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REPORT ON GEOLOGICAL SURVEY AND ECONOMIC POTENTIAL OF IRON ORES

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1617 Bayview Ave.
Willowdale
Toronto, Ontario

W. N. INGHAM, Ph.D.
Consulting Geologist

REPORT ON GEOLOGICAL SURVEY AND ECONOMIC POTENTIAL OF IRON ORES

DUNCAN RANGE IRON MINES LIMITED

Southwestern Ungava District
Quebec
Canada

By

W. N. Ingham, Ph. D.,
Consulting Geologist.

November 18, 1958.

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ILLUSTRATIONS

Twenty-three photographs, mainly of iron formation.

Four geological map-sheets at 400 feet to the inch.

One composite geological map at 1,320 feet to the inch.

Duncan Range Iron Mines Limited,
Suite 415,
18 Toronto Street,
Toronto, Ontario.

Gentlemen:

This report describes the economic potential and the geological environment of the magnetite iron ore deposits on your 43 square mile Mineral Exploration License, in the Ungava District, Quebec, Canada. The report is based on a personal field mapping, examination, and sampling program carried out during June, July and August, 1958. It is concluded that your property embraces one of the largest iron deposits in Canada. Moreover, metallurgical test work shows that the ore is readily amenable to magnetic benefication, the concentrate containing 66% iron and only 6% silica with an average recovery of 94% for the six main orebodies.

PROPERTY

The property of Duncan Range Iron Mines is held under a Mineral Exploration License (M.E.L.) No. 137, Block 335, granted to the Company by the Province of Quebec, Department of Mines, in October, 1957. The M.E.L., loosely called a "Mining Concession", covers an area of 43 square miles. It is centred at Latitude 53°- 41'. The property is elongated in a northeast-southwest direction, with a length of 17 miles and average width of 2.5 miles. The west boundary is at Longitude 77°- 51', the east at 77°-33'; the north boundary is at Latitude 53° - 37', and the south at 53° - 27'.

LOCATION AND ACCESS

The property is in the southwestern section of the Ungava District of Northern Quebec. It covers the eastern end of Duncan Lake, a body of water some 17 miles long and 5 miles wide. The centre of the M.E.L. is 52 miles east of James Bay, at a point on the shore that is 22 miles south of Fort George. Fort George, a Hudson Bay Company Post, which is inhabited by about 900 Indians, is the nearest settlement in the area. It is on the shore of James Bay, at the mouth of the mile-wide Fort George River. Great Whale River, on the shore of Hudson Bay, where a major radar installation and airport for large planes are located, is 110 miles north of the M.E.L.

Duncan Lake is 360 air miles north of the float plane air base at Senneterre, Quebec. This is a small town on the main northern line of the Canadian National Railway, 360 miles northwest of Montreal, Quebec. Chibougamau is 340 miles southeast of the property. The northern terminus of the Ontario Northland Railway at Moosonee, Ontario, at the south end of James Bay, is 180 miles by water from Fort George.

TOPOGRAPHY

The M.E.L. is at the east side of a low peneplain extending eastward for 60 miles inland from James Bay. This terrain is mostly muskeg-covered and flat, except for a few, low, rocky hills and unconsolidated glacial eskers and morraines of

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sand, gravel and boulders.

Duncan Lake is 475 feet above sea level. Desaulniers Lake, in the eastern part of the M.E.L., is 495 feet above sea level. The property area is moderately wooded with mainly spruce and jackpine trees, a few of which attain 10 inches at the butt in the muskeg sections. The Rusty Hills between Honsberger Lake and Duncan Lake rise about 150 feet above the water. Figure 1 is a view of the terrain looking north from the Rusty Hills toward islands in Duncan Lake. Magnetite Hill, on Almond Island, is about 80 feet high. A prominent glacial esker, 25 to 100 feet high, and up to a mile wide, extends along the north side of Desaulniers Lake for 10 miles southwestward to north of Maloney Lake. An Indian portage route follows high ground from Cabin Bay on Duncan Lake to Maloney Lake, to Beutl Lake, to Iron Lake and to Desaulniers Lake. Espirit Lake can be reached from Duncan Lake by portages via Honsberger and Ingham Lakes.

Figure 1. - Typical terrain of the western part of the Duncan Range Iron Mines property, Ungava District, Quebec.

Duncan Lake drains south into Espirit Lake by a short series of rapids dropping about 12 feet. Desaulnier Lake drains north by 1/4 mile of rapids at the outlet of Trout River, which drop about 15 feet.

ELECTRIC POWER

Fifteen miles north of the M.E.L., the Fort George River follows a narrow, steep-sided valley eastward towards James Bay. A series of some 25 rapids occur along 30 miles, with a substantial drop in elevation. An airplane observation flight along this part of the river indicates several places apparently feasible for construction of a hydro-electric power dam.

TRANSPORTATION

Several alternation routes can be considered for shipping ore from the property. One is by a 60-mile railway to be built to Fort George, thence by water via Hudson Bay and Hudson Straits to the Atlantic Ocean. Hudson Straits are not navigable during the winter months. A second route is by water south across James Bay, for 180 miles, from Fort George to Moosonee, then by existing railways for about 500 miles to Georgian Bay on Lake Huron. A third possibility is a railway to be built for 340 miles to Chibougamau, thence by rail for 200 miles to Port Alfred on the Saguenay River, from where ocean vessels can proceed to the St. Lawrence Seaway.

A natural sea harbour with 36 feet of water exists at Fort George. It lies at the mouth of the Fort George River behind Stromness Island, a view of the western end of which is shown in Figure 2.

Figure 2. - Air photograph of the western part of Stromnes Island, Fort George, James Bay, Quebec.

PREVIOUS EXPLORATION

The iron ore was discovered in 1949 by J. C. Honsberger, and L. B. Almond and R. Maloney. Honsberger carried out a ground magnetometer survey of thewestern half part of the present M.E.L. in 1953. An aeromagnetic survey of 250 square miles, covering the present M.E.L. and vicinity, was carried out in 1956. During the winter of 1958,extensive ground magnetometer surveys were conducted over the eastern part of the property. The last exploration is the mapping and sampling carried out by the writer during the summer of 1958. Up to the present time, no diamond drilling has been done.

DISTRICT GEOLOGY

Geological Survey of Candda, Map No. 23-1957, shows the general geology of Eastern James Bay Area. A part of this map is reproduced on the generalized geological plan of the M.E.L. accompanying this report. The district is underlain predominately by Archean (Early Precambrian) granite gneiss, within which are large bodies of massive granite to granodiorite. A discontinuous belt of volcanics and sedimentary rocks extends northeastward from the Paint Hills at the shore of James Bay through Duncan Lake, for 180 miles to and beyond Lac Grande Point. These formations are also Archean, except for a restricted area 25 to 50 miles east of Duncan Lake, which is Proterzoic (Late Precambrian) sediments.

PROPERTY GEOLOGY

Survey Control

The surveyed base-lines and conjugate picket-lines established during the 1953 and 1958 geophysical surveys were used as control to map the iron deposits and adjacent formations. Air photographs with stereoscopic overlap, although available only at a scale of 1 mile to 1 inch, proved very useful to locate outcrop areas, glacial hills, and muskeg sections. Extensive areas of the M.E.L.

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not within the limits of the picket-line-blocks, were examined by pace and compass traversing. The base-lines and picket-lines of the 1953 survey were re-cut, and the 100-foot interval pickets set up again, except in the swampy area at the eastern end.

Sampling

The chip sampling process employed consisted not in cutting a continuous channel across a given outcrop, but in breaking off pieces an inch or two in size about 1 foot apart along ledges, cracks, or cross joints. In order to make the samples as continuous and representative as possible, it was often necessary to offset the line of sampling to one side or the other of an arbitrary median line, in order to take advantage of the best exposed parts of an outcrop. In no case does the width samples represent the entire width of the iron ore at that point, because of lack of exposure. In addition to 200 pounds of various hand specimens or grab samples, a total of 955 points of chip samples were collected representing an aggregate sampled width of 4,014 feet. As dictated by the extent of the outcrop, individual samples varied in width from 6 feet up to one, which was taken at all available places, across 1,200 feet.

Map-Sheets

The results of the geological survey are gathered together on five map-sheets accompanying this report. Four of these sheets are drawn at a scale of 400 feet to the inch, and titled Sheet No. 1, Sheet No. 2, Sheet No. 3, Sheet No. 4. Each map is a detail plan

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showing all the outcrops of the various iron ore bodies and the exposures of other rock types. The fifth map is a composite plan of the entire M.E.L., made up by reducing the scale of the four detail sheets to 1,320 feet (one-quarter mile) to the inch. It provides a picture of the 15-mile length of the iron formations on one generalized geological plan.

Acknowledgments

The writer wishes to thank prospectors Rene Maloney and Dan Audet for well done assistance during the field mapping and sampling. J. C. Honsberger aided the project considerably by placing at the disposal of the writer all his accumulated technical data on the area. The author is also indebted to W. Atkins for taking the colored photographs that appear in this report.

General Statement

All of the consolidated rocks of the area mapped are of Precambrian age. They are comprised of an assemblage of volcanics and sediments, intruded by a series of basic to acidic igneous rocks, and by Late Precambrian diabase dykes. The volcanic and sedimentary rocks are strongly folded, being not only up-ended, but also overturned in places. The volcanics and sediments are highly altered; the former in places have been changed to schistose, chloritic rock and recrystallized; and much of the latter have been metamorphosed to fine-grained, banded, biotite-rich schist or paragneiss.

The intrusive series vary in composition from quartz-rich granite to hornblende-rich gabbro. The oldest is an impure granite gneiss, for the most part distinctly banded, and probably formed by slow assimilation and reconstitution of pre-existing rocks. Some of the intrusive rock, such as the gabbro, was emplaced before the folding. The diabase or younger gabbro, is a fresh appearing rock forming cross-cutting dykes, that are classified as Keweenawan age in the better known Abitibi Area of Western Quebec.

TABLE OF FORMATIONS

Era	Period	Lithology
Cenozoic	Pleistocene	Gravel, sand, boulders, clay.
Proterozoic	Keweenawan	Diabase, in part gabbro.
Archean	Post-Keewatin	Granite, syenite. Quartz syenite and quartz diorite porphyry. Diorite, gabbro. Gneissic granite.
	Keewatin?	Amphibolite, paragneiss. Greywacke, quartzite, schist, slate, iron formation. Andesite, diorite, tuff.

Volcanic Rocks

The volcanics on the M.E.L. structurally mainly underlie the sediments and thus are regarded as the oldest rocks. However, definite interbedding of flows and clastic sediments occurs in the eastern part of the property, so it is apparent that there is a certain degree of age overlap. Also, at one location, on the east shore of Volcanic Bay, Duncan Lake, as shown on Map Sheet No. 2, an irregular inclusion of sediments, some 400 feet long, occurs in andesite flows. This is probably the result of molten lava pouring out on top of an uneven surface of sediments and enclosing a large block of the latter.

The volcanic rocks occupy the northern section of the concession, occurring as a belt 8000 feet thick, bounded on the north by granitic rocks, and on the south by sedimentary rocks. They are comprised chiefly of andesite and dacite flows, with minor bands of tuff. On weathered surfaces, they range in color from dark green to brownish to dark grey. They are fine-grained, and in places display poorly-developed to well-formed pillow structures. Figure 3 shows pillowed andesite immediately south of the south limb of iron formation, No. 4 Orebody.

Figure 3. - Pillowed andesite 300 feet south of the south limb of Iron Orebody No. 4. Top of the flow is toward top of the picture, or north.

Sedimentary Rocks

The sediments in the map area are all clastic types, including greywacke, cherty greywacke, chert, impure quartzite, and slate. Cherty greywacke, and greywacke changed to biotite schist predominate. The iron formation itself is also an important member of the sedimentary group. These rocks are all well-bedded, the laminations varying from a fraction of an inch to a foot or more in thickness. The sediments are folded and drag-folded as illustrated in Figure 4.

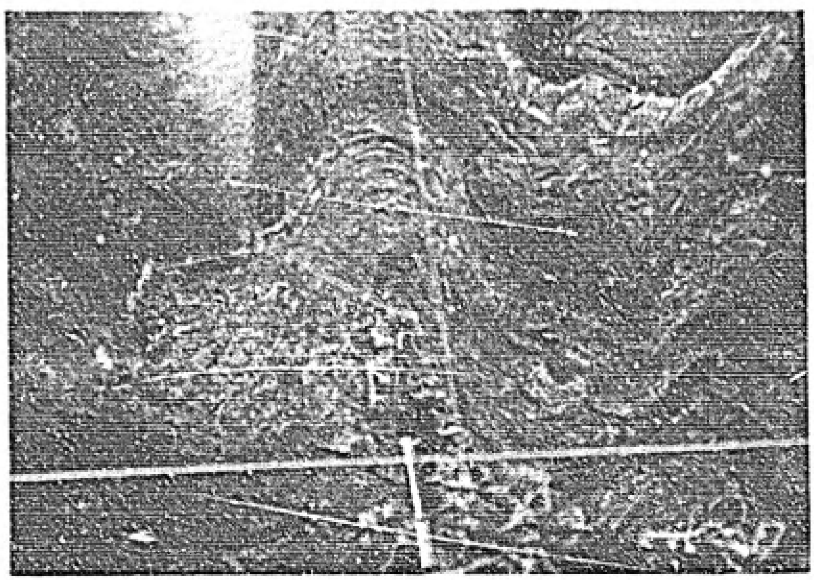

Figure 4. - Drag folding in greywacke east of the north limb, No. 4 Iron Orebody.

Sediments occur as a band some 10,000 feet thick, trending northeasterly along the western two-thirds of the central section of the M.E.L. Large exposures exist north of the No. 1 Iron Orebody. Here, the formations are intensely pyritized across as much as 3,000 feet, as evidenced by numerous, rusty, oxidized, "gossan" outcrops. Figure 5 is a view along the north shore of Honsberger Lake of "rusty" sediments, and it also shows interbedded, slightly cross-faulted, greywacke and quartzite. Dark grey biotite schist and paragneiss comprise the sedimentary band extending northeast from Espirit Lake to and beyond Szetu Lake.

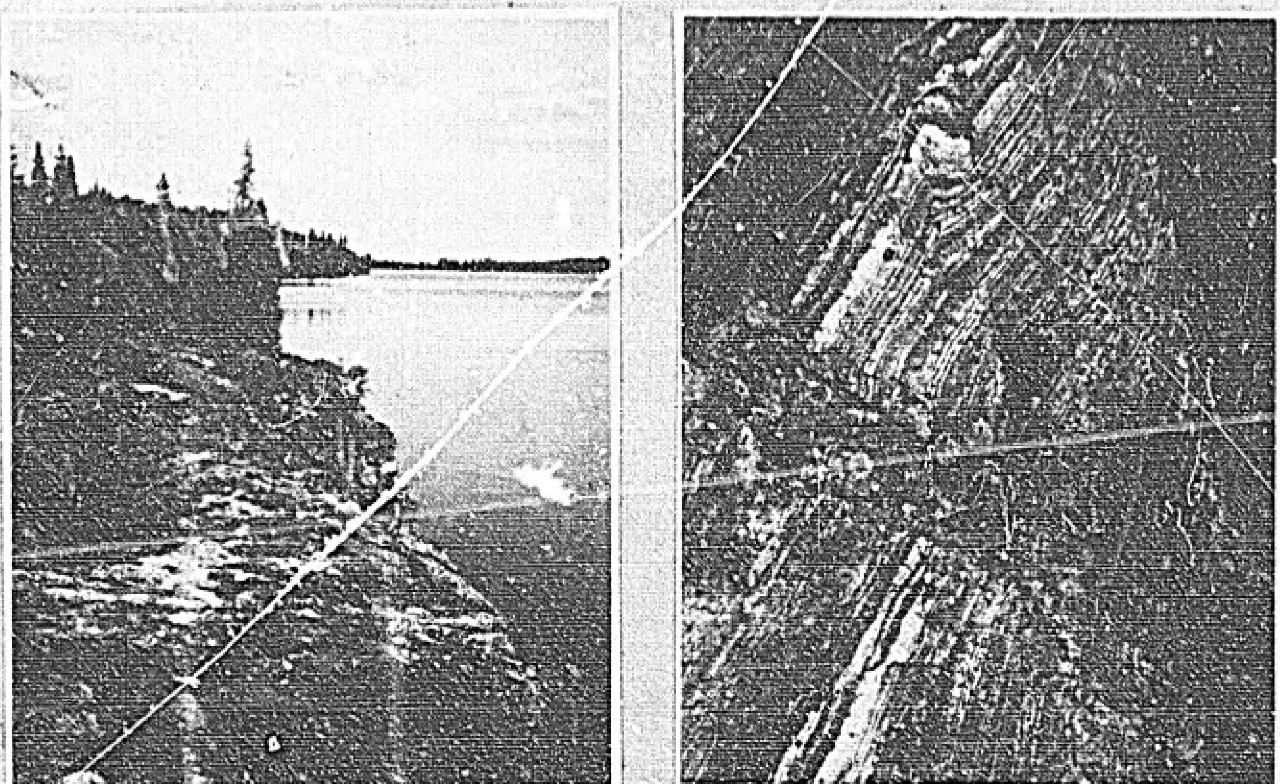

Figure 5. - "Rusty" sediments along Honsberger Lake, and cross-faulted, interbedded greywacke (dark) and quartzite (light).

Greywacke also occurs in the eastern part of the M.E.L. in association with No. 4 orebody, which is a large infolded lense surrounded by volcanic rocks along the axis of an overturned synclinal structure. Thin beds of iron formation lie in the sediments north of

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Honsberger Lake, and wider beds, from 5 to 25 feet wide occur south of the No. 1 orebody and east of the No. 4 orebody. A chip sample of the greywacke across 120 feet adjoining south of the iron formation at the eastern end of Szetu Lake yielded an assay of 10.5% iron.

Amphibolite

This rock type is mapped only on Sheet No. 3. It occurs east of the No. 6 iron orebody, and extends southwesterly from the western end of Desaulniers Lake, as a band about 1,000 feet wide. The map unit is a complex mixture of highly altered sediments, volcanics and probably some intrusive, basic, material. Some outcrops are rich in biotite, others show abundant, chloritic hornblende, and all are more or less granitized and sheared. Original identifying, megascopic structures and textures are obliterated, probably by the adjacent large body of syenite.

Intrusive Rocks

The intrusive rocks of the M.E.L. vary in composition from granite to gabbro. Gneissic granite is believed to be the oldest of the intrusive series. The large lenticular-shaped body of this rock extending for 6 miles within the sediments between Ingham Lake and Beutl Lake is distinctly banded and variable from fine to coarse-grained. It appears to have originated mainly by assimilation, digestion and recrystallization of sediments. It contains narrow dyke-like bodies of basic rock, which are probably recrystallized, more basic beds of the

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primary sediments. The gneissic granite south of the No. 6 orebody is characterized by alternating streaks of pink feldspar and dark green ferromagneisan constituents. Foliation is not well developed in the gneissic granite north of Noack Lake.

The gabbro is a medium to coarse-grained, black rock consisting mainly of hornblende crystals. In most places, it contains scattered grains of pyrite. It occurs as narrow sills and small irregular bodies cutting the sediments north of Cabin Bay, Duncan Lake, and westward along Almond Island. Larger sills outcrop at Ingham Lake as well as south and northwest of Honsberger Lake.

Diorite, quartz diorite, and quartz diorite porphyry intrude the volcanic rocks on the mainland south of Boulder Island, Duncan Lake. Dykes of diorite porphyry, with light brown feldspar phenocrysts, intrude the sediments north of the north band of the No. 1 orebody as far east as the north shore of the east end of Almond Island. In some places the rocks mapped as syenite south of the No. 4 orebody become sufficiently basic in appearance to make them look like diorite.

The elongated intrusive mapped at the western end of Lac Desaulniers is a basic type of syenite with a high proportion of dark-colored minerals mixed with pink to red feldspar. Outcrops along the north shore of the south arm of Szetu Lake are distinctly porphyritic, red syenite. A body of reddish quartz syenite porphyry, lying about a mile southeast of Honsberger Lake, is probably a closely related differentiate of a large stock of pinkish granite to the west. The syenite dyke cutting volcanic rocks just south of the No. 4 orebody on Line G-5-E contains large and small inclusions of iron formation as illustrated in Figure 6.

Fresh, massive, coarse-grained red granite occurs as several small plugs along the north margin of the [illegible]-Beutl Lake body of granite gneiss. Similar granite intrudes the volcanic rocks just west of Volcanic Bay of Duncan Lake, and south of the western end of the No. 1 iron orebody.

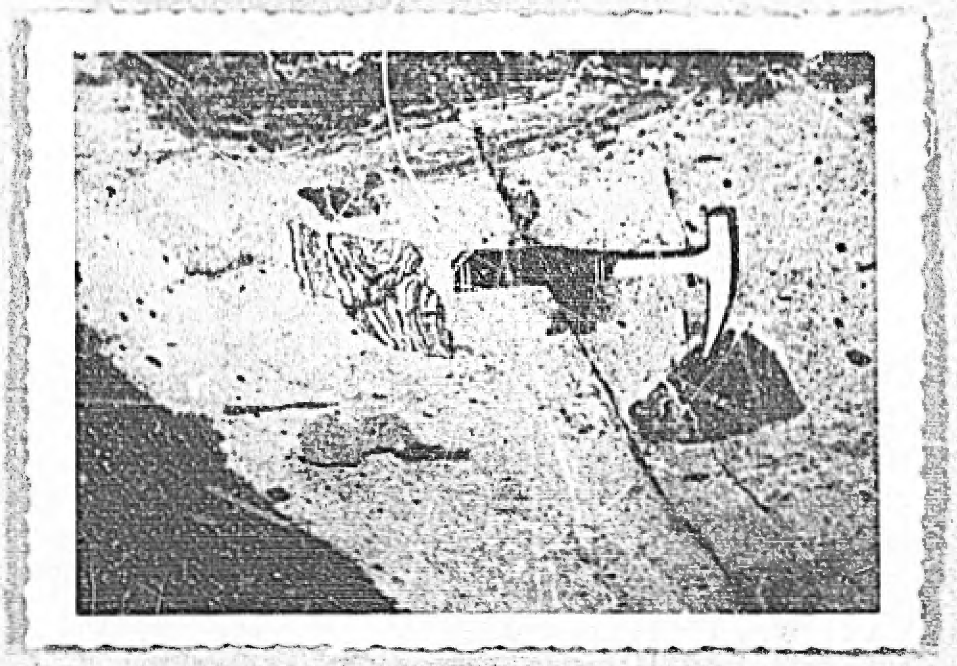

Figure 6. - Basic syenite south of the No. 4 iron orebody in which are included large and smaller fragments of banded iron formation.

North-south striking diabase dykes were found at Noak Lake, Eastern Desaulniers Lake, and at the east end of Honsberger Lake. The latter is up to nearly 200 feet wide, the others are 100 feet wide.

Figure 7 is a photograph of diabase taken at the northeast corner of Honsberger Lake.

Figure 7. - Sharp contact between diabase (left) and sediments (right), No. 1 Map Sheet.

Structure

On the basis of top determinations made from pillowed lavas on either side, a synclinal fold axis is placed centrally along the large lense of sediments containing the No. 4 iron orebody. The south limb of the syncline is overturned, as dips on both sides of the axis are steeply south. The westward continuation of this axis appears to lie between the north and south portions of the No. 3 iron orebody. At this location, the south limb is sharply flexed southward by an anti-clinal cross-fold; and the north limb is contorted by a "Z"-shaped drag-fold.

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All the sediments and volcanics dip south in the eastern part of the area mapped, whereas, from Maloney and Szetu Lakes, for 7 miles to the western end of the mapping, dips are all north or vertical.

The top direction, strike, and dip of the volcanics and sediments south of Boulder Island, and on islands to the east and north , indicates a broad, open synclinal fold with the axis trending east-west across Boulder Island.

Minor drag-folding throughout the area mapped is predominately "S"-shaped, with a steep plunge to the east.' Sharp drag-folding on a larger scale of the No. 1 iron orebody is inferred at the east end of Almond Island.

A strong, northeast-striking cross-fault is believed to occur in the western part of the No. 1 map sheet, entering Duncan Lake at Volcanic Bay. It appears to be the reason for the western termination of the No. 1 iron orebody. If the assumed displacement of the diabase dyke is correct, movement on this fault is west side south. Many shear zones cut the volcanics and sediments all over the area. Strong shearing occurs along the north shore of the eastern end of Almond Island, on the north shore of Maloney Lake northeast of the largest island, a short distance east of Harriet Lake, and south of Noack Lake.

Sulphide Mineralization

Pyrite mineralization is widespread and abundant in the volcanic and sedimentary rocks of the Mineral Exploration License.

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It is finely disseminated through large areas of the sediments north and east of Honsberger Lake, producing extensive outcrops weathered to a reddish brown gossan. It occurs in many places in small shear zones near the gabbro sills. A strong band of sericite schist is heavily mineralized on the north shore of Maloney Lake. Shear zones in the No. 3 iron orebody area are heavily impregnated with pyrite, and it occurs in the volcanics north of the No. 4 orebody. An irregular zone of heavy pyrite mineralization 20 to 40 feet wide, and 300 feet long, occurs in an outcrop of volcanics near the north contact of the syenite at the eastern side of the No. 4 map sheet.

A small amount of chalcopyrite was found in the pyritic sediments 800 feet north of Honsberger Lake between picket lines 130 W. and 143W.. A grab sample from a gossan zone exposed across 4 feet on the edge of a muskeg was found to assay 1.90% copper. This copper occurrence is shown on the No. 2 map-sheet, south of Szetu Lake, a short distance north of the base-line, near Line 00. The showing merits further investigation.

A large vein of white quartz outcrops 820 feet north of the base-line between Lines G-5-E and G-6-E., No. 4 map-sheet. The vein is up to 60 feet wide (See Figure 8). It contains inclusions of country rock, some of which are sparsely mineralized with chalcopyrite and galena. Galena was also found 500 feet to the south in a 3-inch wide quartz veinlet cutting greywacke.

The writer and his helpers did not have any time for prospecting the many rusty shear zones and other bands of pyritic mineralization in the area; but the geological aspects, the widespread pyrite, and the few occurrences of copper and lead observed, lead to the conclusion that the concession has definite base metal possibilities.

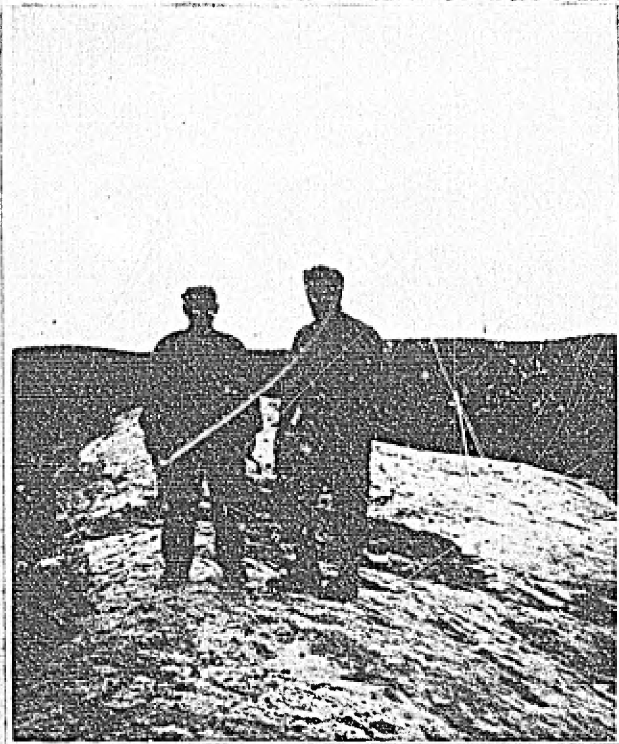

Figure 8. - Prospectors Maloney and Audet standing on 60-foot wide vein of white quartz in the No. 4 iron ordbody area.

IRON ORE

Nature and Distribution

The iron deposits on the Mineral Exploration License of Duncan Range Iron Mines are a typical example of Early Precambrian, sedimentary, iron formation. They consist of alternate silica-rich and magnetite-rich layers, compressed into a relatively fine-grained black rock with a distinct thinly-bedded, or banded structure. Bedding in the rock varies in thickness from paper-thin to an inch or more.

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Grain size is variable from bed to bed, and within individual beds. It also varies within individual deposits and from orebody to orebody. A certain amount of drag-folding and small-scale crenulation occurs in most exposures. Figure 9 illustrates drag-folded iron formation of the No. 4 deposit. Some outcrops display a pronounced jointing pattern, usually at a cross-angle of 20 degrees to the strike, and with a vertical dip. The joints are from 3 inches to 12 inches apart, as shown in Figure 10. They cause the iron rock to readily break into rectangular slabs. Almost everywhere small grains and crystals of pyrite are sparsely disseminated through the iron formations. Considered as a group, the deposits strike N.50°E. They dip mainly on an angle from 70° to vertical.

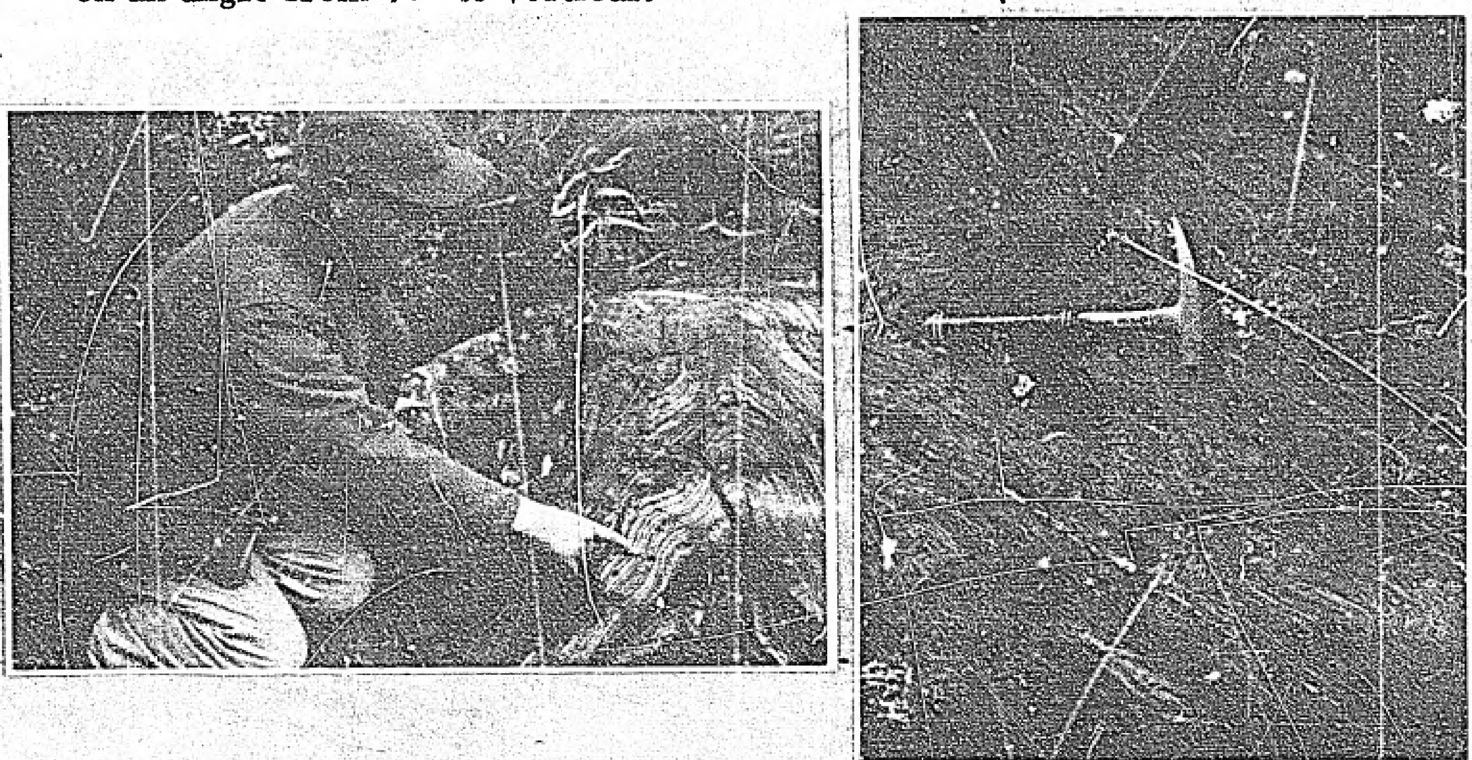

Figure 9. - Drag-folding in iron formation, vertically (left) and horizontally (right).

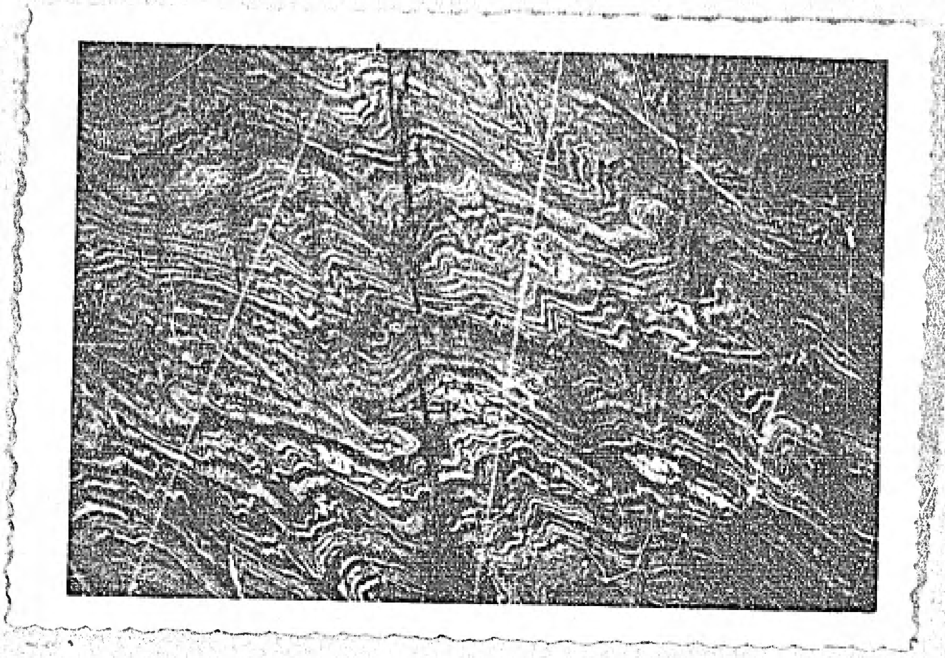

Figure 10. - Vertical cross-joints in crenulated iron formation.
The pencil is oriented along the strike of the bedding.

As shown on the accompanying composite geological plan, the iron deposits are distributed along 15 miles within the boundaries of the M. E. L. The six main orebodies are designated No. 1 to No. 6. Four of these lie along a general northern belt of iron formation and two, No. 5 and No. 6, are part of a southern belt. The No. 1 and No. 2 orebodies constitute an iron-bearing horizon traced continuously for a length of 9 miles, but only the sections of this length that are over 100 feet wide are classified as ore. At one point, the south part of the No. 1 orebody is 1,300 feet wide. The main south band is about 1 mile south of, and parallel to, the main north band.

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Where outcrops do not exist, the width and length of the iron formation used is based on the previous ground magnetometer surveys. The outside limit, or edge, or contact, of the iron orebodies with the weakly magnetic enclosing rocks is sharply defined by the very high magnetic values obtained over the magnetite-rich ore. Actual outcrop exposures of the outer contacts of the iron beds were observed at several places and found to correspond within a few feet of the magnetically inferred boundary. The dip of most of the iron orebodies is very steep, or even vertical, so that the magnetically inferred width is close to the true width at the erosion surface. Since these iron orebodies are simply syngenetic sedimentary formations, with an individual length of as much as 9 miles, it is very reasonable to expect that their depth extension will be great.

No. 1 Orebody

The No. 1 orebody is comprised of two, parallel, overlapping bands of iron formation at the western end of the main north belt. Exposures of the two bands occur frequently throughout the eastern three-quarters of their length, but the western end of the north band is concealed by a wet swampy area. The best outcrop is on Magnetite Hill, at the west end of Almond Island. Here, although full width of the orebody is not exposed, a width of 375 feet can be observed almost continuously across the top of the hill. The two bands of iron formation are separated by a thickness of 200 to 400 feet of cherty greywacke, which contains only a few thin magnetite-rich

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beds, the whole estimated to contain less than 10% iron.

The north band is 19,000 feet long, but 5,000 feet at the eastern end just north of Almond Island, appears to be less than 100 feet wide, so this section is not considered ore. The remaining 14,000 feet has a maximum width of 700 feet and an average width of 400 feet. Specific gravity tests indicate a factor of 9.2 cubic feet of ore per short ton. The tonnage indicated is 608,000 tons per vertical foot. This portion of the No. 1 orebody has the lowest iron content of all the ore on the property, three chip samples with an aggregate sampled width of 220 feet averaging 26.0% iron. However, 6,000 feet of ore at the western end of this band, which could not be sampled because of lack of exposure, may prove to be higher-grade material. Metallurgical test work done on Sample C. S. 18, which was taken across an outcrop 85 feet wide near the centre of the length of the orebody, yielded a concentrate with 62.76% iron, 11.07% silica, and negligible amounts of titanium, sulphur and phosphorus. According to the Metallurgical Report, a copy of which is appended to this report along with the 14 other metallurgical reports on samples from all the orebodies: "It is probably possible to produce a better grade of concentrate containing less silica by rewashing the concentrate in a magnetic field of lower intensity than in the first separation."

Figure 11 is a view of the sample C.S. 18 outcrop of the north band of the No. 1 orebody. Figure 12 shows a bed of relatively high-grade iron formation (36.1% Fe. across 25 feet) of the north band of the No. 1 orebody, outcropping 2,600 feet east of C. S. 18.

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Figure 11. - Outcrop of the north band of the No. 1 orebody at Location C. S. 18.

Figure 12. - Bed of high-grade iron formation in the No. 1 orebody, north band, at Location C. S. 26.

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The south band of the No. 1 orebody is 18,000 feet long. However, 3,000 feet at the west end, and 5,000 feet of the eastern extension are less than 100 feet wide, leaving a 10,000-foot long central section constituting a block of ore suitable for open-pit mining. This block has a maximum width of 1,300 feet and an average width of 600 feet. It contains 654,000 tons per vertical foot. The average grade, as calculated from nine chip samples representing a scattered aggregate sampled width of 1,020 feet, is 34.6% iron. Individual chip samples, as shown on Geological Sheet No. 1, vary in width from 30 to 360 feet, and in grade from 39.1% iron to 31.9% iron. The chip samples represent a length of 6,000 feet of the widest section of the iron formation as mapped on Almond Island and to the west on the mainland. Sample No. C.S.J.C. was collected by J. C. Honsberger. Figure 13 shows two outcrops of the south band, No. 2 orebody.

Figure 13. - Outcrops of the south band No. P orebody. Left photo is at C.S.21, right picture is the south edge of the band at C.S.22. Light grey colour is moss and litchen.

Metallurgical test work has been completed on four samples of the south band, No. 1 orebody. The results are tabulated below:

Sample No.	Feet Width	Iron Grade	Grade of Concentrate	Silica in Concentrate	Percent Recovery	Concentration Ratio
C.S.23 & 23A	210	34.16%	66.69%	6.06%	79.84	2.4
C.S.24 & 28	75	34.85	64.41	8.52	96.26	1.9
C.S.19 to 22	205	35.60	68.67	4.09	98.79	1.9
C.S.27	120	30.81	67.17	5.57	94.27	2.3
Average	152	33.85%	66.73%	6.10%	92.29%	2.1

Detailed results of the tests are shown on the four appended reports, in which it is pointed out that the results are highly satisfactory. Figure 14 shows two exposures of the south band of the No. 1 orebody. If open-pit mining is carried out to a depth of 600 feet, which is the average width, then nearly 400,000,000 tons of ore are available in only this part of the No. 1 orebody.

Figure 14. - High grade outcrops of the south band, No. 1 orebody. Left is at Location C.S. 19, 36.7% iron; right is at Location C.S.20, 39.1% iron.

No. 2 Orebody

This section of the north belt of iron formation extends for 4 miles in length from the north side of Cabin Bay, Duncan Lake, to a point 1/2 mile north of Beutl Lake. As shown on the detail Geological Map Sheet No. 2, it outcrops at two places. One of these is along a high rocky and sand ridge lying between Maloney Lake and Duncan Lake, and the other is a flat outcrop close to the north shore of the eastern part of Maloney Lake. Of the 20,000-foot length, three sections with a total length of 7,900 feet are more than 100 feet wide and are classified as ore.

The west shoot, between Maloney and Duncan Lakes, is 2,300 feet long, with a maximum width of about 150 feet. Sample No. C.S. 14, across 110 feet, assayed 33.6% iron. It yielded a concentrate containing 65.72% iron, 7.25% silica, 0.015% sulphur, and 0.018% phosphorous. Iron recovery amounted to 97.87%, and the ratio of concentration is 1.9 tons of ore to produce 1.0 ton of concentrate.

The centre shoot, along the north shore of eastern Maloney Lake, is 3,000 feet long, with a maximum width of about 300 feet. Sample No. C.S. 15, across 90 feet, assayed 31.2% iron. It yielded a concentrate containing 67.91% iron, only 4.80% silica, 0.017% sulphur, and 0.016% phosphorous. Iron recovery amounted to 97.89%, and the ratio of concentration is 2.2. The metallurgical report (appended) states these results are very highly satisfactory. The titanium assay of the ore has not yet been received, but since these two shoots are in the direct extension of the No. 1 orebody iron formation, which contains

W.J.D.

only 0.11% titanium dioxide, it is expected to be also very low.

The east shoot is connected to the centre shoot by 1,800 feet of narrow iron formation. The shoot does not outcrop, but the magnetometer survey indicates a length of 2,600 feet and average width of 150 feet.

No. 3 Orebody

The No. 3 Orebody lies west of the western end of Lac Desaulniers. It is a complicated structure comprised of three parts designated:the north band, the west limb and the east limb. The north limb appears to be the drag-folded and greatly thickened extension of the No. 1-No.2 orebody main north belt of iron formation. The west limb and the east limb may be the extension of the main south belt of iron formation, occurring as the complimentary limbs of a cross-fold which distorts the original synclinal structure. The contorted pattern of the three components of the No. 3 ore area are illustrated on Geological Sheet No. 3.

The north band, which lies chiefly between Iron Lake and Harriet Lake, has a maximum width of 1,000 feet, and an estimated average width of 500 feet for a length of 7,200 feet. These dimensions yield a potential of 390,000 tons per vertical foot. The ore could not be sampled, as it is concealed by a hill of glacial debris on the south and by a muskeg on the north. Numerous float boulders of iron ore, lying a short distance west along the direction of glacial ice movement, probably come from the ore zone. They assay 35.5% iron.

W.J.J.

The west limb outcrops near its west end and near its eastern end at Lac Desaulniers. Magnetic data indicate a length of 7,400 feet, and a maximum width of 400 feet. An average width of 200 feet is calculated, excluding lenses of sediments, but these lenses may actually be low-grade iron formation. The outcrop on the north shore of Iron Lake near the west end is only 6 feet wide. It was blasted open, as shown in Figure 15. The iron formation exposed consists of relatively coarsely granular magnetite and silica grains in beds that dip vertical. From the standpoint of grain size, it is one of the best looking outcrops on the entire M.E.L..

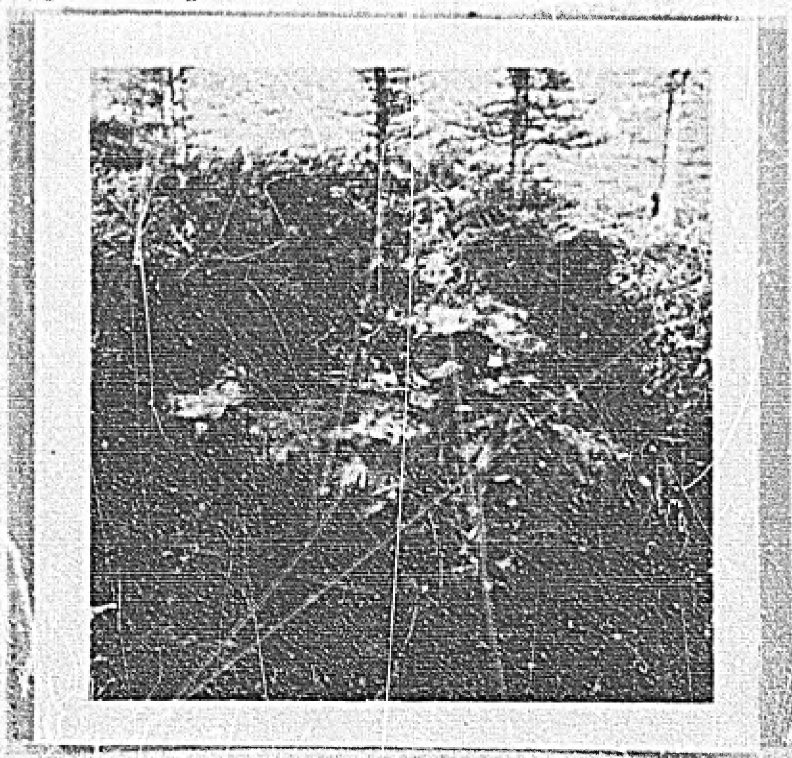

Figure 15. - Stripped and blasted outcrop on the north side of Iron Lake, No. 3 Orebody. This material produced a very high grade concentrate carrying 70.16% iron and only 2.60% silica.

J.J.J.

A conservative calculation of the ore available in the west limb of the No. 3 Orebody is 160,000 tons per vertical foot. A 35-pound sample from the Iron Lake outcrop assayed 31.17% iron. It produced an exceptionally excellent concentrate assaying 70.16% iron, 2.60% silica, and negligible amounts of sulphur and phosphorous. Iron recovery for this test amounted to 97.82%, the ratio of concentration is 2.2. Sample No. C.S. 9, from the eastern part of this west limb, was taken partly along and partly across the strike of the bedding for a length of 65 feet. It assayed 36.2% iron.

The east limb of the No. 3 Orebody lies opposite the eastern portion of the west limb, just north of the eastern end of Lac Desaulniers. This orebody was discovered during the geological mapping program, as it lies just outside the limits of the winter magnetometer survey Block "F". The size and shape of the orebody are based only on outcrops and structural inferences. It is given a length of 3,500 feet, maximum width of 500 feet and average width of 300 feet. The iron formation lies directly on top of pillowed andesite lava. A sample, No. C.S. 6, taken across 238 feet of the east side of the orebody, assayed 28.9% iron. Farther north in this outcrop, the iron-bearing beds appear to be high in silica, so that the average grade of the whole orebody may be lower than 28% iron. Metallurgical test work on C.S.6 yielded a first class 67.44% iron concentrate containing a low 5.10% silica. Iron recovery amounted to 96.43%.

Jo.J.-11.

If the No. 3 Orebody is open-pit mined to an average depth of 500 feet, it should produce over 300,000,000 tons of iron ore. Assuming the two metallurgical tests made are representative, the concentrate will be premium quality carrying 68.8% iron and only 3.85% silica.

No. 4 Orebody

The No. 4 Orebody is a mile north of the eastern part of Lac Desaulniers. It lies along the north slope of Trout Creek Valley, formed by a high volcanic ridge on the north, and a broad glacial esker on the south. Much of the terrain is burned over by recent bush fires, and is relatively open, as can be seen by Figure 16.

The orebody is comprised of two portions, which, on the basis of the direction that the tops of the pillowed lavas face on both sides, form the opposite limbs of a synclinal structure. All of the formations dip steeply south, indicating the south limb of the syncline is overturned. As depicted on Geological Map Sheet No. 4, the two orebodies are separated by a thickness of from 100 to 400 feet of greywacke, which may carry about 10% iron, as indicated by Sample C.S. 5A. The combined width of the two orebodies at their widest section, including 100 feet of intervening low-grade greywacke, is 2,050 feet.

The north limb of the No. 4 Orebody is 5,000 feet long. It has a maximum width of 850 feet and an average width of about 300 feet. Four chip samples at intervals along 4,000 feet of its length, constituting an aggregate sampled width of 275 feet, average 32.4% iron. Two

W.J.I.

samples, C.S.5 and C.S.8, averaging 29.7% iron, yielded a concentrate averaging 65.56% iron, 5.31% silica, 0.98% titanium dioxide, 0.021% sulphur, and 0.022% phosphorous. Although Sample C.S.1 assayed 30% iron across 100 feet, the high proportion of brecciated quartz-rich layers up to 1/2 inch wide observed nearby, suggest that the average grade of the western end will be lower. Sample G.S.8,assaying 26% iron, comes from a small outcrop lying on the strike of a magnetic reading on the adjacent Line G-3-E., which is lower than normal for good iron formation, suggesting it represents a lean section about 100 feet wide within the better grade material.

Figure 16. - View looking northeast along the south limb of the No. 4 Orebody at Location C.S. 3.

The south limb of the No. 4 Orebody is 6,000 feet long. It has a maximum magnetic width of 1,100 feet, and average magnetic width of 500 feet. Three chip samples at intervals along 2,500 feet of the western portion, representing an aggregate sampled width of 420 feet, average 34.8% iron. One of these samples, No. C.S. 3, across 290 feet, assaying 33.9% iron, was submitted for metallurgical testing. The concentrate produced carries 62.19% iron and 12.50% silica, with an iron recovery of 76.77%. The relatively low recovery could be caused by non-magnetic heamatite, or considerable ferromagnesian minerals in the ore. The metallurgical report points out that it is probable the grade of this concentrate could be improved by further test work. The No. 4 Orebody contains scattered small dykes and lenses of granitic rock, as shown in Figure 17.

Figure 17.- Outcrops of the south limb of the No. 4 Orebody. Note the drag-folding and the small patches of light colored, granitic rock.

No. 5 Orebody

The No. 5 Orebody lies at the western end of the southern iron belt. It strikes N.50°E. and dips 50° northwest, as mapped on Geological Sheet No. 2. It is the only iron band that dips not very steeply. The iron formation is at least 3 miles long, but only 5,600 feet of this length is in the ore width category of over 100 feet. This 5,600 feet is divided into two shoots designated the centre section and the east section. The 5,500 feet of iron formation west of the centre section is only about 50 feet wide, but it assays 37.4% iron, as determined by Sample C.S. 16A. At this point, the greywacke carries 10.5% iron across 130 feet adjoining on the south. The 50 feet of iron formation combined with about 100 feet of the lean greywacke would make a low-grade ore width, but this property has such a large good-grade ore potential that this low-grade material need not be considered at all.

The centre section of the No. 5 Orebody is 4,000 feet long and up to 250 feet wide. About one-half of this length is under Szetu Lake. A small outcrop found near the western end of the shoot provided sample C.S. 17, which assayed 33.7% iron across 20 feet. The sample yielded a remarkably excellent metallurgical test. The test shows that a concentrate containing 69.04% iron, and only 3.08% silica can be made, with the iron recovery reaching a high for all the samples of 99.5%.

The east section of the No. 5 Orebody is the continuation of the centre section, with a length of 2,100 feet of narrow iron formation

J.V.L.S.

connecting them. The east section is 1,600 feet long and about 100 feet wide, according to magnetic data. It does not outcrop, so no samples could be collected.

No. 6 Orebody

The No. 6 Orebody is considered to be the eastern end of the south belt of iron formation. It is probably an extension of the cross-folded eastern part of the No. 3 Orebody, but is separated from it by a section of intrusive syenite. The iron zone as shown on Geological Sheet No. 3, is along the south shore at the west end of Lac Desaulniers. The orebody is a mixture of bedded, contorted, black iron formation and pinkish, ferromagnesian-rich syenite. In places, the syenite has absorbed so much iron it is also strongly magnetic. Considered as a whole, the orebody is estimated to contain about 20% syenite.

This orebody is some 6,000 feet long. The western part is up to 1,400 feet wide. The average width is estimated to be 800 feet. These dimensions are diagnostic of 520,000 tons per vertical foot. Two chip samples were collected from the orebody. One of these was across 1,200 feet, and the other, 3,400 feet to the east, was across 350 feet. They are numbered: C.S. 10 and C.S. 11, and do not include any syenite. The average of the two samples gives an ore grade of 33.6% iron. The concentrates produced average 62.39% iron, 8.46% silica, 0.023% sulphur, and 0.025% phosphorous. The titanium dioxide assay has not yet been returned, but it will probably be less than 1%. Average iron recovery for the two tests is 98.86%, and the average ratio of concentration is 1.88.

K.J.D.

IRON ORE SUMMARY

From the above descriptions of the six individual orebodies and their component parts, it is apparent that the property of Duncan Range Iron Mines contains a tremendous tonnage of potential iron ore. There are, in fact, 13 orebodies. The total length of these when added together is 72,600 feet, or 13.7 miles, and the weighted average width of them all is 401 feet. The total potential of the 13 orebodies is 3,157,300 tons per vertical foot.

The average grade of all the iron ore is 32.0%. The 15 metallurgical tests show that a concentrate can be produced that carries an average of 66.0% iron and only 6.6% silica, with a recovery of 94.2% of the iron. The average ratio of concentration is 2.19. These metallurgical results are extremely good, the ore being of an unusually excellent quality as a concentrating type. In addition to the 15 samples reported here, test work is proceeding on five samples, to reduce the silica content and produce a better grade of concentrate by rewashing it in a magnetic field of lower intensity. The results of all the metallurgical tests and other pertinent data on the six orebodies are summarized in Table 3.

Cost Analysis

It is beyond the scope of this report to calculate the cost of transportation facilities, power, concentrating-pelletizing plant and preparation of the ore deposits for production. However, based on open-pit mining of 10,000,000 tons of ore to yield about 5,000,000 tons of concentrate annually, J. C. Honsberger, after consulting various experts, estimates the following costs:-

	Per Long Ton Concentrate
Open Pit Mining......................................	1.40
Concentrating..	1.46
Agglomeration (Pelletizing)..........................	1.37
Rail Haul to Fort George..............................	0.70
Stockpiling and loading at Fort George..................	0.20
General - Head Office, Water, Repairs..................	0.40
Ocean Freight - Fort George, Baltimore(3,100 miles)....	4.50
Total cost of shiprail at Baltimore......................	10.03
Amortization based on a capital cost of $100,000,000.00 to be paid back in 20 years...........	1.00
Total Cost..	$ 11.03

Profit Potential

Pelletized magnetite iron ore, grading about 65% iron and containing less than 10% silica. is worth at least $15.00 per gross ton at lower Great Lakes Ports. If the quoted $11.03 cost estimate to produce and deliver a ton of such an iron ore concentrate from the Duncan Range Deposits is correct, then the profit potential is $4.00 per ton of concentrate. Evidently, should the certain amount of exploration yet to be done on the deposits definitely prove the present inferred potential of at least a billion tons of concentrate, net operating profit from 5,000,000 tons of concentrate might be $20,000,000.00 per year.

CONCLUSIONS AND RECOMMENDATIONS

1. The geological survey has proven that very large deposits of iron formation occur on the Ungava, Quebec, property of Duncan Range Iron Mines, Limited.

2. The combined potential of 13 ore zones comprising six main ore areas is 3,157,300 tons per vertical foot.

3. The six ore areas are distributed along 15 miles, their component orebodies having an aggregate length of 13.7 miles.

4. Thirty-two chip samples weighting 955 lbs., combined into 27 assay samples, representing an accumulated sampled width of 4,014 feet, show that the average grade of the ore is 32.0% iron.

5. Twenty-four chip samples weighing 615 lbs., combined into 15 metallurgical test samples, yielded excellent results. They show that a concentrate assaying 66% iron and only 6.6% silica can readily be made simply by magnetic separation. Recovery of the iron is as high as 99.5%, and averages 94.2%. The average ratio of concentration is 2.19 tons of ore to make 1.0 ton of concentrate.

6. The following preliminary program is recommended to block out ore reserves and protect title to the property for 21 years:

PHASE 1:

A 1959 program of exploration work estimated to cost $500,000.00, which is based tentatively on the following:

1. Exploratory drilling of the No. 1, No. 3 and No. 4 orebodies.

2. Outlining a minimum of 500 million tons of open-pit ore, preferably in one particular deposit having the best metallurgy.

3. Estimated costs:

1.	Quebec Land Survey on selected area	$ 10,000.00
2.	Camp erection, supplies and cookery	10,000.00
3.	Road and Tractors	30,000.00
4.	Plane freighting. - Charter, 4 months.	40,000.00
5.	Quebec Acreage Tax for 21 years.	60,000.00
6.	Diamond Drilling No. 1, No. 3 and No. 4 orebodies - 40,000 feet @ $6.00/ft.	240,000.00
7.	Assaying - 3,000 Assays approximately	30,000.00
8.	Metallurgical Testing - 400 tests @ $100.00 each. (Note: Large Steel Companies may test every 5.0 feet. 40,000 feet = $800,000.)	40,000.00
9.	Management, Head-Office, Legal Fees, Consultant Engineering and Metallurgical Fees. Economic Surveys, including: 1. Hydro-electric Power Surveys 2. Road and Dock Surveys, etc. 3. Railway to Fort George or other points. 4. Town Survey, Concentrator, etc. 5. Alternative methods to be selected for beneficiation, products, etc..	50,000.00
	TOTAL	$ 520,000.00

4. Some of the above is tentative and subject to changes and increased knowledge that only field work and economic studies can determine.

5. The depth to which diamond drilling is carried out should be commensurate with the width of the ore at that section, which will largely control the feasible depth of open-pit mining.

W.J.J.

6. Drilling of the three orebodies selected for initial exploration should be widely spaced, and followed by detailed drilling of the best one to prove up material for first production.

PHASE 2:

1. A 1960 proposed program of development work estimated to cost an additional $500,000. The work will be an enlarged, but mainly similar, effort to the 1959 program. It will be subject to adjustment and change, depending on the results of the 1959 exploration and economic studies.

2. Estimated Costs - Phase 2.

1.	Camp Maintenance, erection, cookery, etc.	$ 20,000.00
2.	Road and Tractor Operation	40,000.00
3.	Plane Freighting - 7 months	70,000.00
4.	Management, Head-Office, Consultant Fees on Economics and Investigations	90,000.00
5.	Diamond Drilling - 30,000 feet @ $6.00/ft.	180,000.00
6.	Assaying	30,000.00
7.	Metallurgical Testing	40,000.00
8.	Contingency Allowance	30,000.00
	TOTAL	$ 500,000.00

3. Decisions as to methods, timing, and economics of a production schedule will depend on, and be made progressively during and following, the completion of the first two phases of development.

Submitted by

W. N. Ingham

W. N. Ingham, Ph. D.,
Consulting Geologist.

Toronto, Ontario,

November 18, 1958.

Phone: HI. 7-7417

1617 Bayview Ave.
Willowdale
Toronto, Ontario

W. N. INGHAM, Ph.D.
Consulting Geologist

CERTIFICATE

1. I am Walter Norman Ingham, with office at 1617 Bayview Avenue, Willowdale, Toronto, Ontario, Canada.

2. I graduated with the degree of B. A. in Geology from McMaster University, in 1938; I have the degree M. A. in Geology from the University of Toronto, in 1941; and I received the degree Ph. D. in Economic Geology from the University of Toronto, in 1944.

3. I am a member of the Canadian Institute of Mining and Metallurgy since 1947; and a Charter Fellow of the Geological Association of Canada.

4. I have practised my profession as a geologist for 22 years. I spent 3 years working for the Geological Survey of Canada. I was employed by the Province of Quebec, Department of Mines, Mineral Deposits Branch, for 16 years. Most of this time was spent examining and reporting individual mining property exploration, development and production. I have practised as an independent consultant for the past three years.

5. The information in this report is based on a program of field mapping, examination, and sampling conducted personally during June, July and August, 1958. Data has been used from the magnetometer surveys carried out in 1953 by J. C. Honsberger, and in 1958 under the direction of the writer. General Geological information has been taken from the published Geological Survey of Canada, Map No. 23-1957. Statements on the results of the metallurgical work are based on test work and reports by H. U. Ross, well known Consulting Metallurgist, and Professor of ferrous metal metallurgy, University of Toronto. The writer obtained considerable geological knowledge of the type of iron deposits described from mapping and property examinations in Northwest Quebec during the 16 years on the staff of the Quebec Department of Mines.

W. N. Ingham

W. N. Ingham, Ph. D.,
Consulting Geologist.

Toronto, Ontario,

November 18, 1958.

APPENDIX I

References:

1. Shaw, G.: Preliminary Map 42-10. Eastmain, Quebec. Geological Survey of Canada. 1942 - 1 inch to 8 miles.

2. Hornberger, J.C.: Report on the Magnetometer Survey and on the Economic Possibilities of the Duncan Lake Iron Deposits. April 14, 1953.

3. Ingham, W. N.: Report on Duncan Range Iron Mines Limited. Company Prospectus. September 11, 1957.

4. Eade, K. E.: Preliminary Map 23-1957. Sakami Lake Area, New Quebec. Geological Survey of Canada. 1958. 1 inch to 8 miles.

5. Ingham, W. N.: Report on Magnetometer Surveys and Potential Iron Ore Tonnage, Duncan Range Iron Mines Limited. April 17, 1958.

6. Ross, H. U.: Reports on Iron Ore Concentration Tests, Duncan Range Iron Mines Limited. November 3, 1958. (Appended to this report)

* * * * * * * * * * * * *

APPENDIX II

Metallurgical Reports:

The following 30 pages are copies of the original reports on 15 "Iron Ore Concentration Tests", made by H. U. Ross, Metallurgical Engineer, dated November 3, 1958.

* * * * * * * * * * * * * * * * *

W. L. G.

H. U. ROSS
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

Duncan Range Iron Mines Ltd.,
Suite 415, 18 Toronto Street,
Toronto 1, Ontario.

Dear Sirs:

Letter-Report on Iron-Ore Concentration Test

This letter-report is written to present the results of a magnetic concentration test made in the Davis-tube magnetic separator on a sample of ore from your property submitted by Dr. W. N. Ingham.

This sample weighed 30 pounds and was identified by the number C.S.18. It was reported to have come from the north band, central section of Orebody No. 1 and to contain 30.3% iron.

After crushing all of the sample to minus ¼ inch, a representative portion was cut out and ground in a MacCool pulverizer until all of it passed through a 200-mesh screen. A 30-gram portion of this ground material was then separated into a concentrate and tailing which were separately dried, weighed and analyzed for soluble iron. The concentrate was also analyzed for phosphorus, silica, sulphur and titanium dioxide. A head sample was analyzed for soluble iron.

Detailed results of the test are shown on the attached laboratory sheet. The test shows that a concentrate containing 62.26% soluble iron could be made with a recovery of 88.72% of the iron at a ratio of concentration of 2.850. It is probably possible to produce a better grade of concentrate containing less silica by rewashing the concentrate in a magnetic field of lower intensity than in the first separation. This would result in a lower iron recovery.

Respectfully submitted

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

H. U. Ross
Metallurgical Engineer

November 3, 1958.

H.U. ROSS, P.Eng.
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

LABORATORY SHEET

Date: 20 September 1958

NAME: Duncan Range Iron Mines Limited

Sample No.: C.S. 18

Lot No.: 1

TYPE OF TEST: Davis Tube

Test No.: 1

Description of Test:

PRODUCT	WEIGHT		ASSAY	ASSAY – %					UNITS (Wt % x Assay)					DISTRIBUTION %				
	GRAMS	%	NO.	Iron	Phos.	Silica	Sulph	TiO_2	Iron					Iron				
Concentrate	10.6	35.25	4124	62.20	0.027	11.07	0.067	0.103	2194.66					88.72				
Tails	19.2	64.75	4125	4.31					279.07					11.28				
Cal'd Heads	29.8	100.0	-	24.74					2473.73					100.0				
Assay Heads	30.0	-	4126	24.74														

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

REMARKS: No. 1 Orebody north band, central section 30.3% Fe
Magnetic Iron Assay 21.95%

Operator: [signature]

H. U. ROSS
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

Duncan Range Iron Mines Ltd.,
Suite 415, 18 Toronto Street,
Toronto 1, Ontario.

Dear Sirs:

Letter-Report on Iron-Ore Concentration Test

This letter-report is written to present the results of a magnetic concentration test made in a Davis-tube magnetic separator on a sample of ore from your property submitted by Dr. W. N. Ingham.

This sample weighed 45 pounds and was identified by the numbers C.S.23 and 23A. It was reported to have come from the south band, western section of No. 1 Orebody and to contain 33.7% iron.

After crushing all of the sample to minus ¼ inch, a representative portion was cut out and ground in a MacCool pulverizer until all of it passed through a 200- mesh screen. A 30-gram portion of this ground material was then separated into a concentrate and tailing which were separately dried, weighed and analyzed for soluble iron. A head sample was also analysed for phosphorus, silica and sulphur.

Detailed results of the test are shown on the attached laboratory sheet. The test shows that a concentrate containing 66.69% soluble iron can be made with a recovery of 79.84% of the iron at a ratio of concentration of 2.041. This is a highly satisfactory grade of concentrate containing only 6.35% silica.

Respectfully submitted

H. U. Ross
Metallurgical Engineer

November 3, 1958.

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

H.U. ROSS, P.Eng.
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

LABORATORY SHEET

Date: Sept. 20, 1958

NAME: Duncan Range Iron Mines Limited

Sample No.: C.S. 23 and 23A

Lot No.: 4

TYPE OF TEST:

Test No.: 4

Description of Test:

PRODUCT	WEIGHT GRAMS	WEIGHT %	ASSAY NO.	ASSAY – % Iron	Phos.	Silica	Sulph	UNITS (Wt % x Assay) Iron	DISTRIBUTION % Iron
Concentrate	12.2	40.90	4133	66.69	0.022	6.06	0.016	2727.62	79.84
Tail	17.6	59.10	4134	11.65				688.52	20.16
Cal'd. Head	29.8	100.0	-	34.16				3416.14	100.0
Assay Head	30.0	-	4135	34.16					

REMARKS: No. 1 orebody, southern band, western section 33.7% Fe

Magnetic Iron Assay - 27.28%

Operator: [signature]

H. U. ROSS
METALLURGICAL ENGINEER
23 BLYTH HILL ROAD
TORONTO 12, CANADA

Duncan Range Iron Mines Ltd.,
Suite 415, 18 Toronto Street,
Toronto 18, Ontario.

Dear Sirs;

Letter-Report on Iron-Ore Concentration Test

This letter-report is written to present the results of a magnetic concentration test made in a Davis-tube magnetic separator on a sample of ore from your property submitted by Dr. W. N. Ingham.

This sample weighed 30 pounds and was identified by the numbers C.S.24 and 28. It was reported to have come from the south band, north margin, central section of No. 1 Orebody and to contain 35.5% iron.

After crushing all of the sample to minus ½ inch, a representative portion was cut out and ground in a MacCool pulverizer until all of it passed through a 200-mesh screen. A 30-gram portion of this ground material was then separated into a concentrate and tailing which were separately dried, weighed and analyzed for soluble iron. A head sample was also analyzed for iron. In addition, the concentrate was analyzed for phosphorus, silica and sulphur.

Detailed results of the test are shown on the attached laboratory sheet. The test shows that a concentrate containing 64.41% soluble iron could be made with a recovery of 96.26% of the iron at a ratio of concentration of 1.920. This is a satisfactory grade of concentrate containing 8.52% silica.

Respectfully submitted,

H. U. Ross
Metallurgical Engineer

November 3, 1958.

Registered Professional Engineer
[illegible]
Province of Ontario

H.U. ROSS, P.Eng.
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

LABORATORY SHEET

Date September 26th, 1958

NAME Duncan Range Iron Mines Limited

Sample No. C.S. 24 & 28

Lot No. 5

TYPE OF TEST Davis Tube

Test No. 19

Description of Test

PRODUCT	WEIGHT		ASSAY	ASSAY - %					UNITS (Wt% x Assay)				DISTRIBUTION %				
	GRAMS	%	NO.	Iron	Phos.	Silica	Sulph		Iron				Iron				
Concentrate	15.4	52.08	4178	64.41	0.031	6.52	0.025		3354.47				96.26				
Tail	14.2	47.92	4179	2.72					130.34				3.74				
Cal'd. Head	29.6	100.0	-	34.85					3484.81				100.0				
Assay Head	30.0	-	4180	34.85													

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

REMARKS No. 1 Orebody, south band, north margin, central section, 35.5%Fe

Magnetic Iron Assay = 33.54%

Operator [signature]

H. U. ROSS
METALLURGICAL ENGINEER
70 BLYTH HILL ROAD
TORONTO 12, CANADA

Duncan Range Iron Mines Ltd.,
Suite 415, 18 Toronto Street,
Toronto 1, Ontario.

Dear Sirs:

Letter-Report on Iron-Ore Concentration Test

This letter-report is written to present the results of a magnetic concentration test made in the Davis-tube magnetic separator on a sample of ore from your property submitted by Dr. W. N. Ingham.

This sample weighed 45 pounds and was identified by the numbers C.S.19, 20, 21, and 22. It was reported to have come from the south band, south portion, central section, of No. 1 Orebody and to contain 37.5% iron.

After crushing all of the sample to minus ¼ inch, a representative portion was cut out and ground in a MacCool pulverizer until all of it passed through a 200-mesh screen. A 30-gram portion of this ground material was then separated into a concentrate and tailing which were separately dried, weighed and analyzed for phosphorus, silica, sulphur and titanium dioxide. A head sample was analyzed for soluble iron.

Detailed results of the test are shown on the attached laboratory sheet. The test shows that a concentrate containing 68.67% soluble iron can be made with a recovery of 98.79% of the iron at a ratio of concentration of 1.953. This is a highly satisfactory grade of concentrate containing only 4.09% silica.

Respectfully submitted

H. U. Ross
Metallurgical Engineer

November 3, 1958.

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

H.U. ROSS, P.Eng.
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

LABORATORY SHEET

Date: September 20th, 1958

NAME: Duncan Range Iron Mines Ltd.

Sample No.: C.S. 19,20,21,22

Lot No.: 3

TYPE OF TEST: Davis Tube

Test No.: 5

Description of Test

PRODUCT	WEIGHT		ASSAY	ASSAY - %					UNITS (Wt% x Assay)				DISTRIBUTION %				
	GRAMS	%	NO.	Iron	Phos	Silica	Sulph	TiO_2	Iron				Iron				
Concentrate	15.2	51.22	4136	68.67	0.021	4.09	0.010	0.120	3517.28				98.79				
Tail	14.6	48.78	4137	0.88					42.93				1.21				
Cal'd Head	29.8	100.0	-	35.60					3560.21				100.0				
Assay Head	30.0	-	4138	35.60													

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

REMARKS No. 1 Orebody, south band, south portion, central section. 37.5% Fe
Some +200 mesh material discarded.
Magnetic Iron Assay - 35.17%

Operator [signature]

H. U. ROSS
METALLURGICAL ENGINEER
20 ALTIN HILL ROAD
TORONTO 12, CANADA

Duncan Range Iron Mines Ltd.,
Suite 416, 18 Toronto Street,
Toronto 1, Ontario.

Dear Sirs;

Letter-Report on Iron Ore Concentration Test

This letter-report is written to present the results of a magnetic concentration test made in the Davis-tube magnetic separator on a sample of ore from your property submitted by Dr. W. N. Ingham.

This sample weighed 35 pounds and was identified by the numbers C.S.27. It was reported to have come from the south band eastern end of No. 1 Orebody and to contain 32.7% iron.

After crushing all of the sample to minus ¼ inch, a representative portion was cut out and ground in a MacCool pulverizer until all of it passed through a 200-mesh screen. A 30-gram portion of this ground material was then separated into a concentrate and tailing which were separately dried, weighed and analyzed for soluble iron. A head sample was also analyzed for iron. In addition, the concentrate was analyzed for phosphorus, silica and sulphur.

Detailed results of the test are shown on the attached laboratory sheet. The test shows that a concentrate containing 67.17% soluble iron can be made with a recovery of 94.27% of the iron at a ratio of concentration of 2.314. This is a highly satisfactory grade of concentrate containing only 5.75% silica.

Respectfully submitted

H. U. Ross
Metallurgical Engineer

November 3, 1958.

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

H.U. ROSS, P.Eng.
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

LABORATORY SHEET

Date 20th September 1958

NAME Duncan Range Iron Mines Limited

Sample No. C.S. 27

Lot No. 7

TYPE OF TEST Davis Tube

Test No. 6

Description of Test

PRODUCT	WEIGHT		ASSAY	ASSAY - %					UNITS (Wt% x Assay)				DISTRIBUTION %				
	GRAMS	%	NO.	Iron	Phos.	Silica	Sulph		Iron				Iron				
Concentrate	12.8	43.24	4139	67.17	0.020	5.75	0.029		2904.43				94.27				
Tail	17.1	56.76	4140	3.11					176.52				5.73				
Cal'd. Head.	29.9	100.0	-	30.81					3080.95				100.0				
Assay Head	30.0	-	4141	30.81													

REMARKS No. 1 Orebody, south band, eastern end, 32.7% Fe

Magnetic Iron Assay - 29.04%

PROFESSIONAL ENGINEER H. U. ROSS PROVINCE OF ONTARIO

Operator [signature]

H. U. ROSS
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

Duncan Range Iron Mines Ltd.,
Suite 415, 18 Toronto Street,
Toronto 1, Ontario.

Dear Sirs:

Letter-Report on Iron-Ore Concentration Test

This letter-report is written to present the results of a magnetic concentration test made in the Davis-tube magnetic separator on a sample of ore from your property submitted by Dr. W. N. Ingham.

This sample weighed 35 pounds and was identified by the number C.S.14. It was reported to have come from the western shoot of No. 2 Orebody and to contain 34.1% iron.

After crushing all of the sample to minus ¼ inch, a representative portion was cut out and ground in a MacCool pulverizer until all of it passed through a 200-mesh screen. A 30-gram portion of this ground material was then separated into a concentrate and tailing which were separately dried, weighed and analyzed for soluble iron. A head sample was also analyzed for iron. In addition, the concentrate was analyzed for phosphorus, silica and sulphur.

Detailed results of the test are shown on the attached laboratory sheet. The test shows that a concentrate containing 65.72% soluble iron can be made with a recovery of 97.87% of the iron at a ratio of concentration of 1.992. This is a satisfactory grade of concentrate containing 7.25% silica.

Respectfully submitted

H. U. Ross
Metallurgical Engineer

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

November 3, 1958.

H.U. ROSS, P.Eng.
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

LABORATORY SHEET

Date 20th September 1958

NAME Duncan Range Iron Mines Ltd.

Sample No. C. S. 14

Lot No. 8

TYPE OF TEST Davis Tube

Test No. 7

Description of Test

PRODUCT	WEIGHT		ASSAY	ASSAY - %					UNITS (Wt% x Assay)					DISTRIBUTION %				
	GRAMS	%	NO.	Iron	Phos.	Silic	Sulph		Iron					Iron				
Concentrate	15.1	50.16	4142	65.72	0.018	7.25	0.015		3296.52					97.87				
Tail	14.9	49.84	4143	1.44					71.77					2.13				
Cal'd Head	30.0	100.0	-	33.68					3368.29					100.00				
Assay Head	30.0	-	4144	33.68														

REMARKS No. 2 Orebody, western shoot 34.1%

Magnetic Iron Assay - 32.96%

REGISTERED PROFESSIONAL ENGINEER H. U. ROSS PROVINCE OF ONTARIO

Operator [signature]

H. U. ROSS
METALLURGICAL ENGINEER
50 BLYTH HILL ROAD
TORONTO 12, CANADA

Duncan Range Iron Mines Ltd.,
Suite 415, 18 Toronto Street,
Toronto 1, Ontario.

Dear Sirs:

Letter-Report on Iron-Ore Concentration Test

This letter-report is written to present the results of a magnetic concentration test made in a Davis-tube magnetic separator on a sample of ore from your property submitted by Dr. W. N. Ingham.

This sample weighed 35 pounds and was identified by the number C.S.15. It was reported to have come from the central shoot of No. 2 Orebody and to contain 34.5% iron.

After crushing all of the sample to minus ¼ inch, a representative portion was cut out and ground in a MacCool pulverizer until all of it passed through a 200-mesh screen. A 30-gram portion of this ground material was then separated into a concentrate and tailing which were separately dried, weighed and analyzed for soluble iron. A head sample was also analyzed for iron. In addition, the concentrate was analyzed for phosphorus, silica and sulphur.

Detailed results of the test are shown on the attached laboratory sheet. The test shows that a concentrate containing 67.91% soluble iron can be made with a recovery of 97.89% of the iron with a ratio of concentration of 2.217. This is a very highly satisfactory grade of concentrate containing only 4.80% silica.

Respectfully submitted

H. U. Ross
Metallurgical Engineer

November 3, 1958.

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

H.U. ROSS, P.Eng.
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

LABORATORY SHEET

Date 20 Sept. 1958

NAME Duncan Range Iron Mines Ltd.

Sample No. C. S. 15

Lot No. 9

TYPE OF TEST Davis Tube

Test No. 8

Description of Test

PRODUCT	WEIGHT		ASSAY	ASSAY – %				UNITS (Wt% x Assay)	DISTRIBUTION %
	GRAMS	%	NO.	Iron	Phos.	Silica	Sulph	Iron	Iron
Concentrate	13.3	45.10	4145	67.91	0.016	4.80	0.017	3026.74	97.89
Tail	16.7	54.90	4146	1.20				65.88	2.11
Cal'd Head	30.0	100.0	-	31.28				3128.62	100.00
Assay Head	30.0	-	4147	31.29					

REMARKS No. 2 Orebody, central shoot 34.5% Fe
Magnetic Iron Assay - 30.63%

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

Operator [signature]

H. U. ROSS
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

Duncan Range Iron Mines Ltd.,
Suite 415, 18 Toronto Street,
Toronto 1, Ontario.

Dear Sirs:

Letter-Report on Iron-Ore Concentration Test

This letter-report is written to present the results of a magnetic concentration test made in a Davis-Tube magnetic separator on a sample of ore from your property submitted by Dr. W. N. Ingham.

This sample weighed 35 pounds and was identified by the numbers C.S.12A, 12B, and 12C. It was reported to have come from the western end of No. 3 Orebody and to contain 32.3% iron.

After crushing all of the sample to minus ¼ inch, a representative portion was cut out and ground in a MacCool pulverizer until all of it passed through a 200-mesh screen. A 30-gram portion of this ground material was then separated into a concentrate and tailing which were separately dried, weighed and analyzed for soluble iron. A head sample was also analyzed for iron. In addition, the concentrate was analyzed for phosphorus, silica and sulphur.

Detailed results of the test are shown on the attached laboratory sheet. The test shows that a concentrate containing 70.16% soluble iron can be made with a recovery of 97.82% of the iron at a ratio of concentration of 2.299. This is a very highly satisfactory grade of concentrate containing only 2.60% silica.

Respectfully submitted

H. U. Ross
Metallurgical Engineer

November 3, 1958.

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

H.U. ROSS, P.Eng.
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

LABORATORY SHEET

Date: Sept. 28, 1958

NAME: Duncan Range Iron Mines Ltd.

Sample No.: C.S. 12 A, B, & C.

Lot No.: 10

TYPE OF TEST: Davis Tube

Test No.: 20

Description of Test:

PRODUCT	WEIGHT GRAMS	WEIGHT %	ASSAY NO.	ASSAY – % Iron	Phos.	Silica	Sulph	UNITS (Wt % x Assay) Iron	DISTRIBUTION % Iron
Concentrate	13.1	43.46	4181	70.16	0.025	2.60	0.030	3049.15	97.82
Tail	16.2	56.54	4182	1.20				67.85	2.18
Cal'd Head	29.3	100.0	-	31.17				3117.00	100.0
Assay Head	30.0		4183	31.17					

REMARKS: No. 3 Orebody Western end, 32.3% Fe. Samples 12D not included.
Magnetic Iron Assay – 30.49%

REGISTERED ... H. U. ROSS ... PROVINCE OF ONTARIO

Operator:

H. U. ROSS
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

Duncan Range Iron Mines Ltd.,
Suite 415, 18 Toronto Street,
Toronto 1, Ontario.

Dear Sirs:

Letter-Report on Iron-Ore Concentration Test

This letter-report is written to present the results of a magnetic concentration test made in the Davis-tube magnetic separator on a sample of ore from your property submitted by Dr. W. N. Ingham.

This sample weighed 43 pounds and was identified by the numbers C.S.6A, 6B, and 6C. It was reported to have come from the southern extension, east limb of No. 3 Orebody and to contain 35.2% iron.

After crushing all of the sample to minus ¼ inch, a representative portion was cut out and ground in a MacCool pulverizer until all of it passed through a 200-mesh screen. A 30-gram portion of this ground material was then separated into a concentrate and tailing which were separately dried, weighed and analyzed for soluble iron. A head sample was also analyzed for iron. In addition, the concentrate was analyzed for phosphorus, silica and sulphur.

Detailed results of the test are shown on the attached laboratory sheet.The test shows that a concentrate containing 67.44 per cent iron can be made with an iron recovery of 96.43% at a ratio of concentration of 2.421. This is a highly satisfactory grade of concentrate containing only 5.10% silica.

Respectfully submitted

H. U. Ross
Metallurgical Engineer

November 3, 1958.

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

H.U. ROSS, P.Eng.
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

LABORATORY SHEET

Date 28th September 1958

NAME Duncan Range Iron Mines Ltd.

Sample No. C.S. 6A, B, C

Lot No. 12

TYPE OF TEST Davis Tube

Test No. 10

Description of Test

PRODUCT	WEIGHT GRAMS	WEIGHT %	ASSAY NO.	ASSAY – % Iron	Phos.	Silica	Sulph.	UNITS (Wt% x Assay) Iron	DISTRIBUTION % Iron
Concentrate	12.4	41.38	4151	67.44	0.022	5.10	0.032	2790.67	96.43
Tail	17.3	58.62	4152	1.76				103.17	3.57
Cal'd Head	29.7	100.0	-	28.94				2893.84	100.0
Assay Head	30.0		4153	28.94					

REMARKS No. 3 Orebody southern extension, east limit 35.2%Fe
Magnetic Iron Assay - 27.91%

Operator H.U. Ross

H. U. ROSS
METALLURGICAL ENGINEER
28 BLYTH HILL ROAD
TORONTO 12, CANADA

Duncan Range Iron Mines Ltd.,
Suite 415, 18 Toronto Street,
Toronto 1, Ontario.

Dear Sirs:

Letter-Report on Iron-Ore Concentration Test

This letter-report is written to present the results of a magnetic concentration test made in the Davis-tube magnetic separator on a sample of ore from your property submitted by Dr. W. N. Ingham.

This sample weighed 15 pounds and was identified by the number C.S.8. It was reported to have come from the central section, north limb of No. 4 Orebody and to contain 32.8% iron.

After crushing all of the sample to minus ¼ inch, a representative portion was cut out and ground in a Mac Cool pulverizer until all of it passed through a 200-mesh screen. A 30-gram portion of this ground material was then separated into a concentrate and tailing which were separately dried, weighed and analyzed for soluble iron. A head sample was also analyzed for iron. In addition, the concentrate was analyzed for phosphorus, silica and sulphur.

Detailed results for the test are shown on the attached laboratory sheet. The test shows that a concentrate containing 68.62% iron can be made with a recovery of 95.37% iron at ratio of concentration of 2.739. This is a highly satisfactory grade of concentrate containing only 4.[illegible]% silica.

Respectfully submitted

H. U. Ross
Metallurgical Engineer

November 5, 1958.

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

H.U. ROSS, P.Eng.
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

LABORATORY SHEET

Date 28th September 1958

NAME Duncan Range Iron Mines Ltd.

Sample No. C.S. 8

Lot No. 14

TYPE OF TEST Davis Tube

Test No. 12

Description of Test

PRODUCT	WEIGHT		ASSAY	ASSAY - %					UNITS (Wt% x Assay)					DISTRIBUTION %				
	GRAMS	%	NO.	Iron	Phos.	Silica	Sulph		Iron					Iron				
Concentrate	10.8	36.55	4157	68.62	0.023	4.11	0.019		2508.06					95.37				
Tail	19.0	63.45	4158	1.92					121.82					4.63				
Cal'dl Head	29.8	100.0		26.30					2629.88					100.0				
Assay Head	30.0		4159	26.30														

REMARKS No. 4 Orebody: Central section, north limb, 32.8% Fe

Magnetic Iron Assay - 25.08%

Operator

H. U. ROSS
METALLURGICAL ENGINEER
80 BLYTH HILL ROAD
TORONTO 12, CANADA

Duncan Range Iron Mines Ltd.,
Suite 416, 18 Toronto Street,
Toronto 1, Ontario.

Dear Sirs:

Letter-Report on Iron-Ore Concentration Test

This letter-report is written to present the results of a magnetic concentration test made in a Davis-tube magnetic separator on a sample of ore from your property submitted by Dr. W. N. Ingham.

This sample weighed 40 pounds and was identified by the number C.S.5. It was reported to have come from the eastern end, north limb of No. 4 Orebody and to contain 32.7% iron.

After crushing all of the sample to minus ¼ inch, a representative portion was cut out and ground in a MacCool pulverizer until all of it passed through a 200-mesh screen. A 30-gram portion of this ground material was then separated into a concentrate and tailing which were separately dried, wieghed and analyzed for soluble iron. The concentrate was also analyzed for phosphorus, silica, sulphur and titanium Dioxide. A head sample was analyzed for soluble iron.

Detailed results of the test are shown on the attached laboratory sheet. The test showed that a concentrate containing 62.51% iron can be made from the ore with a recovery of 97.[illegible]% of the iron in the ore at a ratio of concentration of 1.930. This is a satisfactory grade of concentrate containing 6.52% silica.

Respectfully submitted

H. U. Ross
Metallurgical Engineer

November 3, 1958.

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

H.U. ROSS, P.Eng.
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

LABORATORY SHEET

Date: Sept. 28, 1958

NAME: Duncan Range Iron Mines Limited

Sample No. C.S. 5

Lot No. 15

TYPE OF TEST: Davis Tube

Test No. 13

Description of Test

PRODUCT	WEIGHT GRAMS	WEIGHT %	ASSAY NO.	ASSAY - % Iron	Phos.	Silica	Sulph	TiO_2	UNITS (Wt% x Assay) Iron				DISTRIBUTION % Iron				
Concentrate	15.4	51.82	4160	62.51	0.021	6.52	0.023	0.98	3239.27				97.90				
Tail	14.4	48.18	4161	1.44					69.38				2.10				
Cal'd Head	29.8	100.0	-	33.09					3308.65				100.00				
Assay Head	30.0		4162	33.09													

REGISTERED PROFESSIONAL ENGINEER H. U. ROSS PROVINCE OF ONTARIO

REMARKS: No. 4 Orebody: Eastern end, north limb 32.7% Fe
Magnetic Iron Assay - 32.39%

Operator: [signature]

H. U. ROSS
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

Duncan Range Iron Mines Ltd.,
Suite 415, 18 Toronto Street,
Toronto 1, Ontario.

Dear Sirs:

Letter-Report on Iron-Ore Concentration Test

This letter-report is written to present the results of a magnetic concentration test made in a Davis-tube magnetic separator on a sample of ore from your property submitted by Dr. W. N. Ingham.

This sample weighed 40 pounds and was identified by the number C.S.3. It is reported to have come from the central section, south limb of No. 4 Orebody and to contain 36.1% iron.

After crushing all of the sample to minus ¼ inch, a representative portion was cut out and ground in a MacCool pulverizer until all of it passed through a 200-mesh screen. A 30-gram portion of this ground material was then separated into a concentrate and tailing which were separately dried, weighed and analyzed for soluble iron. A head sample was also analyzed for iron. In addition, the concentrate was analyzed for phosphorus, silica and sulphur.

Detailed results of the test are shown on the attached laboratory sheet. The test shows that a concentrate containing 62.19% iron can be made with a recovery of 76.77% of the iron at a ratio of concentration of 2.386. It is probable that the grade of this concentrate could be improved by rewashing it in a magnetic field of lower intensity than that used in the primary separation. Of course this would result in a lower iron recovery.

Respectfully submitted

REGISTERED PROFESSIONAL ENGINEER H. U. ROSS PROVINCE OF ONTARIO

November 3, 1958.

H. U. Ross
Metallurgical Engineer

H.U. ROSS, P.Eng.
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

LABORATORY SHEET

Date 28th Sept. 1958

NAME Duncan Range Iron Mines Ltd.

Sample No. C.S. 3

Lot No. 17

TYPE OF TEST Davis Tube

Test No. 15

Description of Test

PRODUCT	WEIGHT		ASSAY	ASSAY - %					UNITS (Wt % x Assay)					DISTRIBUTION %				
	GRAMS	%	NO.	Iron	Phos.	Silica	Sulph		Iron					Iron				
Concentrate	16.3	41.93	4166	62.19	0.020	12.50	0.019		2607.63					76.77				
Tail	13.4	58.07	4167	13.59					789.17					23.23				
Cal'd Head	29.7	100.0	-	33.97					3396.80					100.0				
Assay Head	30.0		4168	33.97														

REGISTERED ... H. U. ROSS ... PROVINCE OF ONTARIO

REMARKS No. 4 Orebody - Central section, south limb, 36.1% Fe

Magnetic Iron Assay - 26.08%

Operator [signature]

H. U. ROSS
METALLURGICAL ENGINEER
70 BLYTH HILL ROAD
TORONTO 12, CANADA

Duncan Range Iron Mines Ltd.,
Suite 415, 18 Toronto Street,
Toronto 1, Ontario.

Dear Sirs:

Letter-Report on Iron-Ore Concentration Test

This letter-report is written to present the results of a magnetic concentration test made in a Davis-tube magnetic separator on a sample of ore from your property submitted by Dr. W. N. Ingham.

This sample weighed 20 pounds and was identified by the number C.8.17. It was reported to have come from the central section of No. 5 Orebody and to contain 35.6% iron.

After crushing all of the sample to minus ¼ inch, a representative portion was cut out and ground in a McCool pulverizer until all of it passed through a 200-mesh screen. A 30-gram portion of this ground material was then separated into a concentrate and tailing which were separately dried, weighed and analyzed for soluble iron. A head sample was also analyzed for iron. In addition, the concentrate was analyzed for phosphorus, silica and sulphur.

Detailed results of the test are shown on the attached laboratory sheet. The test shows that a concentrate containing 69.04% iron can be made with a recovery of 99.51% of the iron with a ratio of concentration of 2.057. This is a very good grade of concentrate containing only 3.08% silica.

Respectfully submitted

H. U. Ross
Metallurgical Engineer

November 3, 1958.

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

H.U. ROSS, P.Eng.
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

LABORATORY SHEET

Date 28th Sept. 1958

NAME Duncan Range Iron Mines Ltd.

Sample No. C.S. 17

Lot No. 18

TYPE OF TEST Davis Tube

Test No. 16

Description of Test

PRODUCT	WEIGHT		ASSAY	ASSAY - %					UNITS (Wt% x Assay)				DISTRIBUTION %				
	GRAMS	%	NO.	Iron	Phos.	Silica	Sulph		Iron				Iron				
Concentrate	14.3	48.62	4169	69.04	0.019	3.08	0.031		3358.72				99.51				
Tail	15.4	51.38	4170	.32					16.44				.49				
Cal'd Head	29.7	100.0	-	33.75					3375.16				100.0				
Assay Head	30.0		4171	33.73													

REMARKS No. 5 Orebody - Central section, 35.6% Fe

Magnetic Iron Assay - 33.59%

Operator [signature]

REGISTERED PROFESSIONAL ENGINEER H. U. ROSS PROVINCE OF ONTARIO

H. U. ROSS
METALLURGICAL ENGINEER
21 BLYTH HILL ROAD
TORONTO 12, CANADA

Duncan Range Iron Mines Ltd.,
Suite 415, 18 Toronto Street,
Toronto 1, Ontario.

Dear Sirs:

Letter-Report on Iron-Ore Concentration Test

This letter-report is written to present the results of a magnetic concentration test made in a Davis-tube magnetic separator on a sample of ore from your property submitted by Dr. W.N. Ingham.

This sample weighed 120 pounds and was identified by the number C.S.10. It was reported to have come from the western section of No. 6 Orebody and to contain 37.1% iron.

After crushing all of the sample to minus ¼ inch, a representative portion was cut out and ground in a MacCool pulverizer until all of it passed through a 200-mesh screen. A 30-gram portion of this ground material was then separated into a concentrate and tailing which were separately dried, weighed, and analyzed for soluble iron. The concentrate was also analyzed for phosphorus, silica, sulphur and titanium dioxide. A head sample was analyzed for soluble iron.

Detailed results of the test are shown on the attached laboratory sheet. There appears to be an error in the iron analysis of the concentrate. The figure reported, namely 50.83%, is too low to be consistent with a silica assay of 6.83%. Because of this inconsistency, an iron assay for the concentrate was calculated from the weight percentages and the iron analysis for the heads and tailings. The calculated analysis was found to be 61.32% iron. Using this figure, the iron recovery was calculated to be 99.16% and the ratio of concentration was 1.831.

Respectfully submitted

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

H. U. Ross
Metallurgical Engineer

November 3, 1958.

H.U. ROSS, P.Eng.
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

LABORATORY SHEET

Date: September 26, 1958

NAME: Duncan Range Iron Mines Ltd.

Sample No.: C. S. 10

Lot No.: 19

TYPE OF TEST: Davis Tube

Test No.: 17

Description of Test:

PRODUCT	WEIGHT GRAMS	WEIGHT %	ASSAY NO.	ASSAY – % Iron	Phos.	Silica	Sulph	TiO_2	UNITS (Wt% x Assay) Iron	DISTRIBUTION % Iron
Concentrate	16.4	54.66	4172	60.83	0.023	6.83	0.026	0.95		
Cal'd. Conc. Assay				61.32*					3351.98	99.14
Tail	13.2	45.34	4173	.64					29.02	.86
Cal'd. Head	29.6		-							
Assay Head	30.0	100.0	4174	33.81					3381.00	100.0

REMARKS: No. 6 Orebody – Western section, 37.1% Fe

* Indicates a calculated assay.

Operator: [signature]

H. U. ROSS
METALLURGICAL ENGINEER
29 BLYTH HILL ROAD
TORONTO 12, CANADA

Duncan Range Iron Mines Ltd.,
Suite 415, 18 Toronto Street,
Toronto 1, Ontario.

Dear Sirs:

Letter-Report On Iron-Ore Concentration Test

This letter-report is written to present the results of a magnetic concentration test made in the Davis-tube magnetic separator on a sample of ore from your property submitted by Dr. W. N. Ingham.

This sample weighed 40 pounds and was identified by the number C.S.11. It was reported to have come from the eastern section of No. 6 Orebody and to contain 31.0% iron.

After crushing all of the sample to minus ¼ inch, a representative portion was cut out and ground in a MacCool pulverizer until all of it passed through a 200-mesh screen. A 30-gram portion of this ground material was then separated into a concentrate and tailing which were separately dried, weighed and analyzed for soluble iron. A head sample was also analyzed for iron. In addition, the concentrate was analyzed for phosphorus, silica and sulphur.

Detailed results of the test are shown on the attached laboratory sheet. The test shows that a concentrate containing 63.47% iron can be made with a recovery of 98.59% of the iron at a ratio of concentration of 1.926. It is probable that the grade of the ore could be improved by rewashing the concentrate in a magnetic field of lower intensity than that used in the primary separation. Of course, this would lower the iron recovery a little.

Respectfully submitted

H. U. Ross
Metallurgical Engineer.

November 3, 1958.

REGISTERED PROFESSIONAL ENGINEER
H. U. ROSS
PROVINCE OF ONTARIO

H.U. ROSS, P.Eng.
METALLURGICAL ENGINEER
20 BLYTH HILL ROAD
TORONTO 12, CANADA

LABORATORY SHEET

Date September 28, 1958

NAME Duncan Range Iron Mines Ltd.

Sample No. C.S. 11

Lot No. 20

TYPE OF TEST Davis Tube

Test No. 16

Description of Test

PRODUCT	WEIGHT GRAMS	WEIGHT %	ASSAY NO.	ASSAY – % Iron	Phos.	Silica	Sulph		UNITS (Wt% x Assay) Iron				DISTRIBUTION % Iron				
Concentrate	15.5	51.91	4175	63.47	0.025	10.10	0.023		3294.73				98.59				
Tail	14.0	48.09	4176	.96					46.17				1.41				
Cal'd. Head	29.5	100.0	-	33.42					3341.90				100.0				
Assay Head	30.0	-	4177	33.41													

REMARKS No. 6 Orebody - Eastern section 31.0% Fe

Magnetic Iron Assay - 32.95%

Operator [signature]