RAM PETROLEUMS LIMITED

LABORATORY TESTING ON A SAMPLE
OF WOLLASTONITE-BEARING MARBLE
HAWLEY FARM PROPERTY
OLDEN TOWNSHIP
FRONTENAC COUNTY
SOUTHERN ONTARIO

C. R. Bowdidge, M.A., Ph.D.

November 1989

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MINING LANDS SECTION
INTRODUCTION

This report provides an introduction to a separate report by J. Kreins of I.M.D. Laboratories Ltd. which describes the results of laboratory tests on a sample of wollastonitic marble from the Hawley Farm property of Ram Petroleums Limited. Details of the property, location and access, history, geology, sample location, and sample collection are given in the following paragraphs.

PROPERTY, LOCATION AND ACCESS

The property consists of two unpatented claims, SO 748449 and 748450, covering the north-east and north-west quarters respectively of lot 4, Concession III, Olden Township, Frontenac County, Southern Ontario Mining Division. The claims have a nominal area of 50 acres each. Surface rights are owned by the Hawley family.

The property lies about 6 km south of the village of Mountain Grove, which is 2 km south of Highway 7, 51 km west of Perth and about 280 km east of Toronto. A township road which links the hamlets of Long Lake and McLean runs across the property and provides access.

HISTORY AND PREVIOUS WORK

An old trench has been blasted on the zinc showing in the western part of the property. The date of this trench is unknown, but it was probably made after 1946, as it is not shown on the geological map of that date by W. D. Harding (Ont. Dept. Mines Ann. Rept., Vol. LVI, Part 6, 1947, with map 1947-5). In the early 1970's, Lynx-Canada Explorations Limited held a claim on the western half of the present property, and carried out magnetic, VLF-
EM, and self-potential surveys as well as geological mapping and a soil geochemical survey.

During the summers of 1988 and 1989, the writer carried out geological mapping over the present property for Ram Petroleums Limited. This work is described in a separate report written in July 1989.

GEOLOGY

The property lies within the Grenville structural province of the Canadian Shield. The geology of Olden Township has been mapped by W. D. Harding (op cit). The property lies near the south-western margin of a large and irregularly shaped body of diorite about 8 km by 5 km, which extends from Long Lake north almost to Mountain Grove. This dioritic intrusive complex is bounded on the east, west, and south by granite and granitic gneiss, and on the north by metasediments (marble and clastic rocks). It contains numerous metasedimentary remnants of considerable size, one of which hosts the Long Lake zinc mine. There is an occurrence of nickel mineralization reported in the northern part of the diorite complex.

The geology of the property has been described in detail in the writer's earlier report, the geological map from which is also appended to this report.
SAMPLE COLLECTION

A trench was excavated near the north-western end of the exposed portion of the band of wollastonitic marble. The trench, which is approximately 9 metres long, tested most of the width of the wollastonitic material at this point. Drilling and blasting were done by Doug Ridell of Clarendon, Ontario. A backhoe was used to excavate blasted material, and also to replace broken rock in the trench after the sample was taken. This was necessary because the location is in a field used for cattle pasture. The proximity of the trench to the farmhouse and barn necessitated the use of a blasting mat to restrict the amount of broken rock which was scattered.

The trench location is shown on the geological map attached to this report. Approximately 500 kg of fresh rock from a depth of between 30 cm and 60 cm was collected from the whole length of the trench. A representative sample of about 100 kg was shipped to I.M.D. Laboratories Ltd. of Concord, Ontario for laboratory testing. The remainder is stored at the tremolite plant of Commercial Industrial Minerals Limited at Clarendon, Ontario.

Respectfully submitted,

C. R. Bowdidge, M.A., Ph.D.

November 2nd, 1989
Fig. 1: Location Map, scale 1:700,000.
Fig. 2: Claim Map (from Plan M-136) Scale 1:31,680
PROCESSING STUDY ON A
WOLLASTONITE CONTAINING ORE SAMPLE

SEPARATION OF WOLLASTONITE FROM
CARBONACEOUS MINERALS & OTHER CONSTITUANTS

Prepared For: Ram Petroleums
Prepared By: I.M.D. Laboratories Ltd.
October, 1989
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1.0 SUMMARY

The crude rock, containing wollastonite can be upgraded by the following:

- Crushing the rock by jaw and rolls crushing to approximately 30 mesh, followed by wet grinding to approximately 50 mesh.

- Treat the wet ground ore by a froth flotation process, separating the wollastonite from the calcite and other minerals.

- Magnetic separation of the -30 mesh crushed and ground rock prior to flotation is recommended.

- Removal of -325 mesh fines after flotation is suggested as it will have a beneficial impact on the quality of the wollastonite.

- Tailings, particularly the rougher tailings produced in the flotation process consist of almost pure calcite of good brightness and may be a viable byproduct.

- The ore contains a small amount of quartz, part of which tends to co-float with the wollastonite. Further work to minimize the level of quartz in the wollastonite is warranted.

- The wollastonite products produced by the extraction process exhibits a good acicular structure and aspect ratio.

- Due to budget limitation it was not possible to investigate alternative grinding methods. This is an important aspect in producing wollastonite with high aspect ratios. Further work which is certainly warranted should emphasize this in further investigations.
The appropriate grinding process to further reduce wollastonite products as produced by froth flotation to commercial quality products must also be investigated.

The ore sample as submitted is of a quality that when properly processed should be of commercial interest.
2.0 INTRODUCTION

A bulk sample of a wollastonite containing ore was submitted to I.M.D. Laboratories Ltd. by Ram Petroleums.

The bulk sample was obtained from a trench blasted into a surface showing of a potential wollastonite deposit under study by Ram Petroleums.

I.M.D. was engaged for the purpose of investigating the processing requirements for producing the best possible wollastonite concentrate, and to comment on the potential commercial value of products that could be extracted.

This process study has been completed as requested. The salient data on results obtained are given in this report.
3.0 SAMPLE PREPARATION

The bulk sample consisted of relatively large rock pieces which after manual breaking were crushed in a jaw crusher to approximately 1".

The 1" material was "staged" rolls crushed to approximately 30 mesh. After each crushing stage the material was screened over a vibratory screen equipped with a 30 mesh screen deck.

Oversize, coarser than 30 mesh was recrushed until all of the material passed 30 mesh.

A sample was split out for determination of size distribution, chemical and mineralogical composition.

The size distribution of the -30 mesh material was determined to be as follows:

<table>
<thead>
<tr>
<th>Size</th>
<th>Retained % Individual</th>
<th>Retained % Cumulative</th>
</tr>
</thead>
<tbody>
<tr>
<td>+30 mesh</td>
<td>3.3</td>
<td>3.3</td>
</tr>
<tr>
<td>-30 + 40 mesh</td>
<td>31.2</td>
<td>34.5</td>
</tr>
<tr>
<td>-40 +50 mesh</td>
<td>17.8</td>
<td>52.3</td>
</tr>
<tr>
<td>-50 +70 mesh</td>
<td>16.1</td>
<td>68.4</td>
</tr>
<tr>
<td>-70 +100 mesh</td>
<td>11.1</td>
<td>79.5</td>
</tr>
<tr>
<td>-100 +200 mesh</td>
<td>10.6</td>
<td>90.1</td>
</tr>
<tr>
<td>-200 mesh</td>
<td>9.9</td>
<td>100.0</td>
</tr>
</tbody>
</table>
3.1 Chemical & Mineralogical Analysis

The chemical composition of the ore was determined by x-ray fluorescence, the mineralogical composition by x-ray diffraction. These analysis were performed on magnetically separated and crude ore. The following results were obtained:

### Chemical Analysis

<table>
<thead>
<tr>
<th>Element</th>
<th>Crude Ore</th>
<th>Separated Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiO₂</td>
<td>27.7</td>
<td>27.0</td>
</tr>
<tr>
<td>Al₂O₃</td>
<td>0.13</td>
<td>0.13</td>
</tr>
<tr>
<td>CaO</td>
<td>52.2</td>
<td>52.1</td>
</tr>
<tr>
<td>MgO</td>
<td>0.79</td>
<td>1.21</td>
</tr>
<tr>
<td>Na₂O</td>
<td>0.03</td>
<td>0.04</td>
</tr>
<tr>
<td>K₂O</td>
<td>0.08</td>
<td>0.08</td>
</tr>
<tr>
<td>Fe₂O₃</td>
<td>0.31</td>
<td>0.20</td>
</tr>
<tr>
<td>MnO</td>
<td>0.27</td>
<td>0.26</td>
</tr>
<tr>
<td>Tₐ₂O₂</td>
<td>&lt;0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>P₂O₅</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>L.O.I.</td>
<td>17.1</td>
<td>18.6</td>
</tr>
</tbody>
</table>

### Mineralogical Analysis

The X-RD analysis showed the ore to consist of major wollastonite and calcite. A trace of quartz was found plus an unidentified mineral believed to be sanidine. Diopside while not found in the analysis is believed to be present.

Based on the chemical analysis, the composition is believed to be:

- Calcite: Approximately 50%
- Wollastonite: Approximately 45%
- Quartz - Diopside: Approximately 5%
3.2 Microscopic Examination

Each of the size fractions was examined under the stereo microscope. The purpose of this examination was to determine the following:

3.2.1 Crystal structure of wollastonite in any given size fraction.
3.2.2 Apparent aspect ratio of acicular wollastonite crystals
3.2.2 Liberation of wollastonite from other mineral constituents in the ore

The following observations were made:

-30 X 40 Mesh Size Fraction

Wollastonite is present as mostly thick stalks made up of many individual wollastonite needles. Short stubby pieces and fragments broken from larger crystals were observed. Some quartz and diopside were also observed.
Calcite is present as coarse rhombohedral crystals with a slightly yellow tinge.
Estimated aspect ratio of wollastonite ranges from 2:1 to 10:1 with an average of 5:1.

40 X 50 Mesh Fraction

The same comments apply to this fraction as to the 30 X 40 mesh fraction.
50 X 70 Mesh Fraction

This size fraction shows a distinct improvement in aspect ratio of the wollastonite and less "multi-crystal" aggregates. Aspect ratio ranges from 4:1 to 12:1 with a 7:1 estimated average.

70 X 100 Mesh Fraction

A further distinct improvement in the aspect ratios with needles becoming thinner.

100 X 140 Mesh Fraction

Very good aspect ratio ranging from 7:1 to 15:1 with an average of over 10:1.

-140 X 200 Mesh Fraction

This fraction looks very good with thin acicular wollastonite crystals with an aspect ratio of up to 20:1 with an average estimated at 12:1.

-200 Mesh Fraction

The minus 200 mesh fraction consists of wollastonite with high aspect ratio and also many fine crystal fragments of low to medium aspect ratio.
3.3 Distribution of Calcite & Wollastonite

To determine if either the wollastonite or calcite showed any degree of concentration in the coarse, medium or fine fractions, each of the size fraction was calcined for one (1) hour at 1000°C. The weight loss in each fraction is attributed to the loss of CO₂, i.e. carbon dioxide from calcite contained in the individual size fractions. The percent of calcite contained was calculated from the determined loss of ignition attributed to CO₂.

The following results were obtained:

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Weight Loss %</th>
<th>Calculated % Calcite</th>
</tr>
</thead>
<tbody>
<tr>
<td>-30 Mesh - Crude Ore</td>
<td>23.63</td>
<td>53.70</td>
</tr>
<tr>
<td>+ 30 mesh</td>
<td>18.35</td>
<td>41.70</td>
</tr>
<tr>
<td>-30 +40 mesh</td>
<td>20.23</td>
<td>46.0</td>
</tr>
<tr>
<td>-40 +50 mesh</td>
<td>20.65</td>
<td>46.9</td>
</tr>
<tr>
<td>-50 +70 mesh</td>
<td>21.7</td>
<td>49.3</td>
</tr>
<tr>
<td>-70 +100 mesh</td>
<td>23.32</td>
<td>53.0</td>
</tr>
<tr>
<td>-100 +200 mesh</td>
<td>25.74</td>
<td>58.5</td>
</tr>
<tr>
<td>-200 mesh</td>
<td>30.1</td>
<td>68.41</td>
</tr>
</tbody>
</table>

**Conclusion** It is obvious that the calcite and by inference the wollastonite is fairly evenly distributed throughout the size range. There is a gradual increase in the calculated calcite content with diminishing particle size. However, it is not significant and indicates that it is not possible to produce a wollastonite concentrate by dry processing method.

The only suitable alternative is separation of wollastonite by froth flotation.

For commercial applications, particularly ceramics and refractories it is important for the wollastonite to be pure, essentially free of calcite as demonstrated by a low loss on ignition or CO₂ in the range of 1.5% or less with 1% being desirable.
Another important aspect of wollastonite is its use as a reinforcing filler in plastics, or as a substitute for asbestos. For these applications wollastonite with a high aspect ratio is essential.

To achieve these objectives it is critical to develop an effective means of grinding, retaining or enhancing the acicular wollastonite structure and aspect ratio. Equally important is the need to develop an efficient flotation process that is effective in achieving separation of wollastonite from other minerals constituents, in particular calcite, in order to achieve the low levels of residual calcite containing CO₂ (carbon dioxide).

Traditionally, the flotation practice is to float the calcite with wollastonite the "non-floated", i.e. sink fraction. This has disadvantages in that it is difficult to float calcite without floating a significant amount of wollastonite. I.M.D. Laboratories has developed a new flotation process in which wollastonite is floated from calcite.

This process has shown to be effective on several wollastonite ores. Diopside if present tends to co-float with wollastonite but can be removed by high intensity magnetic separation before or after flotation. If calcite is of good purity and is a potential by-product, removal of diopside prior to flotation is considered the proper approach particularly if other mineral contaminants that can be removed by magnetic separation are present.

The nature of the submitted ore sample indicated that the calcite in the ore is a potential by-product. Other than calcite, some other dark minerals and diopside were noted. To investigate the potential benefit of magnetic separation, a test was conducted with dry, high intensity magnetic separation. This indicated that most of the dark minerals and diopside responded to this treatment. It was decided to prepare a bulk sample for flotation testing by first removing magnetic and para-magnetic mineral components.
4. MAGNETIC SEPARATION

Part of the -30 mesh bulk sample was processed by high intensity magnetic separation, using the Eriez "induced roll" high intensity magnetic separator. The bulk sample was first given a pass over the separator using low intensity. This did not produce any magnetics. The sample was then processed by high intensity separation, giving it two passes at high intensity. This resulted in two para-magnetic waste fractions. The pertinent data is given on the following table:

4.1 Magnetic Separation Results

Feed Material - 30 mesh crude ore

<table>
<thead>
<tr>
<th></th>
<th>Weight</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low intensity magnetics</td>
<td>110 gram</td>
<td>0.046</td>
</tr>
<tr>
<td>1st high intensity magnetics</td>
<td>656 gram</td>
<td>2.77%</td>
</tr>
<tr>
<td>2nd high intensity magnetics</td>
<td>368 gram</td>
<td>1.55%</td>
</tr>
<tr>
<td>Non magnetics</td>
<td>22,603 gram</td>
<td>95.62%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>23,638 gram</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
5.0 FLOTATION TESTS

A total of eight flotation tests were conducted of which several were of an exploratory nature. A range of "flotation feed" particle sizes were tested following either dry or wet grinding.

Flotation tests consisted of a rougher float plus up to three stages of cleaner floats. Reagents used for flotation are a proprietary reagent with a chemical composition similar to dialkyldimethyl ammonium chloride and dissolved in an alcohol. This reagent is effective in floating silicate minerals from non-silicate minerals under certain operating conditions.

All flotation tests were conducted using 1 kg batches of material at a pulp density of 25%. Conditioning times ranged from 2 to 4 minutes at 40% solids. Citric acid was employed as a depressant for calcite in most tests.

5.1 Test Objectives

Primary objectives to be achieved were as follows:

5.1.1 Obtain products with low L.O.I. (loss of ignition), attributable to residual calcite in flotation products.

5.1.2 Recovery of a minimum of 80% of the wollastonite contained in the ore.

The secondary objective was to retain the acicular structure of the wollastonite during grinding, and to determine if a commercially acceptable calcite by-product could be produced.

Table #1 summarizes flotation results and table #2 analysis of products produced by the flotation process employed.
<table>
<thead>
<tr>
<th></th>
<th>Test #1</th>
<th>Test #2</th>
<th>Test #3</th>
<th>Test #4</th>
<th>Test #5</th>
<th>Test #6</th>
<th>Test #7</th>
<th>Test #8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed Size to Flotation</td>
<td>30 Mesh</td>
<td>30 Mesh</td>
<td>40 Mesh</td>
<td>50 Mesh</td>
<td>30 Mesh</td>
<td>-40 Mesh</td>
<td>-50 Mesh</td>
<td>-50 Mesh</td>
</tr>
<tr>
<td>Dry of wet ground</td>
<td>Dry</td>
<td>Dry</td>
<td>Dry</td>
<td>Dry</td>
<td>Dry</td>
<td>Wet</td>
<td>Wet</td>
<td>Wet</td>
</tr>
<tr>
<td>Flotation Pulp Density</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>Collector gram/tonne</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Citric Acid gram/tonne</td>
<td>--</td>
<td>--</td>
<td>500</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>Sodium Silicat gram/tonne</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>2,000</td>
</tr>
<tr>
<td>Fuel oil gram/tonne</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>175</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Conditioning time/minutes</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Rougher Tails%</td>
<td>47</td>
<td>19.6</td>
<td>30.0</td>
<td>33.4</td>
<td>19.8</td>
<td>38.7</td>
<td>45.4</td>
<td>42.1</td>
</tr>
<tr>
<td>1st Cleaner Tails %</td>
<td>11</td>
<td>2.3</td>
<td>7.4</td>
<td>6.5</td>
<td>4.8</td>
<td>6.7</td>
<td>7.0</td>
<td>8.0</td>
</tr>
<tr>
<td>2nd Cleaner Tails %</td>
<td>4.4</td>
<td>4.3</td>
<td>2.5</td>
<td>3.9</td>
<td>4.6</td>
<td>4.1</td>
<td>6.7</td>
<td>2.4</td>
</tr>
<tr>
<td>3rd Cleaner Tails %</td>
<td>4.0</td>
<td>--</td>
<td>5.6</td>
<td>9.7</td>
<td>2.7</td>
<td>2.8</td>
<td>1.2</td>
<td>3.7</td>
</tr>
<tr>
<td>Magnetics %</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Wollastonite product yield %</td>
<td>35.6</td>
<td>73.8</td>
<td>54.6</td>
<td>46.5</td>
<td>68.0</td>
<td>47.6</td>
<td>39.7</td>
<td>43.7</td>
</tr>
</tbody>
</table>
Table #2

Product Quality - % LOI

<table>
<thead>
<tr>
<th>Test Number</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
<th>#5</th>
<th>#6</th>
<th>#7</th>
<th>#8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rougher Tails (Calcite)</td>
<td>--</td>
<td>42.08</td>
<td>41.81</td>
<td>43.35</td>
<td>--</td>
<td>42.2</td>
<td>88.9</td>
<td>39.71</td>
</tr>
<tr>
<td>1st Cleaner Tails</td>
<td>--</td>
<td>39.95</td>
<td>36.41</td>
<td>37.72</td>
<td>--</td>
<td>38.4</td>
<td>30.2</td>
<td>29.50</td>
</tr>
<tr>
<td>2nd Cleaner Tails</td>
<td>--</td>
<td>34.51</td>
<td>36.1</td>
<td>37.89</td>
<td>--</td>
<td>29.9</td>
<td>15.5</td>
<td>22.3</td>
</tr>
<tr>
<td>3rd Cleaner Tails</td>
<td>--</td>
<td>--</td>
<td>15.89</td>
<td>23.87</td>
<td>--</td>
<td>24.1</td>
<td>15.6</td>
<td>19.86</td>
</tr>
<tr>
<td>Wollastonite Product</td>
<td>4.84</td>
<td>15.7</td>
<td>5.39</td>
<td>2.66</td>
<td>--</td>
<td>1.85</td>
<td>2.56</td>
<td>4.6</td>
</tr>
</tbody>
</table>

LOI on Product Fractions

Tests were conducted to determine if any of the residual calcite present in the wollastonite flotation product was concentrated in any particular size fraction. This was found to be true as is shown in table 2A.

<table>
<thead>
<tr>
<th>Float Test #</th>
<th>% LOI in Size Fractions of Concentrates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+200 Mesh</td>
</tr>
<tr>
<td>6</td>
<td>0.23%</td>
</tr>
<tr>
<td>7</td>
<td>0.44</td>
</tr>
<tr>
<td>8</td>
<td>0.51</td>
</tr>
</tbody>
</table>

This demonstrates that most of the residual calcite is contained in the fine -325 mesh fraction which is only a small portion of the concentrate. Removal of this fraction will result in products with very low LOI. It is likely that very fine calcite "piggy-backs" on wollastonite during flotation.
5.2 Discussion of Results - Recovery & Quality - Exploratory Other Tests

5.3.1 TEST #1

Test #1 used -30 mesh dry ground product. Only the collector was used with no depressant for calcite. Product appeared clean but recovery at 35.6% was below expectation. The wollastonite product had a L.O.I. of 4.84% which is too high.

5.3.2 TEST #2

Test #2 used a lower level of collector addition. This level of collector was insufficient as it was not able to sufficiently activate the wollastonite, particularly the coarser fractions. Also, it caused more extensive co-flotation of calcite. This is demonstrated by the fact that while the product yield was high the level of L.O.I. at 15.7% indicated that a significant amount of calcite is present in the concentrate.

5.3.3 TEST #3

Test #3 was conducted at a finer feed size, i.e. -40 mesh and citric acid was introduced as a depressant for calcite. This resulted in a high product recovery but product was not of acceptable quality with a 5.39% loss on ignition.

5.3.4 TEST #4

In test #4 the addition of citric acid was doubled while the particle size of the feed reduced to -50 mesh. This resulted in a good product yield and a loss on ignition of 2.66%, a significant improvement over previous tests.
5.3.5 TEST #5

Test #5 was again done at -30 mesh using the same 500 gram/tonne of collector and 1000 gram/tonne of citric acid. Fuel oil at 175 gram/tonne was added as an auxiliary collector. This did not work well. The fuel oil caused the froth to collapse and removal of wollastonite was poor. It also caused coating of the calcite with fuel oil resulting in it to float. Product was not tested.

5.3.6 TEST #6

In test #6 grinding was changed from a dry to a wet process. The first wet grind was a -40 mesh product which upon examination appeared to result in a wollastonite with a greater aspect ratio. The same levels of collector and citric acid were employed. Product yield was excellent at 47.6% while loss on ignition was 1.85%, the best result achieved. It was noted that the rougher tails were very clean and white, testing indicated it to consist of almost pure calcite, i.e. 9.6% CaCO₃.

5.3.7 TEST #7

For test #7 the feed was also wet ground, this time to approximately 50 mesh. The same reagent levels were employed as for the previous test. This test gave a lower product yield. Also, loss on ignition was higher than in test #6, at 2.56 compared to 1.85 in test #6. This was attributed to a higher level of fines which causes the flotation process to be less effective.

5.3.8 TEST #8

For test #8 the feed was wet ground to a size between the grinds for tests 6 and 7. Instead of citric acid, sodium silicate was used as depressant for calcite and the trace of quartz present in the ore.
This altered the behaviour of the system with a different type of froth and a slower flotation rate. Product yield at 43.7% was good. The loss on ignition of the final product however was 4.6%.

5.3 Conclusions

Wet grinding to approximately -40 mesh appears to be the optimum particle size for flotation. Citric acid appears to be the best depressant for calcite.

Product recovery is excellent with only small amounts of wollastonite lost in process tailings test #6 and #7 products are close to the desirable purity for wollastonite products.

Calcite, particularly contained in rougher tails are of good quality showing a good white colour and may be a viable by-product.

While these tests indicated the type of results that can be achieved it is believed that further improvements are possible. Other grinding methods should be explored to determine if wollastonite with better aspect ratios can be produced. Also, reduction in the amount of fines produced during and grinding is of importance. Alternatively, removal of fines prior to flotation will have a beneficial effect on product quality.
Ministry of Northern Development and Mines

Ontario

Report of Work
(Expenditures, Subsection 77(19))

**Type of Work Performed**

**Beneficiation Studies**

**Mining Division**

**SOUTHERN ONT.**

**Township or Area**

**OLDEN**

**Recorded Holder**

RAM PETROLEUMS LIMITED

**Prospector's Licence No.**

1 T 409

**Address**

435 Exeter Rd., London, ON, N 6E 2Z3

**Telephone No.**

519 681 2264

**Work Performed By**

IMD LABORATORIES LTD.

**Name and Address of Author (of Submission)**

J. Kriens, 630 Rivermeade Rd., Unit 10, Concord, ON L 4K

**Date When Work was Performed**

From: 11 Oct 89 To: 10 Oct 89

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**All the work was performed on Mining Claim:**

**Indicate no. of days performed on each claim.**

*See Note No. 1 on reverse side

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**Instructions**

Total days credits may be distributed at claim holder's choice. Enter number of days credits per claim in the expenditure days credit column (below).

**Calculation of Expenditure Days Credits**

Total Expenditures $1,800 - 15 = 120

**Total Number of Mining Claims Covered by this Report of Work**

2

**Certification of Beneficial Interest**

I hereby certify that, at the time the work was performed, the claims covered in this report of work were recorded in the current recorded holder's name or held under a beneficial interest by the current recorded holder.

*See Note No. 2 on reverse side

**Certification Verifying Report of Work**

I hereby certify that I have a personal and intimate knowledge of the facts set forth in the Report of Work annexed hereto, having performed the work or witnessed same during and/or after its completion and the annexed report is true.

**Name and Address of Person Certifying**

C. A. Boudinote, 118 Amelia St., Toronto, ON M 4X 1E 4

**Telephone No.**

363 6028

**Date**

11 Oct 89

**Certified By (Signature)**

C. A. Boudinote

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**For Office Use Only**

**Total Days Cr. Recorded**

120

**Date Recorded**

Oct 11/89

**Acting Mining Recorder**

D. Lollimore

**Date Approved & Recorded**

30 Jan 90

**Provincial Manager, Mining Lands**

W. Wilson
September 30, 1989

Mr. Richard Opekak
Ram Petroleums Ltd.
435 Exeter Road
London, Ontario
N6E 2Z3

I.M.D. INVOICE # 1133
I.M.D. PROJECT # 90224
Processing Study on the Separation of Wollastonite from Carbonaceous & Other Associated Minerals.

Professional Fees:

J. Kriens 39.0 hrs. @ $60.00  $2,340.00
Technologist 25.0 hrs. @ $45.00 1,125.00

Total Professional Fees  $3,465.00

Expenses:

Chemical & X-Ray Diffraction Analysis to Sept. 26, 1989

XRAL Invoice # 9518  $134.75
XRAL Invoice # 9631  172.00

Total Expenses  $306.75

TOTAL INVOICE  $3,771.75

Received full payment - Oct 11, 1989
with thanks.

[Signature]