a quartz vein which strikes northwest and dips eighty-five degrees to the southwest. The winze is full of water and the raise is too difficult to enter without climbing equipment. Past these the tunnel encounters a fault which strikes north twenty east and dips eighty degrees to the south. The fault zone contains several inches of gouge and approximately a foot of breccia, but no metallic mineralization. The tunnel follows the hanging wall of the fault up to the face of the tunnel.

Very little of value was found in the Forty Nine tunnel. Samples were taken from the points indicated on the sketch map of the tunnel. These samples were assayed for their gold and silver content only. Results were as follows.

No. of sample	Au value per ton	Ag value per ton
1.	$1.75	$3.00
2.	$2.10	$4.00
3.	$2.05	$2.50
4.	$3.50	$4.10

Open Cuts

The claims comprising the Forty Nine holdings have undergone surface exploration by means of open cutting. Not all of these open cuts were sampled in the course of the examination of the property. Only those open cuts which, it was felt, would give a reasonably accurate appreciation of the value of the surface showings were sampled. All other open cuts were, of course, inspected.

All of the open cuts on the property have been cut in quartz veins traversing the beds of mineralized tuff which occur on the property. Most of these quartz veins are mineralized with sulfides. The most abundant of these sulfides is pyrite. Other sulfides present are galena, sphalerite, arsenopyrite, tetrahedrite and other silver minerals. Extent of mineralization and relative abundance of the separate minerals shows a marked local variation between separate veins and outcrops.

The open cuts on Oxedental mineral claim and the Occidental fraction explore the surface outcrops of a quartz vein which traverses a bed of tuff which occurs on these claims. The vein strikes northwest and dips eighty degrees to the southwest. It averages five feet in width and can be followed on the surface for a distance of 450 feet. At the southerly end of the exposure the vein and the bed of tuff disappear under and are overlain by a heavy overburden of glacial till. The northerly end is discontinued by a large fault which has displaced both the vein and the tuffbed. There is tuff on the northerly wall of the fault but the quartz vein has been completely lost. The vein is moderately well mineralized with sulfides. Pyrite is the most abundant of these but there is a fair showing of galena and tetrahedrite. Small amounts of sphalerite and arsenopyrite are also present.

On the Forty Nine mineral claim the open cuts are located, for the most part above the Forty Nine tunnel. They explore the surface outcrops of a quartz vein striking northwest and dipping vertically. The vein averages six feet in width and traverses a bed of tuff sparsely mineralized with pyrite. The northwesterly end of the vein begins at the portal of the Forty Nine tunnel as does the bed of tuff. Both the vein and the tuff are cut off at the southeasterly end of the vein by a dyke of fine-grained diorite. The system does not continue on the other side of the dyke. It appears to have been displaced to the south. Several open cuts were cut several hundred feet to the south on the upper side of the dyke in what appears to be the continuation of the system. However the vein is discontinuous a short distance past the dyke. The vein is quite well mineralized with pyrite. There is also some galena, tetrahedrite and a trace of sphalerite.

The open cuts on the Yellowstone fraction are cut in an outcrop of tuff. There is little concentration of minerals in these cuts and therefore only one of these was sampled. The bed of tuff is continuous over the claim.

Several quartz veins outcrop on the Million Dollar fraction. All have been breached on the surface by open cutting. All occur in the same bed of tuff. The first of these veins is located along the southern edge of the claim. It strikes northwest and dips seventy-five degrees to the southwest. It varies quite markedly in width but averages approximately five feet. It can be traced on the surface for a distance of four hundred feet. It is sparsely mineralized with pyrite, and a trace of tetrahedrite. The second of these veins lies two hundred feet to the north of the first. This vein averages four feet in width and can be traced on the surface for 150 feet. This vein is moderately well mineralized pyrite, tetrahedrite and a trace of galena. The third and last quartz vein is located almost half way across the claim. Like the other two veins it strikes northwest and dips steeply to the southwest. It is approximately four feet wide and can be traced on the surface for 150 feet. This vein is well mineralized with pyrite. Small amounts of galena and tetrahedrite are also present.

The last series of open cuts investigated lie on the Chicago mineral claim. These cuts explore the surface outcrops of a discontinuous quartz vein which is irregular in strike and varies considerably in width. The general strike of the vein is northwest, and its dip is 75 degrees to the southwest. At its southeasterly end it is very heavily mineralized with pyrite and a small amount of galena. At this end the vein is seven feet wide. In all of the other cuts on this vein it is much narrower, and is only moderately well mineralized with pyrite and galena. This vein also cuts through a bed of tuff. This tuff disappears under glacial till at the southeasterly end of the vein. At the lower end of the vein it grades into a greywacke and disappears.

Samples were taken from all of the open cuts shown on the plan map. These samples were assayed for their gold and silver content only. Results were as follows.

Sample and Cut No.	Au value per ton	Ag value per ton
1.	$5.00	$6.00
2.	$3.07	$4.25
3.	$ .42	$1.28
4.	$3.75	$5.32
5.	$8.53	$10.27

Sample and Cut No.	Au value per ton	Ag value per ton
6.	$10.25	$12.59
7.	$ 2.58	$ 4.25
8.	$ 3.07	$ 5.32
9.	$28.50	$41.22
10.	$25.62	$37.51
11.	$19.08	$30.26
12.	$ .22	$ .50
13.	$ 3.07	$ 4.53
14.	$ 2.81	$ 3.81
15.	$ 4.02	$ 6.21
16.	$ 1.91	$ 2.53
17.	$ 2.65	$ 4.07
18.	$ 9.42	$13.80
19.	$12.51	$17.23
20.	$ 9.27	$12.57
21.	$14.29	$19.22
22.	$ 8.04	$21.06
23.	$75.08	$93.21
24.	$10.06	$12.02
25.	$ 2.51	$ 6.09
26.	$ 5.07	$ 9.21
27.	$ 6.06	$10.09
28.	$10.01	$15.33
29.	$ .92	$ 1.10
30.	$ .09	$ 2.53
31.	$ 8.59	$11.66
32.	$10.01	$13.84

Sample and Cut No.	Au value per ton	Ag value per ton
33.	$11.20	$ 9.35

Transportation and Communication

Transportation and communication are extremely difficult and therefore expensive services in the Portland Canal area. The mountainous and very irregular terrain, coupled with the severe climatic conditions that prevail over the greater part of the year, make the establishment and maintenance of these essential services very difficult and costly.

The one practical method of large scale transportation to and from the Forty Nine property is by road. There now exists a passable gravel road up to the Big Missouri mine. A grade has been bulldozed for approximately a mile beyond this point but is impassable except on foot. It would be possible to continue this grade to the Forty Nine property, a distance of approximately three miles.

The portion of the existing road lying between the Premier and Big Missouri mines would require considerable reconstruction before it could be used for extensive haulage. At present the road is very narrow, the roadbed is considerably damaged by erosion and the switchbacks are much too sharp for trucking purposes.

The remainder of the access road lies, for the most part, in Alaska. It is in excellent condition and could be used for heavy haulage purposes. Permission to use this road would, of course, have to be obtained from the Alaskan government.

Direct communication with the town of Stewart and other outside points would be by radio-telephone. This method would be relatively inexpensive and fully as reliable as an ordinary telephone system.

Conclusions and Recommendations

The ore-shoots on the Forty Nine property occur in quartz veins where these veins cut through beds of mineralized tuff. The veins are quite irregular and tend to be somewhat discontinuous throughout their length. The ore-shoots are not predictable as to dimensions, location within the host vein, or mineral content.

The mineralization contained in the veins and ore-shoots consists entirely of sulfides.Pyrite is the most abundant of these and occurs throughout the mineralized portions of the veins and tuff beds. Lesser amounts of galena and tetrahedrite occur in almost all of the ore-shoots. Sphalerite occurs only as a trace and is present in only a few isolated instances. These minerals are, for the most part, disseminated throughout the mineralized zone. Locally, within the ore-shoots, the mineralization occurs as small massive veinlets. These, however, are not numerous.

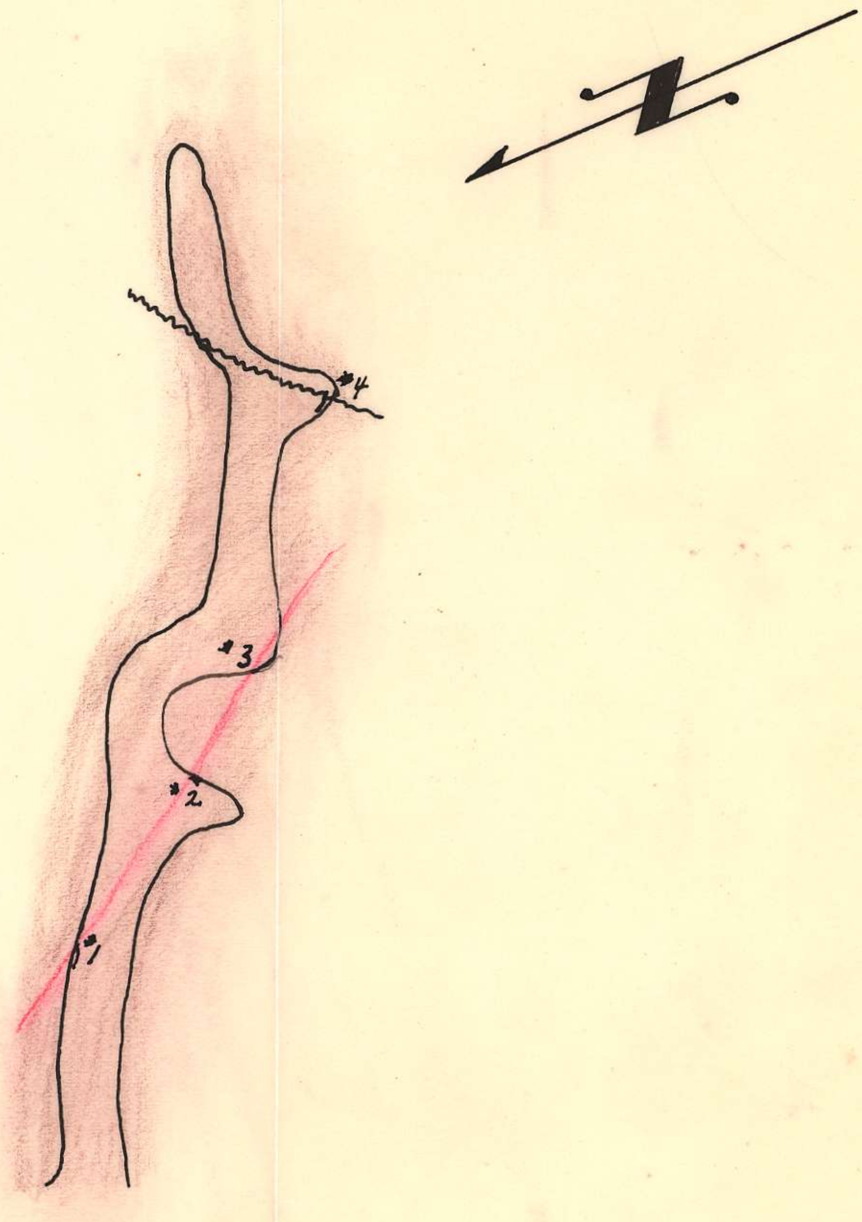
The values found in the ore-shoots exposed on the surface and in the tunnels, coupled with the extent and number of mineral-bearing quartz veins on the property, indicate a possibility of an economic amount of ore on the property. This does not guarantee that this is the case. The true picture can be determined only by extensive underground exploration.

If further exploration work is decided upon, a plan of action should be set up and carried out. First, a complete geological survey of the property should be undertaken. The results of this survey will allow the engineer in charge to locate drilling sites and drill hole courses judiciously.

After the survey is completed a comprehensive drilling program to obtain information on underground deposits should be carried out. Further development on the property would depend on the results obtained from this program.

Once sufficient ore, if there is any, is proved to exist work could proceed on the location of the drifts and the road survey. After the road survey is completed the road could be built and the equipment necessary for mining and milling the ore could be brought in and production gotten under way.

Supplies required for this preliminary work could be brought in by truck as far as the Big Missouri mine and from there to the Forty Nine by pack train. An alternative to this would be sledge the supplies in during the winter with caterpillar tractors.



Plan Sketch
Of The
Oxedental Tunnel

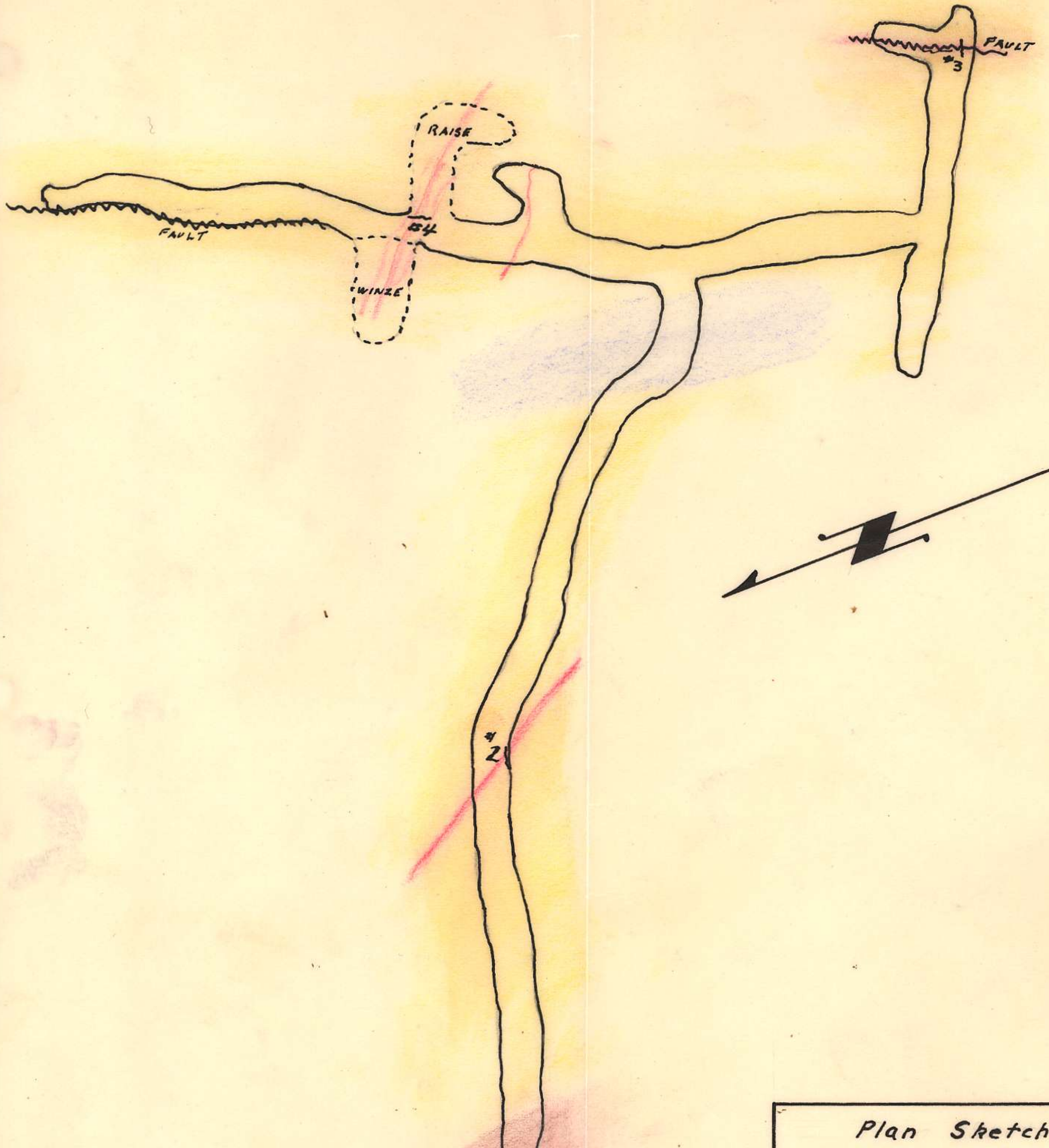
Legend

Vein- - - - - - - -

Tuff - - - - - - -

Fault- - - - - - -

Scale: 1 In = 20 Ft



Plan Sketch
Of The
Forty Nine Tunnel

Legend

Veins
Tuff
Dyke
Siliceous Material

Scale: 1 in. = 20 ft.