

DISCOVERY MINES LIMITED

MICRO NICKEL PROJECT

White River Area - Whitehorse Mining District, Y.T.

Report on

Reassessment of Available Data

and

The 1967 Program of Geological  
Mapping, Geophysical Surveys,  
Trenching and Diamond Drilling

by

T. Antoniuk

Toronto, Ontario  
December 20, 1967

## TABLE OF CONTENTS

|                     | <u>Page</u> |
|---------------------|-------------|
| Introduction        | 1           |
| History             | 2           |
| Location and Access | 2           |
| Topography          | 3           |
| Regional Geology    | 4           |
| Local Geology       | 6           |
| Structural Geology  | 8           |
| Economic Geology    | 11          |
| Geophysical Surveys | 18          |
| Diamond Drilling    | 20          |
| Ore Reserves        | 21          |
| Ore Potential       | 21          |
| Recommendations     | 25          |
| Conclusions         | 27          |

## ILLUSTRATIONS

|                                      |             |
|--------------------------------------|-------------|
| Sketch of Surface Geology            |             |
| Longitudinal Projection - Main Zone  |             |
| Longitudinal Projection - North Zone |             |
| Cross Section                        | 10,100 East |
| Cross Section                        | 10,250 East |
| Cross Section                        | 10,350 East |

## INTRODUCTION

The Micro and Per Groups, totalling 54 claims in the White River Area of the Yukon, were optioned early in May 1967 from P. Versluce and Associates of Whitehorse. Participants are Discovery Mines Limited (50%), Rayrock Mines Limited (25%), Consolidated Canadian Faraday Mines Limited (25%). During May 1967 an Induced Potential Survey was conducted by Seigel Associates Limited over the central part of the property, including the main orebody. A ground magnetometer survey was conducted over the same area and a Ronka EM 16 survey over a part by P. H. Sevensma Consultants Limited. Fourteen additional claims were staked to fill in fractions and cover possible extensions of I P Anomalies.

The writer arrived at the property late in June and began a reassessment of existing records, relogging of old drill core and a reconnaissance geological mapping and prospecting program with detailed mapping of known ore areas. Trenching of I P Anomalies and extensions of the ore zones was done with a D-7 bulldozer with ripper attachment during July and August but extreme depth of frozen overburden shortened the program. Surface diamond drilling to determine depth continuity and explore extensions was commenced in September. Two holes for a total of 1311 feet of drilling were completed before severe freezing conditions halted drilling.

## HISTORY

Discovery of nickel mineralization on the east bank of the White River was made by prospectors Airways Company Limited in 1952 who subsequently did 5,322.5 feet of surface diamond drilling. The property was then acquired by Canalask Nickel Mines Limited who in 1954 and 1956 completed 8,784.5 feet of surface diamond drill and calculated reserves at 550,000 tons assaying 1.68% Nickel and 0 Copper, undiluted. An underground exploration program was carried out in the 2700 Level, a 336 foot winze and 375 feet of drifting on the 2400 Level. In addition there were 770 feet of diamond drilling on the 2700 Level and 750 feet on the 2400 Level. All work was suspended in April 1958. The property came open and was restaked by P. Verslucce and Associates in 1964.

## LOCATION AND ACCESS

The claims are located on the White River near Mile 1169 on the Alaska Highway, Latitude  $61^{\circ} 57'$  and Longitude  $140^{\circ} 32''$ , Elevation 2400 feet, on Claim Sheet 115-F-15, Whitehorse Mining District, Yukon Territory.

The claims on the East bank of the White River, where the known ore is located, are easily accessible by a  $2\frac{1}{2}$  mile truck road from Mile 1168 on the Alaska Highway. This point is 250 road miles from Whitehorse.

The claims on the West Bank are more difficult to access. An old horse trail follows the west bank of the river

and crosses the property but converting this to a road would be difficult because of some steep rock bluffs and gullies. The best access is over the river ice in the winter but for machinery this is limited to a two month period, mid-February to mid-April, and point of crossing must be selected with care. The White River is glacier fed and although relatively shallow is very fast and turbulent. This leads to numerous changes in channel and in winter much overflow.

### TOPOGRAPHY

The White River cuts the property into two parts with markedly different terrain. To the east the banks rise steeply about 300 feet and then level off with occasional prominent low hills. The land is heavily wooded with spruce, birch and poplar with the best timber along the river shore. To the west the banks rise steeply to the tops of Miles Ridge, a part of the Kluane Ranges, a change in elevation of 2500 feet. The lower slopes are heavily wooded with some good spruce timber.

Outcrop is sparse except for the immediate river banks and the tops of the ridge on the west bank. Those at the river shore are accessible only during the winter or periods of low water. The river is glacier fed, shallow, fast and turbulent. At the adit the river gravel flats are 1200 feet wide with the main river channel, which changes

continually, about 30 feet wide.

#### REGIONAL GEOLOGY

The general geology of the area is described by J. E. Muller in The Geological Survey of Canada Memoir 340, Kluane Lake Map Area, Yukon Territory.

The property lies in the Kluane Range, close to the main structural feature of the Southwest Yukon, The Shakwak Lineament. This is a major fault system, a tectonic hinge line separating the Precambrian rocks of the Yukon Plateau from the Paleozoic rocks of the St. Elias Mountains of which the Kluane Range is a part. Another major thrust fault zone, The Duke River Fault, lies to the west in the St. Elias Mountains with the area between subdivided by two other sub parallel faults, the Miles Creek Fault and the Canyon City Fault, into geologically distinct belts. The property lies roughly midway between the Shakwak and Miles Creek faults.

The major formations of the Kluane Range are Lower Permian to Permian in age. These are divided into two groups but there are similarities and may be some overlapping. The earliest are generally chloritic, commonly albitized, volcanic flows, cherty tuffs with prominent banding due to size gradation, and volcanic breccia with minor banded greywacke-argillite sequences and limestone. Near the Shakwak Fault these are commonly changed to greenschist. The younger group

are sediments, calcareous argillite, greywacke, chert pebble conglomerate, and limestone. Sills of medium grained gabbro and peridotite and a few larger coarse grained bodies occur in many places and are most commonly associated with cherty tuffaceous rocks. All rocks are highly disturbed.

Nickel occurrences are known scattered throughout at least a 100 mile length of the Kluane Range from the Slims River at the south end of Kluane Lake to Miles Ridge close to the Alaska Border. Nickel bearing pyrrhotite occurs in association with elongated, steeply dipping, serpentized peridotite bodies, either along their contact with the enclosing Permian volcanic-sedimentary series or within several hundred feet away from this contact in the Permian rocks.

## LOCAL GEOLOGY

The most prominent feature of the geology of the property is the peridotite sill, about 600 feet wide at the river, striking in a northwesterly direction through the centre of the claims. A detailed study of this peridotite was made by F. A. Campbell, CIMM Transactions, Volume LXIII, 1960, pages 662 - 668. His conclusions were that the peridotite was originally a sill injected parallel to the flat lying volcanic series, all of which were later folded and faulted into their present position, with the footwall to the south. Also that orogenic movements may have at times squeezed the serpentine into and along fault planes. In the immediate mineralized area the apparent dip of the peridotite is steeply to the north whereas the volcanics dip steeply to the south. Also the strike seems to be at 20° to that of the volcanics. Data is minimal and the intensive faulting and fracturing in the area may be the reason for this apparent difference. The peridotites themselves are heavily sheared and serpentized.

To the southwest are primarily the sedimentary series of rocks, but also containing some volcanics. Much of this area is swampy ground with little outcrop.

To the northeast lie the volcanic series. At the east bank of the White River a thickness of 600 feet of tuffs border the peridotite followed by 30 feet of chert and then a wide zone of andesite which may be volcanic flows. The tuffs are

intensely altered, mainly albitization but with varying degrees of silicification. Outcrop is sparse but one knoll 1,200 feet east of the river shows a fairly wide zone of impure limestone to the north of and in contact with the chert.

The degree of albitization, which has destroyed the original characteristics of the rocks, was used in classification of the tuffs in core logging. Three distinctions were made but there was considerable gradation and intermingling. MASSIVE ALBITIZED TUFF - an almost completely albitized rock, essentially light colored, white, greys, greens and purples. Hard, fine grained, dense and brittle, in some cases totally albite. MOTTLED ALBITIZED TUFF - a distinctive rock with light colored rounded "spots" of albite up to 1/2 inch in diameter in a darker less altered ground mass. Laminar ALBITIZED TUFF - lamina from 1/8 to 1/2 inch in width, many exhibiting the characteristics of the above. Some zones of fine fragmental (breccia?) were encountered but do not appear very extensive, fragments of albite and quartz, 1/8 to 1/4 inch, in an albitized groundmass. Correlation of these variations between drill holes 50 feet apart is difficult which indicates that alteration was differential with controlling factor unknown. Sulphide mineralization is widespread, generally as a dissemination of very fine pyrrhotite or pyrite, except in the very highly albitized sections.

On the west bank of the river the width of peridotite is about 400 feet and the width of albitized tuffs about 150 feet. No chert is present between the tuffs and the andesites to the north

STRUCTURAL GEOLOGY

Lack of outcrop and incomplete data on previous work mean that diamond drill results must carry a great deal of weight in structural interpretations. The fact that data on locations of old drill holes is incomplete, and core of some holes is missing, coupled with the poor recovery leads to some uncertainties.

The ore bearing albitized tuffs and chert strike roughly east-west to S 80° and dip steeply to the south. They are gently curving (overtured anticlinal) with dips of 80° to the south at the surface flattening to 70° at a depth of 300 feet. The cherts, in trenching 1,500 feet to the east, indicate a flattening on strike as well but further evidence is required. On surface the chert bed is bordered to the north by andesite. All the deeper drill holes which passed through the chert bed intersected albitized tuffs in this area. Thickness and extent are not known.

A shatter zone, about 50 feet wide, within the hard, brittle, albitized tuffs appears to be one of the controlling factors of ore deposition. Near surface this shatter zone is about 400 feet north of the hanging wall of the peridotite sill. It has an east-west strike and seems roughly conformable with the volcanics, indicating some possible stratigraphic influence. There is a possibility of convergence with the peridotite body at depth, as mentioned earlier.

One fairly prominent fault has been identified within this shatter zone. This fault strikes N 65° W, at 25° to the zone,

and dips  $80^{\circ}$  to the north. At the 2,700 level this fault forms the north limits of the ore zone at the river bank and crosses the adit 55 feet east of the portal. Hole 608 was in this fault when passing through the projected location of the main zone. The shear appears to be post ore but evidence is lacking. Displacement is minor unless movement was primarily vertical. In the adit there is a 50' wide low grade zone in the hanging wall of this fault, possibly the result of remobilization and upward migration of mineralization as ore north of this zone is appreciably higher grade than the mineralization below the fault.

Indications are that there is a major fault down the White River Valley with an approximate north-south strike and dipping steeply to the east. No evidence is discernable at surface and river banks do not show any shearing. Drill holes 608 and 67-2A, both drilled at a small angle under the river cut definite fault zone material and are the main evidence supporting this hypothesis. Hole S-10, S-11, S-12 and S-13, all drilled at the river edge, all showed much lost core and may have been at least in part in this fault. From the evidence of 67-1 and 67-2A it is believed to be a reverse fault. That is the foot wall or west side has moved up relative to the east side. There is little evident displacement of the peridotite sill so that movement is believed to be primarily vertical with an offset of 200 to 300 feet proposed. It is not known whether this is the whole fault zone or just one arm of a larger zone.

The peridotite body exhibits a possible flexure within the property boundaries. The general trend of the sill is N 45° W. At the central part of the property, near the mineralization, the sill has an apparent strike of N 20° W. Data is sketchy and this apparent change may be the result of the intensive faulting in the region.

A strong shear zone, striking east-west and dipping steeply to the north (?) is located in the peridotite 800 feet south of the main ore zone. This shear is exposed at the river shore and in a trench 600 feet east. A 12 foot highly sheared and serpentized zone is bordered to the south by a 40 foot zone which is moderately sheared and serpentized.

Interrelationships between these structures and their relationship to the Shawkak and Miles Creek Fault systems is uncertain. Also unknown is any connection with the peridotite intrusions although F. A. Campbell proposed that the major structural changes came after the emplacement of the ultrabasics. The sequence of events proposed was:

1. Gentle arching of the marine sediments and volcanics with minor faulting.
2. Intrusion of peridotite, mainly as sills with minor dyke injection.
3. Folding and faulting with development of fractures north of the White River Sill.
4. Intrusion of gabbro.

5. Shearing and fracturing of gabbro and country rock.
6. Emplacement of sulphides.

#### ECONOMIC GEOLOGY

Sulphide mineralization in the area is widespread, generally as a weak, very fine dissemination of pyrite, some pyrrhotite and occasionally chalcopyrite. Again reference must be made to the study by F. A. Campbell who concludes that the White River nickel deposits are hydrothermal, with a general pyritization preceding the main period of mineralization. The sulphides and ultrabasics were co-magmatic, with the sulphide fraction separated, at depth, from the parent magma and later squeezed up into shears and fractures.

Sulphide concentrations, mainly pyrrhotite, occur in such fracture and shear zones in albitized and silicified tuffs, and also in some thin bedded laminar tuffs, especially when interbedded with chert which possibly provided impervious barriers to migration. In all cases mineralization is in the form of dissemination and scattered small patches of sulphides impregnating the rock and not as fractures filling. Only these sulphides in fracture and shear zones are nickeliferous and even these are not consistent. Nickel minerals appear to be nickeliferous pyrrhotite, pentlandite and possibly millerite. Sulphide content, even when the nickel values are high, is rarely greater than 20% with most of the zones in the 3% to 5% range.

Some narrow zones of massive pyrrhotite have been encountered with no nickel values. One characteristic seems to be that heavier sulphides occur on the south or hanging wall of the zones with mineralization decreasing and gradually changing to primarily pyrite, to the north although no corresponding decrease in nickel content is noted. Nickelferous zone contacts seem quite sharp with little apparent relationship to the sulphide content. This would indicate that emplacement of nickel bearing minerals was later than the emplacement of most of the sulphides. Dr. F. A. Campbell states that the pentlandite shows no exsolution with pyrrhotite and therefore must be later. Also some of the chalcopyrite is later than both pyrrhotite and pentlandite.

A. MAIN ZONE (South Zone)

This is the discovery zone, on which most of the work to date has been performed. Mineralization is localized in a shatter zone in albitized tuffs about 400 feet north of the peridotite sill. The zone strikes east-west and dips 75° to the south, roughly conformable to the enclosing tuffs. Development work by Canalask Mines delimited this zone at the adit horizon. The adit, crosscuts and flat drill holes showed a length of 310 feet with an average width of 49.2 feet to assay 1.46% nickel. Assays for copper are not available but old records indicate a grade of 0.04% copper was assumed. Nickel values

end abruptly to the east with no diminution of sulphide content but with an apparent increase in chalcopyrite. The western end of this length is a rock bluff at the White River. Two drill holes below this area, 608 and 67-2A indicate that the ore may be cut off by a major fault down the White River. No drilling has as yet cut the projected location of the main zone west of this fault. The ore zone in the adit is divided into two lenses a strike fault, as previously described.

Previous drilling proved continuity of the ore to a depth of 150 feet below the adit. A 336 foot winze was sunk by Canalask Mines and 375 feet of drifting done on the lower level, (2,400 level). No geological records are available for this work. One objective of this season's drilling program was to prove continuity of ore down to the lower level.

The first hole, 67-1, successfully proved this when it intersected a core length of 81.0 feet assaying 1.10% Nickel 50 feet above the lower level drift. Plotting of this drill hole indicates that the drift was driven in the footwall of the ore although with incomplete records this cannot be considered proven. The second hole, 67-2A, was targeted for 100 feet west, just above the west end of the lower level drift. At this point the hole was in strong fault zone material, which, when projected, indicates that the west face of the drift must be in this fault. The eastern limits at this elevation have not been determined. One old hole, 615, believed to be 130 feet east of 67-1, cut

10.0 feet assaying 1.13% Nickel. Exact location is uncertain but the intersection seems to be near the projected position of the strike fault which might explain the narrow width. The next intersection is hole 602, 200 feet east and 50 feet higher than 615, which was only weakly mineralized. There is a possibility of an ore plunge to the east along the plunge of the strike fault.

#### B. NORTH ZONE

A low grade zone, about 150 feet north and roughly parallel to the main zone at surface. Little exploration has been done on this zone except as a secondary target when drilling the main zone. The north zone is in albitized tuffs, in part laminar at the south contact of a 30 foot chert bed. Fracturing and shattering is weak with control of mineralization seemingly more stratigraphic. Sulphide content is high, especially in darker green slightly coarser tuff hands, primarily phrrhotite and in places fair chalcopyrite. Nickel content is low but with erratic highs. The mineralized zone has widths of up to 70 feet. One crosscut, on the adit level, which did not pass completely through the zone, cut 53.5 feet averaging 0.29% Nickel with no copper assay recorded. Trench #2 exposed part of the zone, 34.0 feet which assayed 0.40% Nickel and 0.20% Copper. It is believed that the copper mineralization in Trench #1, 500 feet farther east, is an extension of this zone.

Hole 67-1 cut the zone about 300 feet below the adit and intersected a core length of 12.7 feet which assayed 0.40% Nickel and 0.44% Copper. It must be noted that in this hole the North Zone mineralization is only 25 feet north of the main zone indicating that the two zones are converging with depth.

C. LOWER NORTH ZONE

Three old holes, 616, 24-2 and 24-3, intersected this zone 100 to 200 feet below the lower level. No core and no records remain. Hole 67-2A was extended to cut this zone in roughly the same area. A core length of 61.3 feet averaged 1.15% Nickel and 0.11% Copper. This included a 35.0 foot length which averaged 1.55% Nickel and 0.16% Copper

From the evidence of this one hole, in which core recovery was poor, the following conclusions are made. The Lower North Zone occurs in a shatter zone in albitized tuffs at the north contact of a chert bed west of the White River Fault. It is believed that this chert bed is the same as the one to the north of the North Zone. In this case this is the first definite evidence of probable repetition of mineralized lenses with depth and also the first definite mineralization west of the White River Fault.

D. WEST COPPER ZONE

Float containing chalcopyrite mineralization was discovered in the lower reaches of gullies on the north side of Miles Ridge, west of the White River, by P. Versluce, late in the fall of 1966. The source was located during this program and was found to be from a series of volcanic flows about 1500 feet northeast of the periodotite body. Steep slopes in the area prevented a detailed examination. Mineralization was primarily pyrite, with enough chalcopyrite to cause extensive malachite staining, as a very fine dissemination in volcanic rocks from andesite to diorite to granodiorite in composition. The zone is approximately 3000 feet long and 400 feet wide with chalcopyrite content gradually decreasing towards the extremities.

Some concentrations of chalcopyrite occur near fractures and narrow ultrabasic intrusions in the central sections but no continuity was observed. A selected sample of the best mineralization assayed 0.36% Copper with traces of gold and silver. Over all the zone is estimated at not more than 0.25% Copper. Exploration of depth possibilities would be difficult and expensive as the best part of the zone occurs half way up the slope of Miles Ridge in a steep gully where access is possible only on foot.

E. COPPER MINERALIZATION

Chalcopyrite is associated in some degree with all the mineralized zones. Apparently, in old work, assaying for copper was neglected in some cases, leaving records incomplete. Numerous assays of 0.10% to 0.50% copper are recorded. There seems to be a gradation in content within the known zones with very low chalcopyrite content at the centre of the zone gradually increasing towards the extremities on strike and dip, forming somewhat of a halo effect. There does not seem to be any change laterally across the width of the zone.

A number of interesting copper intersections occur in drill holes apart from the main nickeliferous area. Hole 607 cut 19.8 feet assaying 0.64% Copper 150 feet north of the chert bed. Hole 67-1 had to be abandoned with the last 8.0 feet assaying 0.97% Copper, 80 feet north of the chert. There may be some connection between these two intersections. Hole 608 cut 21 feet assaying 0.65% Copper estimated at 400 feet north of the chert, west of the White River Fault. All of these were in albitized tuffs but in holes 607 and 608 albitization seemed weak and the rock might be classed as greenstone.

Trench #1 opened up a 65.5 foot width of interbedded mineralized albitized and silicified tuff and chert which assayed 0.74% Copper. This is thought to be an extension of th

north zone. Trench #7 was located 200 feet east and showed a sharp increase in quantity of chert with only erratic low copper values.

### GEOPHYSICAL SURVEYS

Ground geophysical surveys were conducted over the central portions of the claims, in May 1967, in an effort to obtain information on possible extensions under the White River. The river gravels to a great degree masked any definite results. A resistivity survey showed 50 feet of gravel at the centre of the river and hole 67-2A showed 78 feet of gravel 25 feet from the east bank of the river.

A magnetometer survey was conducted by Dr. P. H. Sevensma Consultants Limited over a one half square mile area centered on the White River 400 feet north and east of the adit. There seems to be a weak discontinuity along the river close to the east bank which may be the result of the postulated White River Fault. A Ronka EM 16 Survey was run over the central three lines at the same time. The line at the east bank picked up the main zone but readings to the west on the river flats were all low.

An Induced Potential Survey was carried out by Seigel Associates over the same area and extended 1000 feet to the south. Six anomalies were outlined:-

Anomaly "A" - This was the main ore zone and shows an extension of mineralization to the east. To the west the anomaly terminates at the river bank.

Anomaly "B" - Located on the west bank of the river at approximately the north contact of the peridotite sill. This is extensively serpentized and probably the cause of the anomaly. Some weakly mineralized tuffs occur about 50 feet north but any reaction from them would have been masked by the serpentine.

Anomaly "C" - Trench #4 showed this to be a strong, serpentized shear zone about 50 feet in width within the peridotite sill. The shear strikes east-west with a steep dip to the north (?).

Anomaly "D" - A strong, heavily serpentized, shear zone in peridotite outcrops at the river bank 100 feet east of this reading. It is believed to be the same shear as that which caused Anomaly "C".

Anomaly "E" - No outcrop was found at this location and steep slopes made it difficult to trench with the bulldozer. The anomaly appears to be at the south contact of the peridotite sill.

Anomaly "F" - A weak anomaly in the centre of the White River gravel flats. This is roughly on strike with Anomaly "B" and may be an extension.

DIAMOND DRILLING

A diamond drill program was started to confirm the downward continuity of the Main Zone to the 2,500 elevation. Only two holes were completed for a total of 1,311 feet of drilling. The contractor, Boyles Industries Limited, experienced great difficulty in keeping a full crew on the job. Drilling was with BQWL equipment but was extremely slow. The hard, brittle, badly fractured rock caused frequent blocking of the core barrel, necessitated pulling with core runs of only a few inches. As an extreme example in one eight hour shift the core barrel was pulled twenty nine times for an advance of 11.0 feet with 80% recovery of core. On numerous shifts advance was less than ten feet.

Recovery of core in Hole 67-1 was better than 85%. Hole 67-2A had comparable recovery until what is believed to be the White River Fault was encountered. In the fault recovery was about 40%.

Hole 67-2 was collared on the river gravel flats 75 feet from the east bank. After a number of false starts and broken casing this site had to be abandoned at a depth of 40 feet. The drill was moved closer to the shore in the hope that gravel overburden might be less. Hole 67-2A encountered bedrock at a depth of 102 feet, a vertical distance of 78 feet from the collar.

ORE RESERVES

Reserves were calculated for the Main Zone and the lower North Zone. All averages were recalculated and some re-sampling included. Taken into account was possible structural control by the east-west strike fault. These are drill indicated reserves and further work must be done before they can be considered probable. Core recoveries were poor and grade is considered conservative. Only grade of nickel is calculated. Copper assays are for the most part missing. Old records show copper estimated at 0.04%. Current work indicates that this may be low but that copper would not be above 0.10%. A factor of 11.0 cubic feet per ton was used. By visual estimate sulphide content was rarely greater than 15%. No dilution is included.

|                  | <u>Tons</u> | <u>Assay</u> |
|------------------|-------------|--------------|
| Main Zone        | 380,841     | 1.34 % Ni    |
| Lower North Zone | 15,851      | 1.44         |
|                  | <hr/>       | <hr/>        |
| Total            | 396,692     | 1.35 % Ni    |

ORE POTENTIAL

Conditions favorable to the possibility of additional nickelferous mineralization are numerous and were greatly enhanced by the results obtained in the two holes drilled. A number of possible limiting factors also exist.

A. Main Zone

The zone has been delimited at the adit horizon with a length of 310 feet. Three drill holes, S-4, S-7 and 607 cut the

zone 100 to 150 feet below the level. Two drill holes 67-1 and 615 intersected the zone 250 feet below the level. Hole 615 cut the zone near the projected location of the strike fault. There is a possibility of a plunge of ore to the east along this fault. The only hole in this region is 602, 200 feet east and slightly above 615 which leaves a wide area for possible additional ore.

Hole 67-1, the lowest intersection, cut a core length of 81.0 feet which assayed 1.10% Nickel leaving depth possibilities wide open. Grade of ore in this area may be low. Only two drill holes 607 and 67-1 intersect the zone below the strike fault. Both averaged in the 1.10% Nickel range. The outcrop face at the river bank, also below the fault, has much the same nickel contact.

Hole 67-1 indicated a convergence of the Main Zone with the North Zone with depth. There may be enrichment in this area which should be about 200 feet below this intersection. A limiting factor is the possible convergence with the peridotite sill. The attitude of the sill is imperfectly known but indications are that this convergence should occur about 750 feet below the adit level, about 500 feet below the 67-1 intersection. As ore reserves have been running about 1,250 tons per vertical foot this would mean a potential minimum of 600,000 tons additional ore.

To the west the zone appears to be cut off by the White River Fault. No drill holes cut the projected position of the zone west of the fault. As the fault is believed to be post ore there is a good chance that extension of the zone will be located

assuming that the fault located is the main shear and not just an offshoot. Geophysics did not indicate any extension but this may have been masked by the deep gravel in the river channel.

Mineralization is known to occur west of this fault as this is the location of the Lower North Zone. Favorable albitized tuffs outcrop the west river bank 1,200 feet away.

#### B. North Zone

Grade located to date is low but some high assays have been obtained. With detailed exploration some mineable grade shoots might be isolated.

#### C. Lower North Zone

All drill hole intersections are within a relatively small area but there are no known limitations to expansion to the west or in depth dimensions unless there is another arm to the White River Fault. Hole 67-2A, the only one in this zone from which information is available, showed the mineralization to be north of a chert bed believed to be the same as that forming the footwall of the North Zone. Hole 67-1 also encountered well mineralized albitized laminar tuffs north of the chert although no nickel was present. These indications are important as they open up a broad area at depth, as the favorable albitized tuffs near the peridotite sill, where a repetition of nickel mineralization is possible. If the proposed movement on the White River Fault is true there should be an extension of the Lower North Zone east of the fault. Hole 67-1 may have passed above the nickel mineralization.

The high copper values which seem to lie around the fringes of the nickel bodies were intersected.

#### D. Nickel Prospects

The area to the east of the known ore warrants further exploration. The rocks exposed at surface are all weakly mineralized. Moderate copper mineralization was exposed in Trench #1. Pyrrhotite was fairly heavy but no nickel values were present. In Trench #7, 200 feet east, all rocks other than cherts were weakly mineralized but values were low.

Drilling by Canalask at the peridotite contact intersected 8.0 feet of 0.17% Ni. and 0.05% Cu., and 2.5 feet of 0.15% Ni. and Trace Cu. Exact location of these intersections is not known but they are thought to be near where the shear zone causing \*IP Anomalies "C" and "D" leaves the peridotite sill. As known nickel mineralization lies at some distance from the sill/to the east where the shear is in albitized tuff should be explored.

#### E. Copper Prospects

Copper mineralization warrants further exploration. Numerous intersections of better than 0.50% Copper were obtained in the North Zone. Drill holes 607, 608 and 67-1 all cut intersections of chalcopyrite mineralization north of the chert in weakly albitized tuffs. None are of ore grade but may with further work be expanded and with an increase in grade prove mineable. If it is confirmed that the Chalcopyrite mineralization forms a halo around the nickel bearing sulphides depth possibility

for the property is greatly enhanced.

### RECOMMENDATIONS

Indicated ore reserves should be increased to at least 1,000,000 tons.

Drilling of the Main Zone below the strike fault has shown greater widths of mineralization but grades in the 1.10% Nickel range. Higher grade lenses may be isolated but much more information is required before grade and tonnage can be calculated. Sufficient information could be obtained by detailed definition drilling of the Main Zone from the 2400 Level.

#### A. Proposed Program

1. Drill a series of holes from underground and surface to intersect the Main Zone at elevation 2,150, 250 feet below the present limits to increase ore reserves and check the possible plunge to the east along the strike fault.
2. Confirm the grade of the main zone and obtain information on possible high grade lenses at the 2400 Level elevation by fanning drill holes from the drift at 50 foot centres.
3. Drill one hole from surface to better define the location of the White River Fault and with the same hole intersect the projected location of the main zone west of the fault and the westward extension of the Lower North Zone.
4. Diamond drill from the 2400 Level to test the North Zone, the area north of the chert bed for the possible extension of the Lower North Zone, the copper mineralization in 67-1, and to check

the copper intersection in 607. Each hole can check all four of these targets.

5. Test IP Anomalies "B" and "E" by surface diamond drilling.

6. Test the extension of the shear zone causing IP Anomalies "C" and "D" after it has passed out of the peridotite sill and into albitized tuffs by diamond drilling.

7. Test the copper zone in Trench #1 by diamond drilling.

8. Extend some of the underground holes to test the dip of the peridotite sill to obtain more information on possible convergence with the Main Zone.

B. Cost Estimate:

Diamond Drilling

Surface 3,000 ft. @ \$15.00 \$45,000

Underground 6,000 ft. @ \$10.00 60,000

Geological and Engineering work

Surveying, assaying, etc. 15,000

Mine Plant, hoisting, ropes, piping,

Dewatering Winze & rehabilitating drifts 54,000

Camp Servicing, Vehicles 12,000

Total \$186,000

Contingencies - 10% 18,600

Total \$204,600

CONCLUSIONS

1. Control of mineralization is primarily structural and ore is localized in fracture or shatter zone in albitized and silicified tuffs. The albitized tuffs are very brittle and amenable to formation of these shatter zones making this the most favorable rock type and giving the appearance of stratigraphic control.
2. The emplacement of sulphides was later than the intrusion of the peridotites and gabbros but may have been co-magmatic. Nickel mineralization was a late stage of the sulphide emplacement.
3. Drill indicated ore reserves total 396,692 tons averaging 1.35% Nickel, undiluted.
4. Continuity of the main zone was proven down to the 2,400 Level with no indication that it is bottoming and some possibility of lengthening to the east with depth.
5. Grade of mineralization in the main zone below the strike fault appears to be about 1.10% Nickel but with greater widths.
6. A major fault, the White River Fault, was indicated following the east bank of the river, striking north-south, dipping 80° E, and with an estimated primarily vertical displacement of 200 to 300 feet with the west side moving up in relation to the east side.
7. The Lower North Zone was found to lie to the west of

the White River Fault, the first definite indication that economic mineralization occurs west of this fault and under the White River. This opens up a 1,200 foot strike length where conditions are considered very favorable for extension or repetition of the nickel mineralization.

8. Drill holes 67-1 and 67-2A show that at depth mineralization is found north of the chert bed which at surface was thought to form the north limits; also that widths of the favorable albitized tuffs increase.

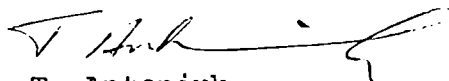
9. The abundant serpentine present in the area made the Induced Potential Survey of limited value.

10. A program is recommended to -

- (a) increase indicated ore reserves to 1,000,000 tons.
- (b) define the grade of the main zone at the 2,400 Level and establish whether any high grade lenses are present.
- (c) explore favorable areas of the North and Lower North Zones on both sides of the White River Fault.
- (d) test for the extension of the Main Zone west of the White River Fault.
- (e) complete the examination of the I.P. Anomalies.

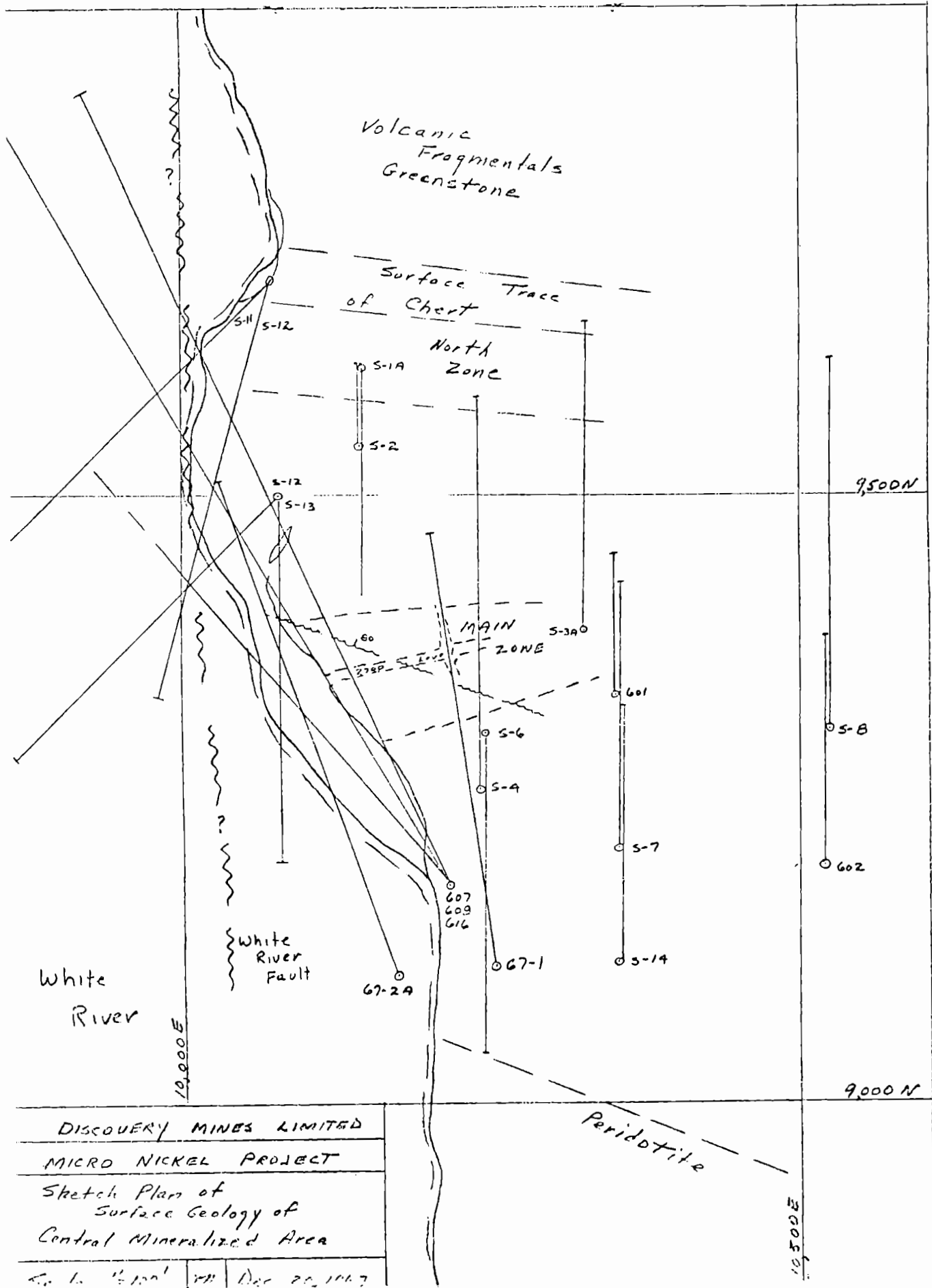
11. Estimated cost of the recommended program is \$204,600.

Respectfully submitted,

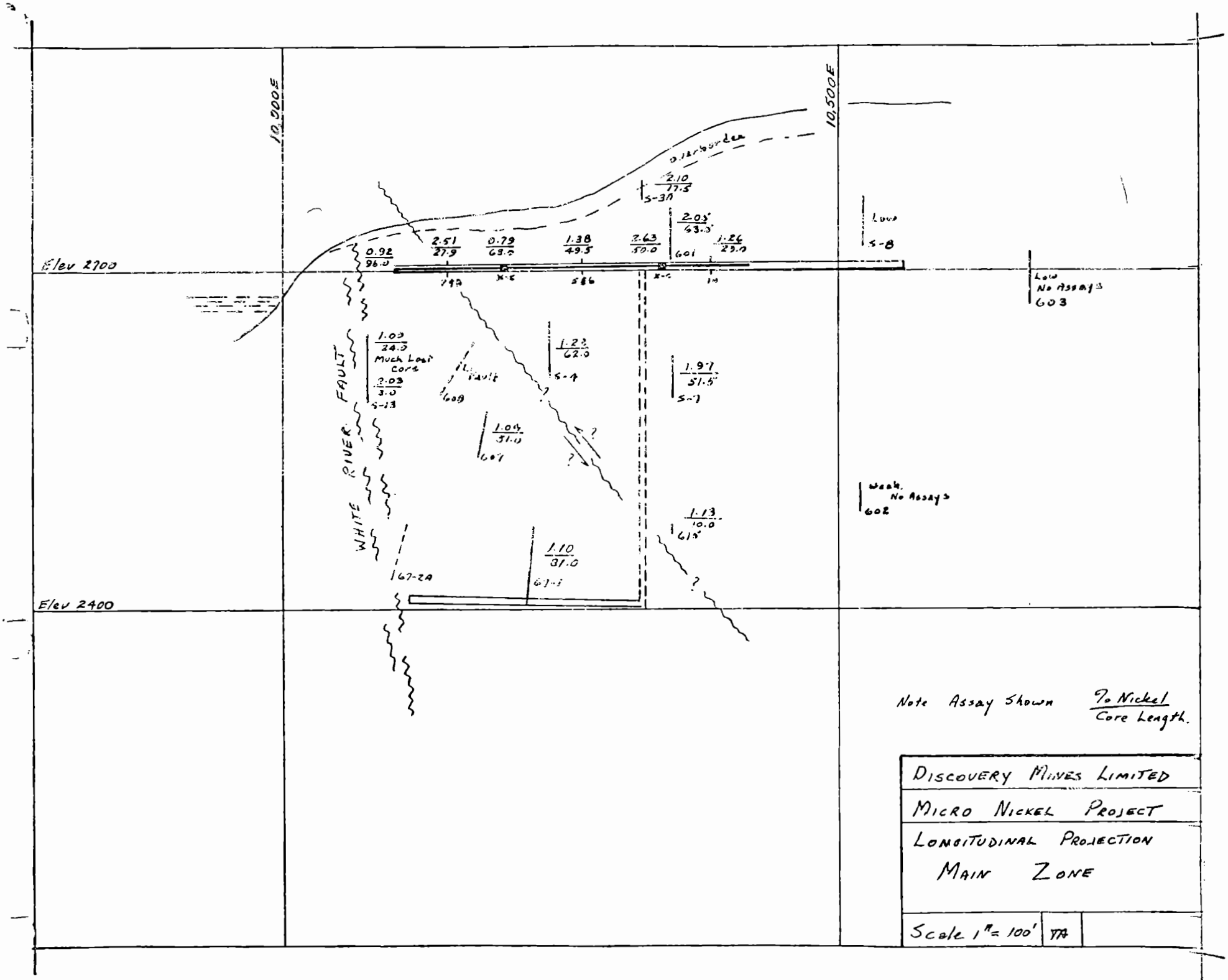


T. Antoniuk  
Field Geologist

Toronto, Ontario  
December 20, 1967



DISCOVERY MINES LIMITED  
 MICRO NICKEL PROJECT  
 Sketch Plan of  
 Surface Geology of  
 Central Mineralized Area  
 S. 1. 1:200' 178 Dec 20, 1967



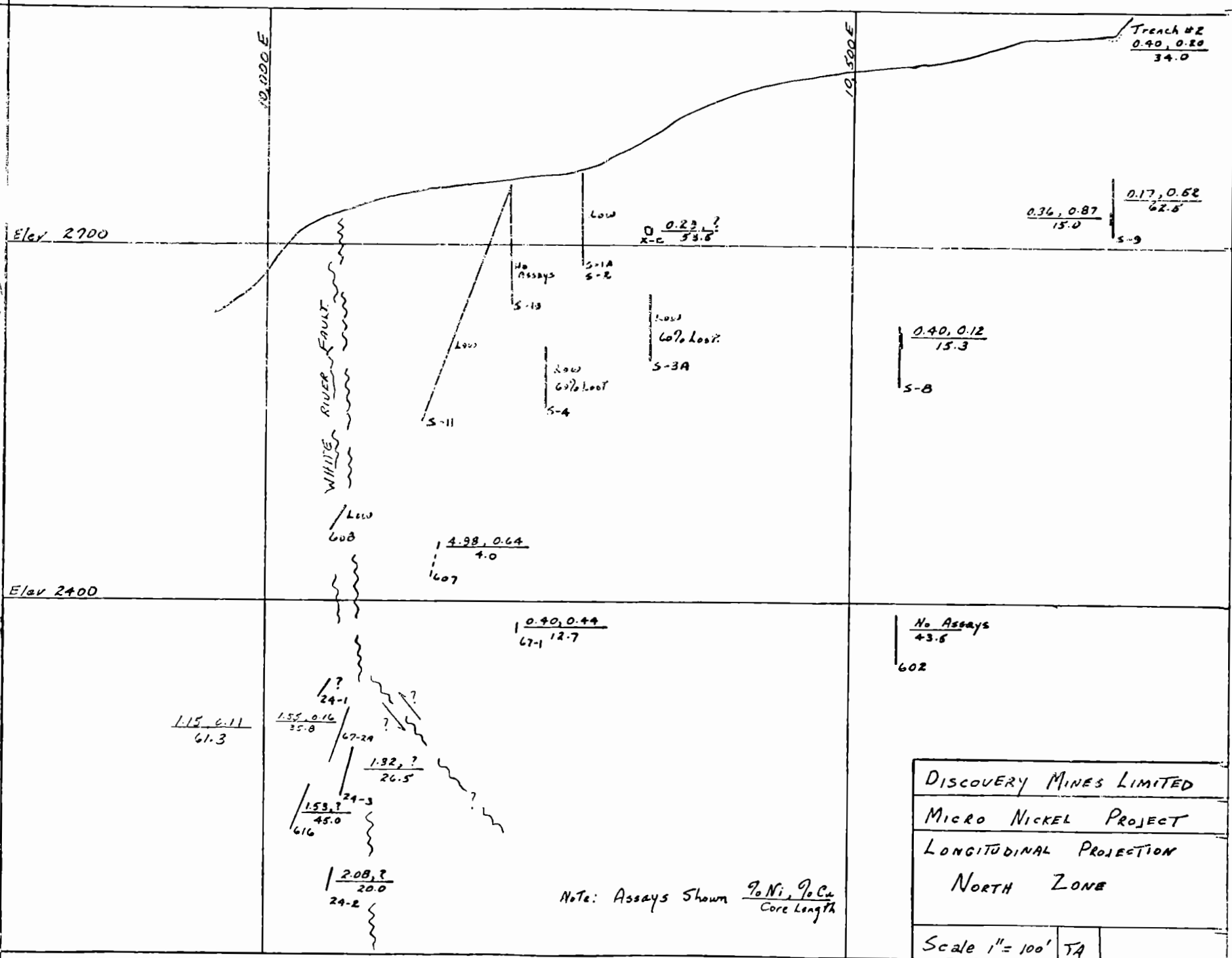
DISCOVERY MINES LIMITED

MICRO NICKEL PROJECT

LONGITUDINAL PROJECTION

MAIN ZONE

Scale 1" = 100' TA



N

S

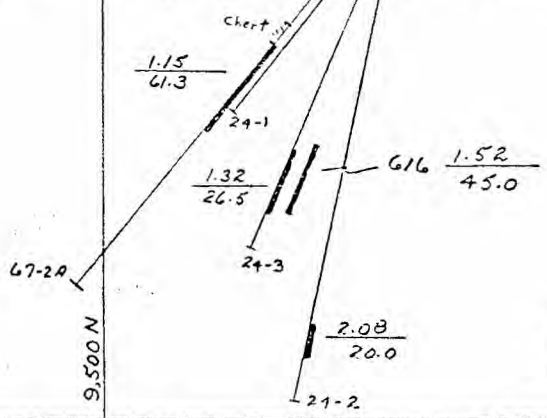
S-13

2700

Scattered high values  
Much lost core

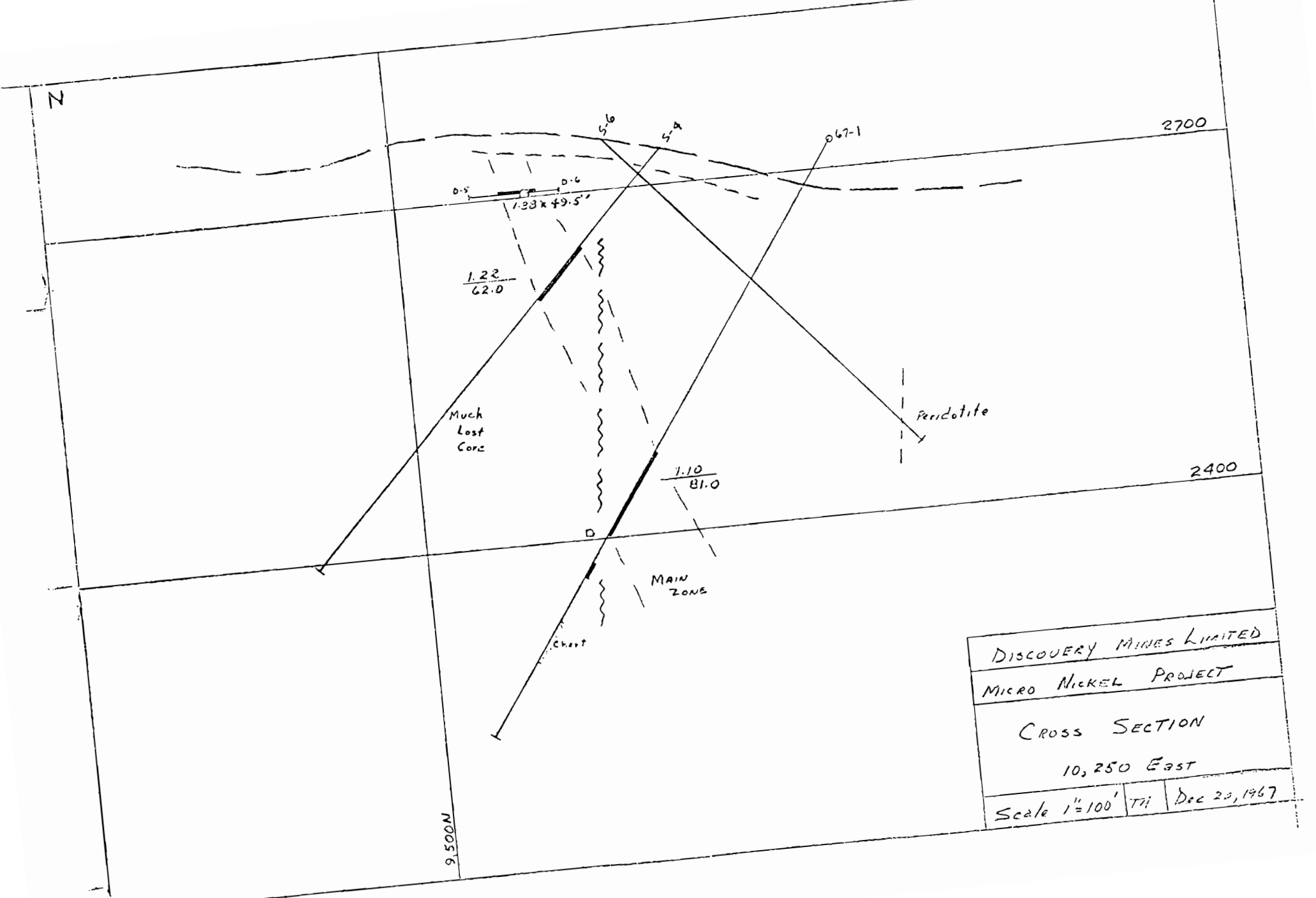
White River Fault?

2400

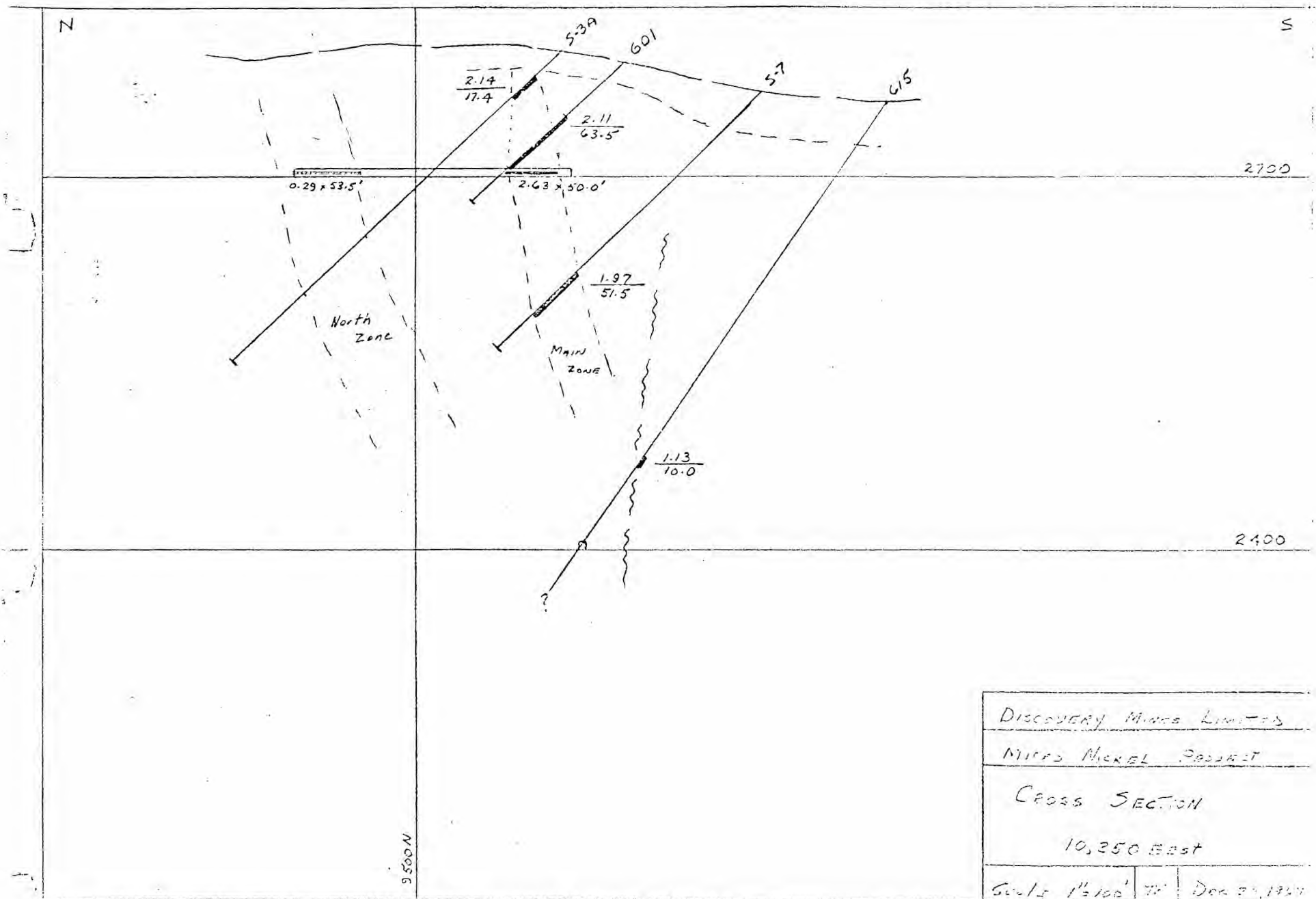


All holes were drilled  
at an angle to the  
section and are projected

|                         |                 |
|-------------------------|-----------------|
| DISCOVERY MINES LIMITED |                 |
| MICRO NICKEL PROJECT    |                 |
| CROSS SECTION           |                 |
| 10,100 East             |                 |
| Scale 1"=100'           | TR Dec 20, 1967 |



|                         |    |              |
|-------------------------|----|--------------|
| DISCOVERY MINES LIMITED |    |              |
| MICRO NICKEL PROJECT    |    |              |
| CROSS SECTION           |    |              |
| 10,250 East             |    |              |
| Scale 1"=100'           | TJ | Dec 20, 1967 |



|                         |     |              |
|-------------------------|-----|--------------|
| DISCOVERY MINES LIMITED |     |              |
| MICKS NICKEL PROJECT    |     |              |
| CROSS SECTION           |     |              |
| 10,250 East             |     |              |
| Scale 1"=100'           | 75' | Dec 27, 1947 |