NORTHFIELD MINES INC.

STEVENSON PROPERTY - IDAHO

FINAL REPORT

by

NORTHFIELD MINES INC.

on

D.M.E.A. PROJECT NO. 2436

CONTRACT NO. IDM - E 334

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John K. Brozo

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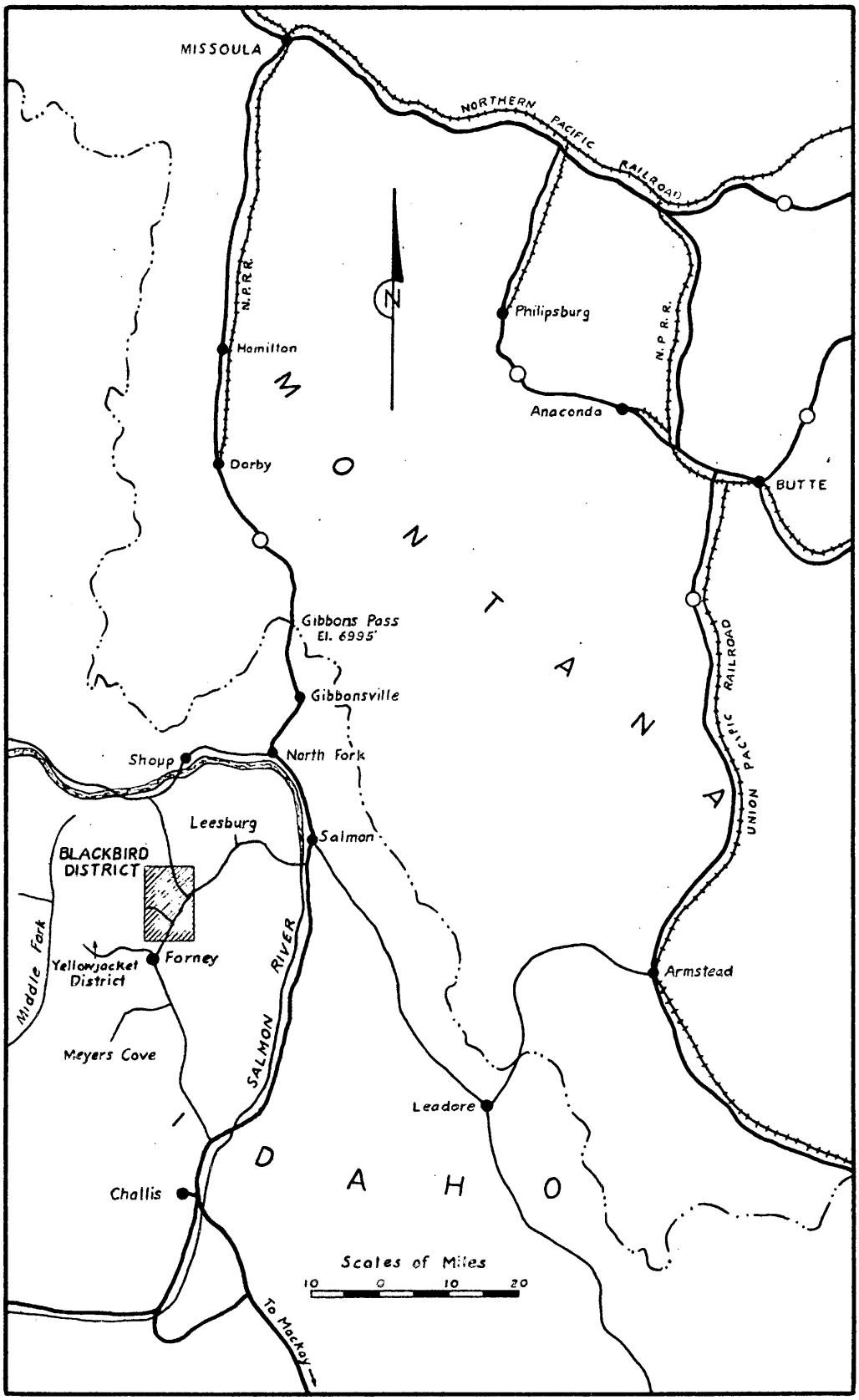

FIG. 1 – LOCATION MAP – BLACKBIRD DISTRICT

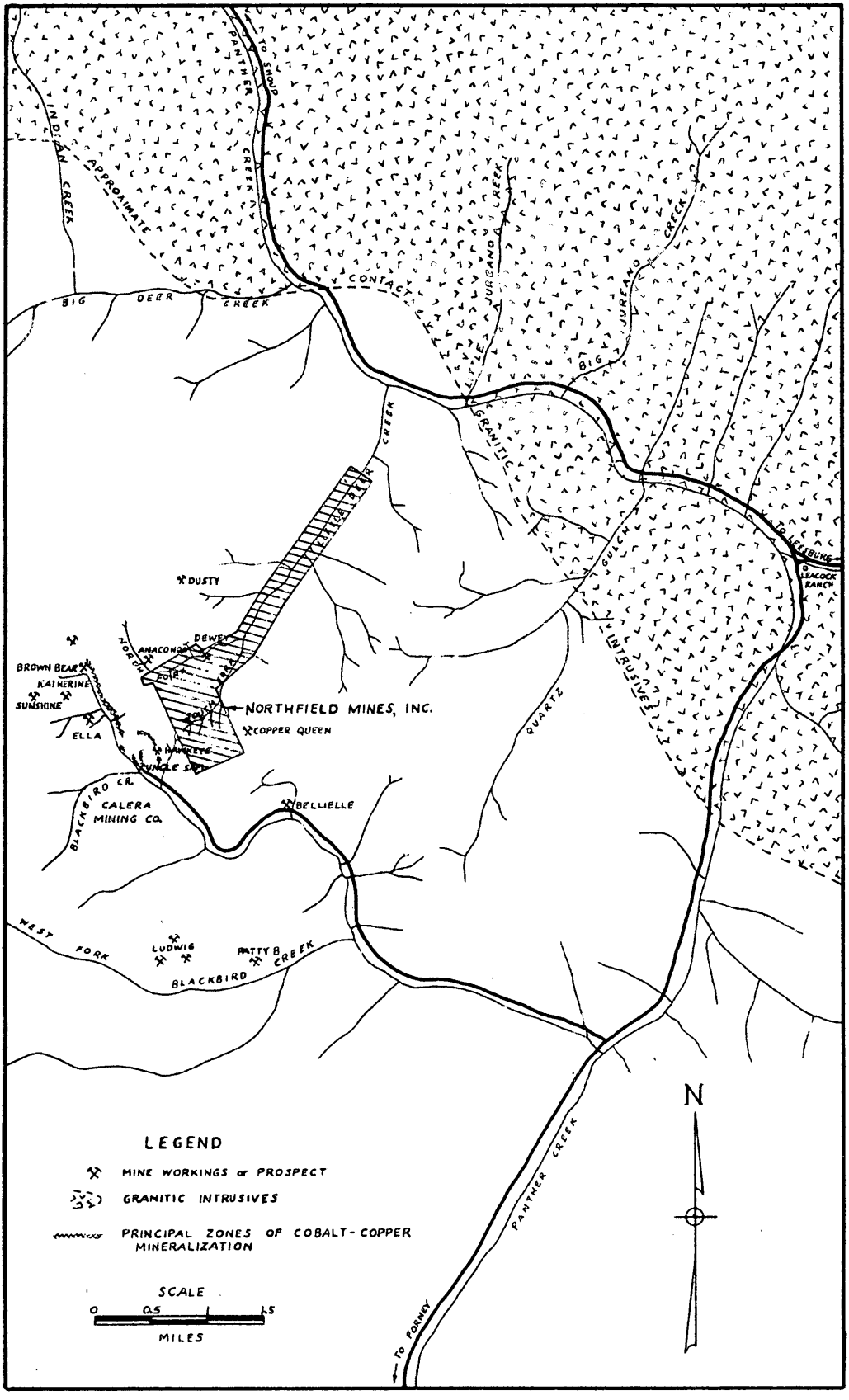

FIG 2 - GENERAL MAP, BLACKBIRD DISTRICT

REPORT SUMMARY

The property explored under DMEA Project No. 2436 is known locally as the Stevenson cobalt-copper prospect. It lies in the Blackbird Mining District, Lemhi County, Idaho, some 50 miles by road south west of Salmon, Idaho, the nearest town of consequence.

Northfield Mines Inc. took an option on this property from F. W. Stevenson et al, in the middle part of 1951. Soon thereafter the company initiated a limited trenching program based on previous surface exploration exposures and the results of a geo-chemical survey conducted by the U.S.G.S. during August and September of 1951. Results of the trenching was the partial outlining of three oxidized gossan zones designated as the "Queen", the "Marle 3" and the "Marle5". Cobalt-copper values of the zones could not be tested by assay because of their oxidized state; nevertheless the indicated strength appeared to warrant further exploration work. However, because of the approach of winter, it was deemed feasible to initiate this additional work in the Spring of 1952.

On June 2, 1952, Northfield Mines Inc. entered into a joint exploration participation contract with the D.M.E.A. for the expressed purpose of further exploring the Stevenson property. A summary of the work outlined under the contract and the work completed by Northfield Mines Inc. is as follows:

Work Classification	Contract Specified Work	Completed Work May 1, 1953	Completed Work Sept. 1, 1953
Trenching	5500 feet	7048 feet	7048 feet
New Road	2500 feet	2248 feet	5000 feet
Road Maintenance	112 Hours	73-3/4 hours	73-3/4 hours
Diamond Drilling	2000 feet	3028 feet	4752.5 feet
Adit Drifting and crosscutting	1000 feet	856 feet	898 feet
Buildings	Three	Three	Three

The trenching, diamond drilling and underground work completed further explored and exposed the following zones:

1. The "Queen Zone" - additional trenching indicated that mineralization in this area was erratic and the shearing varied in intensity from mild to strong. No diamond drilling or underground work was done on this zone.
2. The "Merle 3 Zone" - a strong persistent mineralized shear zone that has been exposed by trenching some 1200 feet along its strike. In addition to trenching, portions of the zone were diamond drilled to depths of 200 to 600 feet below the surface. Results of the drilling proved disappointing in strength of mineralization when compared to the indicated mineral strength of surface exposures. Reasons for the mineral impoverishment at depth might be found in one or more of the following possibilities: 1) the assumed strength of primary cobalt mineralization, from gossan color in surface shows, was incorrect; 2) the mineralized zone could possibly dip to the west although most surface indications point to a steep dip to the east; 3) although the surface shows are well mineralized the shear zone is weakly mineralized at the horizons intersected by the drill holes. Based on the forementioned possibilities reasonable action would dictate that a closer study of this zone be made before additional exploration work be done in the area.
3. The "Merle 5 Zone" - a relatively broad mineralized shear zone, traceable on the surface for 1100 feet. Trenching, diamond drilling and underground work was performed on this particular

zone and although the results of the latter two indicated a zone somewhat low in cobalt-copper content, the results were not entirely disappointing. The limited vertical and horizontal extent of the diamond drilling and underground work performed left considerable portions of the zone still to be explored.

Recommendations for future exploration work on the Stevenson property are as follows:

1) General: trenching should be done in the relatively large area lying within the property lines on the south slope of the north fork of Little Deer Creek. Purpose of this work would be two-fold: to seek extensions of known mineralized shear zones, and prospect for new zones that might lie in this area.

2) "Merle 3 Zone": a re-examination of all geologic data from trenching and diamond drilling should be made to ascertain why at depth the zone appears to show mineral impoverishment. If a well founded reason can be established and if the zone is still a good geologic prospect an X-cut can be driven from the 7000 Level closer to the zone's 7000 Adit elevation projection, and a series of diamond drill holes be put out to prospect the zone. The drill holes would delineate the mineralized zone and indicate the direction in which to further X-cut to the most promising ground.

3) "Merle 5 Zone": test by drilling, the continuity at depth of the zone outlined by previous underground work on the 7000 Level and explore that portion of the zone to the south of the 7000 Adit.

4) Outside consultant: assessment of the property by a qualified consultant, after a detailed study of the property has been made by him, is to be recommended. The opinion of a consultant familiar with the property might be very helpful in planning any future exploration work on the Stevenson property.

The above is a summary of the enclosed report made by the author and as such is respectfully submitted.

Signed:

John K. Brozo

John K. Brozo

NATURE OF REPORT

The purpose of this report is to present in final form the results of the exploration program conducted by Northfield Mines Inc. on the Stevenson property as carried out under D.M.E.A. Project No. 2436. Said program was initiated on June 2, 1952, and was carried on to its conclusion on September 1, 1953. The main phases of the program, in order as completed, consisted of trenching, diamond drilling and underground exploration work in areas shown to hold promise by the forementioned trenching and diamond drilling.

LOCATION AND ACCESSIBILITY

The property under discussion, known locally as the Stevenson Property, is situated in the Blackbird Mining District, Lemhi County, Idaho and more particularly lies along Little Deer Creek and in the headwaters of the north and south forks of the same creek. (See Drawings Nos. 1 and 2). The western edge of the property adjoins the Calera Mining Company's holdings and is about 3000 feet northeast of their mine plant.

Access to the property is by means of a steep graded "Cat" road running from Calera Mining Company's 7100 Level mine yard over a ridge on the east side of Meadow Creek to the headwaters of the southfork of Little Deer Creek. This road while reasonably accessible during the summer is hard to maintain during the winter months because of snow.

Any major operation of the Stevenson property would require that the road accessibility from the public roads to the property be improved. A preliminary reconnaissance indicates that this necessary access road could be put in along Little Deer Creek and should be relatively inexpensive to construct. Such a road would be about 5 miles in length with an elevation drop of 2100 feet.

The nearest towns of consequence are Salmon and Challis, Idaho and were used as supply points for the present operation. The former is some 50 miles from the property by way of the Williams Creek road whereas the latter is

reached by way of the Morgan Pass road and is about 60 miles from the property.

The two closest railheads are over 100 miles away. The Union Pacific rail line terminus is at Mackay, Idaho, some 113 miles distant by way of the Morgan Pass road, while the Northern Pacific railhead is located at Darby, Montana, and is 114 miles away via Shoup and North Fork. The greater portion of the roads mentioned are graded gravel and in places, particularly the Morgan Pass road, the grade often exceeds 8 percent.

PHYSICAL FEATURES

Topography of the area covered in the report reflects the attendant results of a youthful erosional cycle superimposed upon an earlier mature

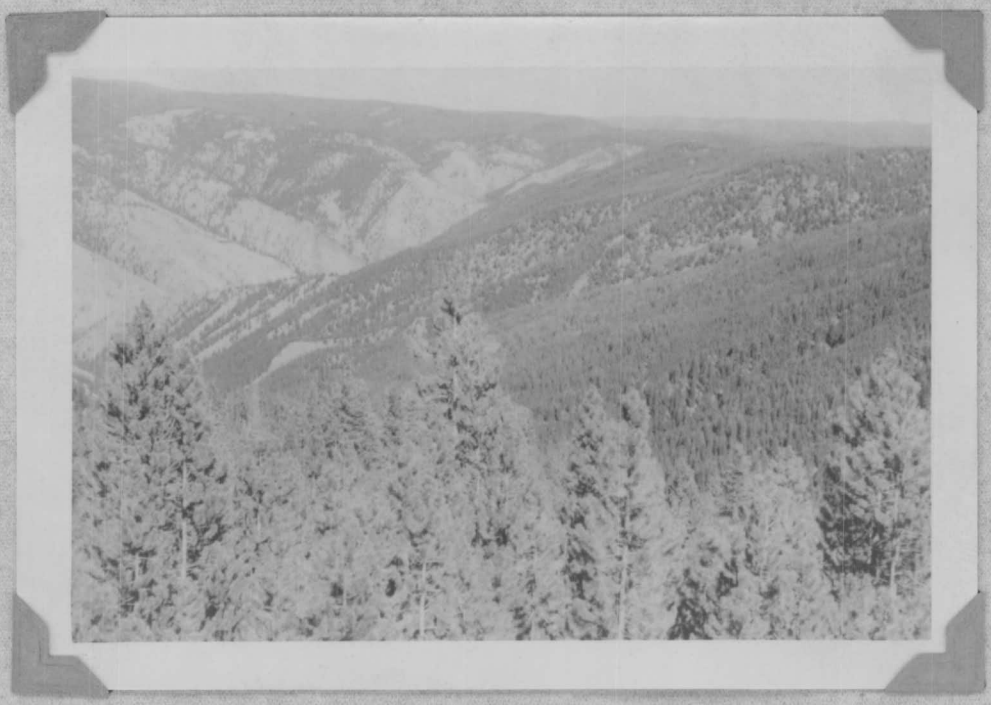

Photo No. 1
- Looking Northeast from the Property -
(South fork Little Deer Creek runs from right foreground to left side middle of picture, watershed of Panther Creek visible in left background)

erosional cycle. At the upper elevations the ridges present a peneplaned surface which appears to be quite extensive in area. This remnant peneplaned surface

was developed during an earlier erosional cycle and pre-dates the more recent mountain building processes that have taken place. In contrast, the valleys show an abrupt topographical change to V-shaped valleys with precipitous slopes that are associated with the youthful phase of land surface erosion. Elevation extremes on the Stevenson ground range from 5000 to 7500 feet with the greater part lying between 6500 to 7500 feet.

Inmature soil development has progressed quite extensively, particularly on the north facing slopes and supports abundant vegetation in the form of heavy stands of "Lodge Pole" pine, brush piles of "Elder" brush interspersed

Photo No. 2
- Looking East Across Property -
(Showing heavy stands of timber)

with some Spruce and Douglas fir. Outcrop development has been very poor because of the weathering characteristics of the rock and the few rock outcrops that have developed are usually obscured by the dense vegetation, humus and windfalls of timber.

PAST HISTORY

Prospecting and mining activity in the Blackbird Mining District started around the 1890's and since that time various individuals and companies have attempted to bring different prospects into production on a stable basis. However, until just recently, the area has been noted for its erratic mineral production. Along with the general development of the district the ground now held under option by Northfield Mines Inc. probably was subjected to some prospecting activity. How thoroughly this area was prospected is not known but the few prospect pits and caved adits with small dumps indicated that the exploration was not very extensive. The heavy cover of overburden and the erratic nature of the mineralization presented a difficult obstacle to economic mineral development. Although the presence of cobalt was noted, it did not have a readily available market and unless the copper content was quite high the various prospects had little chance of success. Under these conditions the property offered little incentive for mineral exploitation until just recently. With the advent of cobalt as a desired metal and the successful development of the Calera holdings, the "Stevenson" property took on importance as a mineral prospect. The nucleus of the present claims now held under option by Northfield Mines Inc. were located by F. W. Stevenson in 1937 and it was only in the latter part of the 1940's that a road was bulldozed into the property. In the process of cutting the road two shear zones were exposed that showed promise of being mineralized with cobalt and copper. Aside from the road work the only other development work performed was for the benefit of keeping the claims in good standing. The property remained in this status until the middle of 1951, at which time, Northfield Mines Inc. took an active interest in the ground by making a preliminary geologic reconnaissance in the form of geochemical sampling and limited trenching.

DISTRICT GEOLOGY

For a more detailed picture of the general geology of the Blackbird Mining District and more specifically the area around Calera Mining Company's operation, the reader is referred to a preliminary report [1] written by Dr. J. S. Vhay of the United States Geological Survey. A brief abstract of Dr. Vhay's report presents the following geologic picture:

The rocks of the district are made up of metamorphosed sediments of the Yellowjacket formation, (Precambrian in age), of the Belt series. This series consists of phyllites, grey quartzose schists, quartz mica schists, garnet mica schists, intercalated quartzite schists and quartzites.

Structurally and lithologically the Blackbird district has been divided into three separate blocks based on their dominant rock type, intensity of folding and the presence of boundary fault zones. From east to west across the district the blocks have been designated as the Haynes-Stellite, the Blackbird and the Lookout. The Haynes-Stellite block is made up of massive beds of quartzites and phyllites that lie in open folds with a general strike of east and west and dip moderately to the north. The central block, designated the Blackbird unit, is separated on the east from the Haynes-Stellite block by a boundary fault. This block is made up of intensely folded schistose rocks ranging from grey quartzose schists to micaceous quartzites in the southern part and garnet chloritoid schists to the north. The folds strike from northeast to northwest and usually plunge 20° to 40° north. Further to the west the Lookout structural unit begins at a boundary fault zone marking the west limit of the Blackbird block. Beyond the fault the rocks of the Lookout block lie in more open folds and range from quartzites in the south to grey schists and garnet schists in the north.

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[1] Vhay, J. S., Cobalt-Copper Deposits of the Blackbird District, Lemhi County, Idaho; Strategic Minerals Investigation, Preliminary Report 3-219.

Faulting within the blocks has occurred but the pattern, intensity, displacement and geologic importance are not readily ascertainable because of the absence of stratigraphic markers and poor outcrop development. Evidence does point to rather large and important fault ruptures but the pattern is not complete. Orientation of fold structure will probably be shown as having had a strong influence on the attitude of the faulting.

The igneous rocks found within the district include granite, quartz feldspar porphyry, gabbro and numerous small basic dikes. The granite predominates throughout the area as a part of the Idaho batholith. Both the granite and quartz feldspar porphyry are probably Cretaceous in age whereas the gabbro and basic dikes were intruded before regional metamorphism took place and in places show intense metamorphic change in texture and mineral composition.

Mineralization within the district has been confined to fracture and shear zones. The fracture zone type of mineralization is associated with the Haynes-Stellite block and consists of the introduction of tourmaline, pyrite, glaucodot and fine grained cobaltite. The sulfides are widely disseminated throughout and only in certain areas within a fracture zone is the cobalt concentration high enough to be of possible economic importance. In the other blocks the mineralization loci are the shear zones which vary in width from several feet to several hundred feet. Classification of the shear zones has been made on the basis of attitude and strength. One set strikes northwest and dips 50° to 75° northeast; the second strikes north and dips steeply east or west, is usually narrower and appears to be controlled by folding; the last set strikes northeast and dips steeply northwest or southeast, is quite narrow and erratic in extent.

A mineralization contouring of a local concentration within the shear zone shows a more or less pod-like form limited in extent along the strike and down the dip, the greatest mineral dimension being down the plunge of the pod.

Mineralization may be in the form of only bull quartz and green hydrothermal biotite while in other sections within the shear zone one might find a range of minerals including not only those mentioned above but in addition pyrite, pyrrhotite, cobaltite, chalcopyrite, safflorite, some arsenopyrite and their oxidation counterparts of native copper, chalcocite, covellite, heterogenite and montronite. Other non-metallic minerals found as minor constituents closely associated with mineralization are tourmaline, chlorite and some apatite.

On the surface the oxidation of the sulfides within a pod has been quite complete and the relic minerals usually are limonite, jarosite and Fe gossan. On occasion primary sulfides have been found at the surface but in all cases the sulfides were in the more silicious portions of a pod where the oxidizing action of meteoric waters had not had a chance to take place.

PROPERTY GEOLOGY

The geology of the major portion of the Stevenson property is a close prototype of the general geology of the Blackbird block. Previous mapping of this particular area within the Blackbird unit was not extensive because of the lack of good exposures both on the surface and underground. Subsequent trenching, diamond drilling and underground work performed under the exploration program has made it possible to obtain a clearer and more detailed geologic picture of certain portions of this property.

Lithology

The metamorphosed sedimentary rocks have been typed into the following facies: grey schist, quartz mica schist, green biotite schist, quartzite schist (intercalated), and quartzite. There are deviations within the types enumerated due mainly to the original variation in the mineral content of the sediments and the effect of the intensity of metamorphism. These variations within defined rock types have made it difficult, if not impossible, to work

out a stratigraphic sequence or establish marker beds.

Within the confines of the exposures made to date the only rock of igneous origin found has been the pre-mineral basic dikes. The nature of the dikes range from intensely metamorphosed mafic material to relatively fresh unaltered rock. One feature of the dikes that is worthy of note is that in all cases to date they have been found in or in close proximity to the mineralized shear zones. If of no greater import the presence of this igneous rock seems to act as a marker for areas in which movement and solution access could have taken place.

Folding

The beds as exposed showed rather tight folding and in some cases has resulted in the development of local drag folding and crumpling. From the "Queen Zone" to the "Merle 3 Zone" the observed dips[1] would indicate two minor anticlinal structures culminating in a major anticline in the Merle 3 area. General strike of the beds is north to northwest with plunge angles of 20° to 40° north. The Merle 5 area showed fold structure that had strikes from northwest to northeast and dips that were normally to the west although east dips were logged in 702 Drift.

Other than in the above mentioned areas no mapping of fold structure has been done by the writer. However, it is reasonable to expect that the fold structure will be tight and follow the general pattern of the Blackbird unit as a whole.

Faulting

Before discussing the faulting it might be well to distinguish between a fault and a shear zone as interpreted by the author. Any dislocation or rupture that is confined to one principal plane of slippage was logged as a

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[1] In some cases bedding attitudes in the trenches have proven to be unreliable because of ground creep and limited vertical extent of the trench.

fault. In the case of a shear zone, dislocation of the beds can not be readily ascertained as having occurred along any one plane but rather took place on a series of planes with the resultant development of slip shear cleavage.

All the zones explored showed faulting but the surface trenching, diamond drilling and underground exploration performed on the "Merle 5 Zone" offers the best opportunity for correlating the fault structure and geologic influence on a particular mineralized zone.[1]

Strong evidence is present that both pre and post mineral rupturing has taken place. Intrusion of pre-mineral b.sic dike material and slight mineralization along some faults attested to pre-mineral movement whereas offsetting of the mineralized shear zone and granulation of the mineralization are ample proof of post-mineral movement.

Overall, the pre-mineral faulting seems to have generally exerted only a minor influence as a localiser or access channel for ore solutions and the post-mineral movement has resulted in only minor offsets in the shear zone pattern.

Ore Zones

As a result of the exploration work performed on the Stevenson ground three main mineralized zones were disclosed. For identification purposes these zones have been designated as the "Queen", the "Merle 3" and the "Merle 5".[2]

Queen Zone - the most westerly zone, namely the "Queen Zone" was wholly prospected by trenching. A total of seven trenches averaging 150' to 200' in length were cut in the immediate area. Intersections of the zone were

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1. See Drawing No. 6
2. See Drawing No. 3

made in Cuts Nos. 1.9N8.5W, 14 and 15. The strongest show, based on strength of Fe gossan and jarosite, was made in Cut 1.9N8.5W. At this point there are two mineralized zones, separated by an intervening fault, that lie in a shear zone; the shearing of which strikes N5°E, dips vertical and plunges 57° north. Cut 15, 100 feet to the south and on approximately the same course as Cut 1.9N8.5W intersected the same general shear zone but the mineralization was weak, consisting of bleached grey schist, quartz, green biotite schist and some Fe stain. An unusual exposure was made in Cut 14; the north wall showed very strong Fe gossan and jarosite yet the south wall showed no mineralization. Logging of the trench showed a fault rupture running at a slight angle to the direction of the trench and dipping to the southeast. The north wall was mineralized whereas the south wall was not. Indications are that the fault might have localized this particular mineralization.

The whole Queen area appears to have suffered shearing action. Most of the action was mild and only in those localized spots where action was more intense does it appear that mineralization was strong. Under these conditions the pattern of ore deposition, although strong in a particular exposure, appears to be quite spotty when viewed overall.

The intervening area between the Queen zone and the Merle 3 zone to the east was prospected with a number of trenches. Exposure of the bedrock revealed that the area had been mildly sheared and in places mineralization was present. No important mineral intersections were made except in Cut A and Cut 1.8S.3E where a sparse concentration of cobaltite was found in a quartz mica schist. Incidentally, soil samples taken during the geochemical survey made on the property showed numerous high "kicks"[1] in this area, yet

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1. See Sheet 1, Geochemical Assay Map

the trenching failed to uncover the indicated strong mineralization. An explanation of these geo-chemical anomalies in what appears to be a weakly mineralized area might be explained by a phenomenon that occurred on the West Fork of Blackbird Creek where the U.S.G.S. ran a geo-chemical survey. "Microscopic amounts of cobalt locked in quartz grains distorted the geo-chemical results indicating a strongly mineralized area which actually was found to be only weakly mineralized."

Merle 3 Zone - This zone, although somewhat irregular when viewed on a plan section, is a rather strong continuous zone within beds of quartzite and quartzite schist and has been traced on the surface by trenching for about 1200 feet. The overall general strike is N20° to 30°W with a dip ranging from vertical to steeply east and showing a plunging lineation pattern of 20° to 40° north. Offsetting of the zone by faulting has been noted and one characteristic of these offsets is that the north side has been displaced to the west. This displacement has been in the range of 50 to 75 feet on the horizontal. Width of the shear zone, as mapped, varies from 30 to 60 feet; undoubtedly the actual width of the zone of differential movement extends further out into the walls than the limits set for the more intensely sheared portions.

There is a possibility that what has been grouped under one zone is actually a series of small disconnected overlapping shears with an overall N30°W alignment. The chance is remote that such a condition does exist because in laying out trench cuts it was reasonably easy to predict where the zone should be intersected, taking in the effect of faulting; and even if such a zone arrangement existed the conditions listed above would make it safe to consider the Merle 3 zone as one continuous zone.

The strength of mineralization is not uniform throughout the zone; mineralization consisting of quartz, hydrothermal biotite and some Fe gossan was noted in all the zone exposures but the trench cuts to the north of Cut

No. 1 definitely showed more "gossan color" than those to the south. Cobaltite was found in the silicious walls of the mineralized zone in Cuts Nos. .8N.4W, 9, Aex and 10 and in addition all of the cuts to the north of Cut 1 showed strong Fe gossan and jarosite.

A total of six inclined diamond drill holes, (D9 to D14 inclusive), ranging from 224' to 670' in depth were put down in this area to intersect at depth the mineralized zone that had been outlined by trenching. The results from the drilling brought to light the following: the zone of oxidation was deeper than expected, 200 feet plus below the surface, and the strength of mineralization intersected was weak when compared to the estimated strength of the oxidized surface showings. Only in drill hole D11 was cobaltite in primary form encountered and it was a 1/4" seam. Reasons for this indicated mineral impoverishment at depth is not known to date but the following possibilities should be considered: 1) the assumed strength of primary cobalt from "gossan color" shows on the surface may be wrong; 2) the mineralized zone could dip to the west although all surface indications point to a dip to the east; 3) although the surface "shows" are well mineralized the zone is weakly mineralized at the horizons intersected by the drill holes. This latter possibility might be true but it seems the chance of intersecting a well mineralized portion of the zone would be good in six drill holes. Certainly the fact that the six drill holes were little better than slightly encouraging makes it apparent that a closer study of the zone should be made to determine the cause. Herein lies the answer to the question whether the Merle 3 is worthy of future exploration work in the area explored to date. Calera had a similar experience; the first eight holes they drilled in what is now a productive area failed to disclose values approaching ore grade.

Lying in close proximity to the Merle 3 zone are several other small

shear zones that have been mineralized. Continuity of these zone had not been tested beyond the making of one, or at the most two, exposures. A large geo-chemical anomaly lies over one exposure that was made near the east end of Cut. 2. Another cut was made 170 feet further to the northwest and because of the extreme depth of overburden and position it was difficult to expose the bedrock completely. However, indications were that the shear zone had been intersected and was mineralized. The shears in this group are all small and probably represent readjustment shears sympathetic to the main shear.

Merle 5 Zone - lying some 800 feet to the east of the Merle 3 zone is a continuous shear zone that has been designated the Merle 5 zone. Trenching has outlined the zone for 1100 feet along its strike; the northernmost exposure is in Cut No. 4 and the zone extends southward to its southernmost exposure in Cut No. 18. Within these limits it is readily recognizable as a sharply defined mineralized shear zone lying in unmineralized grey schist and quartzite schist. To the north of Cut 5 the shear seems to lose strength both in horizontal extent of differential movement and strength of mineralization. The zone also shows indications that splitting of the main shear into two or possibly three relatively small shears has occurred.

Cut No. 5 was by far the best trenching exposure made of mineralization within the shear, based on jarosite and Fe gossan "color". At this point the intensely sheared rock has a width of 50 to 75 feet and the zone of mildly sheared rock extends even further, 24 to 50 feet each side of this area. Further south Cuts 7, 17 and 18 intersected what is believed to be a continuation of the same zone that has been displaced to the east some 100 to 150 feet by faulting. Based on "color" these intersections were strong, and in addition the cuts exposed several other mineralized sections where drag folding

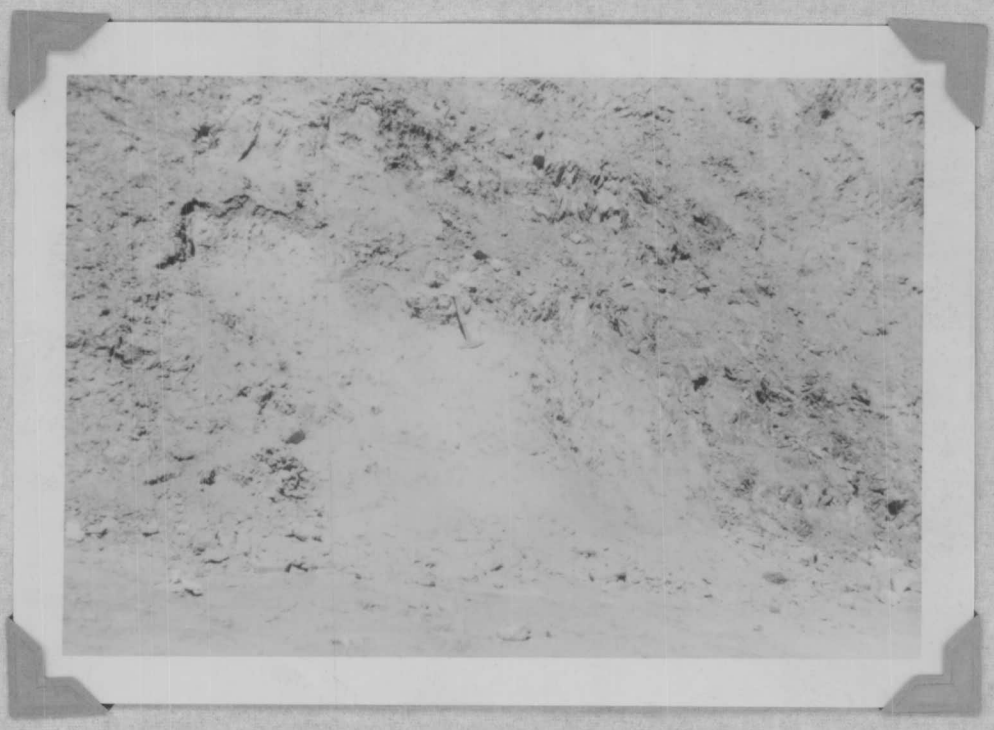

Photo No. 3
- Cut No. 5 -
(Showing strong zone of Jarosite and Fe gossan)

and relatively narrow zone of localized movement had provided access to the mineralizing solutions.

A total of eight surface drill holes, D1 to D8 inclusive, were put down in this area to test the above zone at a depth of 80 to 150 feet below the surface. All the holes except D8 showed either sulfide or oxide sulfide mineralization. Drill holes D2 and D7 made mineral intersections that could be considered ore or near ore grade whereas drill holes D1, D3, D4, D5 and D6 gave assay values that extended over 20 to 50 feet in width but were low. (Later underground development showed that D3 and D6 had not intersected what is considered the main zone.)

All the underground work performed was done in the zone with the purpose in mind of testing the information gained from trenching and diamond drilling. The strongest intersection was made in the 7000 Adit where the mineralized zone extended over a width of 60 feet and was heavily mineralized in places with sulfides. Attitude of the shearing in this heading was N 10°

to 15° W with dips ranging from 57° to 85° west and lineation plunges of 20° to 32° to the northwest. In and near the shear zone numerous intrusions of readily recognizable basic dike rock and suggestive mafic material of the same origin were logged. In places, particularly at the end of 701 Drift, the basic dike rock has been mineralized with quartz, pyrite, chalcopyrite and some cobaltite. On the surface at the end of Cut 18 there is a large intrusion of basic dike rock, the attitude of which is confusing because of the faulting in this section. The dike rock does appear to have intruded along the bedding of the quartzite schist. An oxide coating of a blue-black amorphous mineral (heterogenite?), was found in the fractures and a heavy iron staining prevails throughout. The dark blue mineral was sent in for assay and it tested both for copper and cobalt. Whether this material is secondary to minerals in situ or represents the deposition by percolating solutions is an interesting question. The fact that the rock in the immediate vicinity showed Fe gossan boxwork and irregular crystal casts would seem to indicate that the blue-black amorphous material was residual or semi-residual in origin.

No doubt any permeable structure or bed in the immediate area of the shear served as a loci for the mineralizing solutions. However, by far the most persistent loci found to date has been the shear zone itself. Taking into consideration fault displacement, the shear has a general strike of N 10° to 15° W and a dip of 65° to 70° west. From the 7000 Adit north the zone has been delineated by underground diamond drilling from 701 Drift for 300 feet along its strike. The heavy metals concentration within the zone appear to favor the contact between the green biotite schist and the quartzite schist. Several "shoots" have been found running out into the fractured quartzite but the main body of mineral concentration has been along the contact. Mineralization of the zone is in the form of a dissemination of very small to small,

1/8" to 1", discontinuous stringers of sulfides. Occasionally there is development of a rather large vein structure, three feet plus or minus, that shows quartz and sulfides; however, it has limited horizontal extent and actually is more of a pod or lense type of mineral concentration.

Mineralization Control

The solution of the mineralization control as affecting the Stevenson property is by far the most important part of the overall geologic picture. Geologic data from the trenching, diamond drilling and underground work has confirmed Dr. Vhay's general premise that the loci of mineralization within the Blackbird block are the shear zones. The author's own experience in this regard has been that wherever crumpling, drag folding and shearing of beds has occurred the zone of dislocation invariably showed evidence of having been mineralized. In many cases the mineralization was only of a minor magnitude consisting of quartz and hydrothermal biotite with little introduction of the heavy metals.

The shear zones, by far the most continuous form of crustal dislocation are not heavily mineralized throughout. The sub-economic to economic mineral concentrations within these zones are more in the form of pods or lenses and it is this erratic nature of heavy metal concentration that complicates the ore exploration picture. The persistency of these concentrations may be down the plunge, as is the experience of Calera, but limited vertical exploration on the Stevenson property precludes, for the present, the making of a hard and fast rule that the pods or lenses found here will follow the same pattern. However, the chances are good that they will because of the seemly similar nature, in many respects, of the mineral deposits.

Reasons for the nature of the concentration could reasonably be

found to be due to the following factors: 1) the effective solution accessibility as expressed by the intensity of shearing; 2) the favorable mineral deposition characteristics of a certain bed or beds; 3) the trapping or localising effect of pre-mineral faults and lastly, certainly the most important, 4) the strength of the heavy metals mineralization. The first three factors would govern the location and the last would control the tenor of the concentration.

Mineralogy and Paragenesis

Very little work has been done on the study of minerals found in the ore zones except by hand lens. The following minerals as associated with primary mineralization were identified: quartz, biotite, pyrite, arsenopyrite, pyrrhotite (?), chalcopyrite, covellite (might be secondary to chalcopyrite), cobaltite and/or safflorite. Also the sequence of introduction of these minerals was not made a subject of study as it was felt that the order of paragenesis as put forth by Dr. Vhay in his report was applicable to the Stevenson property. Dr. Vhay's order of mineral introduction is: (1) formation of bull quartz by replacement or injection, (2) silification and the formation of hydrothermal biotite, (3) introduction of tourmaline, (4) fine grained cobaltite following all of the above, (5) fracturing and introduction of quartz and dull pyrite, (6) further fracturing followed by introduction of bright pyrite, chalcopyrite, quartz, carbonate and muscovite and the recrystallization of the cobaltite into larger crystals and masses with safflorite replacing some of the cobaltite and (7) minor fracturing and introduction of small stringers of pyrite, carbonate, quartz and probably ludlamite.

Ore Reserves

No attempt has been made to estimate the ore tonnage indicated by this program because it is felt that the erratic nature of the mineralization and the limited vertical extent of exposures made to date would result in its

being classified only as possible ore. As such this estimate would be little more than a calculated guess. However, work in the Merle 5 zone did outline a zone 300 feet in length that has a maximum width of 30 feet near the south end and narrows down to 4 feet at its northernmost exposure. Judging from drill hole assays this zone at the horizon of the 7000 Level would probably run .35 to .40% cobalt and about 1% copper.

PROGRAM DATA

Geochemical Sampling

Soil samples were taken both in 1951 and 1952 to fill in and extend the geochemical survey made by the U.S.G.S. A total of 180 samples were taken and a cobalt p.p.m. assay was made on all samples based on a colormetric technique developed by the Denver Division of the U.S.G.S. under the direction of Dr. Harold Bloom.

Results of the geochemical work are shown on two drawings at the end of this report. Contouring of the results was on the basis of their p.p.m. values, and color shades were used to bring out more clearly the so-called geochemical "highs". The approximate position of the "Queen", "Merle 3" and "Merle 5" zones have been shown with heavy dashed lines to indicate their position with relation to the "highs".

Use of this prospecting aid brought out the following: 1) although the geo-chemical "highs" did not conform to the exact location of the later exposed mineralized shear zones, trenching in those indicated areas invariably resulted in the exposing of a mineralized zone or break within a reasonable distance from a "high"; 2) the actual value of the p.p.m. assay was not as important when compared with the so-called background p.p.m. assay as was the percentage-wise spread between the two; a 100 p.p.m. assay in one area might be significant, whereas this might not be true in another.

Trenching

For prospecting the Stevenson property, trenching with a D8 caterpillar, or its equivalent, proved to be both an inexpensive and rapid method for outlining the shear zones. Only in areas where there was deep overburden, unfavorable slope conditions, or where extreme water seepage had occurred did the "cat" experience difficulty in making trenches.

Photo No. 4
- Aerial View of Merle 3 Zone -
(Showing trenches along the zone)

Photo No. 5
-Aerial view of Merle 5 zone-
(Showing trenches along the zone)

Under the program's amended authorization a total of 7,048 lineal feet of trenching was completed in 425.5 hours of "cat" work. A greater portion of the trenching was confined to the "Queen", the "Merle 3" and the "Merle 5" areas. Thirty two trenches[1] were cut in all; the average length was 200 to 300 feet and average depth was 6 feet.

Diamond Drilling

The drilling program was started when the trenching phase of the overall program was about half completed. Purpose of the drilling was to determine three things: 1) how deep below the outcrop oxidation had taken place, 2) ascertain the continuity and width of the shear zone at depth and 3) tenor of the values contained within the mineralized shear zone.

Results of the drilling answered the above reasonably well. In the "Merle 5" area partial oxidation extended to a depth of 150 feet below the surface and somewhat deeper in the quartzite schist. The "Merle 3" zone showed oxidation effects even deeper, almost complete oxidation to 200 feet, and partial oxidation to 300 feet plus. The continuity of the zone was good in most of the drill holes in the "Merle 5" area, whereas the "Merle 3" area some doubt exists whether the surface equivalent of the zone had been intersected. The cobalt tenor of the "Merle 5" zone, as indicated by the drilling, proved to be lower in some holes than was later determined by underground exploration work. Reasons for this could be attributed to a higher zone intersection with oxidation impoverishment and somewhat poor core recovery. To date, the assay values of the drilling on the "Merle 3" zone have not been tested by underground workings but they were quite low.

A total of 4,752.5 feet of drilling was completed on the two zones, 3,028 feet was from the surface and the remainder was underground. In the

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1. Trench cuts made under the D.M.E.A. program are numbered Nos. 1 to 33 incl. with No. 8 omitted.

Photo No. 6
- Typical Diamond Drill Setup -
(Drilling drill hole D8)

"Merle 5" area continual caving of the hole made it necessary to ream and follow up with casing to keep the hole open. Two holes had to be stopped on account of this cave dondition; they were drill holes D2 and D6. The Merle 3 area, although in more competent rock, also had cave trouble due to fractured bull quartz pods and, in addition, it was difficult to always maintain circulation. Average core recovery of drill holes D1 to D8 inclusive in the mineralized zone was 40 to 50% wherease the recovery in drill holes D9 to D14 inclusive ran higher, averaging around 55 to 65%. In the former, the tendency was to wash core because of the friable nature of the rock, whereas in the latter group of drill holes fractured ground caused "blocking" and resulted in grinding up of the core.

To alleviate the poor core recovery several different techniques were tried: (1) Shortening up on the core runs helped to some extent, (2) Resorting to reverse circulation did not appreciably improve the core recovery and in a caving hole one ran the chance of getting stuck. In fairness to the

latter technique it should be said that it did not get an exhaustive test, (3) Change in the type of bit to a face discharge bit showed a marked improvement when underground drilling was done from the 7000 Level. Close attention by the driller coupled with the use of this type of bit resulted in an average core recovery of around 60 to 70% in the type of ground drilled in the Merle 5 area.

From the experience gained and the results obtained from drilling on the Stevenson property the following facts stand out: (1) Long diamond drill holes are an aid when drilled for a general control purpose, such as tracing the shear zones at depth; (2) short, closely spaced drill holes proved satisfactory in delineating the mineralized portions of a particular shear zone; (3) drilling for close stope control and grade-tonnage calculations would most likely prove to be unsatisfactory and it probably will be necessary to drive sub-development headings to determine the tenor and persistency of a particular ore intersection found by drilling.

7000 Adit Work

At the conclusion of the trenching and diamond drilling the results obtained were assessed and all factors favored the Merle 5 zone as being the logical location for doing the underground exploration allowed for under the D.M.E.A. program. The relative shallowness of oxidation in portions of the zone, favorable topographic position to gain "backs" quickly to the west and north, two drill hole intersections of ore grade and minable width and the elevation difference between the Merle 5 and Merle 3 was such that an X-cut could be driven from this level 800 feet more or less to intersect the projected Merle 3 zone 100 to 150 feet below the limit of partial oxidation.

At the very outset of the underground work it became apparent that timbering would have to be resorted to because of a poor ground condition.

This general bad ground condition can be attributed to a number or reasons: (1) the area in or near the vicinity of the shear zone has been subjected to post mineral faulting, (2) the incompetent nature of the grey schist, (3) the effect of water seepage due to proximity to the surface and (4) the innate friability of the shear zone. While driving the headings it was frequently necessary to carry both spiling and breast boards in the face. The ground was not unusually heavy; instead it displayed a ready tendency to start running. "Getting under " ground that had started running proved to be quite time consuming and after a particular area had been "caught up" it was imperative that relieving of lagging be done to take the pressure off of caps and posts until the ground had reached "equilibrium".

Because of the ground condition and timber upkeep required in the mineralized portion of the shear zone in the 7000 Adit it was deemed advisable not to attempt to drift on the mineralization but rather drift along the strike either in the foot or hanging wall and run X-cuts on short centers to intersect the zone.

To the north of the 7000 Adit the original plan was to drift in the hanging wall side close to the zone, in the quartzite schist, so that any swing or change of dip would be immediately indicated and the direction of the drift could be changed to meet this condition. A turnoff was started at station 2 + 60 in the 7000 Adit to the north but the "back" came in and the immediate area began to cave. The personnel in charge of the operation sought advice from Calera on their experience in this type of ground and they said they had found it more feasible to abandon a particular heading and go around such ground at another point. Because of the timber condition of the 7000 Adit in the shear zone and the fact that it would be the only access to a heading driven north it was decided to run the north drift, 701 Drift, at station 1 + 29 in the footwall side and at a reasonable distance from the zone with the

possibility of having somewhat better ground. The ground condition did improve to some extent but in faulted areas it still gave considerable trouble.

Off the 701 Drift X-cuts were to be driven to the mineralized zone but being plagued by bad ground and the fact that the contract was expiring the decision was made to diamond drill on 50 foot centers from this heading and delineate the zone without the unusual development expense that such an area would require if X-cuts were driven in it.

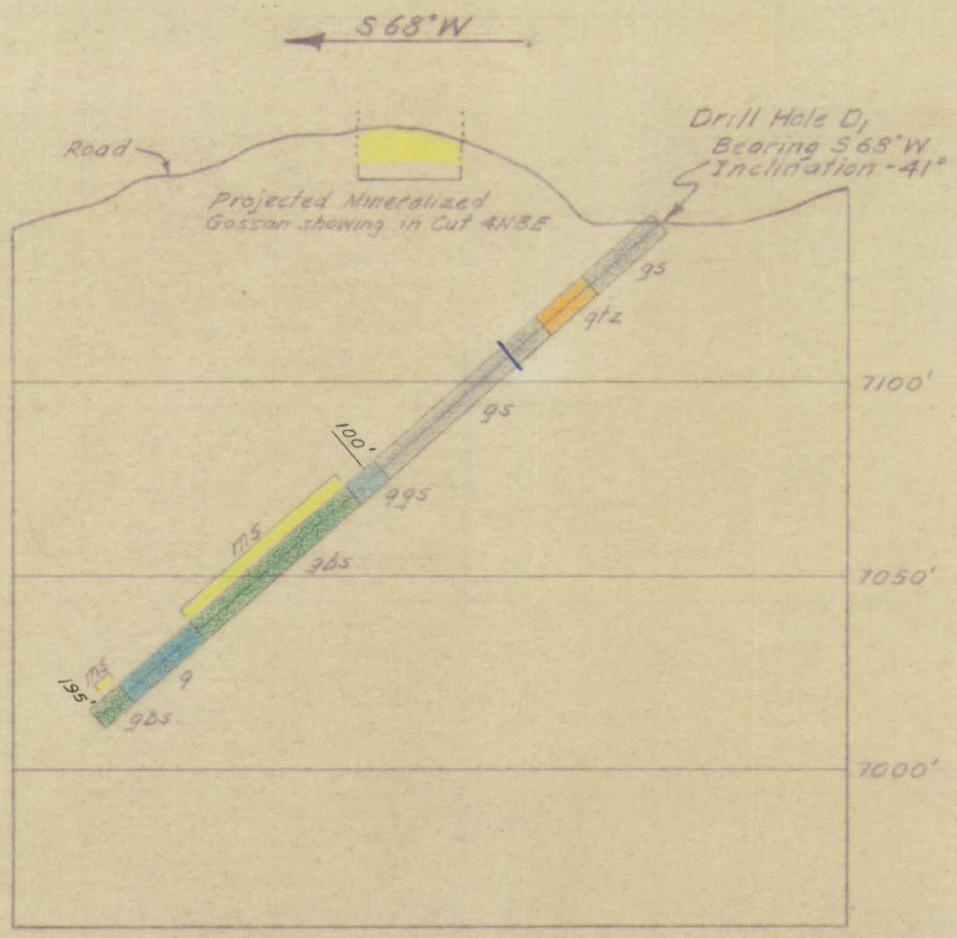
To the south of the 7000 Adit the initial plan was to drift to cross the projected position of the zone from the 7000 Adit intersection and drift in the hanging wall to the south. Drill hole D3 had indicated that the zone might be faulted out of this area but the intersection was 50 to 70 feet below the level and more positive geologic information was desired. As it turned out the zone was displaced to the east and a X-cut in this direction would have very little "backs" so it was decided to drift south southeast to the projected position of a mineralized intersection that had been made in drill hole D6.

At the expiration of the government's participation in the program Northfield Mines Inc. had completed 898 feet of drifting and cross-cutting in the Merle 5 zone. The headings driven were 7000 Adit, 701 Drift, 702 Drift, 701a X-cut and 703 X-cut. During the earlier phase of the underground exploration the work was contracted out to a local contractor. In April 1953 the company took over the work from the contractor and continued driving of the headings as a company operation until termination of the D.M.E.A. contract.

Although the program called for the completion of 1000 feet of headings the nature of the ground was the main reason this portion of the contract was not completed as scheduled. However, sufficient footage was made so that with the aid of underground diamond drilling, the Merle 5 mineral zone had been outlined 300 feet along its strike at the 7000 Level.

MAPS

Drawing No. 8



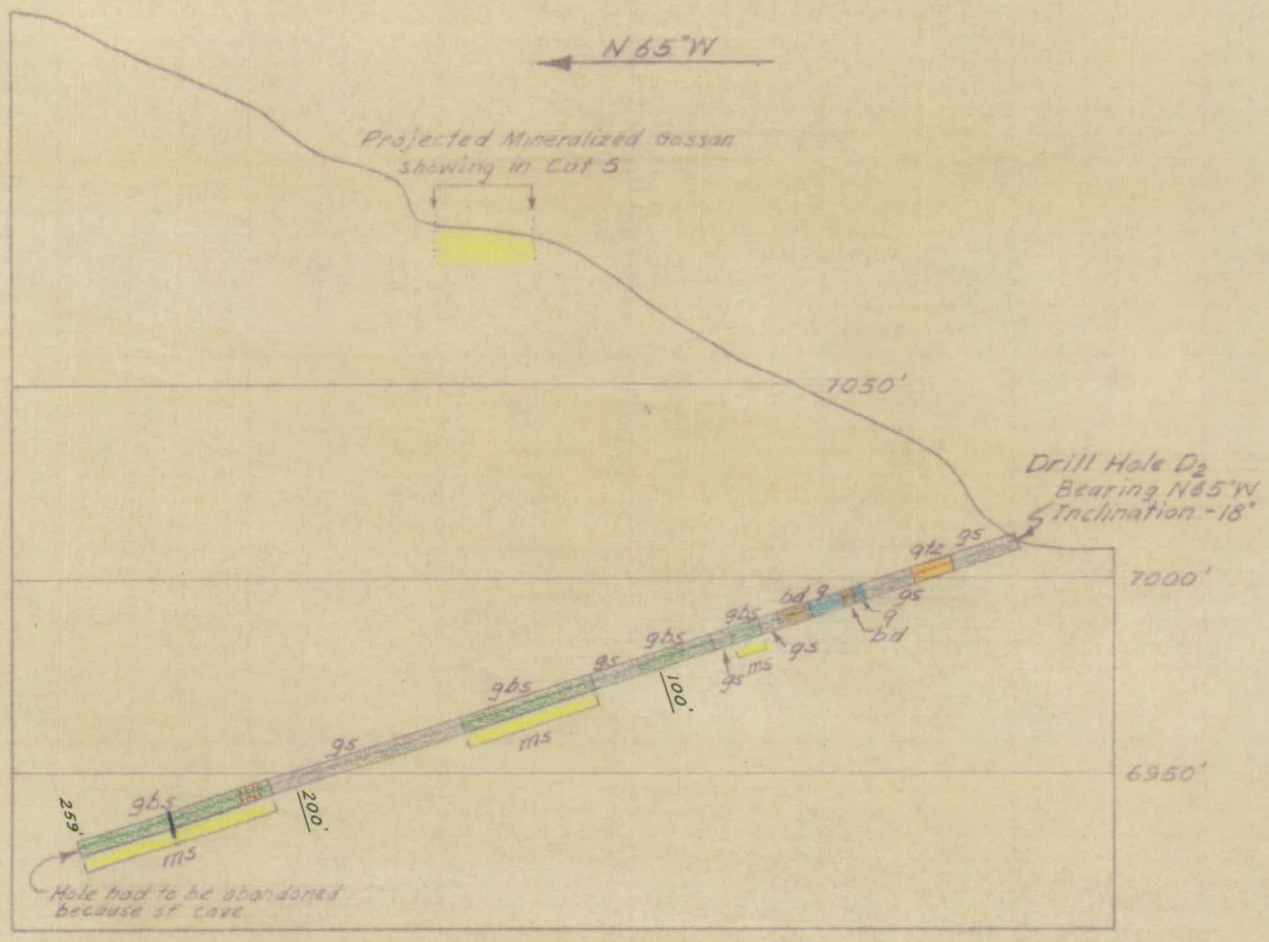
ASSAY RESULTS

No.	Interval	Type	%Co	%Cu
D1-19	106-112	Core	0.058	0.08
-20	112-116	"	0.132	0.52
-21	116-120	"	0.088	0.74
-22	120-125	"	0.073	0.15
-23	125-130	Sludge	0.073	0.18
-24	130-138	Core	0.117	0.75
-25	138-145	"	0.102	0.35
-26	145-150	"	0.088	0.43
-27	150-155	"	0.161	0.20
-28	155-160	"	0.117	0.25
-29	160-165	"	0.102	0.25
-30	165-175	"	0.088	0.18
-31	175-180	"	0.146	0.60
-32	180-185	"	0.088	0.18
-33	185-190	"	0.117	0.24
-34	190-195	Sludge	0.110	0.20

LEGEND

- gs — Grey Schist
- q — Quartzite
- gqs — Quartzite-Grey Schist (intercalated)
- qtz — Quartz
- gms — Quartz Mica Schist
- gbs — Green Biotite Schist
- bd — Basic Dike
- ms — Mineralization-qtz, Fe gossan & Sulfides
- ms — Mineralization-Cobalt
- Contact
- Fault

NORTHFIELD MINES, INC.
Blackbird Mining District, Idaho
SECTION D1 - D1'
Scale: 1" = 50'



ASSAY RESULTS

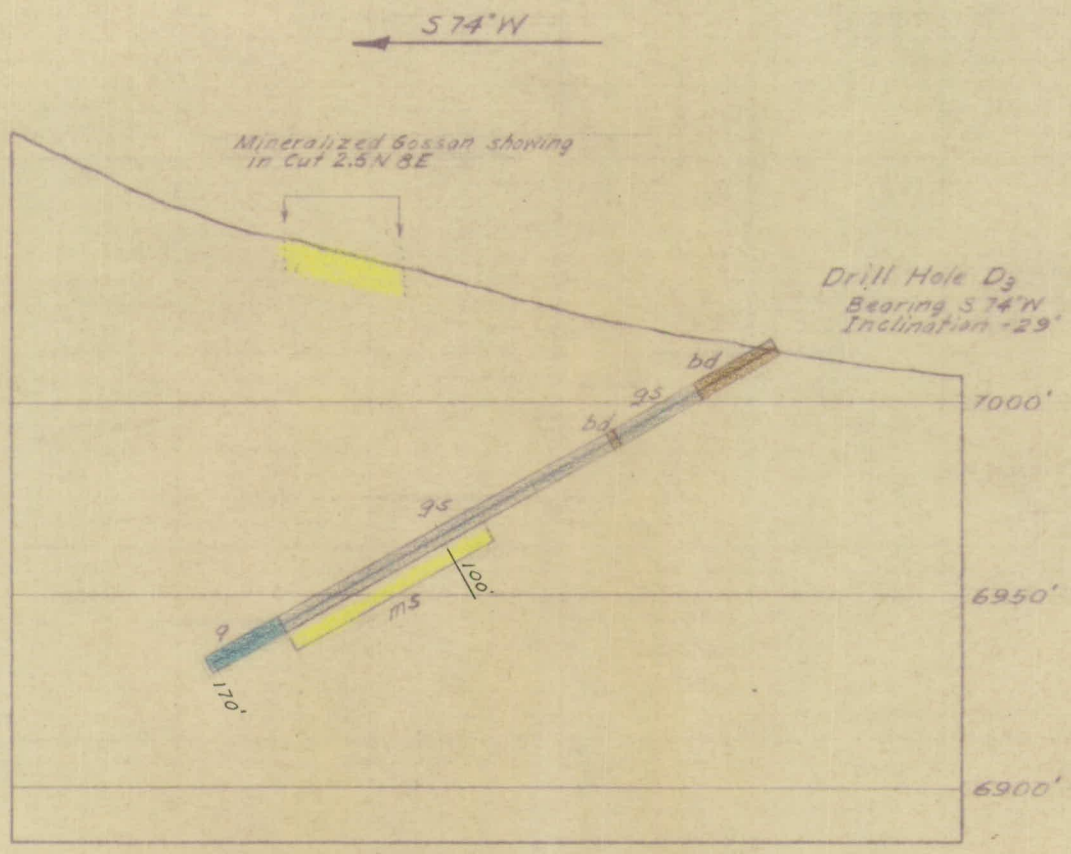
No.	Interval	Type	% Co	% Cu
D_2-17	74-77	Core	0.20	0.44
-9	119-121	"	0.17	1.22
-10	121-124	"	0.10	0.09
-11	124-126.5	"	0.11	0.06
-12	126.5-129	"	0.11	0.27
-13	124-134	Sludge	0.20	0.27
-14	131.5-134	Core	0.52	0.44
-15	134-139	"	0.32	0.36
-16	139-144	"	0.22	0.10
-1	209-212	"	2.64	1.17
-2	212-215	"	0.66	0.35
-3	215-218	"	0.17	0.03
-4	218-221	"	0.17	0.30
-5	221-224	"	0.17	0.30
-6	224-229	Sludge	0.14	0.13
-7	230-233	Core	0.46	0.46
-8	236-239	"	0.23	0.39
-18	254-259	Sludge	0.19	0.28

LEGEND

- qs — Grey Schist
- q — Quartzite
- q/qs — Quartzite-Grey Schist (intercalated)
- qtz — Quartz
- qms — Quartz Mica Schist
- gbs — Green Biotite Schist
- bd — Basic Dike
- ms — Mineralization-qtz, Fe gossan & Sulfides
- ms — Mineralization-Cobalt
- Contact
- Fault

NORTHFIELD MINES, INC.
Blackbird Mining District, Idaho
SECTION D_2-D_2'
Scale: 1" = 50'

Drawing No. 10



ASSAY RESULTS

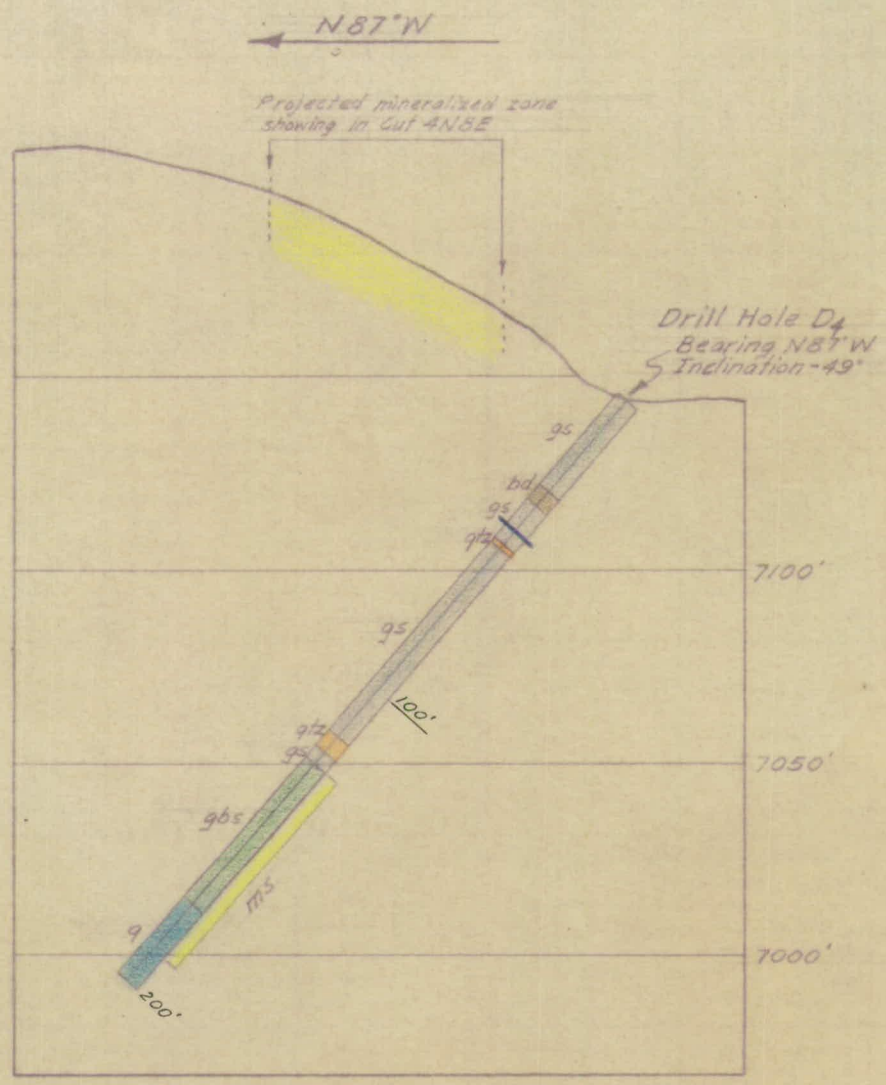
No.	Interval	Type	% Co	% Cu
D3-36	97-102	Core	0.073	1.13
-37	107-108.2	"	0.088	0.32
-38	109-119	"	0.044	0.27
-39	119-128	"	0.058	0.35
-40	128-134	"	0.088	0.32
-41	144-145	"	0.249	0.63
-35	146-150	"	0.102	0.15

LEGEND

- gs — Grey Schist
- q — Quartzite
- q/s — Quartzite-Grey Schist (intercalated)
- qtz — Quartz
- qms — Quartz Mica Schist
- gbs — Green Biotite Schist
- bd — Basic Dike
- ms — Mineralization-qtz, Fe gossan & Sulfides
- ms — Mineralization-Cobalt
- Contact
- Fault

NORTHFIELD MINES, INC.
Blackbird Mining District, Idaho
SECTION D3 - D3'
Scale: 1" = 50'

Drawing No. 11



ASSAY RESULTS

No.	Interval	Type	% Co	% Cu
D4-42	124.5-131	Core	0.073	0.30
-43	131-136	"	0.088	0.25
-44	138-141	Sludge	0.044	0.12
-45	141-149	Core	0.044	0.12
-46	151-157	"	0.073	0.55
-47	141-149	Sludge	0.058	0.22
-48	151-157	"	0.044	0.20
-49	157-164	Core	0.073	0.45
-50	164-174	"	0.322	1.18
-51	174-181	"	0.190	0.50
-52	181-191	"	0.029	0.42

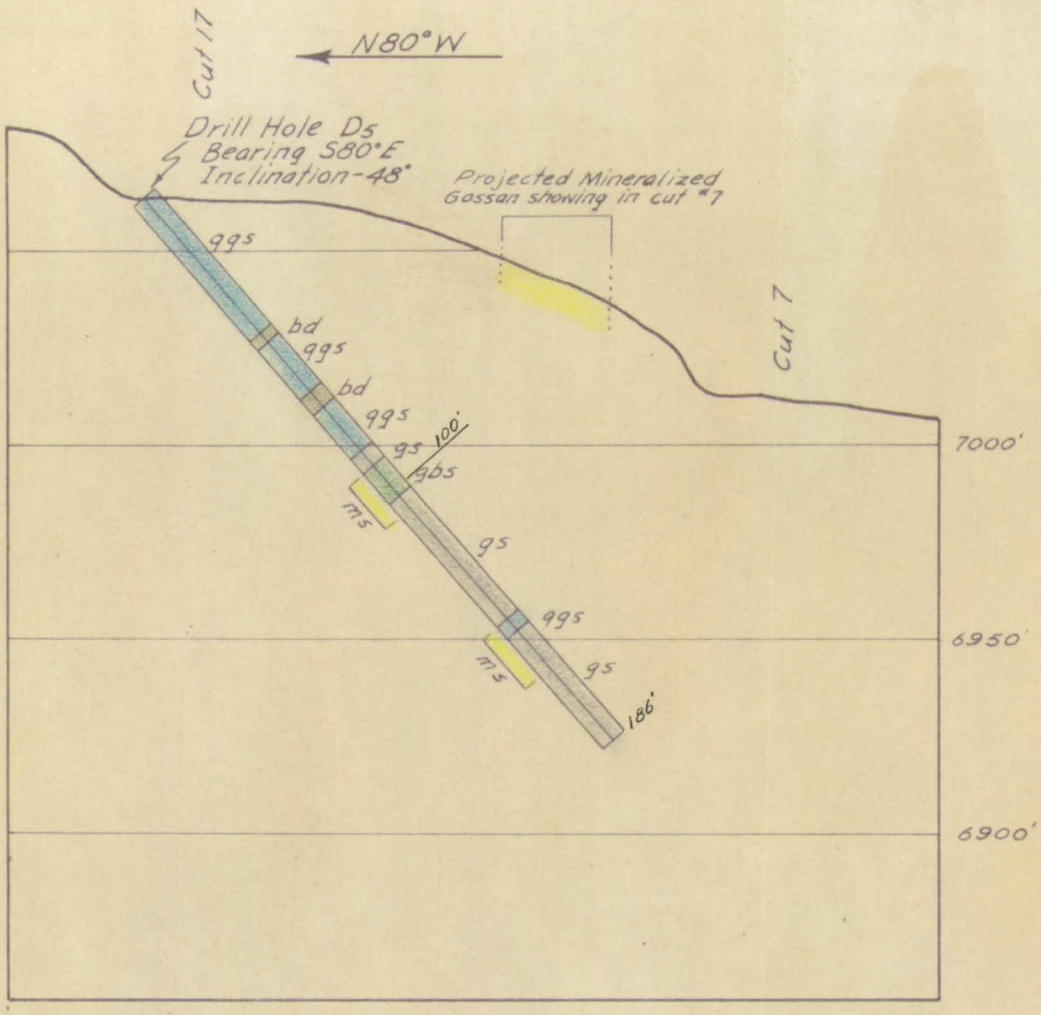
LEGEND

- gs — Grey Schist
- q — Quartzite
- gqs — Quartzite-Grey Schist (intercalated)
- qtz — Quartz
- gms — Quartz Mica Schist
- gbs — Green Biotite Schist
- bd — Basic Dike
- mS — Mineralization-qtz, Fe gossan & Sulfides
- mS — Mineralization-Cobalt
- Contact
- Fault

NORTHFIELD MINES, INC.
Blackbird Mining District, Idaho

SECTION D4-D4'

Scale: 1" = 50'



ASSAY RESULTS

No.	Interval	Type	% Co	% Cu
D5-53	71'-76'	Core	0.073	0.05
-54	144'-151'	"	0.088	0.07
-56	151'-156.5'	"	0.117	1.54

LEGEND

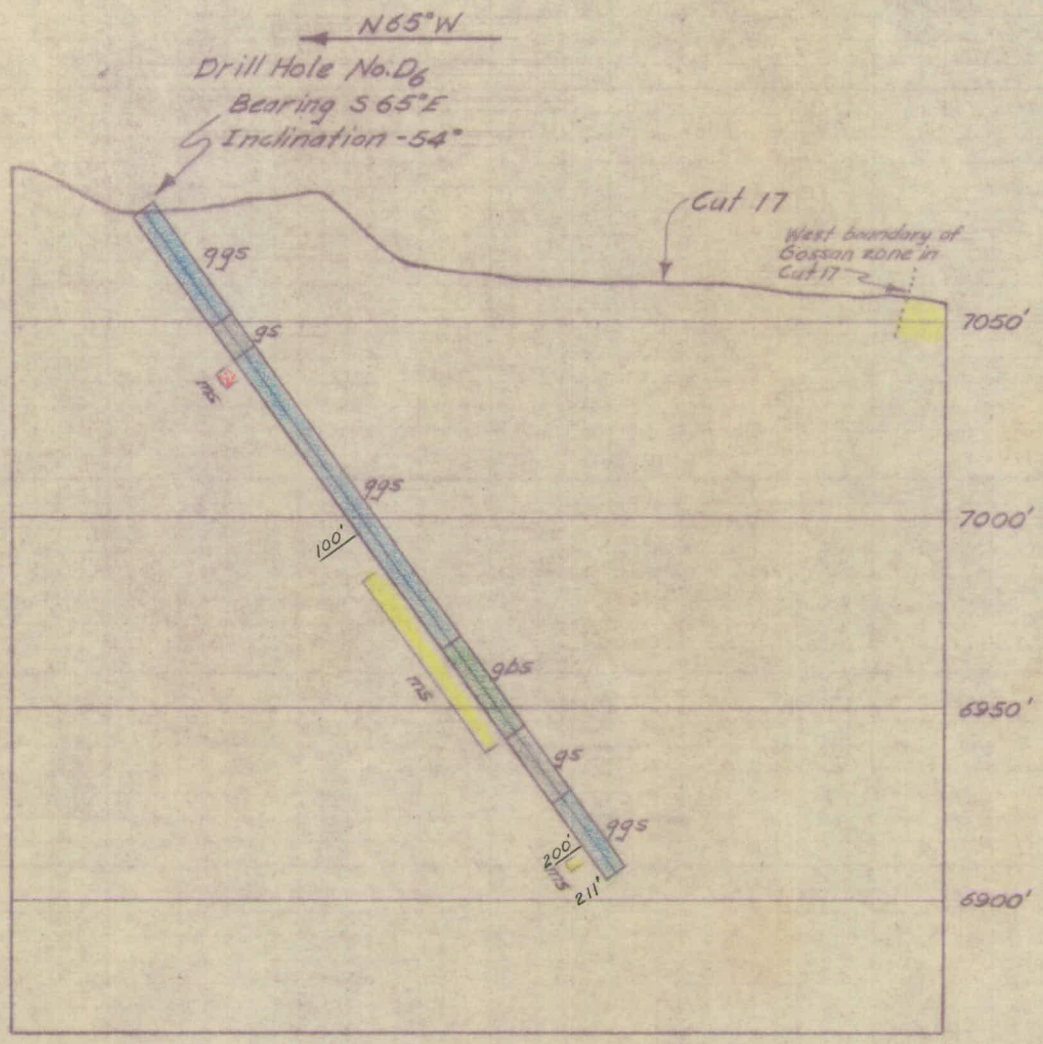
- gs — Grey Schist
- q — Quartzite
- qgs — Quartzite-Grey Schist (intercalated)
- qtz. — Quartz
- qms — Quartz Mica Schist
- gbs — Green Biotite Schist
- bd — Basic Dike
- ms — Mineralization-qtz., Fe gossan & Sulfides
- ms — Mineralization-Cobalt
- Contact
- Fault

NORTHFIELD MINES, INC.
Blackbird Mining District, Idaho

SECTION D5 - D5'

Scale: 1" = 50'

Drawing No. 13



ASSAY RESULTS

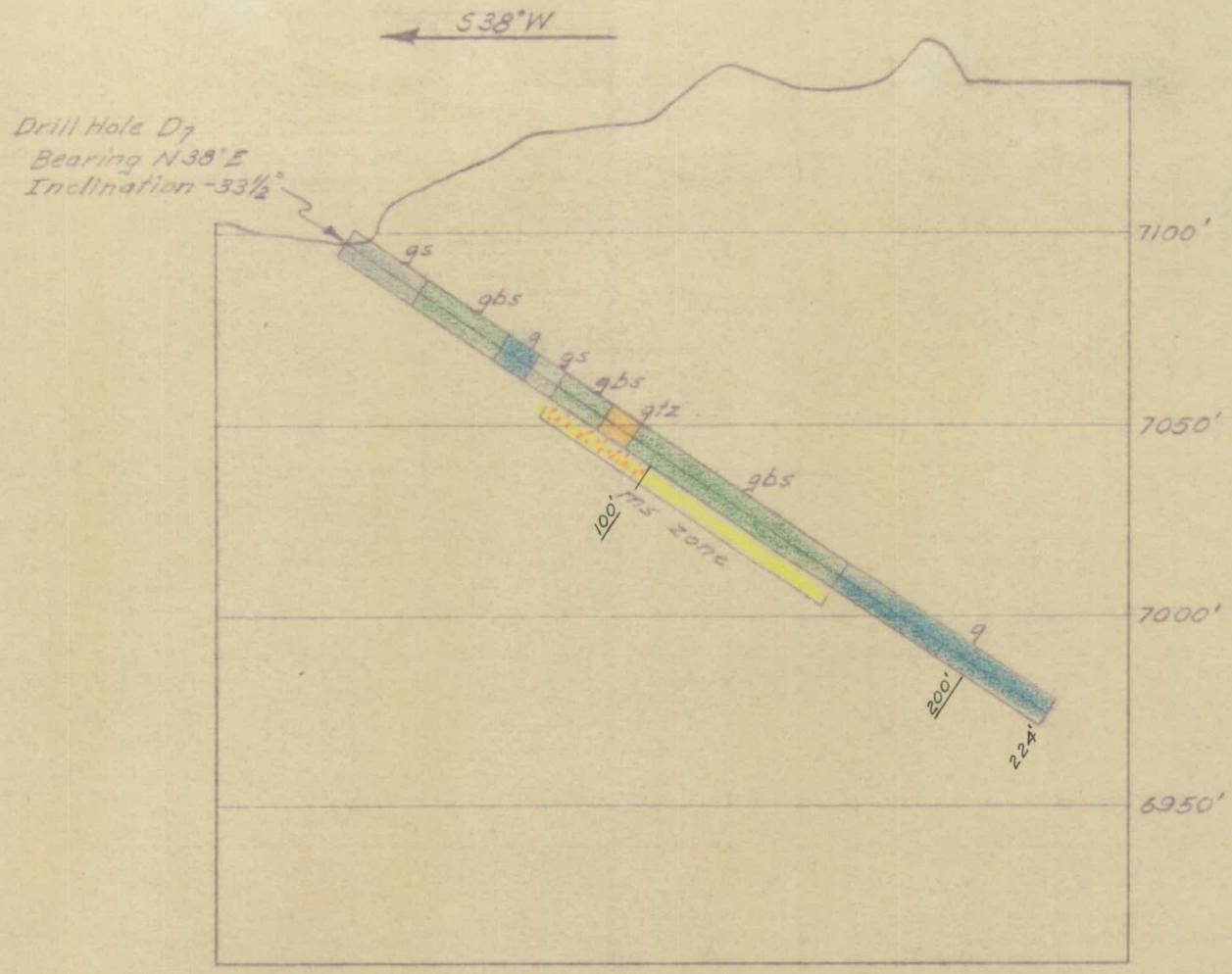
No.	Interval	Type	% Co	% Cu
D6-10	45-56	Core	0.264	0.10
-1	121-131	"	0.051	0.15
-2	131-141	"	0.037	0.55
-3	141-151	"	0.044	0.27
-4	151-161	"	0.029	0.37
-5	161-171	"	0.044	0.17
-6	171-181	"	0.029	0.15
-7	181-191	"	0.029	0.15
-8	200-204.5	"	0.083	0.33
-9	204.5-211	"	0.066	0.07

LEGEND

- gs — Grey Schist
- q — Quartzite
- qgs — Quartzite-Grey Schist (intercalated)
- qtz. — Quartz
- qms — Quartz Mica Schist
- gbs — Green Biotite Schist
- bd — Basic Dike
- ms — Mineralization-qtz., Fe gossan & Sulfides
- ms — Mineralization-Cobalt
- Contact
- Fault

NORTHFIELD MINES, INC.
Blackbird Mining District, Idaho
SECTION D6 - D6'
Scale: 1" = 50'

Drawing No. 14



ASSAY RESULTS

No.	Interval	Type	% Co	% Cu
D7-1	69-79	Core	0.301	0.48
-2	79-86	"	1.291	0.98
-3	86-96.5	"	0.426	0.73
-4	86-96.5	Sludge	0.279	0.73
-5	96.5-104	Core	0.110	0.27
-6	104-109	"	0.169	0.26
-7	109-115.5	"	0.095	0.37
-8	115.5-122.5	"	0.161	0.20
-9	122.5-126.5	"	0.315	2.22
-10	126.5-129	"	0.081	0.45
-11	129-134	Sludge	0.147	0.25
-12	134-144	Core	0.073	0.12
-13	144-152.5	"	0.081	0.50
-14	152.5-158	"	0.147	0.30
-15	173-183	"	0.088	0.12
-16	219-224	"	0.301	0.32

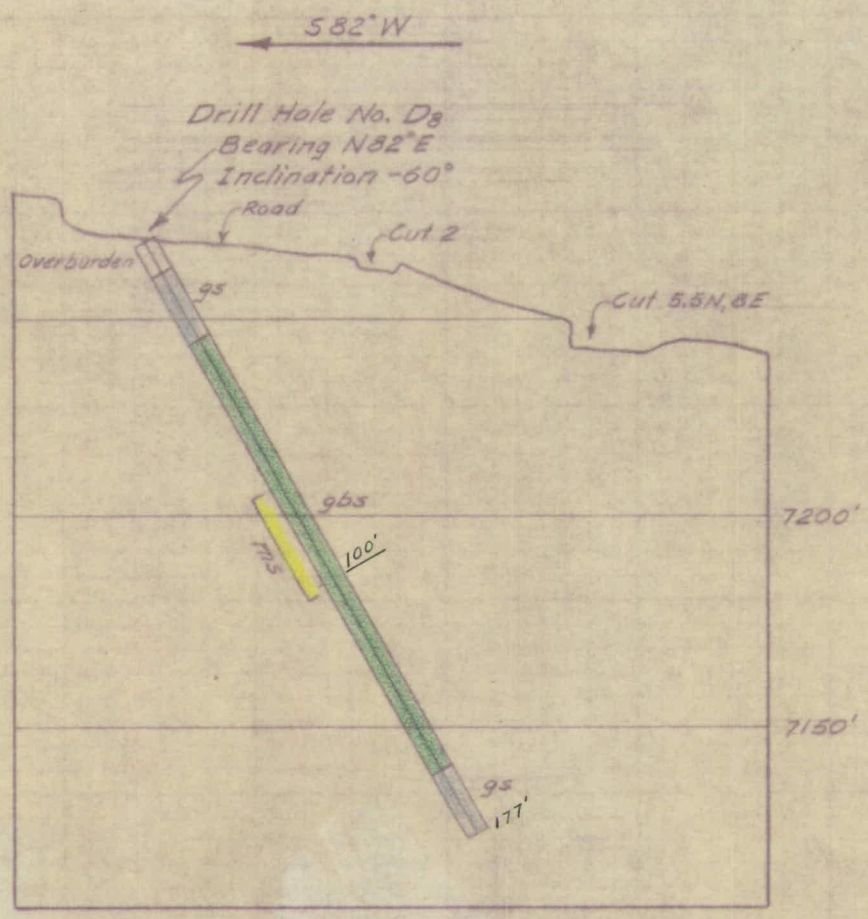
LEGEND

- gs — Grey Schist
- q — Quartzite
- gbs — Quartzite-Grey Schist (intercalated)
- qtz — Quartz
- qms — Quartz-Mica Schist
- gbs — Green Biotite Schist
- bd — Basic Dike
- ms — Mineralization-qtz, Fe gossan & Sulfides
- ms — Mineralization-Cobalt
- Contact
- Fault

NORTHFIELD MINES, INC.
Blackbird Mining District, Idaho

SECTION D7-D7'

Scale: 1" = 50'



ASSAY RESULTS

No.	Interval	Type	% Co	% Cu
D_8-1	72-82	Core	0.037	0.28
-2	82-92	"	0.045	0.28
-3	92-102	"	0.029	0.13

LEGEND

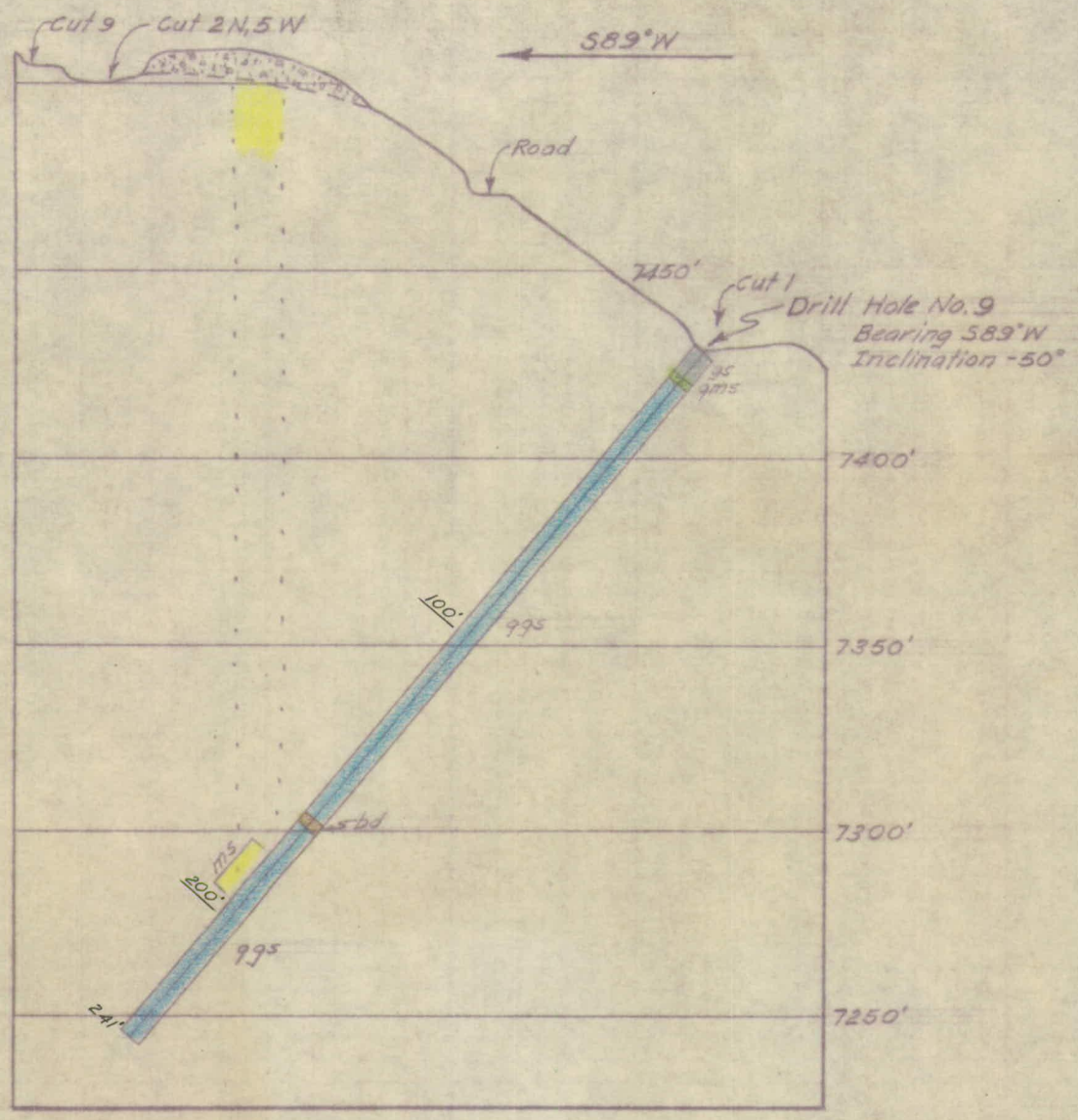
- gs — Grey Schist
- q — Quartzite
- qgs — Quartzite - Grey Schist (intercalated)
- qtz. — Quartz
- qms — Quartz Mica Schist
- gbs — Green Biotite Schist
- bd — Basic Dike
- ms — Mineralization - qtz., Fe gossan & sulfides
- ms — Mineralization - Cobalt
- Contact
- Fault

NORTHFIELD MINES, INC.
Blackbird Mining District, Idaho

SECTION D_8 - D_8'

Scale: 1" = 50'

Drawing No. 16



ASSAY RESULTS

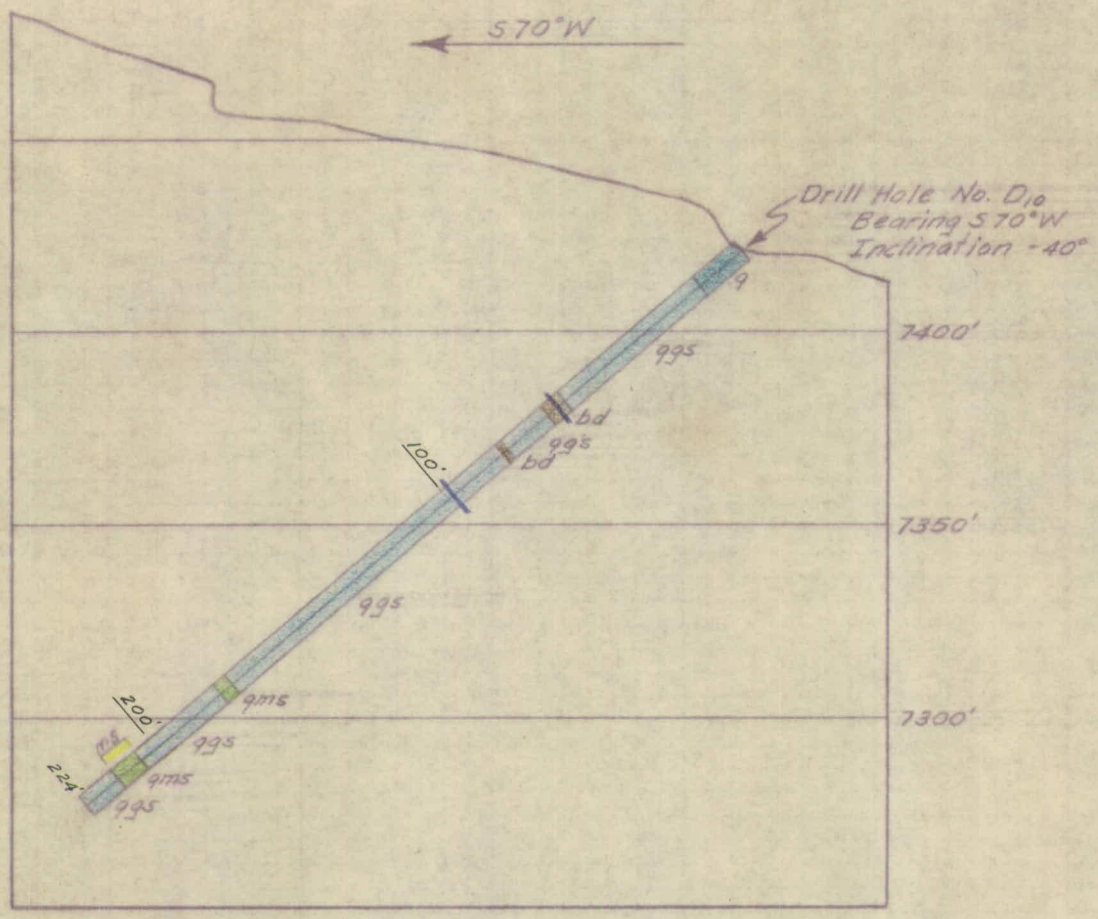
No.	Interval	Type	%Co	%Cu
D_9-1	167-172	Core	0.015	0.10
-2	172-183.5	"	0.015	0.12
-3	183.5-188	"	0.022	0.55
-4	193.5-195.5	"	0.029	1.29
-5	195.5-198	"	0.015	0.00

Note: Sample No D_9-2 also contains 2.40% WO_3

LEGEND

- gs — Grey Schist
- q — Quartzite
- gqs — Quartzite-Grey Schist (intercalated)
- qtz — Quartz
- gms — Quartz Mica Schist
- gbs — Green Biotite Schist
- bd — Basic Dike
- ms — Mineralization-qtz, Fe gossan & Sulfides
- Mineralization-Cobalt
- Contact
- Fault

NORTHFIELD MINES, INC.
Blackbird Mining District, Idaho
SECTION D_9 - D_9'
Scale: 1" = 50'



ASSAY RESULTS

No.	Interval	Type	% Co	% Cu
D_{10}-1	141-151	Core	0.073	0.00
-2	195-197	"	0.058	0.00
-3	203-206	"	0.051	0.00

LEGEND

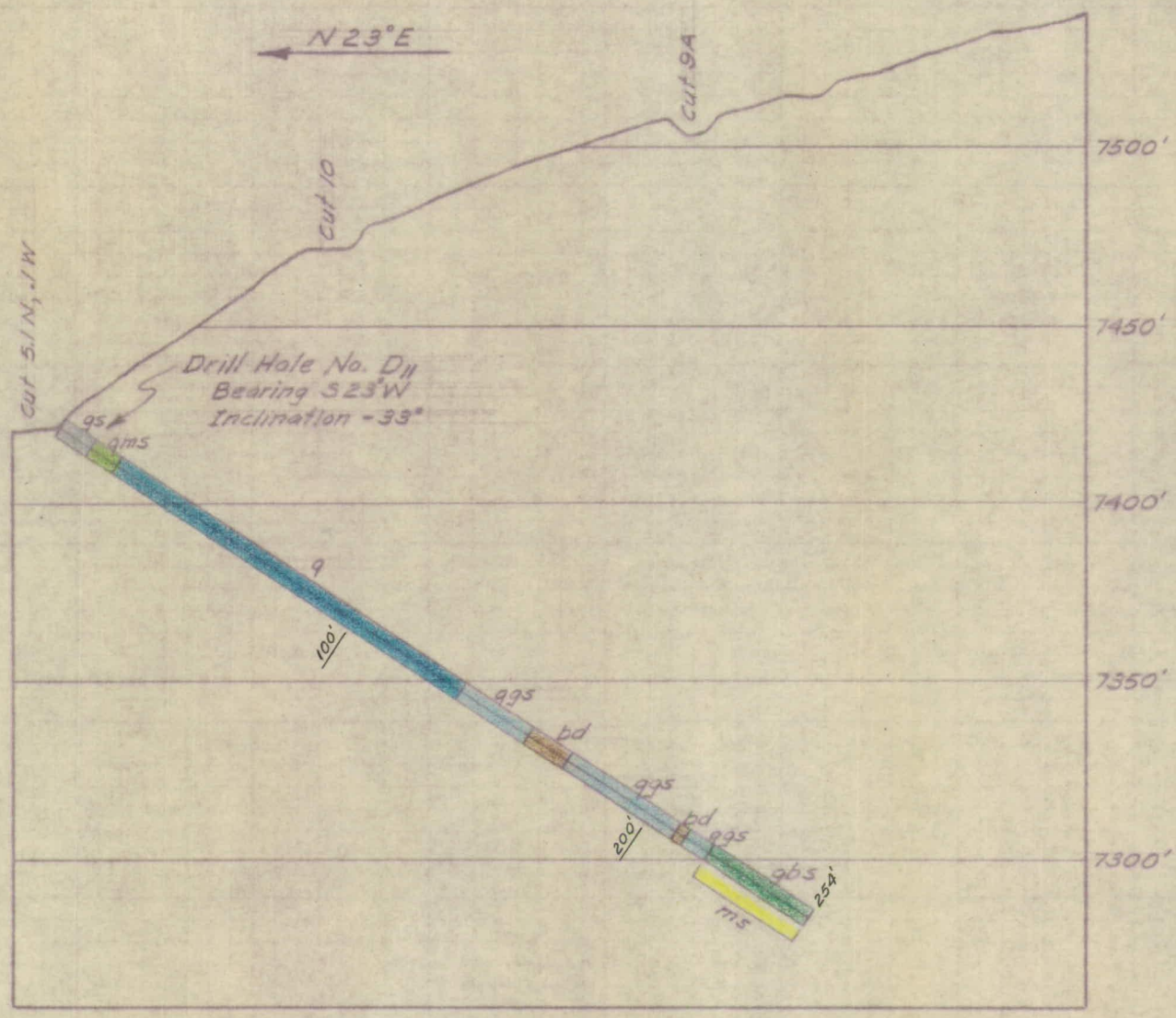
- gs — Grey Schist
- q — Quartzite
- qgs — Quartzite - Grey Schist (intercalated)
- qtz. — Quartz
- qms — Quartz Mica Schist
- gbs — Green Biotite Schist
- bd — Basic Dike
- ms — Mineralization - qtz, Fe gossan & Sulfides
- ms. — Mineralization - Cobalt
- Contact
- Fault

NORTHFIELD MINES, INC.
Blackbird Mining District, Idaho

SECTION D_{10} - D_{10}'

Scale: 1" = 50'

Drawing No. 18



ASSAY RESULTS

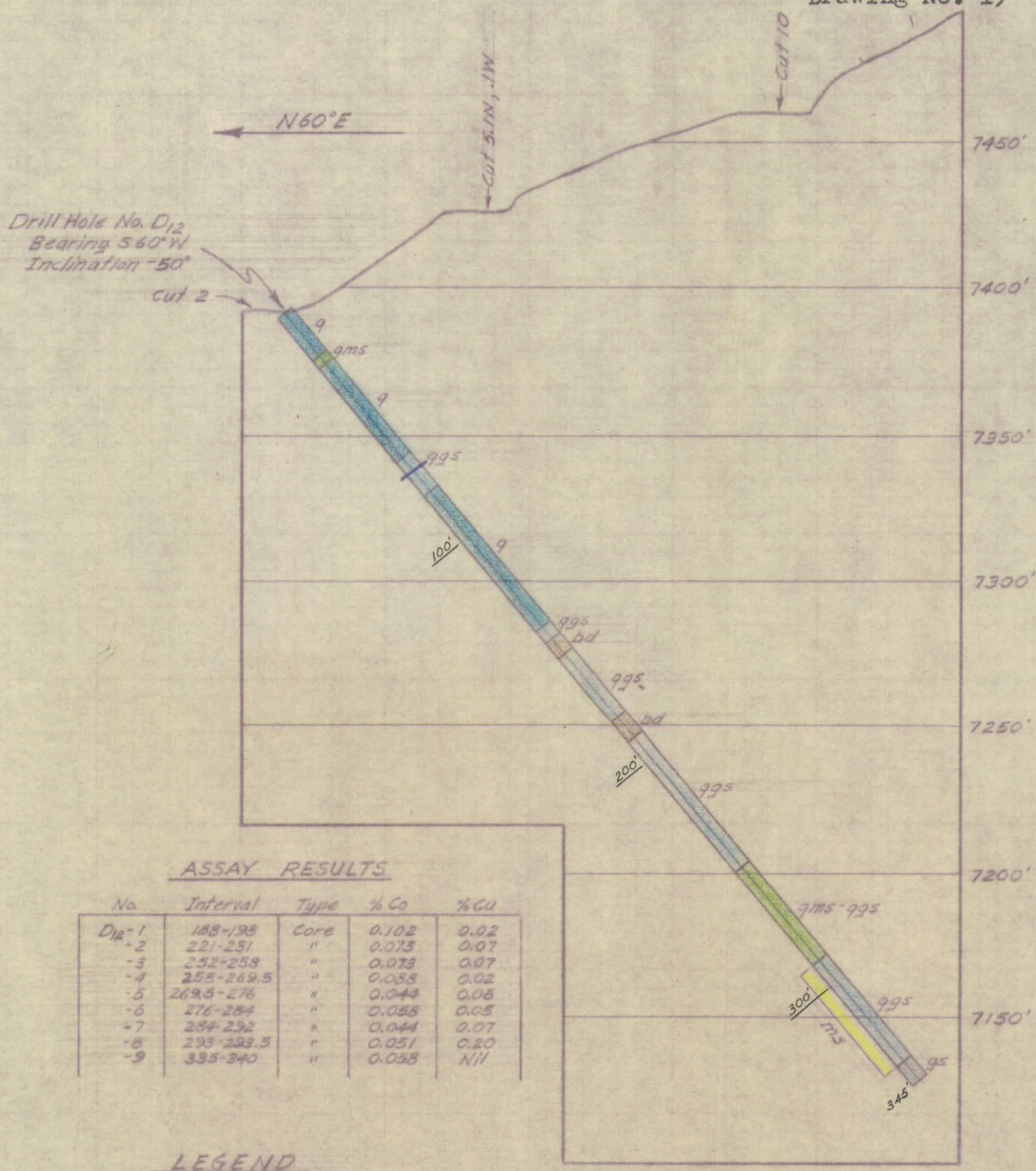
No.	Interval	Type	%Co	%Cu
D11-1	222-228	Core	0.807	0.40
-2	228-234	"	0.044	0.20
-3	234-241	"	0.037	0.32
-4	241-251	"	0.036	0.18
-5	251-254	"	0.044	0.28

LEGEND

- gs — Grey Schist
- q — Quartzite
- qgs — Quartzite-Grey Schist (intercalated)
- qtz — Quartz
- qms — Quartz Mica Schist
- qbs — Green Biotite Schist
- bd — Basic Dike
- ms — Mineralization-qtz, Fe gossan & Sulfides
- ms — Mineralization-Cobalt
- Contact
- Fault

NORTHFIELD MINES, INC.
Blackbird Mining District, Idaho
SECTION D11 - D11'
Scale: 1" = 50'

Drawing No. 19



ASSAY RESULTS

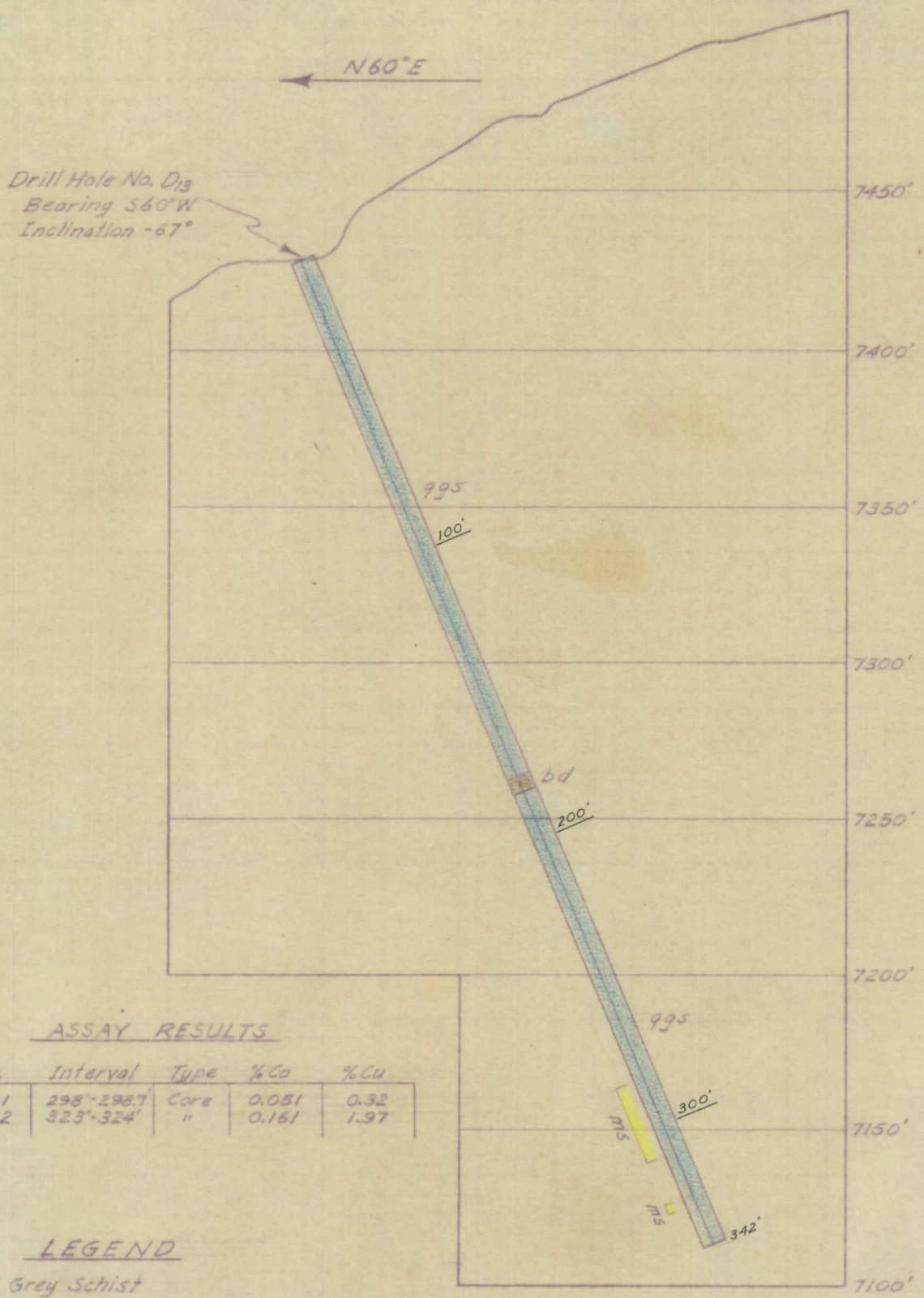
No.	Interval	Type	% Co	% Cu
D12-1	188-198	Core	0.102	0.02
-2	221-231	"	0.073	0.07
-3	252-258	"	0.073	0.07
-4	258-269.5	"	0.058	0.02
-5	269.5-276	"	0.044	0.08
-6	276-284	"	0.058	0.05
-7	284-292	"	0.044	0.07
-8	293-293.5	"	0.051	0.20
-9	335-340	"	0.058	Nil

LEGEND

- qs — Grey Schist
- q — Quartzite
- qgs — Quartzite-Grey Schist (intercalated)
- qtz — Quartz
- qms — Quartz Mica Schist
- gbs — Green Biotite Schist
- bd — Basic Dike
- ms — Mineralization-qtz, Fe gossan & Sulfides
- ms — Mineralization-Cobalt
- Contact
- Fault

NORTHFIELD MINES, INC.
Blackbird Mining District, Idaho
SECTION D12-D12'
Scale: 1" = 50'

Drawing No. 20



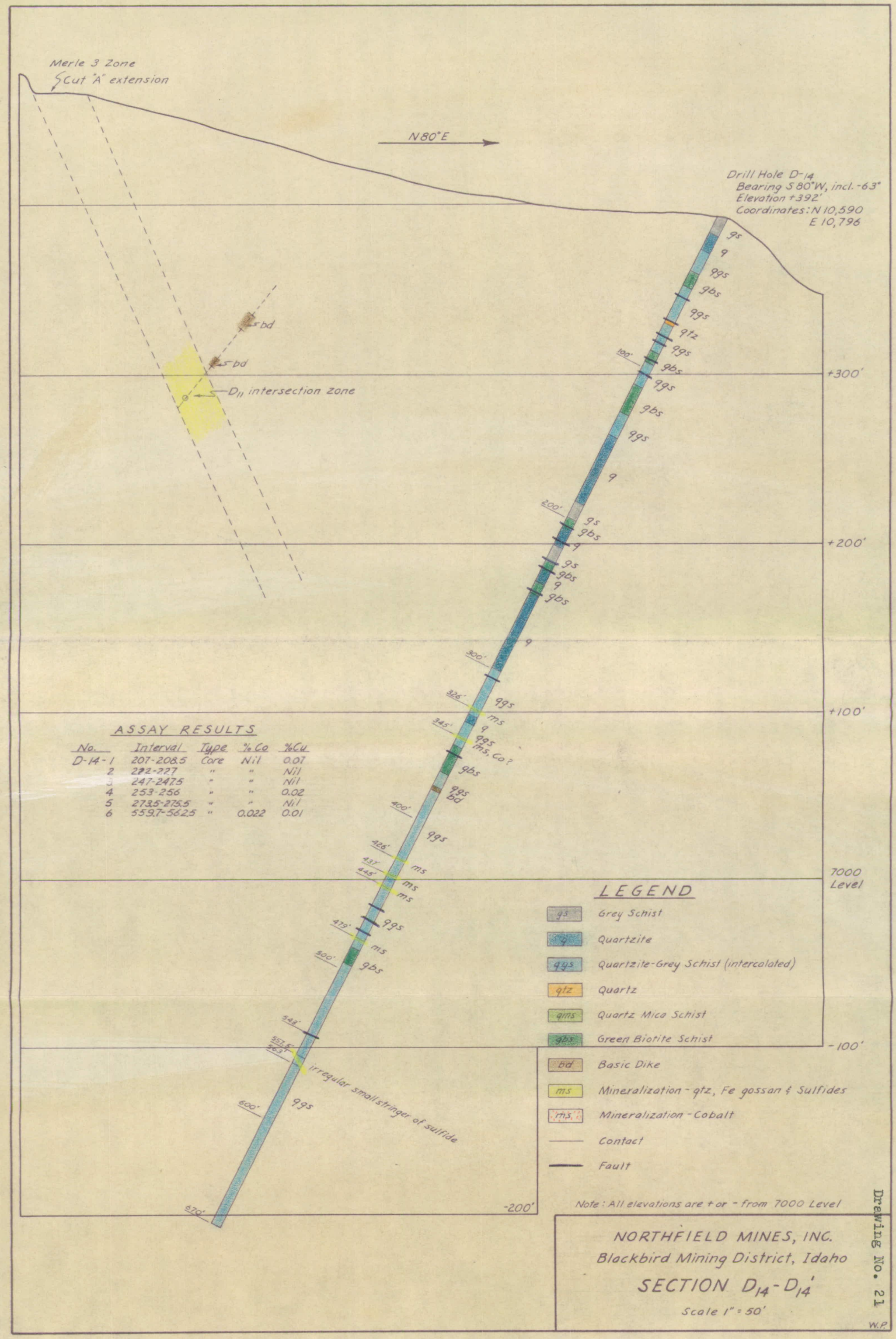
ASSAY RESULTS

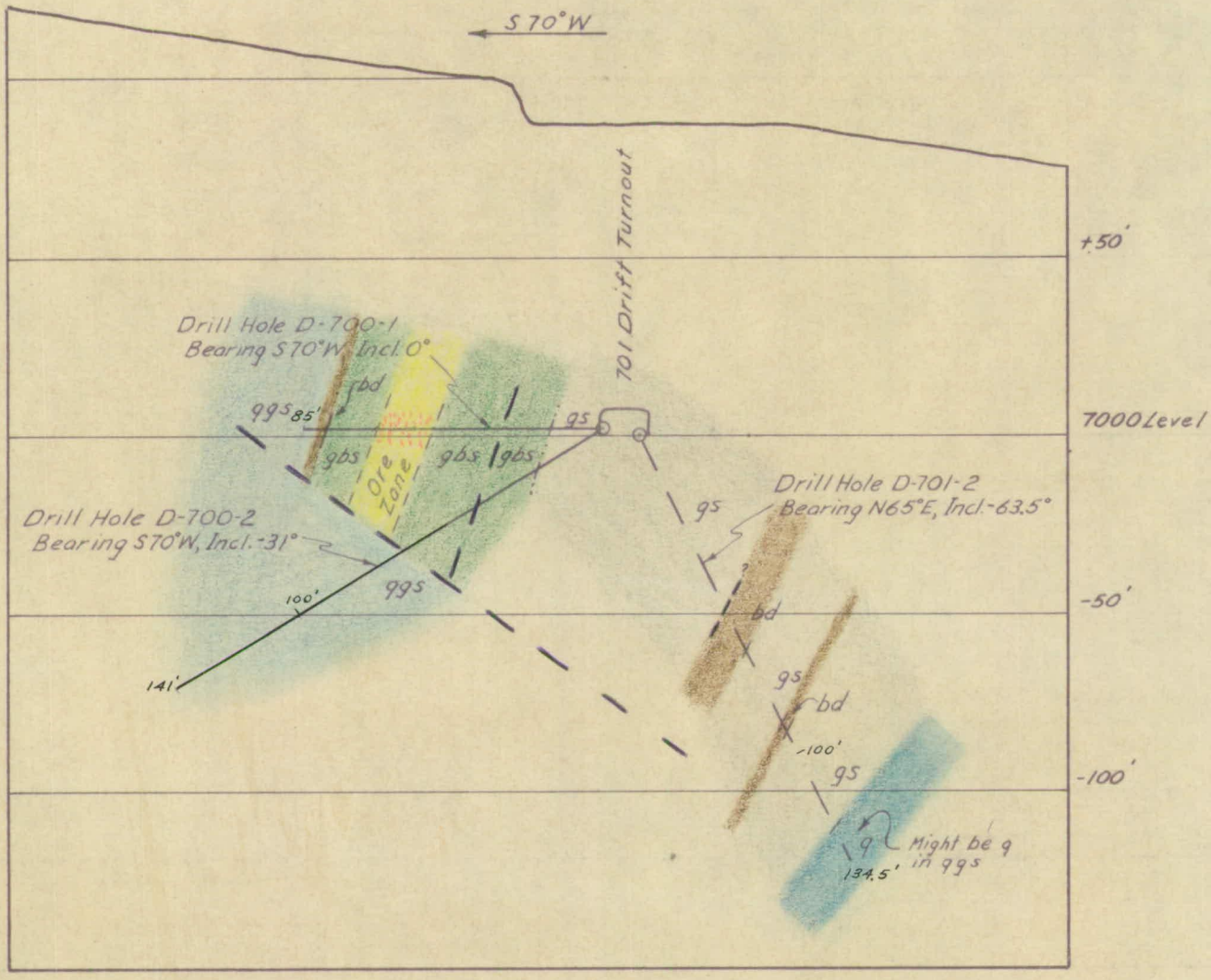
No.	Interval	Type	% Co	% Cu
D13-1	298'-298.7'	Core	0.051	0.32
-2	323'-324'	"	0.161	1.97

LEGEND

- gs — Grey Schist
- q — Quartzite
- gs — Quartzite-Grey Schist (intercalated)
- qtz — Quartz
- gms — Quartz Mica Schist
- gbs — Green Biotite Schist
- bd — Basic Dike
- ms — Mineralization-qtz, Fe gossan & sulfides
- ms — Mineralization - Cobalt
- Contact
- Fault

NORTHFIELD MINES, INC.
Blackbird Mining District, Idaho
SECTION D_{13} - D_{13}'
Scale: 1" = 50'


Merle 3 Zone
Cut "A" extension
N80°E
Drill Hole D-14
Bearing S 80°W, incl. -63°
Elevation +392'
Coordinates: N 10,590
E 10,796
bd
bd
D11 intersection zone
+300'
+200'
+100'
7000 Level
-100'
-200'
ASSAY RESULTS
No. Interval Type %Co %Cu
D-14-1 207-208.5 Core Nil 0.07
2 222-227 " " Nil
3 247-247.5 " " Nil
4 253-256 " " 0.02
5 273.5-275.5 " " Nil
6 559.7-562.5 " 0.022 0.01
irregular small stringer of sulfide
LEGEND
gs Grey Schist
q Quartzite
qgs Quartzite-Grey Schist (intercalated)
qtz Quartz
qms Quartz Mica Schist
gbs Green Biotite Schist
bd Basic Dike
ms Mineralization - qtz, Fe gossan & Sulfides
ms Mineralization - Cobalt
Contact
Fault
Note: All elevations are + or - from 7000 Level
NORTHFIELD MINES, INC.
Blackbird Mining District, Idaho
SECTION D14-D14'
Scale 1" = 50'
Drawing No. 21
W.P.



ASSAY RESULTS

No.	Interval	Type	% Co	%Cu
D-700-2-1	0-10'	Core	0.022	0.15
-2	10'-20.5'	"	0.029	0.07
-3	24.5'-31'	"	0.220	0.43
-4	31'-36'	"	0.059	1.54
-5	36'-41'	"	0.183	1.01
-6	41'-48'	"	0.044	0.50
-7	48'-53'	"	0.044	0.60
-8	53'-63'	"	0.059	0.17
-9	63'-73'	"		
-10	73'-93'	"		
-11	93'-107'	"		
-12	107'-122'	"		
-13	131'-141'	"		

LEGEND

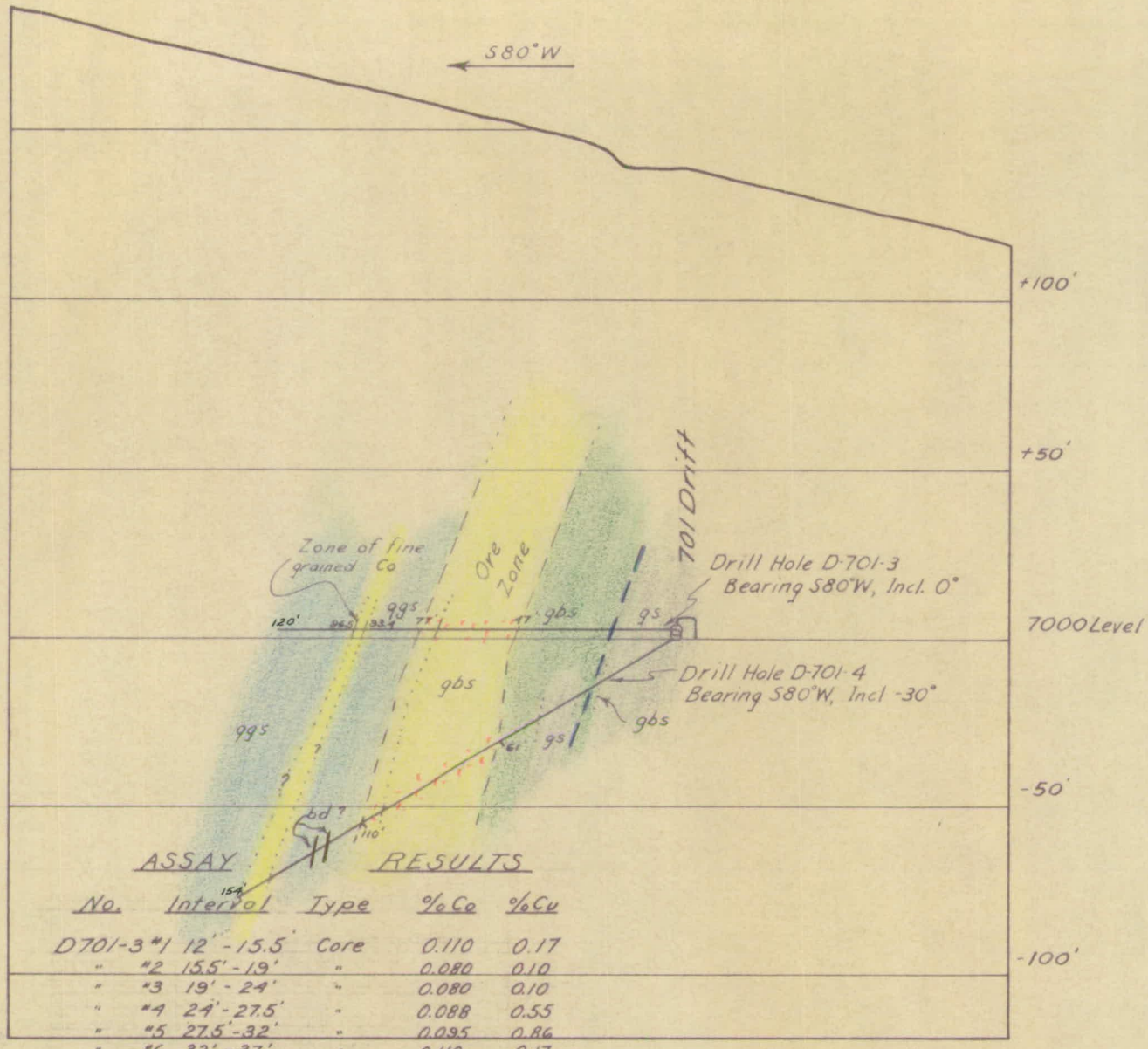
- qs — Grey Schist
- q — Quartzite
- qqs — Quartzite-Grey Schist (intercalated)
- qtz — Quartz
- qms — Quartz Mica Schist
- qbs — Green Biotite Schist
- bd — Basic Dike
- ms — Mineralization-qtz., Fe gossan & Sulfides
- ms — Mineralization-Cobalt
- Contact
- Fault

NORTHFIELD MINES, INC.
Blackbird Mining District, Idaho

SECTION 1

Scale: 1" = 50'

Drawing No. 23



ASSAY RESULTS

No.	Interval	Type	%Co	%Cu
D701-3 #1	12'-15.5'	Core	0.110	0.17
" #2	15.5'-19'	"	0.080	0.10
" #3	19'-24'	"	0.080	0.10
" #4	24'-27.5'	"	0.088	0.55
" #5	27.5'-32'	"	0.095	0.86
" #6	32'-37'	"	0.110	0.17
" #7	37'-42.5'	"	0.095	0.38
" #8	42.5'-47'	"	0.102	0.40
" #9	47'-50'	"	0.763	2.10
" #10	50'-52.5'	"	0.477	1.27
" #11	52.5'-57'	"	0.374	0.83
" #12	57'-60'	"	0.073	0.22
" #13	60'-63'	"	0.697	0.55
" #14	63'-68'	"	0.469	1.05
" #15	63'-68'	Sludge	0.249	1.39
" #16	68'-73'	Core	0.660	0.73
" #17	68'-73'	Sludge	1.027	0.88
" #18	73'-77'	Core	0.469	1.21
" #19	93.4'-96.5'	"	0.822	0.30
D701-3 #20	93.5'-96.5'	Sludge	1.057	1.21
D701-4 #1	31.2'-34'	Core	0.103	0.50
" #2	34'-36'	"	0.117	0.48
" #3	51'-54'	"	0.103	0.71
" #4	54'-57.5'	"	0.088	0.63
" #5	57.5'-61.5'	"	0.073	0.43
" #6	61.5'-67.0'	"	0.308	0.68
" #7	67'-73'	"	0.367	1.95
" #8	73'-78'	"	0.396	0.58
" #9	78'-86.5'	"	0.147	0.68
" #10	86.5'-94'	"	0.367	0.43
" #11	95'-102'	"	0.624	0.93
" #12	102'-108.5'	"	0.374	1.14
" #13	129'-132.5'	"	0.132	0.76
" #14	57.5'-108.5'	Composite	0.337	0.81
D701-4 #15	141'-152'	Core	0.147	0.63

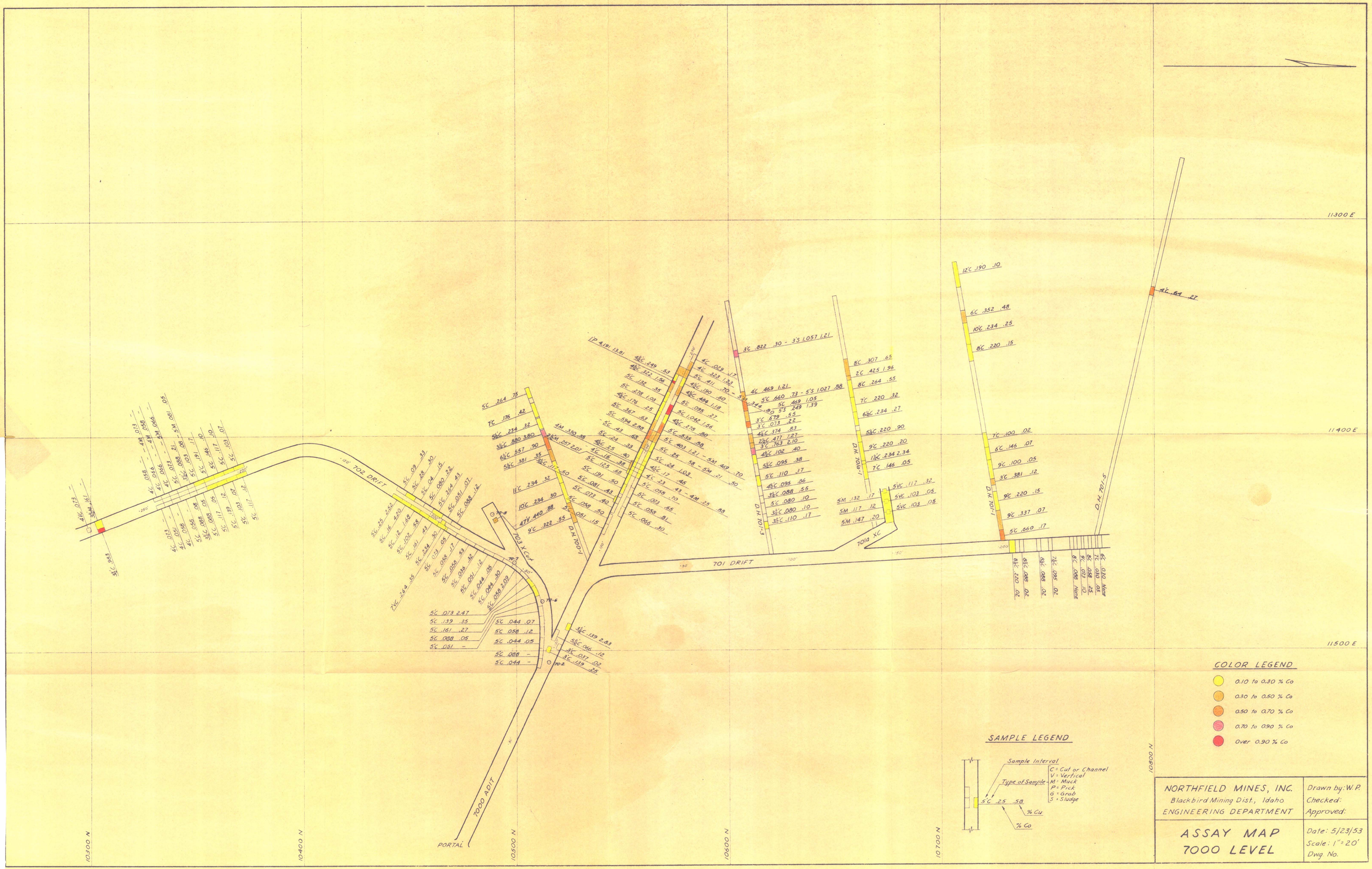
LEGEND

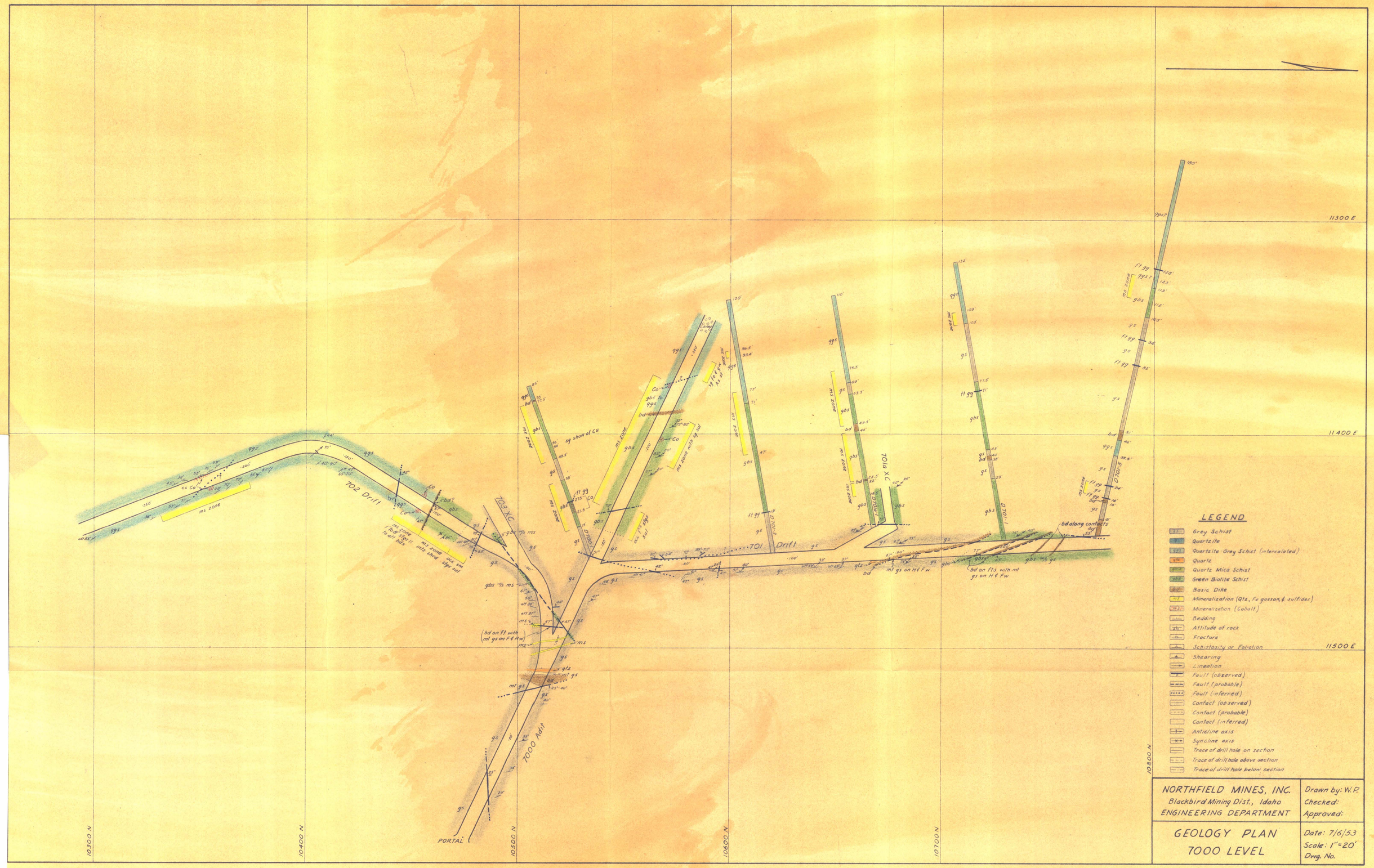
- gs — Grey Schist
- q — Quartzite
- gqs — Quartzite-Grey Schist (intercalated)
- qtz — Quartz
- qms — Quartz Mica Schist
- gbs — Green Biotite Schist
- bd — Basic Dike
- ms — Mineralization - qtz., Fe gossan & Sulfides
- ms — Mineralization - Cobalt
- Contact
- Fault

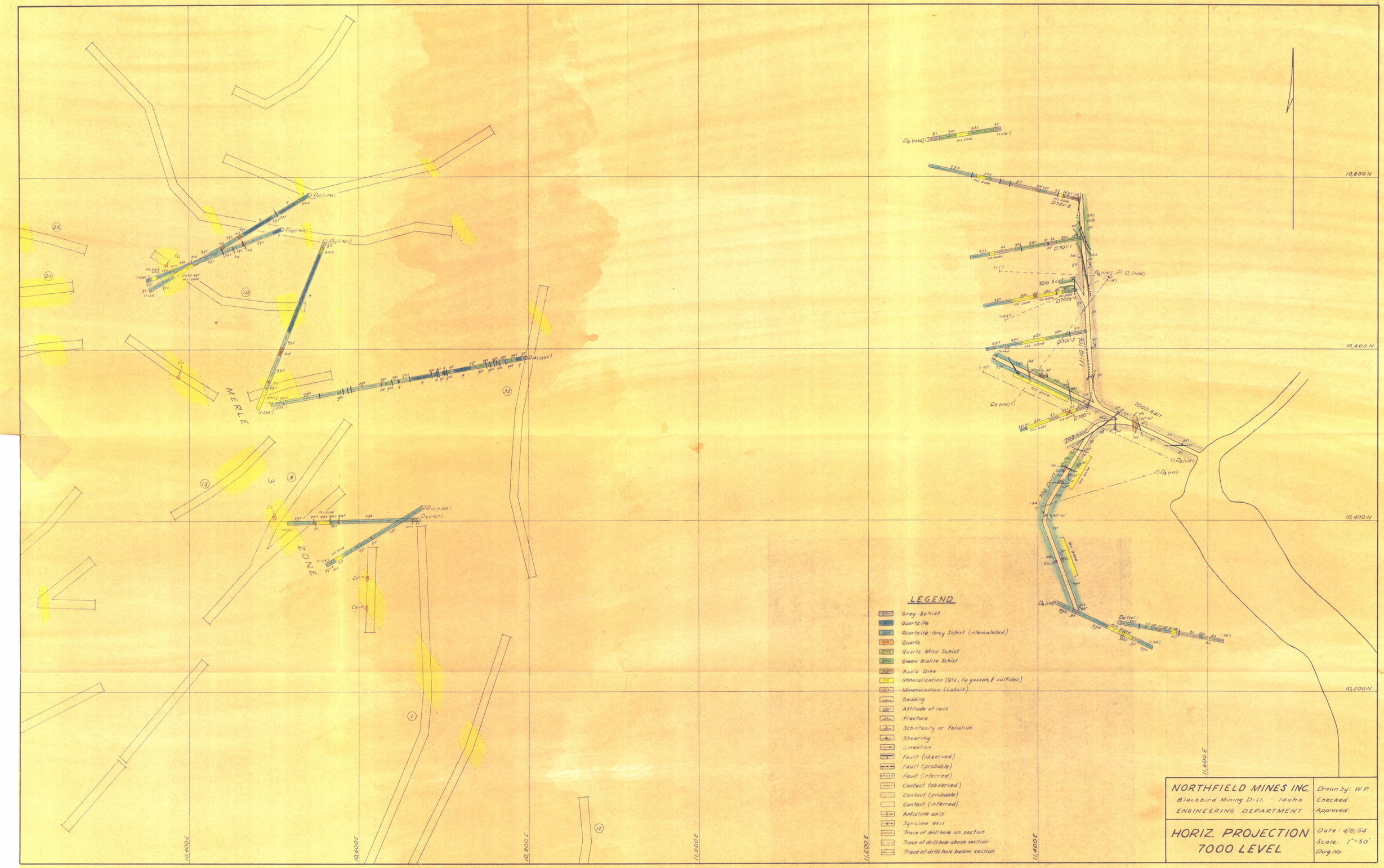
NORTHFIELD MINES, INC.
Blackbird Mining District, Idaho

SECTION 2

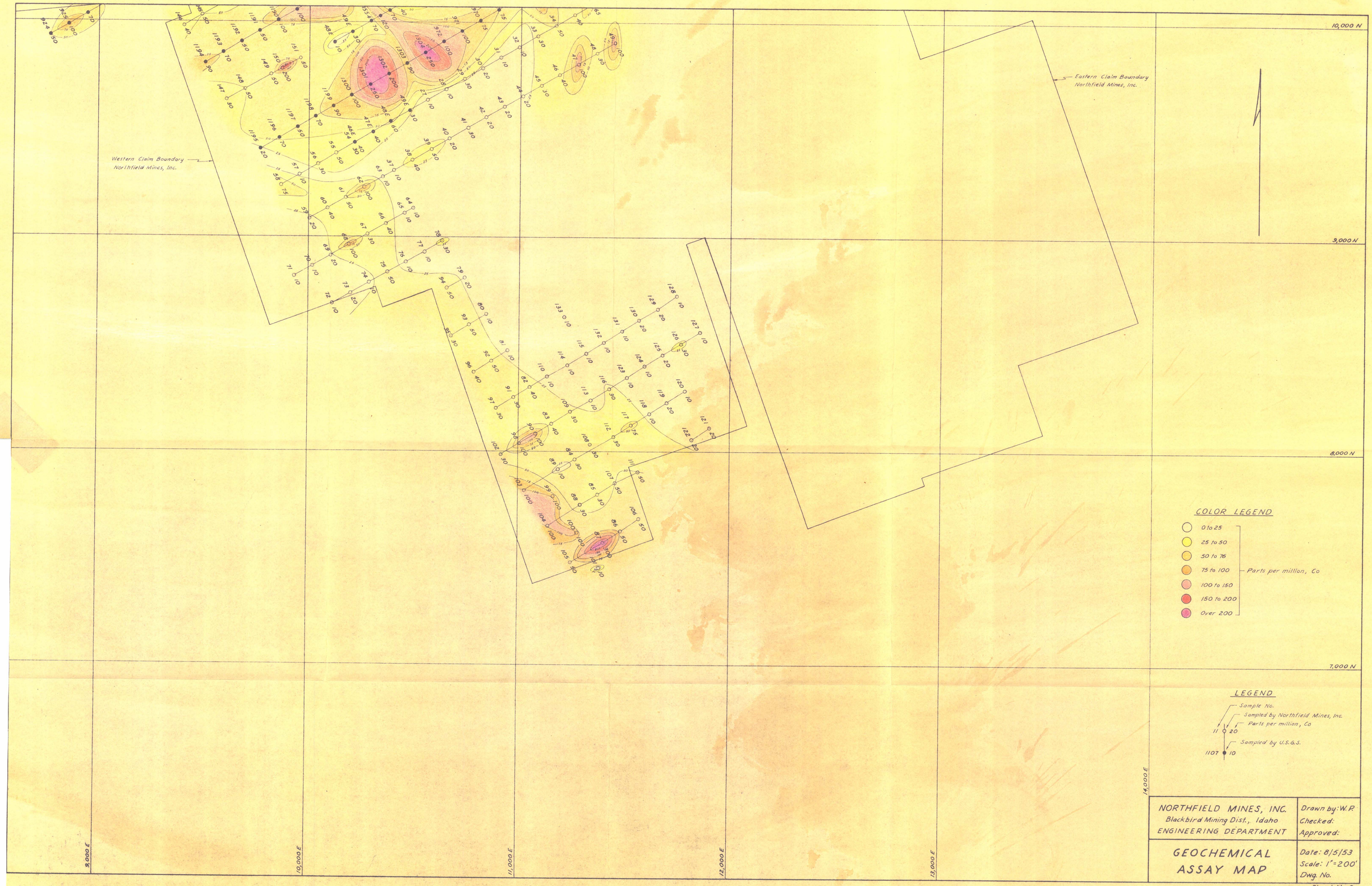
Scale: 1" = 50'


11300 E
11400 E
11500 E
10300 N
10400 N
10500 N
10600 N
10700 N
10800 N
702 DRIFT
701 DRIFT
703 X Cut
7000 ADIT
PORTAL
D.H. 700-1
D.H. 701-3
D.H. 701-1
D.H. 701-5
7010 XC
COLOR LEGEND
0.10 to 0.30 % Co
0.30 to 0.50 % Co
0.50 to 0.70 % Co
0.70 to 0.90 % Co
Over 0.90 % Co
SAMPLE LEGEND
Sample Interval
Type of Sample
C = Cut or Channel
V = Vertical
M = Muck
P = Pick
G = Grab
S = Sludge
% Cu
% Co
NORTHFIELD MINES, INC.
Blackbird Mining Dist., Idaho
ENGINEERING DEPARTMENT
ASSAY MAP
7000 LEVEL
Drawn by: W.P.
Checked:
Approved:
Date: 5/23/53
Scale: 1" = 20'
Dwg. No.


11300 E
11400 E
11500 E
10300 N
10400 N
10500 N
10600 N
10700 N
10800 N
702 Drift
703 XC
701 Drift
7000 Adit
PORTAL
ms zone
sg show of Cu
bd along contacts
bd on ft with mt gs on Ht Fw
LEGEND
Grey Schist
Quartzite
Quartzite-Grey Schist (intercalated)
Quartz
Quartz Mica Schist
Green Biotite Schist
Basic Dike
Mineralization (Qtz., Fe gossan, & sulfides)
Mineralization (Cobalt)
Bedding
Attitude of rock
Fracture
Schistosity or Foliation
Shearing
Lineation
Fault (observed)
Fault (probable)
Fault (inferred)
Contact (observed)
Contact (probable)
Contact (inferred)
Anticline axis
Syncline axis
Trace of drill hole on section
Trace of drill hole above section
Trace of drill hole below section
NORTHFIELD MINES, INC.
Blackbird Mining Dist., Idaho
ENGINEERING DEPARTMENT
Drawn by: W.P.
Checked:
Approved:
GEOLOGY PLAN
7000 LEVEL
Date: 7/6/53
Scale: 1"=20'
Drwg. No.

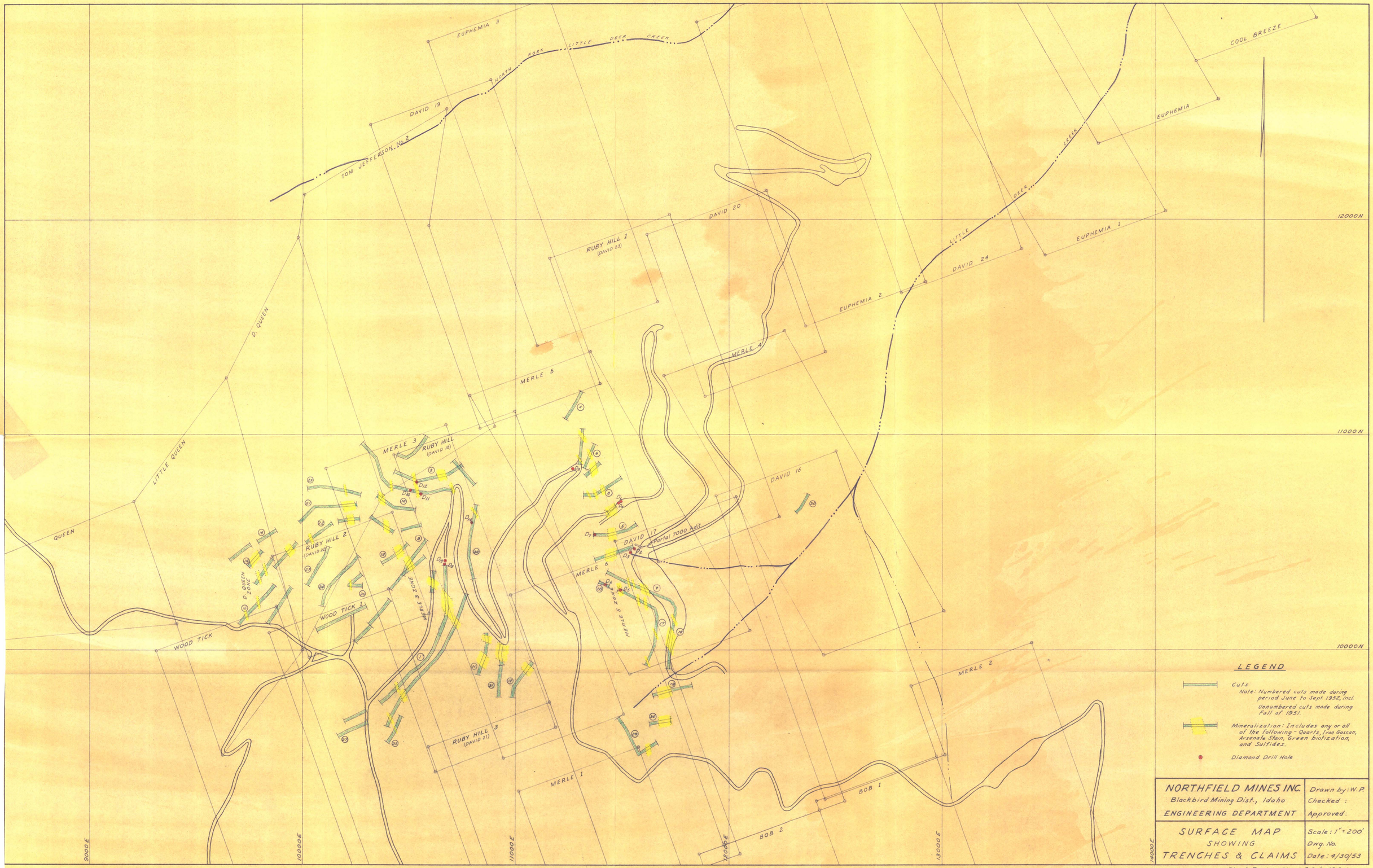

10,800 N
10,600 N
10,400 N
10,200 N
10,400 E
10,600 E
10,800 E
11,000 E
11,200 E
11,400 E
11,600 E
MERLE
ZONE
D701-5
D701-1
701a X-cut
D701a-1
D701-3
D100'
702 X-cut
7000 Adit
LEGEND
Grey Schist
Quartzite
Quartzite-Grey Schist (intercalated)
Quartz
Quartz Mica Schist
Green Biotite Schist
Basic Dike
Mineralization (Qtz., Fe gossan, & sulfides)
Mineralization (Cobalt)
Bedding
Attitude of rock
Fracture
Schistosity or Foliation
Shearing
Lineation
Fault (observed)
Fault (probable)
Fault (inferred)
Contact (observed)
Contact (probable)
Contact (inferred)
Anticline axis
Syncline axis
Trace of drill hole on section
Trace of drill hole above section
Trace of drill hole below section
NORTHFIELD MINES INC.
Blackbird Mining Dist. - Idaho
ENGINEERING DEPARTMENT
Drawn by: W.P.
Checked:
Approved:
HORIZ. PROJECTION
7000 LEVEL
Date: 4/8/54
Scale: 1" = 50'
Dwg. No.

Drawing No. 4


10,000 N
9,000 N
8,000 N
7,000 N
9,000 E
10,000 E
11,000 E
12,000 E
13,000 E
14,000 E
Western Claim Boundary
Northfield Mines, Inc.
Eastern Claim Boundary
Northfield Mines, Inc.
COLOR LEGEND
0 to 25
25 to 50
50 to 75
75 to 100
100 to 150
150 to 200
Over 200
Parts per million, Co
LEGEND
Sample No.
Sampled by Northfield Mines, Inc.
Parts per million, Co
11 20
Sampled by U.S.G.S.
1107 10
NORTHFIELD MINES, INC.
Blackbird Mining Dist., Idaho
ENGINEERING DEPARTMENT
Drawn by: W.P.
Checked:
Approved:
GEOCHEMICAL
ASSAY MAP
Date: 8/5/53
Scale: 1" = 200'
Dwg. No.
Sheet No. 2

Western Claim Boundary
Northfield Mines, Inc.
Eastern Claim Boundary
Northfield Mines, Inc.
12,000 N
11,000 N
10,000 N
9000 E
10,000 E
11,000 E
12,000 E
13,000 E
14,000 E
MERLE 5 ZONE
MERLE 3 ZONE
QUEEN ZONE
COLOR LEGEND
0 to 25
25 to 50
50 to 75
75 to 100
100 to 150
150 to 200
Over 200
Parts per million, Co
LEGEND
Sample No.
Sampled by Northfield Mines, Inc.
Parts per million, Co
Sampled by U.S.G.S.
NORTHFIELD MINES, INC.
Blackbird Mining Dist., Idaho
ENGINEERING DEPARTMENT
Drawn by: W.P.
Checked:
Approved:
GEOCHEMICAL
ASSAY MAP
Date: 5/27/53
Scale: 1"=200'
Dwg No.

Sheet No. 1


EUPHEMIA 3
NORTH FORK LITTLE DEER CREEK
DAVID 19
TOM JEFFERSON, No. 2
COOL BREEZE
EUPHEMIA
LITTLE DEER CREEK
EUPHEMIA 1
DAVID 24
DAVID 20
RUBY HILL 1
(DAVID 23)
EUPHEMIA 2
MERLE 4
MERLE 5
D. QUEEN
LITTLE QUEEN
QUEEN
MERLE 3
RUBY HILL
(DAVID 18)
RUBY HILL 2
(DAVID 22)
D. QUEEN ZONE
WOOD TICK 1
WOOD TICK
MERLE 3 ZONE
DAVID 16
DAVID 17
Portal 7000 Adit
MERLE 6
MERLE 5 ZONE
MERLE 2
RUBY HILL 3
(DAVID 21)
MERLE 1
BOB 1
BOB 2
12000N
11000N
10000N
9000E
10000E
11000E
12000E
13000E
14000E
LEGEND
Cuts
Note: Numbered cuts made during period June to Sept 1952, incl.
Unnumbered cuts made during Fall of 1951.
Mineralization: Includes any or all of the following - Quartz, Iron Gossan, Arsenate Stain, Green biotization, and Sulfides.
Diamond Drill Hole
NORTHFIELD MINES INC.
Blackbird Mining Dist., Idaho
ENGINEERING DEPARTMENT
Drawn by: W.P.
Checked :
Approved:
SURFACE MAP
SHOWING
TRENCHES & CLAIMS
Scale: 1" = 200'
Drwg. No.
Date: 4/30/53
Sheet Designation: 9.0 to 13.0 N
8.6 to 15.0 E
Sheet Elevation: Surface