# GM 62093

THE NIOCAN GREAT WHALE IRON MINING PROJECT

GM 62093

# Annexe - 1
# THE NIOCAN GREAT WHALE IRON MINING PROJECT



## The Great Whale Property

Niocan is the registered owner of 71 mining claims covering a total area of 3,507 hectares and distributed in three groups identified as the "A" Group (36 claims), the "D" Group (20 claims) and the "E" Group (15 claims). Each Group encompasses a large deposit of magnetite iron and, together, the three Groups constitute the Niocan Great Whale Iron Property (the Property).

## Historical Background

In 1957, field engineers of the Little Long Lac Mines Limited organization prospected an area of magnetic disturbance located east of the Great Whale River. This activity led to the discovery of the first and main deposit, which is the "A" deposit. A new Company, Great Whale Iron Mines Limited was formed for the purpose of holding and exploring the mining concessions covering the "A" deposit as well as the "D" and "E" deposits which were subsequently discovered.

Over the period 1958 to 1960, the Company explored the deposits by some 17,000 meters of diamond drilling (AX) of which 11,000 m on the "A" deposit and 3,000 m on each one of the other two deposits. A metallurgical testwork program was carried out on composite samples prepared from nearly all the iron formation drill core intersections, as well as on a 25 Tonne bulk sample blasted from an outcropping part of the "A" deposit. The Consulting Engineers, Sir Alexander Gibb and Partners, realized surveys with respect to harbour facilities, construction of a railway line to the Hudson Bay coast and an hydro-electric power development. The Company's Consulting Mining Geologist, Lloyd M. Scofield of Duluth, Minnesota, prepared a Report covering the results of the 1958 – 1960 exploration and development work campaign, together with a tonnage and grade estimate of the magnetite iron resources recoverable by open-pit, for each one of the three deposits. Since 1960, the following studies were carried out:

- ✓ Study related to a railway line, which would link the three deposits to a deep-water harbour on the St-Lawrence River. (École Polytechnique, 1965).
- ✓ Study on the possibility of extending the shipping period of iron ore pellets from the Manitounuk Sound deep-water harbour on the east coast of the Hudson Bay (CINGEX, 1975).
- ✓ Re-evaluation of the Great Whale Iron Mines deposits, a study which included the description of a mining project to produce 9,000,000 Tonnes of pellets per year (SIDAM, 1978).

In the 80's, at a time when the iron ore market was strongly depressed by a low demand and oversupply situation, the Company abandoned its rights on the deposits. Incited by


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the increasing market price for iron ores and pellets since the beginning of year 2004, as well as by the favourable outlook of the iron sector, Niocan staked and on July 17th 2004 became the registered owner of the 71 claims covering the whole of the "A", "D" and "E" magnetite iron deposits.

## Property Location and Its Environnement

The Niocan's Property lies a few kilometers south of the Great Whale River. The "A" Group of claims is located some 65 km east of the Great Whale Settlement on the Hudson Bay coast, while the "D" and "E" Groups are respectively located some 20 km to the east and 40 km south-east of the "A" Group. The closest road to the Property is the access road from Matagami to the LG-2 hydroelectric power complex which ends, some 150 km to the south of the Property. The Great Whale Settlement area, with an aboriginal population of Crees and Inuit of about 1600 inhabitants, sites a provincial airport with two landing strips which can be used safely by planes of the Boeing 737 size. There is regular airline service to the Settlement. The Manitounuk Sound deep-water harbour, less than 20 km north-east of the Settlement can accommodate ships up to at least 200,000 tons in burden. Via the Hudson Bay Straight, loaded ships can sail to the Atlantic Ocean and to their world port destination.

Two falls on the Denys River, located within a 20 km radius from the "A" deposit could generate 100,000 KW to serve the project. The vegetation of the region is characterized by stunted spruce and caribou moss. On the deposits, outcrops are numerous and overburden very thin. The climate is of the Taïga type, with break-up coming around the first of June and freeze-up in mid-October. No permafrost was observed in the Property area.

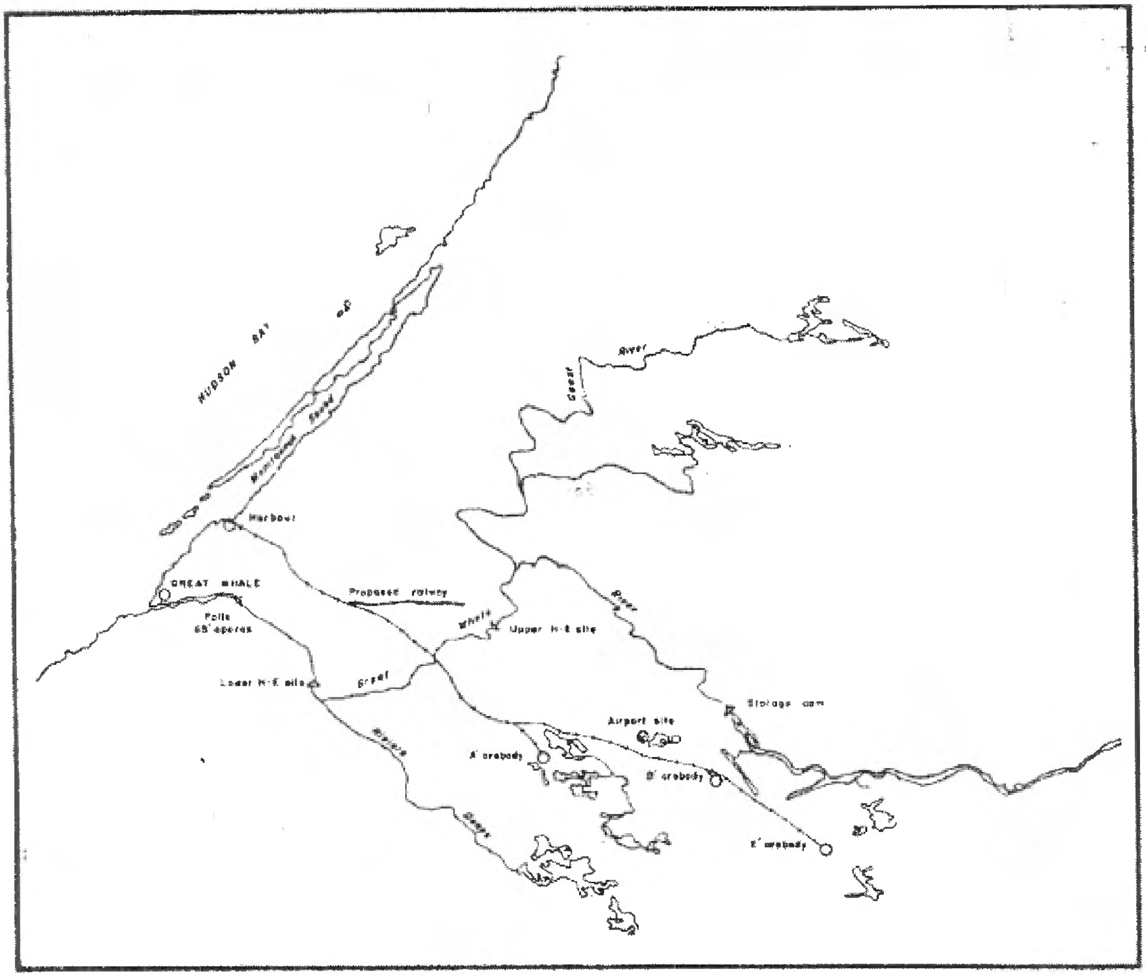
## Geological Context

The three iron deposits and their associated rocks occur as separate enclaves within the vast expanse of granite and gneiss exposures marking the core of the Huronian structural arch extending from the Labrador Through to the east coast of Hudson Bay.

The "A" deposit has an overall length of 5,500 m and a width ranging from 90 m up to 900 m. The strike of the layered rocks is approximately north 15° west and the dip is steep to the east. Results of two deep drill holes have shown that the iron formation extends to a depth of at least 250 m.

The smaller "D" enclave occupies an area about 1,6 km in diameter. It consists of a complex fold of a schist and iron formation sequence. The iron formation resembles that of the "A" deposit but the grain is much coarser.

In the "E" enclave, about 1,3 square kilometres in area, the eastward-dipping iron formation and schist series are surrounded and underlain by the background granite. The iron formation of the "E" deposit contains more silicates and has a lower grade than that of the other two deposits. The grain size is slightly larger than at the "D" deposit.




The ore bodies of Great Whale Iron Mines, as shown on this map, are favourably located with respect to development of power and to the construction of transportation facilities.

## Tonnage and Grade Estimates:

It is not feasible herewith to include the comprehensive report on the Great Whale Iron Mines Limited deposits with accompanying tabulations, maps, etc., or the full abstract thereof, prepared by Lloyd M. Scofield, Duluth, Minnesota – the Company's Consulting Mining Geologist. The following is taken from his conclusions:

> "The three deposits contain an estimated 942 million long tons of crude concentrating ore which can readily be made available to open-pitting by the removal of 361 million tons of waste. Known but unestimated iron formation will, when developed by drilling, increase these figures notably. The crude will yield 383 million tons of concentrates containing 67.1% iron and 5.5% silica. The concentration ratio from crude ore to concentrate is thus 2.46 to 1. An average grind of 85% minus 200 mesh is required to liberate the concentrates. The power required to reduce the magnetite-bearing portion of the crude from minus 20 mesh to liberation size is 19.5 KWH per long ton. These figures give the Great Whale

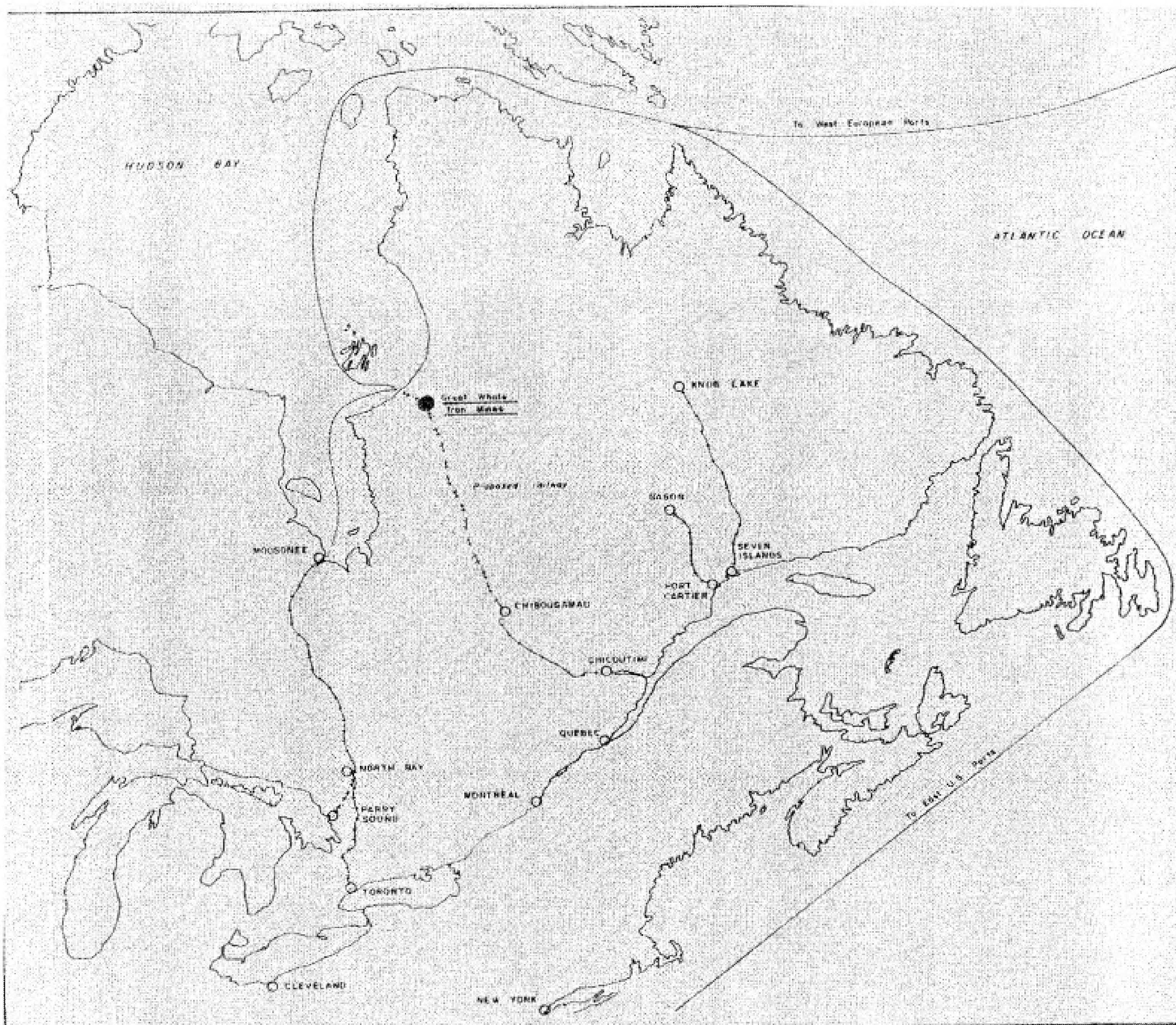
deposits a favorable position in competition with other ore bodies of equivalent availability to market."

## Transportation of concentrates:

No unusual transportation problems are anticipated in connection with the development of the Company's properties. Concentrates and pellets may be transported, preferably by vessel, over an ice-free period of 4.5 to 5 months.

(1) The direct all-water route from Manitounuk Sound (about 50 miles northwest of the Company's properties), via Hudson Straits to European, Eastern Seaboard or other world ports. This route would afford safe, inexpensive transportation during the open season of navigation. The Manitounuk Sound, 2.2 km north of the Great Whale river offers a 60 feet deep natural harbour for large vessels.

(2) An all-rail route to the St. Lawrence River may be a costly alternative. This would involve an extension of the Canadian National Railway from Chibougamau to Great Whale River. This route would provide uninterrupted year-round transportation as opposed to sea shipping in the ice-free period.




The ore bodies of Great Whale Iron Mines, as shown on this map, are favourably located with respect to development of power and to the construction of transportation facilities.

**Niocan's Great Whale Iron Ore property**
**Summary of estimate results**
**(All tonnages in 1000s of Dry Long Tons)**

| Ore body | "A" | "D" | "E" | Total |
|---|---|---|---|---|
| 1. All materials, including overburden | 743,568 | 197,651 | 362,024 | 1,303,243 |
| 2. Less Overburden | 7,597 | 2,656 | 1,627 | 11,880 |
| 3. All Rock Material | 735,971 | 194,995 | 360,397 | 1,291,363 |
| 4. Less Waste Separable at Shovel | 206,331 | 48,842 | 94,276 | 349,449 |
| 5. Crude Ore, Requiring Crushing | 529,640 | 146,153 | 266,121 | 941,914 |
| 6. Less Cobbable Included Waste | 53,257 | 9,272 | 25,044 | 87,573 |
| 7. Ore Material, Requiring Ball-Milling | 476,383 | 136,881 | 241,077 | 854,341 |
| 8. Less Fine Tailings | 256,627 | 71,017 | 143,814 | 471,458 |
| 9. Concentrates (Adjusted for Losses) | 219,756 | 65,864 | 97,263 | 382,883 |
| 10. % Iron in Ore Material | 36.7 | 36.8 | 34.1 | 36.0 |
| 11. % Iron in Concentrates | 66.6 | 68.2 | 67.5 | 67.1 |
| 12. % Silica in Concentrates | 6.6 | 3.5 | 4.4 | 5.5 |
| 13. % Iron Unit Recovery from Ore Material | 83.8 | 88.9 | 79.9 | 83.5 |
| 14. Average Modulus of Grind Required (80%) | 33μ | 99 μ | 111 μ | 66 μ |
| 15. Equivalent Grind in % under Screen Size | 83%-325M | 83%-150M | 76%-150M | 85%-200M |
| 16. Power Index, as Computed | 37 | 20 | 20 | 29 |
| 17. KWH/LT Required from -20 Mesh | 24.8 | 13.4 | 13.4 | 19.5 |

NIOCAN INC.
PROPRIÉTÉ DE FER DE GRANDE BALEINE

## INTRODUCTION

Le 10 février 2004, MM. René Dufour et Alain Robin ont jalonné 71 Claims couvrant 3 gisements de minerai de fer situés non loin de l'embouchure de la rivière Grande Baleine. Ces claims sont détenus par NIOCAN.

Découverts en 1957 par le groupe Little Long Lac (LLL), d'intenses travaux de recherche furent effectués dont 52 sondages sur le gisement principal A et 17 sondages sur chacun des gisements des gisements D et E.

Les claims furent éventuellement abandonnés par le groupe LLL.

L'intérêt pour le fer ayant augmenté, il fut décidé, sous l'instigation de René Dufour, d'acquérir les droits miniers sur les trois gisements.

Depuis l'acquisition de la propriété Grande Baleine, trois ingénieurs dont l'un spécialisé en métallurgie ont participé à obtenir les informations disponibles sur les travaux antérieurs et procédé à une évaluation préliminaire des gisements.

Dans ce rapport, nous décrivons brièvement les travaux réalisés jusqu'à maintenant. Nous référerons à divers documents que nous avons préparés dont :

1. The Great Whale Iron Mining Property (4 pages). Annexe 1
2. A Billion Tonne Deposit of magnetite Iron (36% Fe). Annexe 2
3. La métallurgie des gisements par l'ingénieur métallurgiste Jean-Claude Caron. Annexe 3

Il n'y a pas eu de visite sur le terrain depuis le jalonnement de février 2004. Par contre, lors de travaux antérieurs, M. Dufour a visité la propriété en compagnie du chef géologue de Little Long Lac. Nous avons pu bénéficier des connaissances de M. Jean Claude Caron qui a participé activement aux travaux réalisés par Cingex et Sidam.

**Travaux d'exploration et de faisabilité exécutés par le groupe Little Long Lake.**

Le document (annexe 1) The Niocan Great Whale Iron mining Property enumère les travaux réalisés par le groupe Little Long Lac. M. Dufour avait conservé les catalogues de sondage de même que les rapports d'analyse et travaux exécutés par la firme Lakefield.

Il y aurait aussi lieu de consulter le document Annexe 2 pour apprécier l'ampleur des réserves de même que le potentiel de les accroitre.

De 1975 à 1978, Little Long Lac a demandé à Cingex de réévaluer les études en vue de définir ce que pourrait être le projet de leur mise en exploitatiion. M. René Dufour a dirigé cette étude ce qui l'a amené à visiter la propriété et à survoler le tracé probable du chemin de fer reliant le gisement principal 'A' au port naturel de Manitounuk. Il était accompagné par le chef géologue de LLL.

Au cours de cette étude, il a rencontré le responsable d'Hydro-Québec du projet d'harnachement de la rivière Grande Baleine d'abord pour les informer sur l'existence des trois gisements dont l'un, le gisement 'E', est situé au sud du 55$^{e}$ parallèle donc à l'intérieur du territoire de la Baie James et de s'assurer que le tracé du chemin de fer et autres sites des infrastructures ne seraient pas inondés.

**Expédition des concentrés et boulettes vers les marchés par transport ferroviaire**

En 1967 M. René Dufour a œuvré pendant quelques mois dans les bureaux de Canadian Aero Service à Ottawa et réalisé avec leurs techniciens une étude de transport des concentrés et/ou boulettes par voie ferrée jusqu'à un port en eau profonde sur le St-Laurent. Plusieurs tracés furent étudiés; celui choisi abouti à Sacré-Cœur une localité située à quelques milles de l'embouchure de la rivière Saguenay. Ce tracé aurait une longueur de 793 milles et le coût de construction en 1967 avait été estimé à 300M$. Un deuxième tracé joignant le chemin de fer de la Compagnie Minière Québec Cartier Mining fut aussi réalisé.

Ce chemin de fer, en traversant le plateau intérieur, aurait accéléré le développement des ressources minérales du nord québécois. Par exemple il traverse la région des Monts Otish où d'importants travaux de recherche diamantifères sont en cours. Ils auraient aussi facilité l'accès aux réserves de bois de la forêt boréale.

**Expédition des concentrés et boulettes vers les marchés par voie maritime.**

En 1975, Great Whale Iron Mines Ltd a confié à la firme Canadian International Geo Exp. Ltée (CINGEX) le mandat de colliger toute l'information pertinente relative au transport par voie maritime des concentrés et/ou boulettes de Grande Baleine.

En sa qualité de président de CINGEX, M. René Dufour a participé à la réalisation de cette étude.

En octobre 2004, MM R. Dufour et R. Faucher ont rencontré le vice-président de FEDNAV Ltée, une firme possédant une grande expertise dans la navigation nordique. Ce dernier nous a confirmé qu'il serait possible, en utilisant des vaisseaux de grande capacité, d'expédier 10M de tonnes durant les 5 mois que dure la navigation sur la Baie et le Détroit d'Hudson.

**Vérification des études métallurgiques du groupe Little Long Lac**

On trouvera en annexe 3 les vérifications des analyses des carottes des sondages par l'ingénieur-métallurgiste Jean Claude Caron.

**Rencontre avec le président d'Hydro-Québec en janvier 2005**

Le président s'est montré favorable au projet lequel créerait plus de 1000 emplois. Nous l'avons informé de notre désir d'impliquer les autochtones Cri et Inuit dès le début des travaux. L'Hydro-Québec compte harnacher le rivière Grande Baleine; elle serait prête à prolonger le route d'accès au territoire jusqu'aux villages de Whapmagoostui et de Kuujjuarapik et de fournir l'énergie électrique requise par le projet.

**Rencontre aves des consommateurs de concentrés et de boulettes de fer**

Le marché du fer est captif en ce sens qu'il est nécessaire d'intéresser des utilisateurs de concentrés et de boulettes de fer très tôt dans l'étude de faisabilité d'un projet d'exploitation de ressources de fer.

Des rencontres informelles ont donc eu lieu avec des consommateurs pour les informer sur le plus grand gisement de fer non encore en exploitation au Canada.

**Travaux futurs**

Malgré la grande continuité de la minéralisation de magnétite des gisements, des sondages supplémentaires sont requis.

Auparavant, il serait utile de récupérer la partie minéralisée des carottes de sondage ce qui permettrait la réalisation de certains travaux métallurgiques

ANNEXE-3

# SUMMARY OF THE PRELIMINARY REPORT ON THE BENEFICIATION OF THE GREAT WHALE MAGNETITE DEPOSITS

SUBMITTED TO: NIOCAN INC.

Jean-Claude Caron, M.A.Sc.Eng.

August 22nd, 2005

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# Table of Contents

SUMMARY OF THE PRELIMINARY REPORT
ON THE BENEFICIATION OF
THE GREAT WHALE MAGNETITE DEPOSITS

## INTRODUCTION

This document presents the highlights of the Preliminary Report On The Beneficiation of the Great Whale Magnetite Deposits prepared in October 2004 by Mr Jean-Claude Caron, metallurgical engineer of Les Consultants PROTEC Inc. This Preliminary Report was based on the information contained in the various documents listed in Section 5.0 (References) below.

## 1.0 SAMPLES TESTED

### 1.1 " A - X " Drill Core Samples

The tonnage and grade estimate of the iron resources of the A, D and E deposits was based on the geological information developed from the AX – diamond drilling work carried out on each one of the three deposits as well as on the results of related core sampling, beneficiation tests and assaying activities.

Laboratory beneficiation tests were conducted on each one of the composites listed in Table 1.1.

**Table 1.1**
**Diamond Drilling & Sampling Data**

| Deposit | "A" | "D" | "E" | Total |
|---|---|---|---|---|
| Number of Drill Holes | 58 | 17 | 17 | 92 |
| Meterage of Drilling | 10 950 | 3 116 | 3 081 | 17 147 |
| Meterage Split & Sampled | 5 537 | 1 405 | 1 898 | 8 890 |
| Meterage used for estimate | 4 942 | 1 350 | 1 874 | 8 166 |
| Number of Diagnostic Composites | 433 | N.D. | N.D. | N.D. |
| Number of Group Composites | 80 | N.D. | N.D. | N.D. |
| Number of Combined Composites | 3 | 0 | 0 | 3 |

### 1.2 Bulk Sample

A 25 Tonne bulk sample was blasted from an outcrop located on the east side of the A-Deposit, in an area where the mineralization was identified as finer than that of the average for the A – Deposit (Ref. 1). This sample made the object of laboratory and pilot plant tests conducted at Lakefield Research and at the Mines Branch in Ottawa.

## 2.0 TEST WORK ON DRILL CORE COMPOSITES

### 2.1 Diagnostic Tests

In the course of the core logging, each 3 m drill core intersection in iron formation was marked and its grain size and mineralogical composition visually evaluated. These intersections were split in halves and one half was crushed to – 9 mm. Within a given hole, adjacent samples with similar grain size and mineralogical composition were combined to form Diagnostic Composites each one representing approximately 15 m in core length. Each composite was subjected to a standard grinding and Davis Tube test. Results of these tests provided valuable information on the beneficiation properties of each one of the Diagnostic Composites, such as fineness of grind and power requirements to obtain a given grade of concentrate.

### 2.2 Characterization Tests

Adjacent Diagnostic Composites having similar beneficiation properties were combined on the basis of their tonnage of influence. Each one of the Group Composites thus obtained was submitted to three Davis Tube Tests, the grinding time being increased from one test to another. The grinding times were selected so that the longest grinding period would yield a concentrate assaying at least 65% Fe. This test work returned the following characterization data for each one of the Group Composites:

- ✓ KWH/T in grinding vs % Fe in the concentrate
- ✓ % Fe Recovery vs % Fe in the concentrate
- ✓ % $SiO_2$ vs % Fe in the concentrate

Results of the characterization test work are summarized in Table 2.2.1.

**Table 2.2.1**

**Summary Table of Results**

**Of Characterization Tests**

| **Benefication Data** | Deposits | | | Weighted |
|---|---|---|---|---|
| | "A" | "D" | "E" | Average |
| % Fe in Iron Resources | 36.7 | 68.2 | 34.1 | 36.0 |
| % Fe in Concentrates | 66.6 | 68.2 | 67.5 | 67.1 |
| % $SiO_2$ in Concentrates | 6.6 | 3.5 | 4.4 | 5.5 |
| % Fe Recovered | 83.9 | 88.9 | 79.9 | 83.5 |
| % Weight Recovered | 46.1 | 48.1 | 40.3 | 44.8 |
| Grinding Modules (80%) * | 33 | 99 | 111 | 66 |
| Equivalent to % passing<br>Mesh | 83<br>325 | 83<br>150 | 76<br>150 | 85<br>200 |
| KWH / T (From 20 m) | 24.4 | 13.2 | 13.2 | 19.2 |
| **Concentrate Analysis** | | | | |
| Total Fe | 67.32 | 68.84 | 68.19 | |
| $SiO_2$ | 5.76 | 3.55 | 4.24 | |
| $Al_2O_3$ | 0.35 | 0.42 | 0.69 | |
| CaO | 0.010 | 0.015 | 0.19 | |
| MgO | 0.018 | 0.060 | 0.46 | |
| S | 0.098 | 0.022 | 0.15 | |
| P | 0.026 | 0.031 | 0.015 | |
| As | 0.0012 | 0.0009 | 0.0015 | |
| Cu | 0.0013 | 0.0010 | 0.003 | |
| $TIO_2$ | 0.25 | 0.20 | 0.094 | |

* Grinding Modulus: Screen opening size in microns which 80% of the original sample was passing.

## 2.3 Process Development Tests

Three Combined Composites were prepared through blending Group Composites of the A- Deposit on the basis of their beneficiation characteristics and tonnage of influence. A beneficiation test was conducted on each Combined Composite following the flowsheet illustrated in Figure 2.3.1, which included cobbing and stage grinding between the magnetic separation stages. This flowsheet is similar to that applied for the pilot plant tests on Grinds No. V and V1 on the Bulk Sample (Art: 3.3). Results of the process development tests are summarized in Table 2.3.2.

**Figure 2.3.1 - Flowsheet of The Process Development Tests**

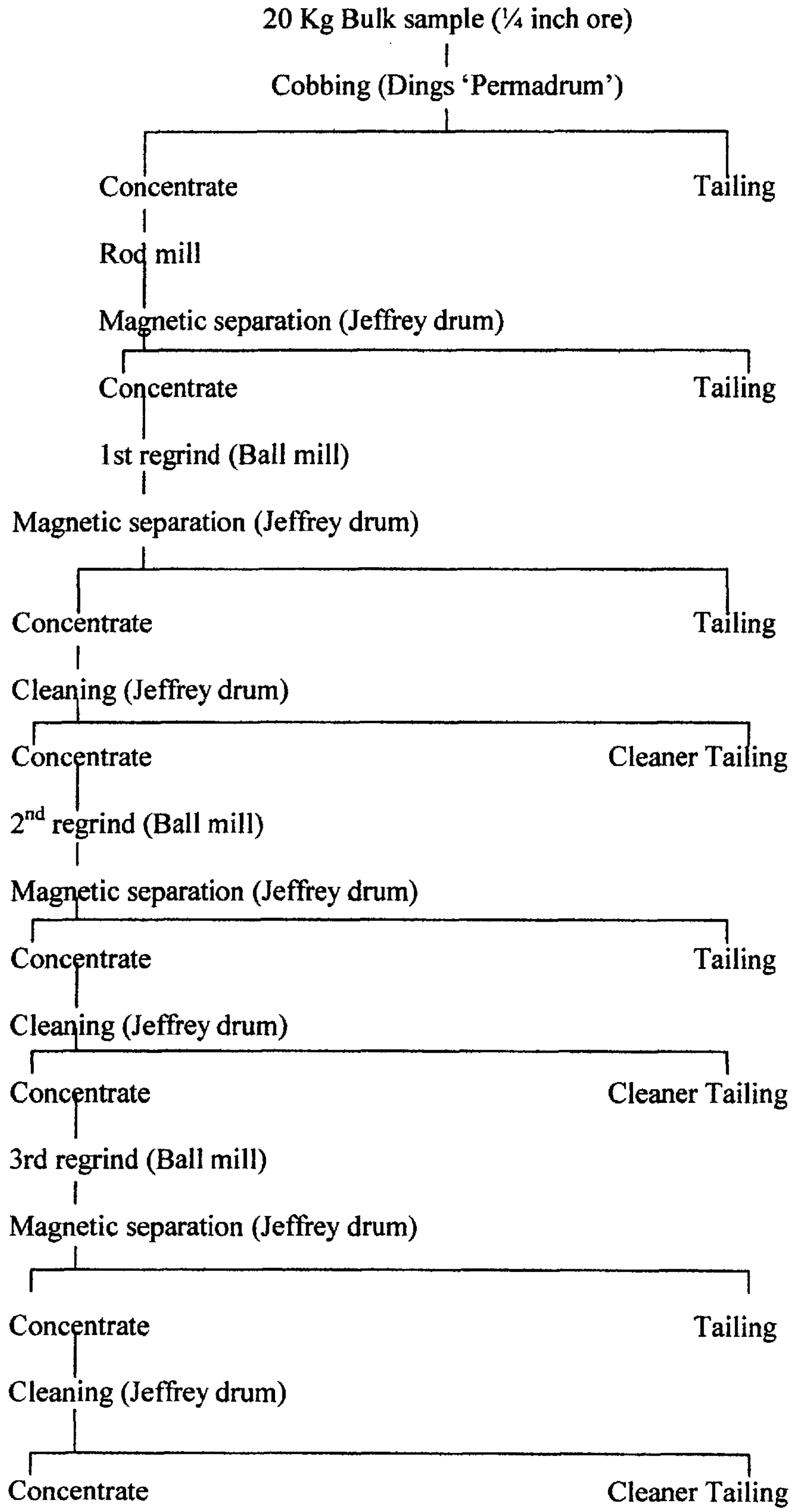


**Table 2.3.2**

**Summary Table of Results of Test Work**

**Conducted on the Three Combined Composites**

| | Composite No. 1 | | Composite No. 2 | | Composite No. 3 | |
|---|---|---|---|---|---|---|
| | Heads | Conc. | Heads | Conc. | Heads | Conc. |
| Weight | | | | | | |
| Weight % | 100.0 | 46.4 | 100.0 | 44.6 | 100.0 | 43.3 |
| Ratio of conc. | | 25.15 :1 | | 2.24 :1 | | 2.31 :1 |
| Assays | | | | | | |
| % Total Fe | 36.62 | 68.60 | 36.77 | 67.92 | 36.40 | 68.74 |
| % Soluble Fe | 34.17 | 68.41 | 33.29 | 67.60 | 32.69 | 68.55 |
| % $SiO_2$ | 43.56 | 4.52 | 42.94 | 5.66 | 43.16 | 4.08 |
| % $TiO_2$ | 0.110 | 0.057 | 0.085 | 0.066 | 0.092 | 0.062 |
| % S | 0.06 | 0.02 | 0.27 | 0.19 | 0.14 | 0.08 |
| Recovery | | | | | | |
| % Soluble Fe | | 92.5 | | 90.0 | | 88.9 |
| % Magnetite | | 95.5 | | 95.4 | | 95.8 |
| Grinding | | | | | | |
| % - 325 Mesh | | 96.4 | | 96.8 | | 98.0 |
| KWH / T | 37.3 | 80.4 | 35.9 | 80.4 | 35.0 | 80.9 |

## 3.0 TEST WORK ON THE BULK SAMPLE

### 3.1 Laboratory Tests

A first series of laboratory grinding and Davis Tube tests were carried out by Lakefield on the Bulk Sample to develop the flowsheet for the pilot plant tests together with related basic parameters such as granulometry and magnetic field intensity at various stages of the flowsheet.

### 3.2 Aerofall Grinding Tests

Six grinding tests were conducted in the 1.5 m in diameter Lakefield Aerofall dry grinding mill. Grinds No. V and No V1, corresponding respectively to a – 48 Mesh and a – 28 Mesh grind, were considered the most adequate for the pilot plant beneficiation tests. The granulometry of the mill products and the power consumption corresponding to these tests are shown in Table 3.2.

**Table 3.2**
**Grinding Tests No. V & No. V1**
**Summary of Results**

| Grind No. | Horizontal Class. | | Cyclone | | Multiclone | |
|---|---|---|---|---|---|---|
| | V % | V1 % | V % | V1 % | V % | V1 % |
| % Weight of Products | 72.1 | 47.5 | 26.2 | 50.4 | 1.7 | 2.1 |
| Screen Analysis | | | | | | |
| + 28 Mesh | | 2.3 | | | | 1.1 |
| - 28 + 35 | | 11.8 | | | | 5.6 |
| - 35 + 48 | 3.2 | 21.9 | | 0.4 | 2.3 | 10.6 |
| - 48 + 65 | 6.9 | 26.7 | | 1.6 | 5.0 | 13.5 |
| - 65 + 100 | 17.0 | 18.0 | | 4.1 | 12.2 | 10.7 |
| - 100 + 150 | 18.2 | 9.0 | 0.5 | 6.6 | 13.2 | 7.6 |
| - 150 + 200 | 13.6 | 4.3 | 1.7 | 7.1 | 10.3 | 5.6 |
| - 200 | 41.1 | 6.0 | 97.8 | 80.2 | 57.0 | 45.3 |
| % Fe | 38.2 | 40.7 | 33.8 | 34.1 | | |
| KWH / T | | | | | | |
| 17' Mill | 13.57 | 11.1 | | | | |
| 22' Mill | 9.91 | 7.85 | | | | |

### 3.3 Pilot Plant Beneficiation Tests

The pilot plant beneficiation tests were conducted at the Mines Branch in Ottawa. Table 3.3 presents a summary of the results obtained from the pilot plant tests on Grinds No V and No V1 mill products. For comparison purpose. Table 3.3 also includes results from the characterization and the process development (Combined Composites) tests.

**Table 3.3**

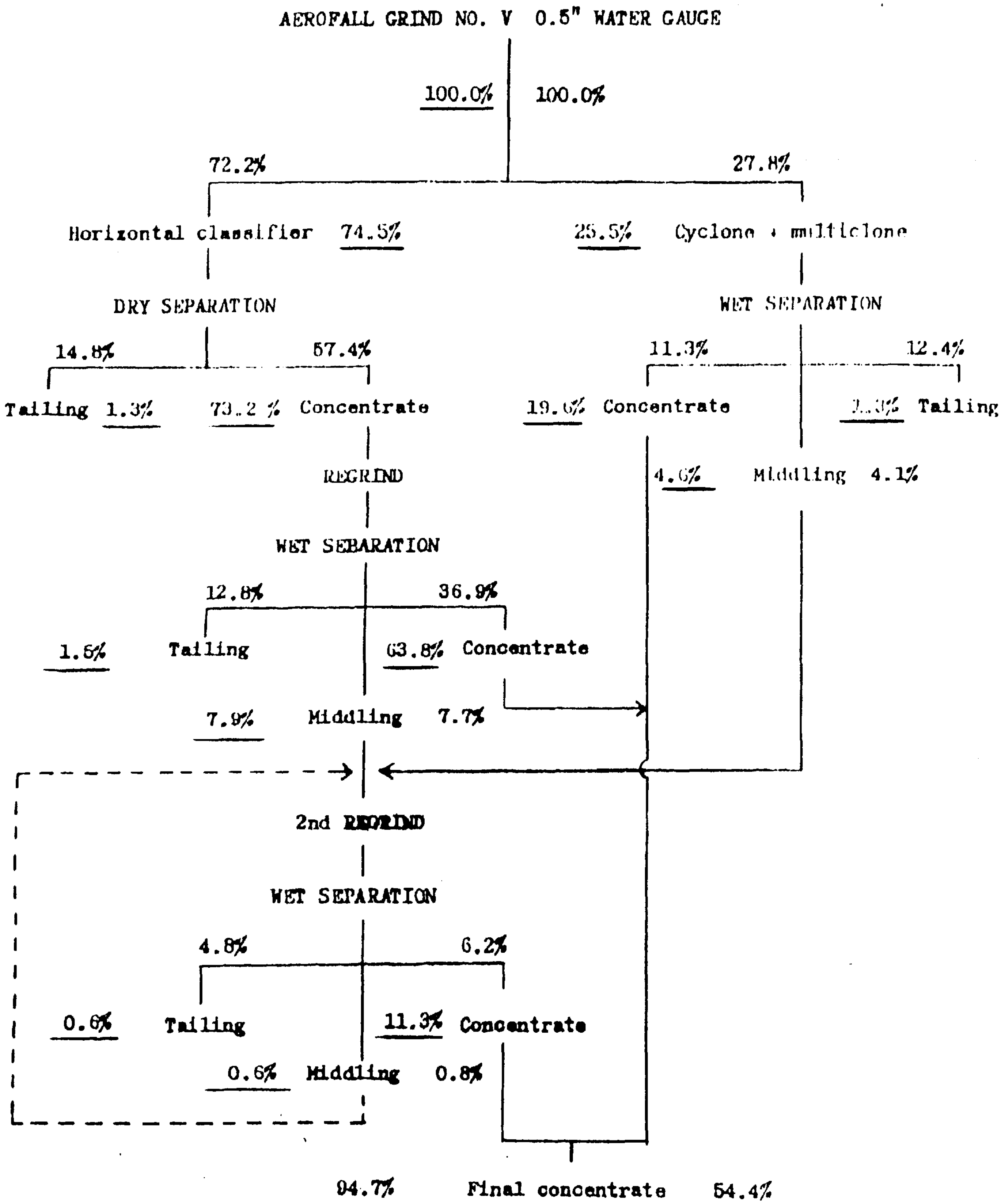
**Summary Table of Results**

**Pilot Plant vs Laboratory Tests**

| | Pilot Plant Tests | | Laboratory Tests | |
|---|---|---|---|---|
| | Grind No. V | Grind No. V1 | Characterization | Process Dev. |
| Heads | | | | |
| % Fe | 37.1 | 37.2 | 36.7 | 36.6 |
| Concentrate | | | | |
| % Fe | 64.4 | 65.3 | 66.6 | 68.2 |
| % $SiO_2$ | 9.7 | 8.8 | 6.6 | 4.8 |
| % Fe Recovery | 94.7 | 91.5 | 83.9 | 90.5 |
| % Weight | 54.4 | 52.2 | 46.1 | 44.8 |
| % - 325 Mesh | 94.7 | 94.1 | 83.0 | 97.1 |
| Grinding Power | | | | |
| KWH / T | 25.7 | 25.5 | 24.4 | 36.1 |

FLOWSHEET NO. 1

GREAT WHALE IRON MINES LIMITED

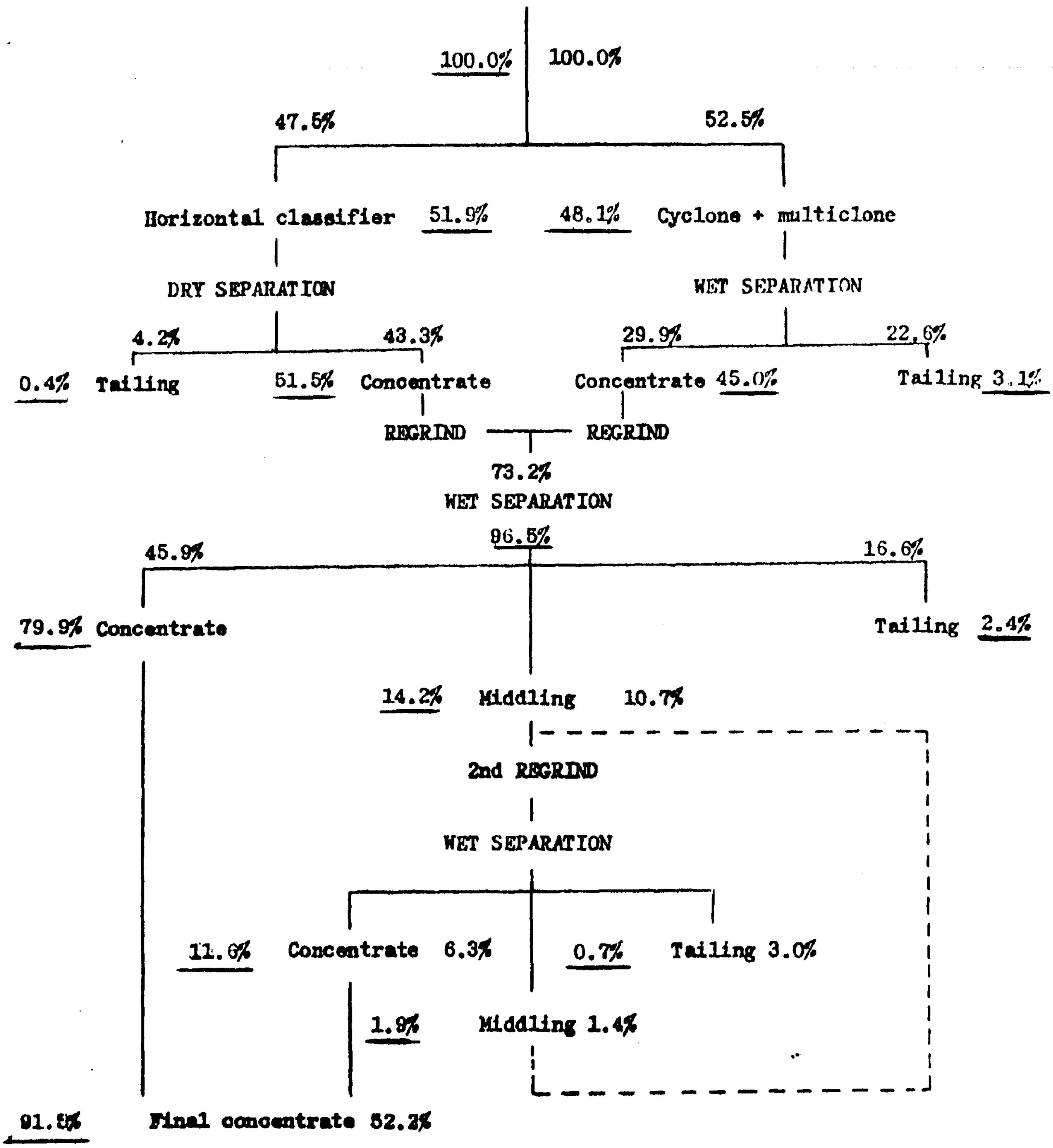



**Underlined percentages correspond to : % Fe distribution**
**Other percentages correspond to : % Weight distribution**

FLOWSHEET NO. 2

GREAT WHALE IRON MINES LIMITED

AEROFALL GRIND NO. VI 3.0" WATER GAUGE




Underlined percentages correspond to : % Fe distribution
Other percentages correspond to : % Weight distribution

## 4.0 CONCLUSIONS & RECOMMENDATIONS

Stage grinding, as it was expected, results in better overall metallurgical results than those obtained from the Characterization tests. When referring to the power consumed in the grinding stages of the process development and pilot plant tests, it is considered that the addition of a grinding stage in the pilot plant tests would have returned results identical to those obtained from the process development tests, including the power consumption in the order of 36 KWH / T.

Future Test Work should include the integration of a final cleaning stage by flotation, a flowsheet which might yield similar Fe grade and recovery with less requirements in regrinding power.

## 5.0 REFERENCES


1. Report on the Magnetite Deposits of Great Whale Iron Mines Limited; Lloyd M. Scofield, November 1960.

2. Progress Report No. 1; Concentration Tests On a Sample Of Iron Ore Submitted by Great Whale Iron Ore Ltd. John M. Britton. P. Eng., Lakefield Research, February 28th, 1958.

3. Progress Report NO. 26 X; Davis tube tests on 50 foot drill core composite samples corrected for a grind of 80% minus 200 mesh; John M. Britton, P.Eng., Lakefield Research, March 20, 1959.

4. Progress Report No. 32 & Appendix; Davis tube tests with varying grinds on group composites from "A" orebody; John M. Britton, P.Eng., Lakefield Research, November 27th, 1959.

5. Progress Report No. 37; Grinding and concentration tests on three composite samples from the "A" orebody; Lakefield Research, December 28th, 1960.

DRAFT

# PRELIMINARY REPORT ON THE BENEFICIATION OF THE GREAT WHALE MAGNETITE DEPOSITS

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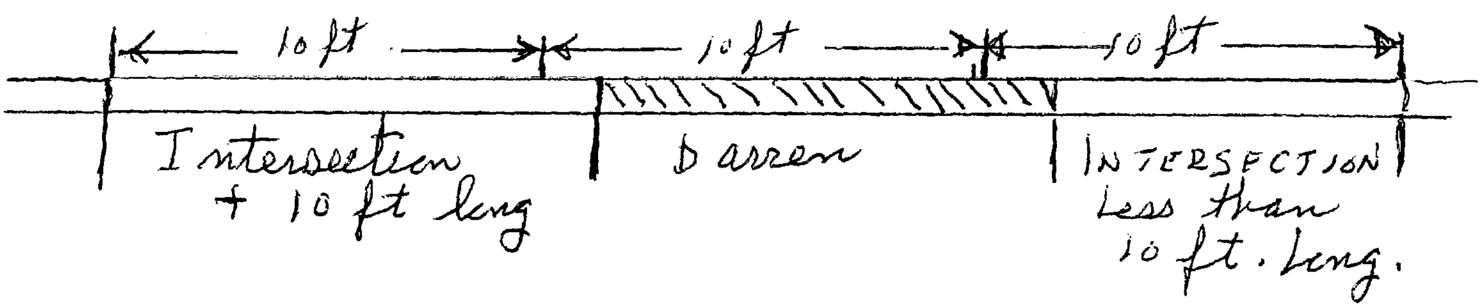
October 30th, 2004

# DRILL CORE (AX) SAMPLE PREPARATION

- In magnetite formation, one sample was prepared from each 10 ft drill core intersection.
  - all bands of barren material, 2 ft long or less were included in the magnetite 10 ft drill core intersection.
  - all bands of barren material over 2 ft long were assumed to be recoverable by the shovel and were not included. When this occured, the procedure followed to prepare the "± 10 ft drill core intersection is illustrated by the sketch below which shows that the drill core intersection sample could be somewhat over or less than 10 ft long.



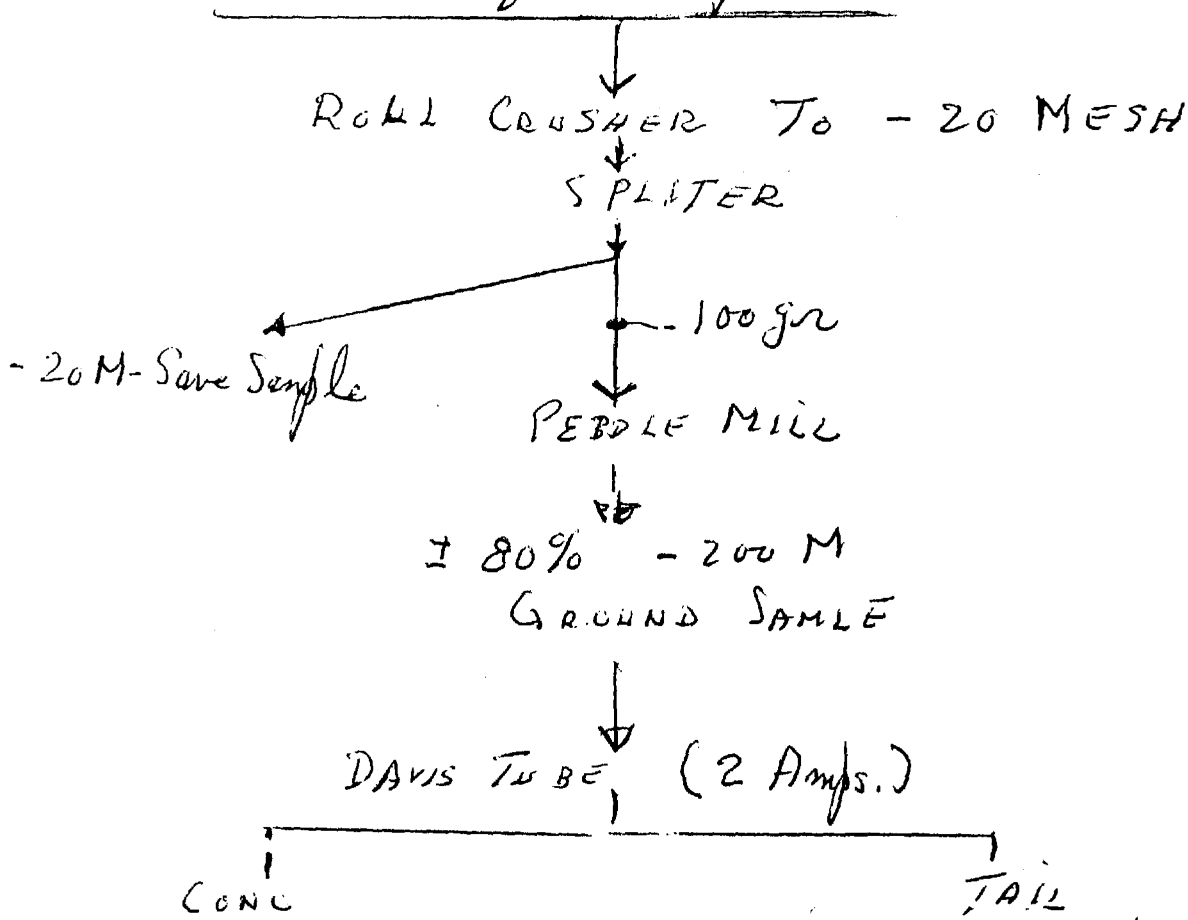
- all drill core intersections to be sampled were splitted in halves, and one half was crushed to -3/8"
- From each -3/8" crushed half, a <u>0.5 pound (225 gr)</u> sample was taken out, "boxed" and sent to Lakefield.

2. DIAGNOSTIC TESTS

To reduce the number of tests, the "10 ft core samples" having similar mineralization were combined to obtain so called "50 ft Composites"; through adding, for each individual intersection, a weigh of its -3/8" sample proportional to its tonnage of influence of the d.d. hole it was originating from. The standard Diagnostic Test Procedure is illustrated in the following figure.

DIAGNOSTIC TESTS PROCEDURE

-3/8" "50 ft Composite"

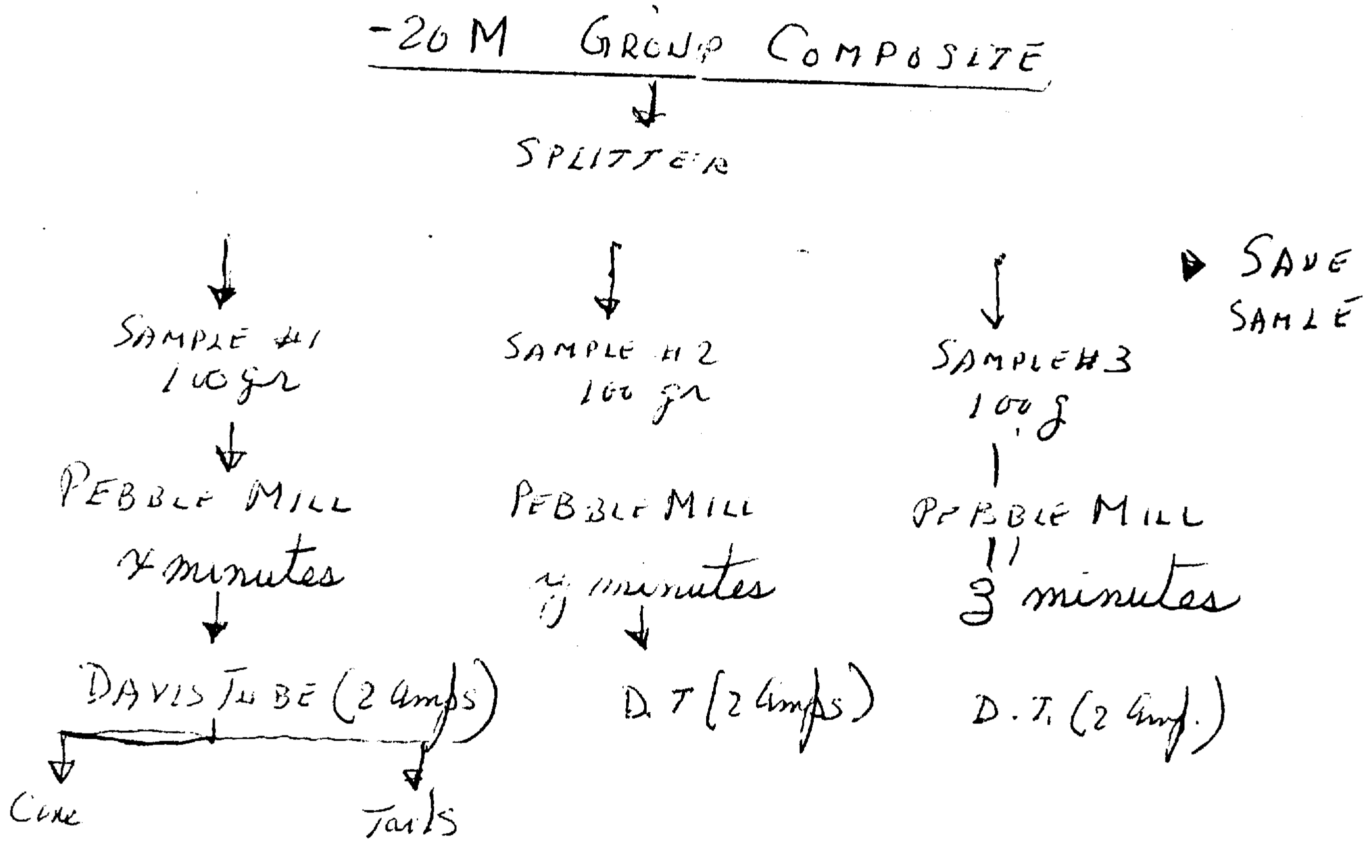



These tests yeld the following diagnostic factors:

- % Fe in the Composite
- % Fe in the Concentrate
- % Weight Recovered

3 GRINDING & CHARACTERIZATION TESTS

The diagnostic factors were entered in the relevant cross-sections. Adjacent "50 ft Composites having similar diagnostic factors were composited into "Group Composites" through adding for each "50 ft Composite" a weight of its -20 Mesh sample proportional its lenght in the total lenght of the "Group Composite". The test procedure is illustrated below:




The grinding times were selected so that the longest grinding time would yield a D.T. Concentrate assaying at least 65% Fe based on the results of the Diagnostic Tests. The following characterization factors were obtained:

- % Fe of each Group Composite Head Sample
- % Fe in Concentrate
- % Weight of each Concentrate
- Grinding time converted into KWH/t
- <u>Size MODULUS</u> of the ground product.

that is the particle size expressed in microns (μ) at which 80% of the original sample had been reduced.

The data obtained were plotted in a series of graphs such as:

- % Fe in Concentrate vs Modulus
- KWH/t vs % Fe in Concentrate
- % Weight recovered vs Modulus

The area of influence of each "Group Composite" was entered on the relevant cross-section together with the following characterization factors as obtained from the tests and graphs:

- Grinding Modulus which would yield a concentrate assaying at least 66% Fe.
- % Weight recovered corresponding to the Grinding Modulus
- KWH/t corresponding to the Grinding Modulus.
- % Fe contained in each Group Sample

# GRADE OF CRUDE ORE AND CONCENTRATION DATA

- The percent iron in the crude ore (ore reserves) was derived from the head assay results obtained for each Group Composite and which corresponds to its area of influence as shown on the relevant cross-section.
- The grade of the magnetite concentrate was chosen from the "Grinding Modulus vs % Fe in Concentrate" graph, using a reasonable modulus, the minimum permissible value of the modulus used having been set. A grade was choosen for each Group Composite and the average grade of the concentrate was estimated in the same manner as the % Fe in the crude ore.
- ~~The Grinding Modulus choosen for each Group Composite~~

- The average Grinding Modulus was derived in the same manner as the % Fe in the crude ore and the concentrate.
- The average KWH/t was obtained from the Grinding Modus vs KW/t graph. Results are shown in the following Table

## SUMMARY OF ESTIMATE RESULTS

(All Tonnages in 1000's of Dry Long Tons)

| Orebody | "A" | "D" | "E" | Total |
|---|---|---|---|---|
| All Material, Including Overburden | 743,568 | 197,651 | 362,024 | 1,303,243 |
| Less Overburden | 7,597 | 2,656 | 1,627 | 11,880 |
| All Rock Material | 735,971 | 194,995 | 360,397 | 1,291,363 |
| Less Waste Separable at Shovel | 206,331 | 48,842 | 94,276 | 349,449 |
| Crude Ore, Requiring Crushing | 529,640 | 146,153 | 266,121 | 941,914 |
| Less Cobbable Included Waste | 53,257 | 9,272 | 25,044 | 87,573 |
| Ore Material, Requiring Ball-Milling | 476,383 | 136,881 | 241,077 | 854,341 |
| Less Fine Tailings | 256,627 | 71,017 | 143,814 | 471,458 |
| Concentrates (Adjusted for Losses) | 219,756 | 65,864 | 97,263 | 382,883 |
| % Iron in Ore Material | 36.7 | 36.8 | 34.1 | 36.0 |
| % Iron in Concentrates | 66.6 | 68.2 | 67.5 | 67.1 |
| % Silica in Concentrates | 6.6 | 3.5 | 4.4 | 5.5 |
| % Iron Unit Recovery from Ore Material | 83.8 | 88.9 | 79.9 | 83.5 |
| Average Modulus of Grind Required (80%-) | 33µ | 99µ | 111µ | 66µ |
| Equivalent Grind in % under Screen Size | 83%-325M | 83%-150M | 76%-150M | 85%-200M |
| Power Index, as Computed | 37 | 20 | 20 | 29 |
| KWH/LT Required from -20 Mesh | 24.8 | 13.4 | 13.4 | 19.5 |
| % Weight Recoveries (Concentration Ratios): | | | | |
| From All Material Moved | 29.6 (3.38:1) | 33.3 (3.00:1) | 26.9 (3.72:1) | 29.4 (3.40:1) |
| From Crude Ore Crushed | 41.5 (2.41:1) | 45.1 (2.22:1) | 36.5 (2.74:1) | 40.6 (2.46:1) |
| From Ore Material Milled | 46.1 (2.17:1) | 48.1 (2.08:1) | 40.3 (2.48:1) | 44.8 (2.23:1) |

# COMPLETE ANALYSIS OF CRUDE ORE & CONCENTRATES

- Crude Ore

An equal weight of the head sample of each Group Composite was taken, and all samples were combined assayed.

- Concentrate

An equal weight of the concentrate obtained from each "grinding & characterization test" carried out at the finest grind was taken, all samples were combined and the concentrate composite assayed.

Results are shown in the following Table.

| Determination | "A" Orebody Crude | "A" Orebody Conc. | "D" Orebody Crude | "D" Orebody Conc. | "E" Orebody Crude | "E" Orebody Conc. |
|---|---|---|---|---|---|---|
| Ferrous Iron (Fe=) | 15.04% | 22.87% | 14.12% | 23.36% | 15.17% | 22.38% |
| Ferric Iron (Fe≡) | 21.22 | 44.45 | 22.86 | 45.48 | 18.86 | 45.81 |
| Total Fe | 36.26 | 67.32 | 36.98 | 68.84 | 34.03 | 68.19 |
| $SiO_2$ | 42.49 | 5.76 | 42.26 | 3.55 | 44.10 | 4.24 |
| $Al_2O_3$ | 1.60 | 0.35 | 1.02 | 0.42 | 1.22 | 0.69 |
| CaO | 0.90 | 0.010 | 1.41 | 0.015 | 1.78 | 0.19 |
| MgO | 2.35 | 0.018 | 2.66 | 0.060 | 3.01 | 0.46 |
| S | 0.170 | 0.098 | 0.038 | 0.022 | 0.10 | 0.15 |
| P | 0.084 | 0.026 | 0.110 | 0.031 | 0.056 | 0.015 |
| As | 0.0091 | 0.0012 | 0.0076 | 0.0009 | 0.0025 | 0.0015 |
| Cu | 0.021 | 0.0013 | 0.008 | 0.0010 | 0.005 | 0.003 |
| $TiO_2$ | 0.21 | 0.25 | 0.18 | 0.[illegible] | 0.073 | 0.094 |

The 36.26% Fe obtained for the "A" Orebody is relatively close to the 36.7% Fe grade

was calculated for the crude ore.

Since the "combined concentrate" corresponds to the finest grind, its %Fe content (67.32% Fe) is slightly higher than the 66.6% Fe as obtained on the basis of a reasonable modulus.

## SPECIAL TESTS ON THREE COMBINED COMPOSITES

The Combined Composites were prepared through blending Group Composites of the A-Deposit on the basis of their characteristics and their tonnage of influence. The Combined Composites assayed as follows.

| | | COMBINED Composite I | COMBINED Composite II | COMBINED Composite III |
|---|---|---|---|---|
| Total iron | (Fe) | 36.62% | 36.77% | 36.40% |
| Soluble iron (1) | (Fe) | 34.17% | 33.29% | 32.89% |
| Ferric iron | ($Fe^{+++}$) | 24.57% | 22.49% | 22.19% |
| Ferrous iron | ($Fe^{++}$) | 12.05% | 14.28% | 14.21% |
| Titania | ($TiO_2$) | 0.110% | 0.085% | 0.092% |
| Silica | ($SiO_2$) | 43.56% | 42.94% | 43.16% |
| Alumina | ($Al_2O_3$) | 1.16% | 0.90% | 2.16% |
| Lime | (CaO) | 1.89% | 1.16% | 1.56% |
| Magnesia | (MgO) | 1.91% | 2.08% | 2.23% |
| Manganese | (Mn) | 0.15% | 0.17% | 0.13% |
| Sulphur | (S) | 0.06% | 0.27% | 0.14% |
| Phosphorus | (P) | 0.079% | 0.056% | 0.077% |

On each Group Composite, one test was carried out under identical conditions following the flowsheet illustrated below.

# SUMMARY OF RESULTS



1. Metallurgical Results

| | | Composite No. 1 Crude ore | Composite No. 1 Conc. | Composite No. 2 Crude ore | Composite No. 2 Conc. | Composite No. 3 Crude ore | Composite No. 3 Conc. |
|---|---|---|---|---|---|---|---|
| **Weight** | Weight % | 100.0 | 46.4 | 100.0 | 44.6 | 100.0 | 43.3 |
| | Ratio of conc. | | 2.15:1 | | 2.24:1 | | 2.31:1 |
| **Assays** | % total Fe | 36.62 | 68.60 | 36.77 | 67.92 | 36.40 | 68.74 |
| | % soluble Fe | 34.17 | 68.41 | 33.29 | 67.60 | 32.89 | 68.55 |
| | % $SiO_2$ | 43.56 | 4.52 | 42.94 | 5.66 | 43.16 | 4.08 |
| | % $TiO_2$ | 0.110 | 0.057 | 0.085 | 0.066 | 0.092 | 0.062 |
| | % S | 0.06 | 0.02 | 0.27 | 0.19 | 0.14 | 0.08 |
| **Recovery** | Soluble Fe | | 92.5 % | | 90.0 % | | 88.9 % |
| | **Magnetite** | | 95.5 % | | 95.4 % | | 95.8 % |

2. Grinding

The grinding requirements, expressed as % - 325 mesh and kw.-hr. /long ton of crude ore for various concentrate grades are summarised below.

| Separation stage | Composite No 1 Conc. % sol. Fe | Composite No 1 % -325 mesh | Composite No 1 kw.hr. (1) | Composite No 2 Conc. % sol. Fe | Composite No 2 % -325 mesh | Composite No 2 kw.hr. (1) | Composite No 3 Conc. % sol. Fe | Composite No 3 % -325 mesh | Composite No 3 kw.hr. (1) |
|---|---|---|---|---|---|---|---|---|---|
| 1st regrind | 57.50 | 53.4 | 13.47 | 57.34 | 65.2 | 12.89 | 58.04 | 68.8 | 12.78 |
| 2nd regrind | 64.67 | 90.0 | 26.50 | 63.39 | 91.0 | 25.08 | 64.91 | 93.0 | 24.61 |
| 3rd regrind | 68.41 | 96.4 | 37.31 | 67.60 | 96.8 | 35.87 | 68.55 | 98.0 | 35.02 |

(1) Cumulative figures - kw.-hr. /long ton of crude ore.
(2) Equivalent to 80.4 kw.-hr. per long ton of final concentrate.
(3) " " 80.4 " " " " " " " "
(4) " " 80.9 " " " " " " " "

3. COBBING

| | Composite No 1 % Wt | Composite No 1 % Fe | Composite No 1 % Dist | Composite No 2 % Wt | Composite No 2 % Fe | Composite No 2 % Dist | Composite No 3 % Wt | Composite No 3 % Fe | Composite No 3 % Dist |
|---|---|---|---|---|---|---|---|---|---|
| COBBING (-1/4") | 1.6 | 5.57 | 0.3 | 3.6 | 5.97 | 0.6 | 3.0 | 7.73 | 0.7 |
| COBBING (-14M) | 27.3 | 3.74 | 3.0 | 29.5 | 3.9 | 3.9 | 31.4 | 4.94 | 4.7 |

4 ANALYSIS OF FINAL CONCENTRATE

| COMPOSITE No | | 1 | 2 | 3 |
|---|---|---|---|---|
| Total iron | (Fe) | 68.60% | 67.92% | 68.74% |
| Soluble iron | (Fe) | 68.41% | 67.60% | 68.55% |
| Ferric iron | ($Fe^{+++}$) | 46.19% | 46.53% | 46.33% |
| Ferrous Iron | ($Fe^{++}$) | 22.41% | 21.39% | 22.41% |
| Titania | ($TiO_2$) | 0.057% | 0.066% | 0.062% |
| Silica | ($SiO_2$) | 4.57% | 5.66% | 4.08% |
| Alumina | ($Al_2O_3$) | 0.19% | 0.32% | 0.41% |
| Lime | (CaO) | 0.21% | 0.10% | 0.14% |
| Magnesia | (MgO) | 0.21% | 0.11% | 0.09% |
| Manganese | (Mn) | 0.09% | 0.10% | 0.10% |
| Sulphur | (S) | 0.02% | 0.19% | 0.08% |
| Phosphorus | (P) | 0.012% | 0.014% | 0.017% |

5 COMMENTS

COBBING

The % Weight cobbed (rejected) from the crude (-1/4") sample varies from 1.6% up to a maximum of 3.6% compared with the 10% of cobbable ~~b~~ barren material as obtained from the ore reserve estimate.

CHEMICAL ANALYSIS

- The % $TiO_2$ varies in the Head Samples from 0.085% to 0.11% $TiO_2$ compared with the 0.21% $TiO_2$ obtained from the analysis of the Combined Group Composites.

- The $TiO_2$ in the concentrates varies from 0.057 % to 0.092 % $TiO_2$ compared with the 0.25% $TiO_2$ obtained from the Combined Group Concentrates.
- The % $TiO_2$ in the concentrates is lower than in the crude while for the Combined Group Composite, the % $TiO_2$ in the concentrate is higher than in the crude are.
- The following Table would indicate that the $TiO_2$ content of the concentrate is inversely proportional to $TiO_2$ content of the crude

| | Crude Sample % $TiO_2$ | Concentrate % $TiO_2$ |
|---|---|---|
| Composite No 1 | 0.11 | 0.057 |
| No 3 | 0.092 | 0.062 |
| No. 2 | 0.085 | 0.066 |

# 6.0 BULK TEST AT LAKEFIELD & THE MINES BRANCH

In 1957 a 28 ton bulk sample was blasted from an iron formation outcrop ~~part~~ on the "A" Orebody. An 8 ton sample was taken out of the bulk sample and sent to Lakefield for laboratory and pilot plant testwork. The chemical analysis of the sample received by Lakefield was as follows:

**Analysis of Head Sample**

**A. Chemical analysis**

| | | |
|---|---|---|
| Total iron | (Fe) | 38.91% |
| Acid-soluble iron | (Fe) | 37.27% |
| Acid insoluble matter | | 47.96% |
| Silica | ($SiO_2$) | 40.88% |
| Alumina | ($Al_2O_3$) | 3.23% |
| Lime | (CaO) | 0.71% |
| Magnesia | (MgO) | 0.34% |
| Titanium dioxide | ($TiO_2$) | 0.16% |
| Phosphorus | (P) | 0.11% |
| Total sulphur | (S) | 0.03% |

## 6.1 Laboratory Testwork

Following are the main conclusions of the laboratory testwork conducted to define the flowsheet and set the condition of operations of the pilot plant tests:

The results of the laboratory scale tests indicated that the ore could be treated by magnetic separation to give a high grade concentrate, with a high recovery of the iron.

Owing to the finely-disseminated nature of the magnetite, relatively fine grinding of the ore would be necessary. Under standard magnetic separation conditions, a linear relationship was observed between the grade of concentrate and the logarithm of the size modulus, i.e. the size in microns which 80% of the product passed. The latter was directly related to the energy used in grinding.

Davis tube tests in which a low magnetising current was used indicated that it would be possible to remove a finished concentrate, as well as a tailing, at an early stage in the operation. This would result in a considerable reduction in the total cost of grinding.

## 6.2 PILOT PLANT TESTS

### 6.2.1 Grinding Tests.

A first series of 4 preliminary grinding tests were conducted in a 5' ø Aerofall mill and various laboratory tests were conducted on the Aerofall mill products. Based on the results of these tests it was decided to carry out two pilot plant tests, one at a relatively fine Aerofall grind (Grind V) and the other one at a relatively coarse grind (Grind VI), merely through increasing the air suction (Water Gauge) from one test (V) to the other (VI). The more significant results are summarized in Table 6.2.1

TABLE 6.2.1

DISTRIBUTION & GRANULOMETRY OF PRODUCTS

| | Horizontal Classifier | | Cyclone | | Multiclone | |
|---|---|---|---|---|---|---|
| GRIND | V | VI | V | VI | V | VI |
| % Weight of Products | 72.1 | 47.5 | 26.2 | 50.4 | 1.7 | 2.1 |
| SCREEN ANALYSIS | | | | | | OVERALL* |
| +28 Mesh | | 2.3 | | | | 1.1 |
| -28 +35 | | 11.8 | | | | 5.6 |
| -35 +48 | 3.2 | 21.9 | | 0.4 | 2.3 | 10.6 |
| -48 +65 | 6.9 | 26.7 | | 1.6 | 5.0 | 13.5 |
| -65 +100 | 17.0 | 18.0 | | 4.1 | 12.2 | 10.7 |
| -100 +150 | 18.2 | 9.0 | 0.5 | 6.6 | 13.2 | 7.6 |
| -150 +200 | 13.6 | 4.3 | 1.7 | 7.1 | 10.3 | 5.6 |
| -200 | 41.1 | 6.0 | 97.8 | 80.2 | 57.0 | 45.3 |
| % Fe | 38.18 | 40.73 | 33.80 | 34.12 | | |
| KWH/T | | | | | | |
| 17' ø Mill | 13.57 | 11.1 | | | | |
| 22' ø Mill | 9.91 | 7.85 | | | | |

* Calculated assuming that the Multiclone product is 100% -200 M.

~~The~~ Grind V and VI correspond respectively to a -48 Mesh and a -28 Mesh grind which indicates a very high power efficiency for the Aerofall mill considering the hardness and fineness of this iron formation.

Referring to the above Table 6.2.2.1, it is considered that the testwork conducted on the Aerofall mill products of Grinds V and VI returned very similar metallurgical results, while the overall Power consumed was identical. The higher recovery ~~achieved~~ on Grind V products was obtained at the expense of a lower grade of concentrate than that obtained on Grind VI products, and visus versa. Cobbing Tableau the relatively coarse product of Grind VI rejected 4.2% by Weight of the crude ore, this figure to be compared with the estimated 10% of barren material bands or lenses ~~within~~ throughout the ore body. The low % weight rejected is certainly due in part to the concentration effect of the Aerofall Mill air system which "sweeps" the lighter barren minerals into the cyclone, as shown by the grade of the horizontal classifier 40.73% Fe vs that of the cyclone product 24.12% F

## 6.2.2 METALLURGICAL TESTWORK ON AEROFALL MILL PRODUCTS

The more significant results of testwork conducted on products of Grinds V and VI are presented in Table 6.2.2.1 (17)

### TABLE 6.2.2.1
### SUMMARY OF RESULTS OF TESTWORK CONDUCTED ON AEROFALL MILL PRODUCTS

**Overall Metallurgical Results of Test No. P2 Grind V**

| Products | Weight % | Assay % Fe | Assay % $SiO_2$ | % Distribution Fe |
|---|---|---|---|---|
| Horiz. classifier 1st regrind conc. | 36.9 | 64.08 | 10.10 | 63.8 |
| Cyclone concentrate | 11.3 | 64.44 | 9.64 | 19.6 |
| Concentrate from 2nd regrind | 6.2 | 67.08 | 6.72 | 11.3 |
| Middling from 2nd regrind | 0.8 | 28.49 | - | 0.6 |
| Tailing from 2nd regrind | 4.8 | 4.93 | - | 0.6 |
| Tailing from cyclone separation | 12.4 | 3.78 | - | 1.3 |
| Tailing from horiz.classifier regrind | 12.8 | 4.45 | - | 1.5 |
| Tailing from horiz.classifier dry sep. | 14.8 | 3.35 | - | 1.3 |
| Head (calculated) | 100.0 | 37.09* | | 100.0 |

**Overall Metallurgical Results OF TEST P. 7N GRIND VI**

| Products | Weight % (original ore) | Assays % Fe | Assays % $SiO_2$ | % Distribution Fe |
|---|---|---|---|---|
| Concentrate from 1st regrind | 45.9 | 64.80 | 9.18 | 79.9 |
| Concentrate from 2nd regrind | 6.3 | 68.77 | 4.40 | 11.6 |
| Middling from 2nd regrind | 1.4 | 50.97 | - | 1.9 |
| Tailing from 2nd regrind | 3.0 | 8.36 | - | 0.7 |
| Tailing from 1st regrind | 16.6 | 5.47 | - | 2.4 |
| Tailing from cyclone sep. | 22.6 | 5.04 | - | 3.1 |
| Tailing from horiz.class. dry sep. | 4.2 | 3.60 | - | 0.4 |
| Head (calculated) | 100.0 | 37.26 | - | 100.0 |

| GRIND No | MAGNETITE CONCENTRATE Weight % | Fe % | Fe % Dist | $SiO_2$ % | -325 M % | POWER REGRIND KWH/T | TOTAL* KWH/T |
|---|---|---|---|---|---|---|---|
| V | 54.6 | 64.40 | 95.0 | 9.70 | 76.5 | 14.70 | 25.77 |
| VI | 53.1 | 65.27 | 93.0 | 8.84 | 75.0 | 17.72 | 25.58 |

* Including operation of a 22' ft. diameter Aerofall mill.

## Chemical Analyses of Concentrates.

Table 6.2.2.4 presents the chemical analysis of the final concentrates obtained from each one of the two pilot tests. These analyses are compared to those obtained on the Combined Group Composites Concentrate as well as to the average grade of the three concentrates produced from each test on the three Special Group Composites.

TABLE 6.2.2.4

| | Grind V Test P2 | Grind VI Test P7 | AVERAGE Grind V + VI | Group Comp | Combined Comp |
|---|---|---|---|---|---|
| T.T (Fe) | 64.43% | 65.33% | | | |
| Sol. (Fe) | 64.40% | 65.27% | 64.83 | 68.17 | 67.32 |
| ($Fe_3O_4$) | 89.00% | 90.20% | | | |
| ($SiO_2$) | 9.70% | 8.84% | 9.27 | 4.77 | 5.76 |
| ($Al_2O_3$) | 0.99% | 0.71% | 0.85 | 0.30 | 0.35 |
| (CaO) | 0.10% | 0.06% | .08 | .15 | 0.02 |
| (MgO) | 0.03% | 0.05% | .03 | .14 | 0.02 |
| ($TiO_2$) | 0.17% | 0.22% | .20 | .057 | 0.25 |
| (S) | 0.003% | 0.004% | 0.003 | .10 | 0.10 |
| (P) | 0.026% | 0.020% | .023 | .014 | 0.03 |
| (Co) | < 0.01% | < 0.01% | | | |
| (Ni) | < 0.001% | < 0.001% | | | |
| (Cu) | < 0.001% | < 0.001% | | | |
| (Mn) | 0.033% | 0.036% | | | |
| (Mo) | < 0.001% | < 0.001% | | | |
| (Sn) | 0.010% | 0.011% | | | |
| (V) | < 0.002% | < 0.002% | | | |
| (Cr) | 0.004% | 0.005% | | | |

The concentrates produced from the two pilot plant tests returned a lower grade than that of the Combined Group Composite Concentrate (CGCC) ~~was~~ as well as the average of the Special Group Composite Concentrates (SGCC) produced in the laboratory. This difference can be explained as follows:

- The Combined Group Composite concentrate contained 97.1% of -325 Mesh material compared with 76.2% in the pilot tests concentrates.
- The fineness of the concentrate is reflected by the Power consumed which was 36.1 KWH/t in the Special Group Composites testwork compared with 25.6 KWH/t consumed in the pilot tests.

<u>%Fe vs % $SiO_2$ In The Concentrate</u>

The relation between the %Fe and the % $SiO_2$ content of the magnetite concentrate is illustrated by the Graph shown in Figure 6.2.2.5.

To upgrade the pilot tests concentrates would require to regrind the products shown in Table 6.2.2.5 and to clean the ground product on a three roll magnetic separator, the middlings of which would be recirculated to the middling circuit.

TABLE 6.2.2.5

PRODUCTS TO BE REGROUND

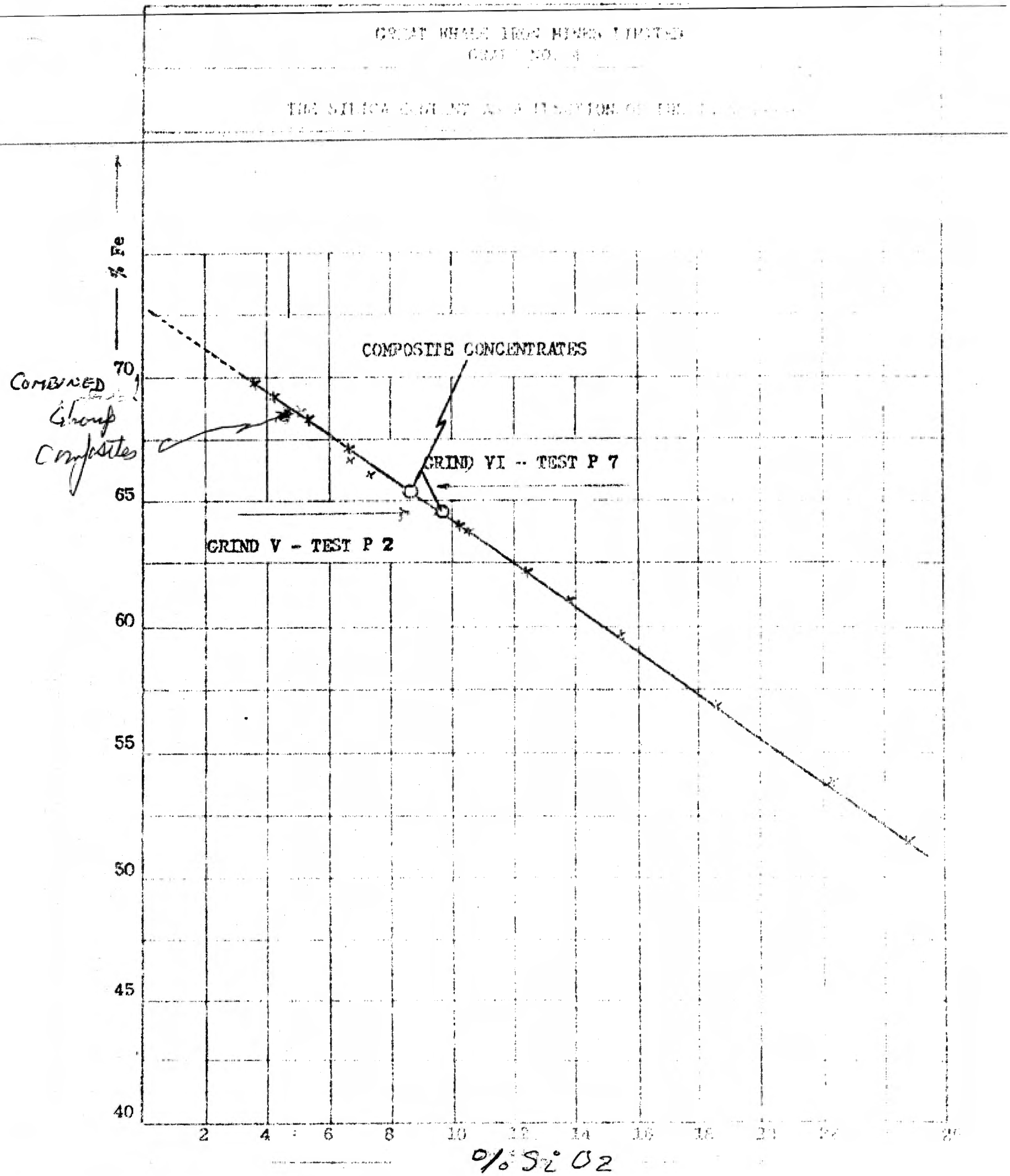
| | % Weight | % Fe |
|---|---|---|
| GRIND V | | |
| Horizontal Class. 1st regrind conc. | 36.9 | 64.08 |
| Cyclone Concentrate | 11.3 | 64.44 |
| COMBINED PRODUCTS | 48.2 | 64.16 |
| GRIND VI | | |
| Concentrate From 1st Regrind | 45.9 | 64.80 |
| Special Group Composites Test 2nd Regrind conc | 48.1 | 64.32. |

Through regrinding (3rd regrind), the 2nd regrind concentrate of the Special Group Composites tests, the 3rd regrind concentrates obtained assayed on the average 68.19% Fe and 4.75% $SiO_2$. The 3rd regrinding stage consumed 10.7 KWH per ton of crude ore.

Referring to Table 6.2.2.5, the % Weight and % Fe of the products to be reground are very similar to the corresponding factors of the the SGCC 2nd regrind concentrate. On that basis it is estimated that to produce a 68% Fe concentrate.

- The Grind V - Concentration Flowsheet would consume 25.77 + ~~12~~ 10.7 KWH/t for an overall of ~~37.8~~ 36.47 KWH/t
- The Grind VI - Concentration Flowsheet would consume 25.58 + 10.2 KWH/t for an overall of ~~36.6~~ 35.78 +10.2 KWH/t

Considering that the Grind V regrinding would require two circuits, compared with one for Grind VI it is recommended to retain the Grind VI flowsheet as a preliminary flowsheet to estimate the potential of the Dridaile


% Fe
70
65
60
55
50
45
40
2
4
6
8
10
COMPOSITE CONCENTRATES
GRIND VI -- TEST P 7
GRIND V - TEST P 2
COMBINED Group Composites
% Si O2

René Dufour ing.

CERTIFICAT DE QUALIFICATION

Je, René Dufour, de Ville Mont-Royal, Québec, déclare par la présente que je suis :

- Ingénieur des mines résidant au :

  129 Glengarry,
  Ville Mont-Royal, Québec
  J3R 1A3

- Membre de l'Ordre des Ingénieurs du Québec depuis 1954

- Diplômé de l'École Polytechnique de Montréal, B.Sc.A. en génie des mines

J'ai débuté ma carrière professionnelle en exploration minière et œuvré dans diverses régions minières du Québec et dans plusieurs pays. J'ai cofondé 4 sociétés offrant des services à l'industrie minière et organismes gouvernementaux.

J'ai par la suite fait carrière en exploitation minière où j'ai occupé les postes d'ingénieur en planification, ingénieur en charge du gisement, chef ingénieur des mines et gérant des mines en charge d'une production journalière de 100,000 tonnes par jour de minerai et stériles.

École Polytechnique de Montréal depuis 1965 : Professeur titulaire au département de génie minéral, directeur du département, adjoint au président de l'École Polytechnique, Président de l'Association des diplômés de Polytechnique.

J'ai agi comme conseiller à la Banque Mondiale, les Nations-Unis, Hydro-Québec, l'Agence canadienne du développement international (ACDI) et différentes compagnies minières.

Aussi conseiller technique auprès de la Commission des valeurs mobilières du Québec pendant quelques années.

Administrateur de compagnies minières.

Ancien président de l'Institut canadien des mines et de la métallurgie.

J'ai réalisé différents travaux de 1967 à 1980 pour le compte du groupe Little Long Lac alors détenteur de la propriété Grande Baleine.

J'ai visité le site des trois gisements en 1977.

Depuis l'acquisition des claims couvrant les trois gisements de Grande Baleine en février 2004, j'ai dirigé les travaux réalisés par M. François Biron et Jean Claude Caron afin de compiler les informations disponibles et d'évaluer le contexte économique actuel des gisements de Grande Baleine.

Les claims miniers sont détenus par Niocan Inc., une compagnie que j'ai fondée en 1995. J'ai rempli les fonctions de président du conseil d'administration et chef de la direction de Niocan jusqu'en 2005; je siège en qualité d'administrateur au conseil et je détiens des actions de Niocan.

René Dufour, ing. 2 août 2005

**CERTIFICATE OF QUALIFICATIONS**

**FRANÇOIS BIRON**

I, François Biron, residing at Québec, Quebec do hereby certify that:

1) I am a Senior Mining Engineer with the firm Met-Chem Canada Inc. (Met-Chem) with an office at Suite 300, 555 René-Lévesque West Blvd, Montreal, Canada;

2) I am a graduate of the École Polytechnique de Montréal with a B. Eng. (Mining Engineer) in 1976. I have practiced my profession continuously since then;

3) I am a member of the "Ordre des Ingénieurs du Québec" (31708);

4) I have not received, nor do I expect to receive, any interest, directly or indirectly, in the Great Whale Iron Project or securities from Niocan Inc, its affiliates or subsidiaries;

5) I am not aware of any material fact or material change with respect to the subject matter of the technical report, which is not reflected in the technical report, the omission to disclose which makes the technical report misleading;

6) I, as a qualified person, am independent of the issuer as defined in Section 1.5 of National Instrument 43-101;

7) I have read National Instrument 43-101 and Form 43-101F1 and the technical report has been prepared in compliance with this Instrument and Form 43-101F1.

8) I am a co-author of the report to which this certificate is attached and was responsible for the technical mining evaluation.

9) I hereby consent to the filing of this report with any regulatory authority.

François Biron, Eng.
Senior Mining Engineer

Juillet 28, 2005

## 6. CERTIFICATE

I, Jean-Claude Caron with my business and residence address at 233 Champagne, Street in Saint- Eustache, Province of Quebec, Canada, J7P 2H2, hereby certify that:

- ✓ I hold a B.A. Sc. degree in chemical and metallurgical engineering (1957) and a M.A.Sc degree in mining engineering (1961) from the École Polytechnique de Montréal.
- ✓ I am a member in good standing of the Ordre des ingéneiurs du Québec since 1957 and have gathered 48 years of practical experience in exploration, mining, mineral processing and management of mining projects and operations, including 35 years as consulting engineer to the mining sector.
- ✓ I have exercised my profession in North America, Brazil, Russia, India and nine countries of Africa.
- ✓ I was metallurgical engineer at Iron Ore Company of Canada from 1957 to 1959 and participated to the construction, start-up and operation of the I.O.C. pilot plant at Labrador City, which included an Aerofall dry grinding mill as well as beneficiation by gravity, magnetic separation and flotation.
- ✓ From 1960 to 1970 I worked for St. Lawrence Columbium and Metals Corp. as Mill Manager (1960 – 1965), Mine Manager (1965- 1967) and Vice-President Mining and Exploration (1967 – 1970).
- ✓ I was an associate of the engineering firm Caron Dufour Seguin & Associates (1970 – 1973), and President of the engineering firms SIDAM Inc. (1973 – 1978), MINEXPERT Inc. (1978 – 1984), PROTEC Inc. (1984 – 2004) and contributed to various projects such as:
  - Cleveland Cliff: Feasibility study of a mining operation on the Star – O'Keef iron deposits.
  - Campbell Chibougamau: Development and evaluation of a project to recover vanadium from the Magnetite Bay Iron deposits.
  - NIOBEC Inc.: Construction of Pyrochlore concentractor

- C.R.D.: Extension to the magnesite processing facilities at the Kimar, Canadian Refractory Division installations.
- La Mine Doyon: Open-pit and gold ore processing facilities
- Minerais Lac: Extension to the gold ore processing facilities at East Malartic.
- NIOCAN Inc.: Process development and design.

✓ I do not hold any interest directly or indirectly in NIOCAN Inc., nor in the Great Whale Magnetite Property and I do not expect to receive nor to acquire any.

Dated in Saint-Eustache, Qc, this 22nd day of August, 2005

Jean-Claude Caron, Eng.