

SECTION 1— ECONOMIC AND GENERAL GEOLOGY

TR3-11-27

Recent Drilling of the Cuni Deposits, Zeehan

by R. G. Robinson

General.

The Cuni area was the subject of a more comprehensive unpublished report by B. L. Taylor and D. Burger (12th September, 1952) and the present report is largely supplementary to it.

Location.

The copper-nickel deposits of the Cuni area are located about five miles east of Zeehan. The deposits are in a predominantly swampy basin to the south-west of the Emu Bay Railway's Argent Tunnel and are (except for the Devereau deposit) on the west of the Emu Bay Railway. In view of the swampy location and the consequently difficult prospecting, it was hoped that geophysical prospecting might locate some new ore shoots.

History.

The deposits were first located about 1893 and have been worked erratically up to 1948. The leases are now held by Montana Silver-Lead N.L. and Mr. R. E. Clark, of Zeehan. Prior to the recent drilling by Montana Silver-Lead N.L., the deposits were bored by Eagle Metals Pty. Ltd., of Melbourne. Eagle Metals Pty. Ltd. bored four holes to completion in the northern portion, and Montana Silver-Lead N.L. have drilled approximately 18 holes throughout the area.

The geophysical prospecting was extended to the south and east of the original grid laid out by Taylor. The geophysical prospecting showed several anomalies but the anomalies away from the known copper-nickel ore shoots were not caused by copper-nickel mineralisation.

Mineralogy.

The copper-nickel deposits are of the sulphide type with the chief minerals pyrrhotite, pyrite, chalcopyrite and pentlandite. Millerite and zaraitite have been recognised in the deposits and show that secondary deposition has occurred here. Galena and sphalerite have been noted in lode-stuff.

The presence of millerite and zaratite indicates secondary deposition with the added possibility of secondary enrichment of the lodes. While secondary enrichment has no doubt occurred to minor extent, the proximity of the water-table to the surface would mean that the secondary enriched zone was very shallow. Due to rapid and extensive erosion in the Pleistocene, any earlier secondary enrichment zones would have been removed.

The occurrence of galena and sphalerite in the deposits is in a manner permitting easy liberation and therefore they could be a profit-earning item. No exact information exists as to the grade of the lead and zinc in the lodes, but at North Cuni the lead and zinc are reported to have exceeded the copper-nickel content at times. The assaying of the recent drill cores was only for copper and nickel with no regard for lead-zinc, so no real appraisal of the lead and zinc reserves may be made.

In both the copper-nickel and lead-zinc deposits in the Cuni area, vughy quartz occurs, and in both is associated with the cutting out of the ore. This quartz, which in the lead-zinc deposits cements the brecciated ore, must have been a late phase injection coming in after the lead-zinc mineralisation, filling in the barren ore channels.

The presence of lead-zinc in the copper-nickel deposits has two possible origins: (a) comagmatic with the copper-nickel; or (b) comagmatic with the nearby lead-zinc deposits and thus later than the copper-nickel. In the present state the origin of the lead-zinc in the copper-nickel lodes cannot be decided.

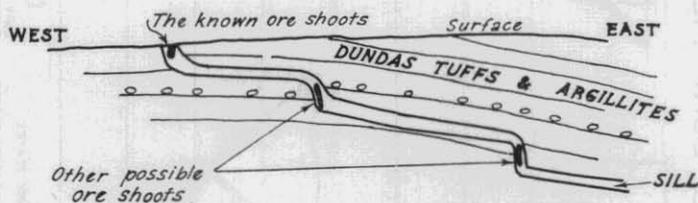
Copper-nickel has been doubtfully reported from the McKimmie mine, but in a recent crude grab sampling from three other nearby lead-zinc deposits no copper or nickel was found. This might be due to poor quality sampling or actual absence of copper-nickel.

Geology.

The ore shoots or lodes occur in the footwall of an ultrabasic rock, originally thought to be a dyke but now regarded as a sill. In the drilling a large number of sills have been found. These are not known on the surface, possibly due to the extent of swamp or to their non-outcropping nature. Taylor (1952) suggests that these sills are of the lit-par-lit type. In general the sill possessing the ore shoots is the largest. About five chains west of the mineralised sill and of parallel trend a gabbro sill is known. This gabbro has not been tested to see if there is any copper-nickel associated with it. Petrologically it is similar to the sill possessing the copper-nickel ore shoots and on this ground is worthy of testing.

In following the copper-nickel lodes down by drilling the ore cuts out about 130 feet below the surface. In mining operations the actual bottom of the ore shoots has not been found, but in the Vaudeau workings this bottoming must be close (within 10 to 20 feet). At the horizon where bottoming occurs the sill shows marked flattening, and it is likely that this flattening is the cause of the bottoming. The only chance of the lodes going deeper than

the 130 feet is if this flattening of the dyke occurs deeper. It is not known why the sill is so steep at the surface (dips 90-80° east) but is probably caused by (a) the attitude of the host rocks steepening, (b) a transgressive section of the sill, or (c) the sill entering a pre-sill fault zone. Of these the transgressive cause is the most probable, and, if similar transgressions occur in depth somewhere to the east, another series of ore shoots (non-outcropping) could exist.



Diagrammatic cross section of sill.

Naturally, the search for such concealed ore shoots is very difficult, but geophysical prospecting still further east might help locate these if they exist. Self potential prospecting is of no use since the ore shoots would not be oxidised. The gravity methods might be used to advantage here. It is possible that the Lead Blocks-McKimmie line of lode could represent a place where later faulting has been controlled by the transgressive section of the sill. If this were true, then drilling well below the lead lodes to intersect the sill would test the likelihood of a step in the sill here. Geophysical prospecting to test this idea should be done prior to drilling. A step would not have shown up on the recent geophysical prospecting due to the methods used.

Results of the Montana Silver-Lead N.L. Drilling Programme.

In the recent drilling programme, temporarily in abeyance, holes were bored in the Genet's Winze section, the Devereau section and the Nickel Reward section. A tabulated summary of the drilling, together with the earlier Eagle Metals drilling, is shown on pp. 15, 16. The two M17 holes and M22 encountered old workings and were abandoned. The Eagle Metals hole EM/5 was stopped at about 65-70 feet without being completed.

5 cm

DRILLING SECTIONS — DUNDAS CUNI FIELD

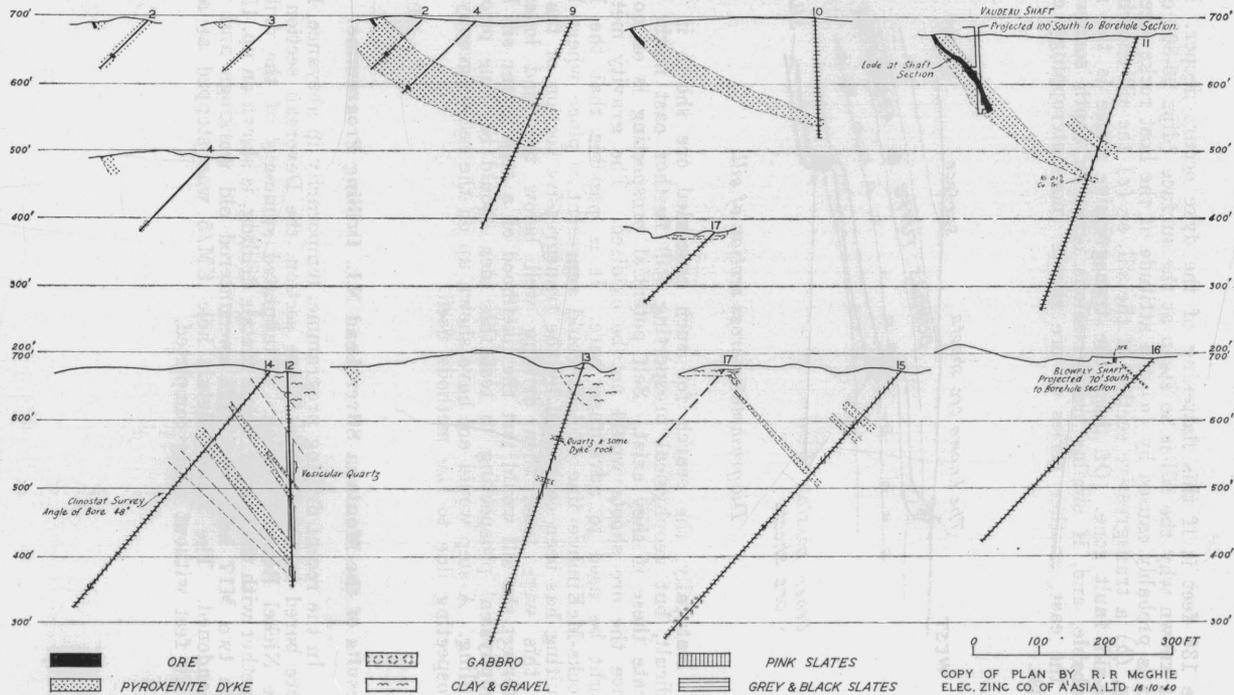


Figure 2.

MONTANA SILVER LEAD DRILLING

Name	Magnetic Bearing	Inclination	Length	Location	Ore Intersections	Comments
M6	312°	-45°	161'	Genet's Winze Section	(123-139') 16' @ (1.56% Cu. 2.28% Ni.) Nil (89-94') 5' @ (1.02% Cu. 0.80% Ni.) Traces only	Dyke 107-136'. Rest Sediments All Sediments Dyke 255-285'
M7	Vert	ical	186'			
M8	312°	-50°	113'			
M9	312°	-55°	285'			
M10	224° 30'	-50°	132'	Devereau Section	Traces only Traces only (74-75') 1' (1.15% Cu. 2.02% Ni.)	Dyke 70-121' Dyke 105-143' Dyke 62-75'
M11	256° 30'	-45°	143'			
M12	40°	-45°	118'			
M13	232°	-45°	145'	Nickel Reward Section	(50-63') 13' Uncertain Grade Nil (32-44') 12' @ (1.57% Cu. 6.42% Ni.) Nil Nil Nil Nil (53-62') 9' @ (1.15% Cu. 0.98% Ni.) (50-56') 6' @ (2.44% Cu. 1.51% Ni.) Traces only	Core upset in transit to Launceston Dyke 10-110' Sediments 110-145' All Sediments All in Dyke All in Dyke except for first 20' All in Dyke (two holes) All in Dyke Dyke 0-64'. Sediments 64-87' 0-22' Dyke, 22-68' Sediments 68-70' Dyke, 70-105' Sediments
M14	232°	-45°	160'			
M15	52°	-45°	113'			
M16	55°	-55°	65'			
M17	52°	-45°	20'			
M17a	10°	-60°	15'			
M18	10°	-45°	95'			
M19	10°	-65°	87'			
M20	10°	-45°	85'			
M21		Not Drilled	105'			
M22	10°	-45°	33' 8'		Nil Nil	All in Dyke, both into workings.
M23	270°	-45°	170'	Half way between Nickel Reward and Rension Bell Rd.	Traces only	All in Serpentine on Geophysical Anomaly

EAGLE METALS DRILLING

Name	Magnetic Bearing	Inclination	Length	Location	Ore Intersections	Comments
EM/1	330°	-45°	120'	Genets Winze Section	(70-79') 9' @ (0.10% Cu, 1.72% Ni.)	Dyke 47-76' Lode Intersection only 11' not 15' due to angle of hole. Dyke 45-82'
EM/2	270°	-50°	120'		(66-81') 15' @ (0.70% Cu, 0.50% Ni.)	
EM/3	270°	-45°	120'	North Cuni Section	(70-85') 15' @ (0.82% Cu, 1.10% Ni.)	Dyke 57-88' Dyke 109-123' Not completed? Indefinite records on EM/5
EM/4	270°	-45°	140'		(118-121') 3' @ (1.56% Cu, 0.37% Ni.)	
EM/5	270°	-45°(?)	65'(?)		Nil	

It is to be noted that in the records of the North Cuni workings (Taylor, 1952, p. 10) the grade of ore obtained in 1929-31 was 10.15% Ni and 5.46% Cu. Even allowing for sharp decreases, the values from EM/3 (1.10% Ni and 0.82% Cu) seem to be out of accordance with mining results. It is possible that drill grades are below actual grades due to incomplete return of water and core. Assay results have, where possible, been weighted by core recovery, yet, due to the poorness of core recovery, these can only be regarded as very conservative guides. There is sufficient information as to volume of sludge obtained to permit adjustment of the core results by sludge results. A similar discordance of assay results of ore and drilling seems to exist at the Nickel Reward section.

In the drilling at the Devereau section two things of note appear: (1) The metal contents of the M.12 intersection show Ni > Cu yet the surface indications are that of Cu > Ni; (2) The dip of the lode and dyke cut by M10, M11, and M12 is southerly (previously dip was unknown).

In the Genet's Winze section similar variations in the copper-nickel ratio appear.

The recorded attitude of the host rock (Taylor, 1952) in the Devereau section is southerly and the southerly dip of the sill found above shows the conformity of dyke and host rock again.

Even with the drilling done at Nickel Reward, the picture here is still rather confused. Due to the self potential anomaly being markedly elongate in a north-westerly direction, the drilling done was normal to this direction. In the case of the predominantly worked-out Vaudeau, Mosquito and Blowfly shoots, the anomalies are elongated at an angle of about 10-15° to the line of lode, and thus it is contended that a similar lack of parallelism between the anomalies and the lode exists in the Nickel Reward section. It has been contended that the grade in M13 and the sulphide exposed by trenching show that the lode is continuous between these points and has a north-westerly trend. It must be pointed out that the occurrence of sulphide ore in M13 and the surface trench is not a proof of continuity. In the dozer cut costean to the south of the Nickel Reward shafts the trend of the ultrabasic rock is about 185° magnetic and the collapsed stoping discernible has a comparable elongation. From this evidence it is concluded that the lode at Nickel Reward strikes approximately 185° and that the lode located by M13 is not directly connected with the lode in the surface trench. These occurrences could be faulted portions of the same lode but at present this could not be tested. Further trenching of the sulphide outcrop to expose the foot and hanging walls and then tracing northward is needed.

There is also another possibility to be further investigated at the Nickel Reward section. There is a distinct possibility that the stoping done from the Nickel Reward shafts is on two separate parallel lodes. The possibility that the lodes are merely faulted portions of the same lode does exist but is not able to be tested in view of the meagre amount of the dyke exposed.

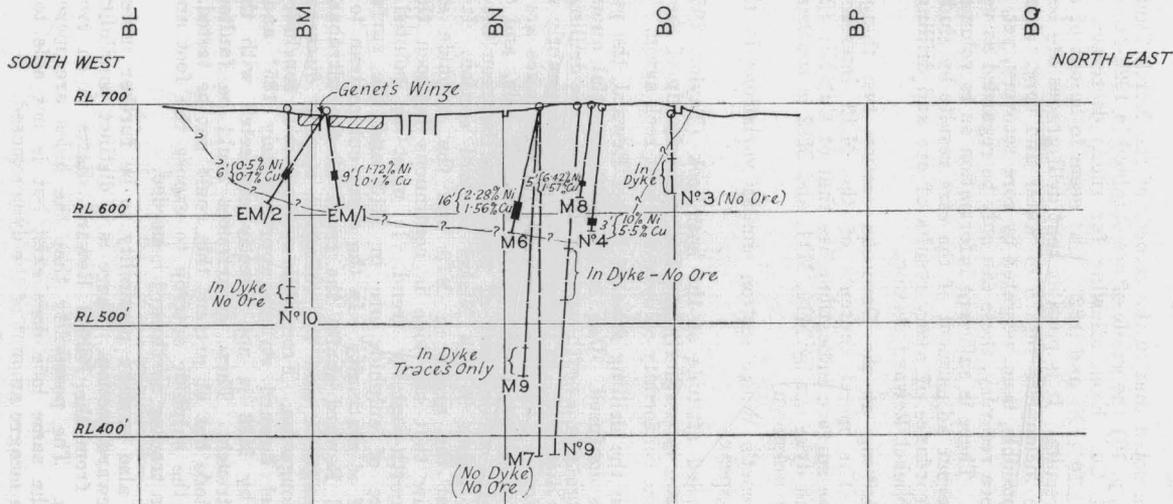
It must be noted to that there are signs of stoping to the north of the shafts that would be coincident with the lode position of the M13 and M15 intersections. In fact, this spot is interesting in that galena has been found there. Regardless of the approach, it

5 cm

LONGITUDINAL PROJECTION—GENET'S WINZE AREA

PLANE OF PROJECTION THROUGH ORIGIN BL50 EAST ON
MAGNETIC BEARING 47° SHOWING DRILLING RESULTS.

0 100 200 FT



DRILLING. ALL LODGE INTERSECTIONS AND ASSAY RESULTS CORRECTED FOR INTERSECTION ANGLE AND CORE RECOVERY.

THREE SERIES OF DRILL HOLES ARE SHOWN. (a) DEPT OF MINES (1930) N^os 2,3,4,9 & 10. (b) EAGLE METALS (1952-3) EM/1, EM/2. (c) MONTANA SILVER LEAD (1956-7) M6, M7, M8 & M9. ORE LIMITS. --- STOPPED GROUND. 

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Figure 3

seems to be an unavoidable conclusion that the disposition of the known stoping and ore occurrences at the Nickel Reward is indicative of at least two (and possibly three) parallel lodes. These lodes are separated not only by barren dyke rock but also an argillite "horse". It is probable that the "horse" is not continuous in depth and that the lodes join beneath the "horse".

The poorness of the drilling results was to a marked extent inevitable from their collar positions and direction for they were laid out on a misconception as to the strike of the lode. This could have been avoided if more efficient examination of the available information and exposures was done initially.

Ore Reserves.

(1) *Genet's Winze Section.*—At this location drilling and trenching have established the existence of a mineable ore shoot. Only little mining has been done here to date. Conservative calculations indicate reserves of possibly more than 15,000 tons at a grade of approximately 4-6% Ni and 2-3% Cu. Drilling (especially No. 3 and No. 9) shows that the ore bottom is about 110-120 feet below land surface. The south-westerly extent is not known with certainty for the most southerly drilling showed nine feet of 0.5% Ni and 0.7% Cu. (Actually showing about six feet of lode due to the angle of intersection.)

(2) *North Cuni Section.*—The ore reserves here are not really calculable since the actual extent of stoping is not known. At least 960 tons of ore have been raised here but the amount of unrecorded production does not permit the total amount of stoping to be calculated. Assuming that the ore shoot "bottoms" about 110 feet, there is a vertical depth of 30 feet of ore below the 80-foot level (the 80-foot level is about 250 feet long in ore). There is also the unbroken lode above the backs of the old stopes up to the surface. In the vicinity of the EM/3 intersection (which did not enter any stoping) this ore above the old stope must have a vertical depth of about 50 feet. It seems likely that an amount of about 2,500 tons still exists above the 80-foot level. This figure of 2,500 tons could be markedly below the true figure, but this amount, together with the ore below the bottom level (say 1,000 tons) makes it worthwhile to reopen the workings.

(3) *South Cuni Section.*—This mine is virtually worked out to the surface from the 80-foot level. There should be about another 30 feet depth of ore below the 80-foot level to be extracted. The 80-foot level is only 90 feet long in ore so that the ore remaining would be only about 300-400 tons.

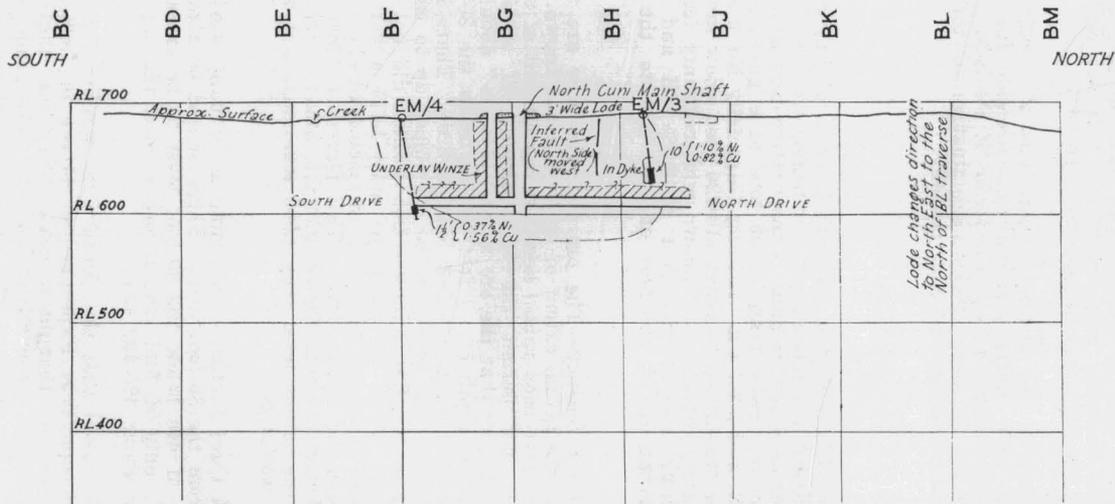
It is to be noted that the South Cuni western lode found by the Imperial Geophysical Experimental Survey in 1928 has never been tested. This was thought to have an outcrop length of about 150 feet with an average width of 2-4 feet. The grade of the lode is not known. No reserves may be calculated for the western lode in view of the paucity of knowledge and because this lode, though known to be pyritic, has not been tested for copper and nickel.

5 cm

LONGITUDINAL PROJECTION—NORTH CUNI SECTION

PROJECTION PLANE IS PARALLEL TO GEOPHYSICAL
BASE LINE (I.E. 172°)

0 100 200 FT.



DRILLING TWO HOLES EM/3 & EM/4 (EM/5 NOT DRILLED TO COMPLETION) ALL LODGE INTERSECTIONS AND ASSAY RESULTS CORRECTED FOR CORE RECOVERY AND ANGLE OF INTERSECTION TO GIVE TRUE LODGE FIGURES (I.E. NORMAL TO LODGE)

ORE LIMITS _____ STOPPED GROUND _____ (ACTUAL EXTENT NOT KNOWN)

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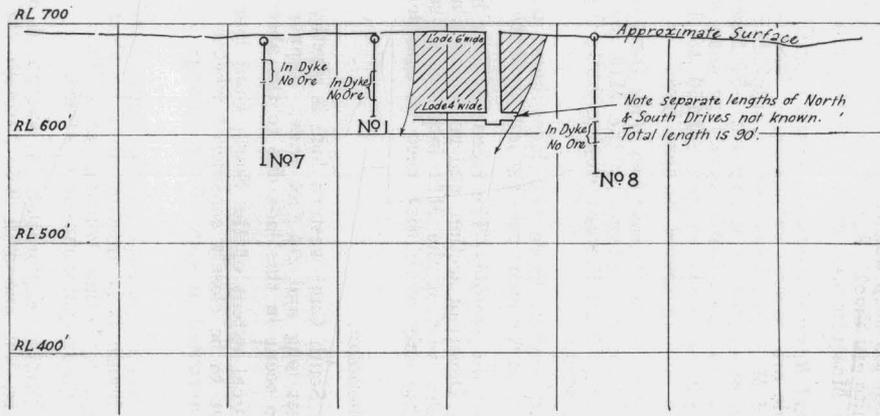
Figure 4

LONGITUDINAL PROJECTION—SOUTH CUNI SECTION

PROJECTION PLANE IS PARALLEL TO GEOPHYSICAL
BASE LINE. (I.E. 172°)

0 100 200 FT.

X Y Z AA AB AC AD AE AF
SOUTH NORTH



ALL THREE DRILL HOLES WERE ONLY TESTS OF LATERAL NOT VERTICAL EXTENSION.

ORE LIMITS

STOPED GROUND (ACTUAL EXTENT NOT KNOWN)

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Figure 5

5 cm

(4) *Vaudeau Section*.—The near total extent of stoping and the closeness of the bottom of the ore shoot shows that there are effectively no ore reserves here.

The Blowfly shoot has been completely worked out, while smaller tonnages still exist in the Mosquito ore shoot. Drill Holes Nos. 12 and 14 (1930) were too deep and too far south to obtain an intersection on the Mosquito ore shoot. A (120 feet) drill hole to test the vertical range of the Mosquito ore shoot is worthwhile.

(5) *Nickel Reward Section*.—There is still insufficient information to permit ore reserve calculations. The intersections in M13, M15, M18 and M19 drill holes and the sulphide in the surface trench are not sufficient to justify mining yet. Surface trenching to trace the sulphide as far as possible should be done first. Bulldozer cut costeans should be made around HB150 to HB350, and if any ore is exposed drilling should be done here.

There appear to be at least two lodes (and possibly three) here. One lode is apparently shown by the M13 and M15 intersections and some of the Nickel Reward stoping while the other is shown in the surface trench.

As stated earlier, these two lodes have an argillite "horse" between them but the lodes possibly join in depth below the "horse".

(6) *Devereau Section*.—The recent drilling has shown virtually no ore in the Devereau section, and no reserves are deemed to exist. Drilling to the west of the M12 intersection seeking a westward "make" is the only work that need be considered here.

Further Exploration.

(1) The South Cuni western lode is worthy of attention, being about 150 feet long and 2-4 feet wide. Copper and nickel are not yet known to occur in this lode due to the absence of sampling.

The vertical extent of the South Cuni lode is not known and it would have to be closely considered whether or not any further drilling is warranted in view of the tonnage (300-400) likely to be present.

(2) The vertical extent of the North Cuni lode is not tested by drilling, though it is anticipated to be about 120 feet. Testing would be done by either winzing or drilling. The southern and northern extents are not completely defined.

(3) No further exploration is warranted on the Vaudeau or Blowfly shoots, but one drill hole through the Mosquito shoot is possibly warranted.

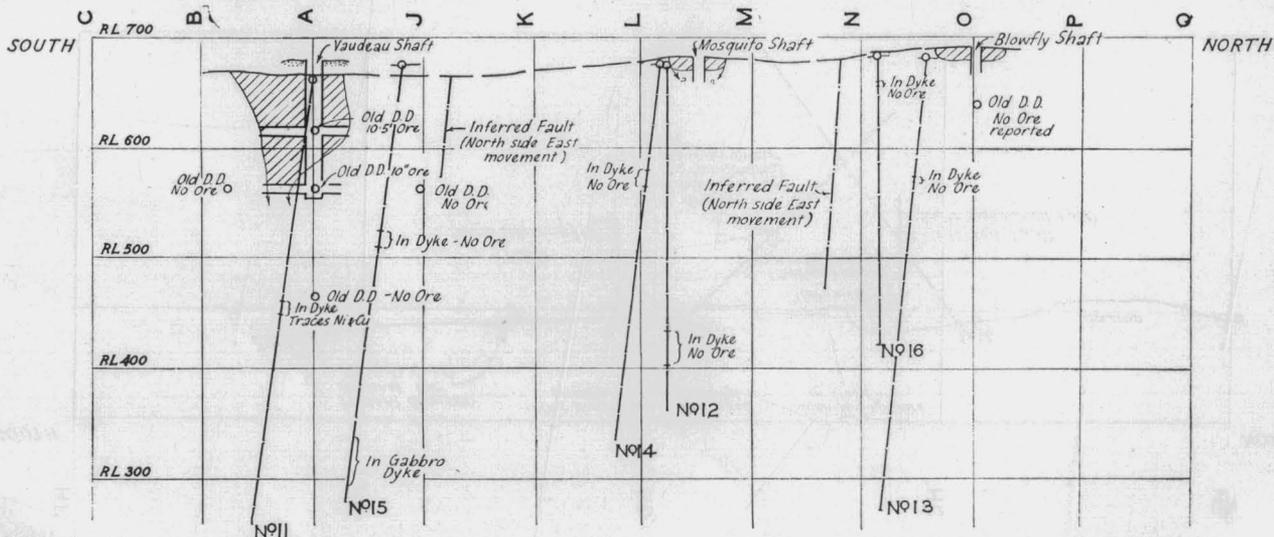
(4) At the Devereau section, one hole to test any chance of a westward "make" would be warranted.

(5) At the Nickel Reward further surface trenching with possibly some drilling north and/or south of the shaft area (e.g., on the North-East Dundas tram west declined drill hole), is necessary. In view of the ore shown in the work to date this is the most interesting prospect in the area. The grade of the sulphide outcrop (ca. 6% Zn, 4% Cu, and 9% Ni) is exceptionally encouraging.

LONGITUDINAL PROJECTION—VAUDEAU SHAFT SECTION

PROJECTION PLANE IS PARALLEL TO GEOPHYSICAL
BASE LINE (I.E. 172°)

0 100 200 FT.



DRILLING TWO SERIES OF HOLES (2) (1913-14) MARKED OLD D.D. AND (b) (1930) MINES DEPT. NOS 11, 12, 13, 14, 15, 16 & 17. (NB. N°17 WAS TOO FAR WEST TO CUT DYKE.)

ORE LIMITS ---

STOPPED GROUND --- ---

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Figure 6

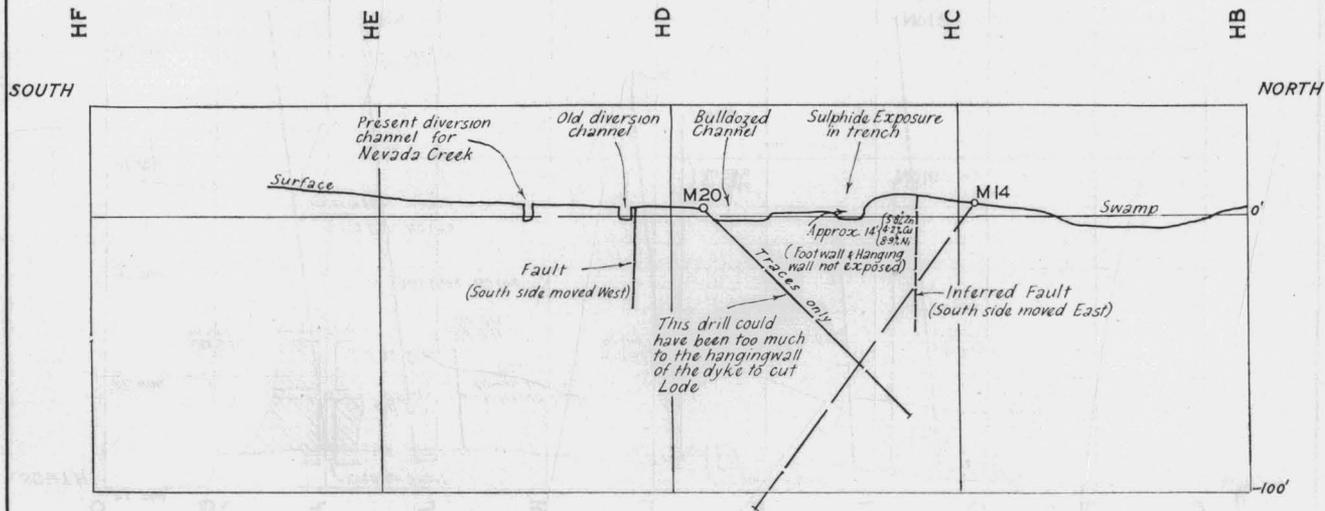
5 cm

5 cm

LONGITUDINAL PROJECTION-NICKEL REWARD EASTERN LODE

PLANE OF PROJECTION BEARS 7°30' MAGNETIC

0 40 80 FT



DATUM FOR LEVELS - COLLAR OF SHAFTS = 0'R.L.

NO ORE LIMITS MAY BE SHOWN AT PRESENT.

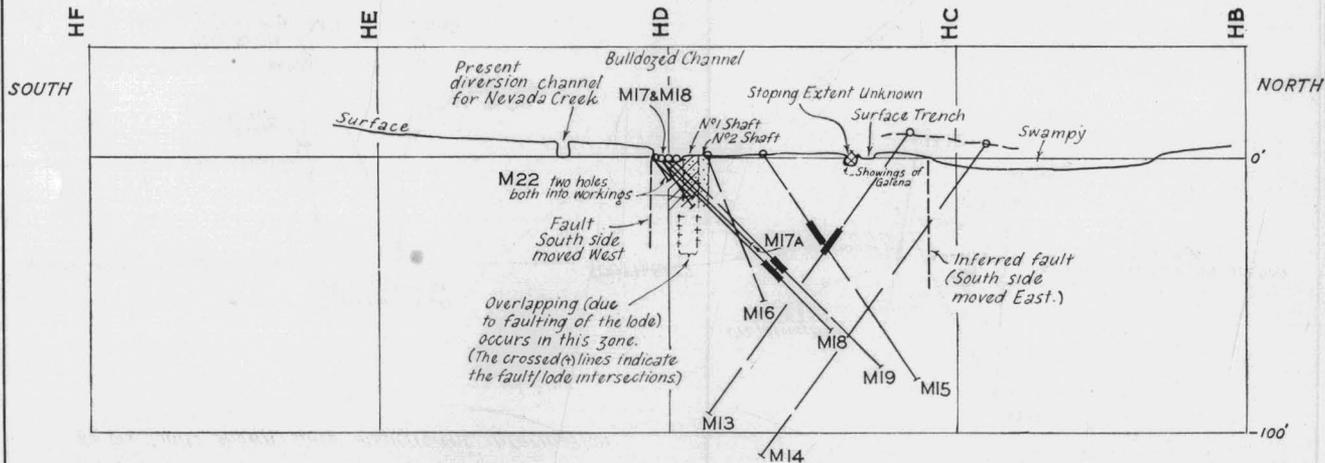
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Figure 7

LONGITUDINAL PROJECTION-NICKEL REWARD WESTERN LODGE

PLANE OF PROJECTION BEARS 7°30' MAGNETIC

0 40 80 FT.



N B IN NO CASE IS THE ENTIRE EXTENT OF STOPING KNOWN. THE ORIGINAL DEPTHS OF THE NICKEL REWARD SHAFTS N°1 & N°2 ARE NOT KNOWN.—AT PRESENT THERE IS MUCH DEBRIS IN THE SHAFTS AND THE DEPTHS MEASURED MAY NOT BE CORRECT. DRILLING RESULTS AT NICKEL REWARD WERE VERY POOR SINCE MANY HOLES WERE DRILLED NEARLY PARALLEL TO THE LODGE FOR THIS REASON LODGE INTERSECTIONS ARE OF EXAGGERATED SIZE AND CORE RECOVERY WAS POORER THAN WAS USUAL

- STOPING FROM N°1 SHAFT.
- STOPING FROM N°2 SHAFT.
- OTHER STOPING

- DRILL HOLES ---
- Ore Shown
- End of hole

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Figure 8

5 cm

5 cm

DEVEREAU SECTION

0 50 100 FT.

LONGITUDINAL PROJECTION

PROJECTION PLANE IS IN DIRECTION 140° MAGNETIC.

No ore limits shown since insufficient information

SURFACE PLAN

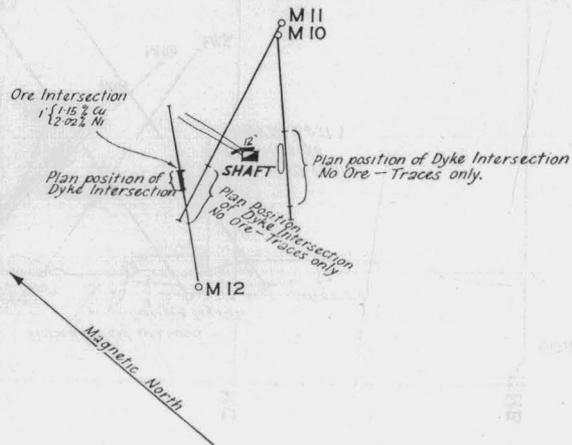
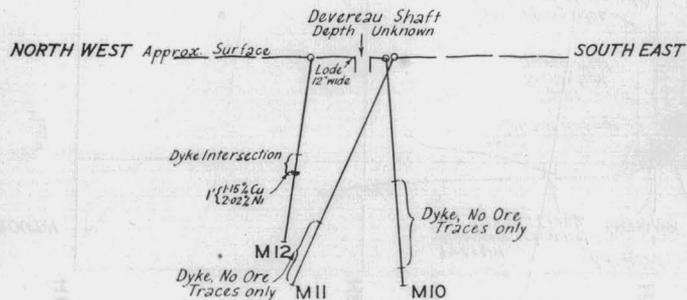


Figure 9

(6) In the Genet's Winze section, production could start without any further surface exploration, but it is recommended that the shaft sinking be done by inclined shaft to the very bottom of the lode before laying out the levels, as it might be possible to take out this shoot using only one level.

Conclusions.

From 1952 to now the following items have been found:—

- (a) No new ore-shoots were revealed by geophysical prospecting.
- (b) Drilling and trenching have shown that ore of sufficient grade and size to be very interesting exists at the Nickel Reward. Further work is needed here.
- (c) Only a very slight possibility exists for an ore shoot at the Devereau section following drilling done.
- (d) Drilling has substantiated the ore reserves of the Genet's Winze section though only M6 need have been drilled here.
- (e) An extension of geophysical prospecting to the north-east from Genet's Winze section and also westward from the Devereau section should be done.
- (f) Testing of the western gabbro sill should be done.
- (g) Geophysical prospecting directed to seek another transgressive step portion of the sill is warranted providing the depth of cover is not prohibitive to either the prospecting or mining.

Much surface trenching is needed at Nickel Reward and no further drilling should be done there until the trenching is thoroughly examined and evaluated.

Mining operations could be started immediately on the Genet's Winze section (provided there is a market for copper-nickel).

The road access to the Genet's Winze section is inadequate for mining purposes, but a branch from the North Cuni tram-track could be easily constructed. Road-making material could be readily obtained from the Lead Blocks dumps.