Report On

F.G. Kirk. ✓

WILORON IRON PROPERTY
Malahat Ridge, Vancouver Island, B.C.

January/61. 1(4)

A.E. Aho.

Aaro E. Aho, Ph. D., P. Eng.

GEOLOGICAL ENGINEER
YUKON 7-2962

4219 LIONS AVENUE
NORTH VANCOUVER, B.C.

EN. 109

Report On

WILORON IRON PROPERTY

Malahat Ridge, Vancouver Island,
B.C.

Submitted to Astra Development Company Limited.
January, 1961.

SUMMARY

The Wiloron Iron property, ideally located on Malahat Ridge near Victoria, B.C., contains numerous lenticular sulfide and magnetite bodies in several zones in limestone lenses and at limestone contacts in a steeply-dipping greenstone-diorite-alaskite complex typical of other British Columbia iron deposits. Some of the magnetite is very pure and occurs separate from the sulfides. Known exposures are small, little systematic work has been done on the magnetite itself, occurrences are scattered over a considerable area, and this type of geologic environment may contain larger economically mineable deposits that are partly or completely covered with overburden.

It is recommended that $5000 be allotted to geologic and dip needle surveys, and possibly a limited amount of trenching, to determine the probable overall potential of the property. This would decide if larger scale exploration and development are justified, and the extent of such work.

C O N T E N T S

ILLUSTRATIONS

PHOTOGRAPHS

Report On

WILORON IRON PROPERTY

Malahat Ridge, Vancouver Island

A.E. Aho
Consulting Geological Engineer. January 15, 1961.

INTRODUCTION

Over the last few years iron mining in British Columbia has attracted increased interest due to Japanese demand for ore and the consequent development of several mines as a result of aggressive exploration, particularly after improvement of provincial government legislation. These deposits occur as magnetite replacement bodies in the Mesozoic Vancouver volcanics that characterize much of Vancouver and Queen Charlotte Islands and the coastal mainland, and are localized by the following conditions:

1. Proximity of dioritic body;
2. Gentle dip of limestone and greenstone or place where limestone butts against greenstone;

The magnetite occurs in the greenstone always close to limestone, or in the limestone near its contact with greenstone. Alaskite bodies and fault or fracture zones also occur around most such deposits and may have some bearing on ore localization. Increased dip needle prospecting and magnetometer

surveys, coupled with geologic work, have resulted in discovery of several important deposits in hitherto undeveloped areas.

The Malahat area has been known to contain iron since the latter part of the 19th century but to date no systematic magnetic surveys or geologic mapping has been done on these deposits to indicate what the potential of the area might be.

GENERAL CONDITIONS

Location and Access

The Wiloron property is situated at about 1600 feet elevation on the top of Malahat Ridge, latitude 48°37'N and longitude 123°35'W, on the southeast coast of Vancouver Island about 16 miles northwest of Victoria, B.C. (see enclosed maps).

It is only 2½ miles directly uphill from deep, sheltered tidewater on Saanich Inlet to the east, and about 2 miles uphill from the Esquimalt and Nanaimo railway at elevation 600 feet near the resort area of Shawnigan Lake.

It can be reached easily by driving along the main Island highway, along the paved B.C. Cement Company road for about a mile, and then up two miles of rough logging road which leads through the centre of the property within a few hundred yards or less of most of the showings. A 4-wheel drive vehicle is required for the last half of the logging

road.

A haulage road or tramline could be easily constructed to connect either with the B.C. Cement Company dock on Saanich Inlet; or with the E & N Railway, which leads about 18 miles to docks at Victoria.

Topography and Overburden

Most of the showings occur in an area of relatively gentle topography between four higher knobs at the top of the ridge (see Photo No.1). Steeper slopes drop off to the north and east.

Bedrock is exposed in numerous outcrops throughout most of the area, but stretches up to several hundreds of feet in extent are mantled with an overburden of glacial till which is very shallow in most places. At a guess, about 80 percent of the area seen is covered to varying degrees by overburden.

Minor sink holes, depressions, and limestone caves occur along sections of limestone bedrock with which the mineral showings tend to be associated.

Forest Cover

Vegetation consists of scrubby Douglas fir, thickets of second growth fir, alder and some jackpine with an understorey of salal, bracken, etc., characteristic of areas of Vancouver Island that have been logged sporadically. Recent logging has left a number of "cat" roads, making travel

easy over parts of the ground.

MacMillan and Bloedel Limited hold surface and timber rights under tree farm licence governing the area.

Water

Oliphant Lake on the southeast end of the property is dammed and used by B.C. Cement Company for a water supply. Whether a substantial supply would be available from this source would have to be investigated. Other minor creeks and ponds are sufficient for exploration purposes except probably late in summer.

Power and Other Facilities

The main B.C. Power Commission transmission line passes by the east corner of the property only a few thousand feet from all showings.

Numerous other facilities of all types are available in Victoria and in other nearby communities.

Climate

Climate is equitable, typical of eastern Vancouver Island, with only moderate rainfall of the order of 40 inches per year, and occasional snowfalls in winter months.

HISTORY

The property has been prospected from time to time

Andrew Arland, prospector for Noranda Exploration; and possibly by others. Except for limited rough dip needle work by Arland and similar M-scope prospecting by the owners, no thorough examination or geophysical work has been done.

PROPERTY (See enclosed map, Figure 2)

The present property of fifteen mineral claims, staked in 1957 and 1959, covers an original block of fifteen crown granted claims, Nos. 11G-21G and 31G-34G. The present claims stand as follows:

Name of Claim	Record No.	Owner	Expiry Date
Wiloron 1- 4	8126-8129	Wilfred H. McKnight	June 25/61
Wiloron 5-15	9283-9293	Thomas Kirk	Nov. 16/61

The claims are jointly owned by the Wiloron Syndicate consisting of Thomas Kirk, Ronald Welsh, Lorne Welsh, and Wilfred McKnight, all of Victoria, B.C. The property lies within the Esquimalt and Nanaimo Railway Company land grant but a grant of 4000 acres (6.5 square miles), shown in red on the accompanying map, is held over an area which surrounds the claims to several times their area. More area could be obtained if desired. The grant itself is free and only a nominal rental is required if it is to be held for production.

The property is under option to Astra Development Company Limited, Box 805, Victoria, B.C., which is managed by Mr. E.C. Brand of 1002 Pakington Ave, Victoria, B.C.

by various individuals since the 1890's. Some work was done about 1897-98 and again about 1903 or 1904, apparently largely in search of gold which occurs in other showings in the area. In 1906 and 1907, the "old" Tyee Mining Company carried out much trenching and drove several short shafts and adits to test the sulfide sections for copper. It is reported that around this period a small trial smelter shipment was brought out by packhorses from No.7 showing, where the best copper values occur.

Further work was done in the 1930's, and in recent years the cuts have been cleaned out and extended. Except for limited recent work, very little has been done to expose or test the magnetite sections.

The property was visited about 1912 by C.H. Clapp of the Geological Survey of Canada (G.S.C. Memoirs Nos. 13,96) and presumably by other company representatives around this period and in subsequent years. In 1941, F.B. Chettleburgh examined the property for the "new" Tyee Mining Company. Up to this time the emphasis was entirely on the copper-bearing sulfide deposits with little or no attention being paid to iron ore.

In recent years, with interest aroused in both copper and iron ore, the property has been staked since about 1948 and has been briefly visited by James Black, geologist for the B.C. Department of Mines in 1953; by James Billingsley, geologist for Cowichan Copper Company around 1957; and by

Former B.C. Government legislation designed to restrict export of iron ore has been rescinded so that there is now no undesirable restriction. It is understood that a small royalty would have to be negotiated with the Esquimalt and Nanaimo Railway.

PRESENT EXAMINATION

The writer was engaged by Mr. Brand to examine and report on the potential of the property. Two days, January 8 and 9, 1961, were spent examining and sampling in the company of Mr. Brand and the owners.

GEOLOGY AND MINERALIZATION

Rock Types

Rocks in the area consist of a greenstone-diorite complex with some bands of crystalline limestone, cut by minor alaskite, and andesitic dikes. This section appears to be typical of the Vancouver volcanics with included Sutton limestone, but slightly more metamorphosed than most sections, perhaps due to the proximity of the Wark diorite-gabbro gneiss to the southwest.

The greenstone, the most common rock, is all recrystallized to some extent, suggesting metamorphism of intermediate grade, perhaps lower amphibolite facies. It commonly grades into dioritized sections of varying grain size.

The diorite, the next most common rock, is medium-

grained and allotriomorphic-textured with no suggestion of gneissic structure as described in the Wark gneiss.

Limestones in the section are white to dark grey, obscurely banded, and mostly coarsely crystalline. They occur as several series of lenses a few feet to hundreds of feet in extent, with one or more bands up to 200 feet in width extending for thousands of feet along strike within the greenstones and diorites.

Alaskite bodies up to several tens of feet in width parallel the older rocks or cut across them; perhaps they are genetically related to the mineralization. Small andesite dikes cutting the above rocks are presumed to be post-ore as in other magnetite deposits in coastal B.C.

Structure

The above rocks strike N 55°W and dip steeply, from 65°NE to 65°SW, with local flattening noted in a couple of places.

No major faulting was recognized although gouge and fracture zones do exist.

Geologic mapping will be necessary to define further structural relations.

Mineralization

(See owner's plan of mineral showings, Figure 3)

Mineralization consists of pyrometasomatic replacement or "contact" deposits which replace limestone or limy

sections near contacts with greenstone or diorite. They consist of two intermingled or complementary types: (a) massive pyrrhotite and pyrite with minor chalcopyrite in skarn, and (b) magnetite in skarn.

More than a dozen separate showings were seen, of which nearly all contained sulfides with or without intermingled magnetite, and two (No.13 and SE of No.12) showed massive magnetite with little or no intermingled or associated sulfides. All of the showings seen, with the exception of Nos.12 and 13 which are larger, appear to be a few feet wide and have been traced only a few tens of feet along strike by M-scope or dip needle. In plan on surface, the deposits are elongated parallel to strike of the surrounding rocks; but their occurrence in numbers suggests that they may well be flattened, pipelike bodies which would extend to depth in comparable numbers and quantity.

The various showings seen by the writer occur briefly as follows (see owner's plan, Figure 3):

No. 1 -- Partly caved trench beside road, showing some rusty coarse-grained magnetite, probably with sulfides, over perhaps several feet. M-scope anomaly reported to be 10'x 10' area; surrounded mostly by overburden for several hundred feet.

No. 2 -- Exposure of diopside-rich skarn with magnetite and mingled massive pyrrhotite with several percent chalcopyrite in patches over 4-5' width of exposure. M-scope anomaly reported to be

about 25' wide and perhaps 100' long.

On NW end of anomaly is width of perhaps 15 feet or more of outcrop and float of skarn with magnetite. A composite grab sample of the better material, taken by the writer, assayed 55.4% iron.

No. 3 -- 30' adit driven at Az 240° to intersect 15 to 20' shaft sunk on 2 - 5' wide lens of limestone and skarn with concentrations of magnetite, mingled pyrrhotite, and some chalcopyrite, striking about N 60°W and dipping about 65-70° SW. Traced by M-scope about 20' to SE and 80' to NW. Anomalous response also in hollow on northeast side.

No. 4 -- Magnetite 1-2' wide, striking N 45°W and dipping moderately SW, near footwall of 60-80' thickness of limestone which strikes N 55-60°W, dips 75°NW, and is traceable for several thousand feet. A short distance to the NE, flat dipping limestone is overlain by diorite.

No. 5 -- Cut with about 1.5' width of magnetite and sulfides traced 25-30' on hanging wall side of limestone band perhaps 20-30' wide.

No. 6 -- Open cut about 400'NW of No.5, driven SW into hanging wall of 80-100' limestone band (probably same as at Nos.4, 8, and 9), shows 10' skarn irregularly mineralized with magnetite in the

centre; pyrite and pyrrhotite on hanging wall side. Traced 50' to SE, 50' to NW with M-scope; sink hole just to SE shows similar iron and a similar sink hole is reported halfway between Nos. 5 and 6.

No. 7 -- Two 3-foot wide bands of massive pyrrhotite and pyrite with chalcopyrite, striking N 55°W, dipping 62°SW, and exposed by an open cut driven N 85°E (photo No.2) and by a caved shaft with perhaps 80 to 100' of workings twenty feet to the SE on the NE zone (photo No.3). Country rock between zones and to the sides is altered greenstone skarn.

A sample cut across the SW zone, mostly sulfides, assayed a trace of gold and of silver and 0.6% copper across 3 feet. A composite sample from two to three tons of dump from the shaft sunk on the NE zone assayed a trace of gold, 0.55 oz/ton silver, and 1.30% copper.

No. 8
No. 9 -- 15' adit (No.9) driven into 3-5' pyrrhotite-magnetite zone with pyrite and chalcopyrite in 15' of skarn on hanging wall contact of 50-80' thick limestone band (same as on Nos. 4 and 6); traced 10' to SE, 50' to NW where a second cut (No.8) shows pyrrhotite and chalcopyrite. Sulfides

on dump assayed 0.02 oz/ton gold and 0.60 oz/ton silver.

No. 10 -- Adit (photo No.4) driven at 215° through diorite into irregular masses of pyrrhotite with chalcopyrite up to 3' wide, and of coarse magnetite up to 4' wide, locally flat-lying but too irregular to determine extent. Adit goes in about 50' with crosscut 15' left at 30', from which 15' raise goes to surface, and other drift extends about 20' subparallel to adit. Sulfides on dump assayed 0.005 oz/ton gold and 0.25 oz/ton silver.

No. 11 -- Shaft perhaps two hundred feet NW of No.10, reported 30' deep, stopped in magnetite and pyrrhotite in limestone (seen on dump).

No. 12 -- Two adjoining lenses 10-20' wide of pyrrhotite and magnetite (about 50% of each) with pyrite and minor chalcopyrite, apparently striking irregularly northwest in skarn and greenstone and extending perhaps a hundred feet along strike; probably interconnected lenses since exposed only a few feet apart. SE end of NE lens assayed as follows from NE to SW across a width of 8 feet:

0-4' -- 0.14 oz/ton gold, 0.35 oz/ton silver, and 0.20% copper in heavy pyrrhotite, magnetite, and pyrite with minor chalcopyrite;
4-8' -- 0.005 oz/ton gold and 0.40 oz/ton silver in skarn with sulfides (photo No.5).

A hundred feet southeast of this sampled cut on No. 12, five exposures of pure magnetite bedrock or float occur over an area about 50' in diameter, from which a composite grab sample assayed 48% iron, 0.16% sulphur and 0.002% phosphorous. Abundant greenstone is exposed nearby, magnetite not traced far by M-scope.

No. 13 -- Pure massive magnetite with minor pyrite and pyrrhotite exposed in 5' wide outcrop (photo No.6) with trench about 15' to NW, apparently formerly showing about 10' width of magnetite with indications of extensions reported in pits some 20' to S and to NW. A channel sample across the 5' exposure gave 66.5% iron, 0.43% sulphur, and a trace of phosphorous; while an additional 3 feet of float on the SW end of this sample gave 68.9% iron. The associated magnetite anomaly, described by the owners and checked by the writer, appears to be kidney shaped with a marked high 30-40 feet wide at the outcrop and with gentler lows extending broadly to the NW and more narrowly to the S so that the entire anomaly is about 130-140' long and 50-60' wide.

The magnetite outcrop lies at the base of a slope with greenstone outcrops to the NE, overburden over the magnetic anomaly which lies in a

swale, and diorite outcrops on the other side to the west. Little or no bedrock is exposed over the anomaly itself and, extending along the swale to the NW and SE, much of the surroundings are also covered with overburden. About 150' to the west of the magnetite outcrop, in the centre of the swale, are exposures of alaskite, greenstone, limestone and minor skarn with a few inches of magnetite, striking N 45°W and dipping 65°NE to vertical. To the west of these exposures, extending up the opposite slope, are the numerous diorite outcrops.

Grab samples taken by the owners in 1959 and assayed by the Department of Mines in Victoria, B.C., gave the following results:

Showing No.	Gold oz/ton	Silver oz/ton	Copper %	Iron %
1	trace	nil	0.03	62.78
2	nil	trace	0.48	41.62
3	nil	nil	0.02	63.70
4	trace	trace	0.16	42.87
5	nil	trace	0.01	62.03
6	0.01	0.3	0.80	42.33
7	nil	nil	0.09	62.33
8	0.80	0.7	4.33	25.84
9	0.08	0.7	2.38	57.33
10	nil	nil	0.02	67.03
11	nil	nil	0.15	51.02
12	nil	nil	0.15	56.72
	---	---	----	36.36
	nil	trace	2.80	43.92
13	nil	nil	----	66.72

Most of these samples were apparently sulfides with magnetite.

Samples taken by the writer in 1961 (see description of showings) and assayed by J.R. Williams & Sons in Vancouver, B.C., gave the following results:

Sample	Gold oz/ton	Silver oz/ton	Copper %	Iron %	Sulphur %	Phosphorus %
- #2 NW end .... (grab)	----	----	----	55.40	----	----
- #7 SW zone (3' channel).	trace	trace	0.60	----	----	----
- #7 dump from shaft	trace	0.55	1.30	----	----	----
- #10 dump	0.005	0.25	----	----	----	----
- #12 SE end (channels NE to SW) 0-4'.	0.14	0.35	0.20	----	----	----
4-8'.	0.005	0.40	----	----	----	----
- Grab of magnetite 100'SE of #12	----	----	----	48.00	0.16	0.002
- #13 (5'channel)	----	----	----	66.50	0.43	trace
- Grab of float.	----	----	----	68.90	----	----

Except for No.2, the magnetite 100' SE of No.12, and that from No.13, which represent magnetite only, the other samples are all sulfides, some with intermingled magnetite. The owners' assays and those of the writer show that the slight gold and silver values occur mostly with the copper and not with the magnetite or other sulfides. Radioactivity is reported to be no greater than background. Spectrochemical analyses of several of the owners' samples show a small fraction of a percent zinc and only normal traces of other metals. All samples taken by the writer were checked for tungsten under ultraviolet light but none was detected.

Several other localities with magnetite float, M-scope

anomalies, dip needle readings, or rust are known on the property and other magnetite showings with or without sulfides occur in the surrounding district. A water well dug at Shawnigan Lake to the northwest is reported to have stopped in massive magnetite. Thus there appear to be numerous magnetite occurrences over a sizeable area which, as far as could be determined, has never been systematically covered ~~even~~ with a dip needle.

CONCLUSIONS

1. The Wiloron Iron property is ideally situated for ease of access, transportation, dock facilities, power, climate and other factors.

2. The property and adjoining area is underlain by steeply-dipping, northwest-striking Vancouver volcanics (greenstone), limestone, diorite, alaskite and andesite dikes; rocks that are characteristic of other iron-producing localities in coastal British Columbia.

3. Mineralization consisting of numerous exposures of iron sulfides and magnetite iron ore, intermingled or separate from the sulfides, is localized in several zones in the greenstone, in small limestone lenses, and at contacts of larger limestone bands.

4. The limestones and associated mineralization are more easily eroded than the other rocks and consequently tend to form slightly lower topography which is covered by more overburden which partly or completely masks many of the sulfide and magnetite deposits.

5. The known sulfide and magnetite exposures are small and pod- or lens-shaped in plan but they are steeply dipping, may well be pipelike, and are thus probably as abundant at depth as on surface.

6. Pure high grade magnetite virtually free from phosphorus and separate from the sulfides occurs at several localities, and similar magnetite is reported in the surrounding district. In the sulfides themselves, low gold and silver values are closely associated with a modest copper content which could be important only as a by-product; otherwise the sulfides appear to be of little economic interest since they do not constitute an acceptable source of iron ore.

7. Further preliminary exploration is definitely well justified in order to define the potential of the property and its surroundings in view of the following: the geologic environment, the numerous showings, the occurrence of pure magnetite, the sizeable district over which magnetite showings are reported, the presence of local flat dips suggesting structural complexity, the extent of overburden in places, and the lack of systematic magnetic or geologic surveys. The right localizing geologic environment (see introduction) may well contain one or more large concentrations of relatively pure magnetite that would be economically mineable in this ideal location.

RECOMMENDATIONS

It is firmly recommended that a modest program of preliminary exploration be conducted as follows to determine the probable potential of the property before larger scale exploration is decided upon:

(a) Semi-reconnaissance geologic mapping to define favourable structures or areas of flat dips for detailed dip needle work, and to provide a framework for interpretation of the dip needle anomalies in terms of potential.

(b) A systematic dip needle survey to cover all areas of overburden particularly along favourable magnetite-bearing sections. This should locate all sizeable magnetic anomalies caused by sizeable magnetite bodies.

(c) Trenching and other work to test one or more of the better anomalies for extent and grade, if possible, at modest cost.

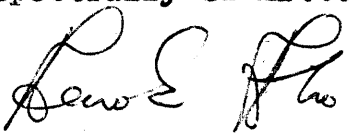
A total of $5000.00 should be allotted to this work, costs being estimated approximately as follows:

Geologic work	$1500
Dip needle survey	2000
Trenching and other	1500
Total;	$5000.00

This work should determine the extent of magnetic anomalies in relation to favourable geology both on the claims and on some of the adjoining area, and thus give a picture of overall probable potential. The results of this work would determine whether larger scale exploration and development are justified, and what the course of this work would be, and thus what major expense would be involved.

Strong anomalies about 150 feet or more in length and 50 feet or more in width should be trenched by bulldozer if overburden is light, to determine surface dimensions and grade, and drilled to determine depth continuity and probable tonnage.

Respectfully submitted,



A.E. Aho.

Vancouver, B.C.
January 15, 1961.

Photo No.1
General terrain and forest cover on property, viewed northwest from near #12 showing

Photo No.2
View SE of 3' of sulfides (between clothing and tree) on SW zone at #7 showing. Cut to left intersects NE zone (3'0

· JAN · 61

Photo No.3
Shaft (foreground) and dump at #7 showing.

· JAN · 61

Photo No.4
Portal of #10 showing and dump.

· JAN · 61

Photo No.5
View northwest along 8-foot width of sulfides on SE end of #12 showing; heavy sulfides on right (NE) side.

· JAN · 61

Photo No.6.
No. 13 showing veiwed northwest, illustrating sampled outcrop which extends to log-filled trench right of stump.