

# Spanish River Carbonatite Complex 2004 Geological and Trenching Exploration Program

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## Spanish River Carbonatite Complex - 2004 Geological and Trenching Program

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#### INTRODUCTION

Between the dates August 21<sup>st</sup> 2004 and November 21<sup>st</sup> 2004 a trenching, prospecting and geological mapping program was carried out on the Spanish River property located in Venturi and Tofflemire Townships, District of Sudbury. The purpose of the 2004 program like the 2003 work was to commence exploration outside of the "Burn's Mine" quarry limits with the prospect of locating further deposits of calcite, apatite, biotite and vermiculite for industrial and agricultural use.

## **PROPERTY DESCRIPTION AND HISTORY**

#### **PREVIOUS WORK**

In 1955 Johns-Mansville Company performed a ground magnetometer survey over what is now referred to as the Spanish River Carbonatite Complex. The purpose for this survey was to find vermiculite. The Ontario Department of Mines in 1962 reinterpreted this data, which outlined an oval shaped magnetic high, which they believed to be a carbonatite.

In 1968 Union Carbide Exploration made a rough surface geological map and drilled a 1746-foot drill hole in search of niobium, copper and rare earths. Outcrop of the Carbonatite is scarce and the main oval shape and size of the deposit was primarily the result of magnetometer work and the one drill hole.

Jenmac Company Ltd. in 1960 completed a trenching program. This work was the basis of the 1962 ODM work and geological mapping by Union Carbide. It was also the point of reference for the Junior Mine Services Ltd. (JMS) 1996 trenching program ultimately leading to the Burns Mine.

In 1975 International Minerals and Chemical Corp. completed a seismic survey over the complex in an effort to determine overburden thicknesses. This was followed up with four reverse-circulation drill holes in an attempt to locate residual apatite. This work has been reinterpreted and included in JMS's 1996 trenching and stripping work. Of particular significance is the depth of what is referred to in the seismic data as the dense layer. Trenching has revealed that this dense layer represents a residuum capping the bedrock. This work has been used to establish ore reserves for the residuum covering the 1962 bulldozer trenches and 1996 follow-up trenching program. At the present time the residuum, whether carbonatite or biotite-pyroxenite represents the mined product.

Ron Sage from Ministry of Northern Mines and Development completed a geological report on the complex in 1987. Dr Sage has subsequently visited the site on several occasions to review work conducted by AMP.

From 1955 through to 1975 no niobium, uranium and residual apatite mineralization was located. Ironically, this feature of the Spanish River Carbonatite coupled with unusually high sovite content makes it ideal for organic agricultural use.

The original Spanish River property consisted of six mining leases and 5 unpatented claims in Venturi and Tofflemire Townships. All claims originally were 100% owned by Junior Mine Services Ltd. ("JMS"). In 1999 Agricultural Mineral Prospectors Inc. (AMP) was incorporated and optioned the property from JMS. The new company was formed to run all activities associated with the

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Spanish River Property and is controlled and run by the principles of JMS. Chris Caron and John M. Slack hold the unpatented claims in trust. Subsequent staking has added an additional 6 claims, which are held by either John M. Slack or Chris Caron in trust on behalf of AMP. The list of leases and mining claims that comprise the Spanish River Property are listed in table: 1.

The property was optioned because of the likelihood of locating sufficient reserves of the minerals calcite, apatite, biotite and vermiculite for the purpose of selling to organic farmers, market and backyard gardeners. From 1994 through to 1996, JMS conducted several site visits collecting samples, preliminary geological mapping and assaying. The purpose of the sampling was to determine consistency of material and potential toxic elements. This was critical to ensure Spanish River Carbonatite would be approved under the organic guidelines. The samples collected were crushed, screened and used in garden test plots and fed as mineral supplement to small flocks of layer hens. Coinciding with these activities JMS began extensive market studies and research into organic agricultural practices and accepted soil mineral amendments.

In 1996 JMS conducted a trenching and bulk sample program to delineate potential zones of afore mentioned minerals, either alone our combined. The program was successful in locating three areas that could be used as a source of nutrients and soil amendments for organic agriculture. As a result a 100 tonne bulk sample was taken and shipped to our farms in Southern Ontario. This material was used in test gardens on the farm, turf applications, layer hen mineral supplement and finally field trials in the Chatham-Kent area.

Following these initial trials we began a comprehensive research and investigation of soil mineral deficiencies, organic and conventional farming practices, weathering characteristics of Spanish River Carbonatite including soil geochemistry and biogeochemistry. From January 1998 until to May 2000 this was the total focus and only business activity carried out by AMP, employing three people full time. In the spring of 2000 AMP commenced an advanced exploration program comprising of stripping, trenching, sampling and a second 1000 metric tonne bulk sample. That same year AMP obtained a quarry permit covering the original six patented claims. To date approximately 15,000 tonnes has been quarried and distributed in Ontario, Quebec, Vermont, New York, Michigan, Pennsylvania and Virginia.

## CURRENT EXPLORATION PROGRAMS

In 1996 the original a small test pit on claim 3002843 located an area of massive sovite hosted in fenitized quartz monzonite. The sovite located in this area was of high purity and lacked biotite, apatite and magnetite mineralization. Trenching and prospecting activities in this area started in the fall of 2002.

In 2003 a total of 9 trenches and one test pit have been excavated to define what was referred to as Zone 4. This work was able to cut and delineate numerous sovite veins and seams none of them of any economic significance. The area exposed is predominantly fenitized host quartz monzonite with an abundance of fracture fillings comprised of sovite and pyroxene. The sovite veins, though of high purity are narrow and discontinuous in this vicinity.

## LOCATION AND ACCESS

The Spanish River Carbonatite Complex straddles the common boundary of Venturi and Tofflemire Townships just south of a sharp bend in the Spanish River known as the "Elbow". The property is cut by numerous, very well maintained, logging roads.



Spanish River Property Location Map

Access to the property is via the Fox Lake Lodge road, which turns off highway 144 at Cartier. From Cartier it is 25 km to the property. At present AMP and Fox Lake Lodge maintains the main road. All river and creek crossing have had culverts and bridges put in place to handle heavy logging trucks. Road infrastructure is excellent and required very little upgrade.

Cartier is the closest town, a village with approximately 500 inhabitants. Within the town limits is a rail spur owned by C.P.R. Sudbury is approximately 50 kilometres south of Cartier on highway 144. Total driving time from Sudbury to the property is 1½ hours.

Accommodation was at the Fox Lake Lodge, located 1000 metres south of the property.

#### **MINING CLAIMS & LEASES**

The Spanish River Carbonatite Complex property consisted of 14 mining claims and 6 leased located in Tofflemire and Venturi townships, district of Sudbury. The mining claims are 100% owned by Agricultural Mineral Prospectors Inc. and held in trust by Chris Caron (C38620) and John Slack.

## Table: 1 - Claims and Leases Comprising Spanish River Property

Mining Claims	Township	Ownership	Recorded Holder	Expiry Date W	<u>ork Req'd.</u>
1237466	Tofflemire	AMP Inc.	Chris Caron	Nov 29 2004	3169
1237463	Tofflemire	AMP Inc.	Chris Caron	Dec 08 2004	800
1198345	Tofflemire	AMP Inc.	John Slack	Feb 10 2005	6400
1198344	Tofflemire	AMP Inc.	John Slack	Feb 10 2005	1600
3002843	Tofflemire	AMP Inc.	AMP Inc.	May 13 2005	1600
1237467	Venturi	AMP Inc.	Chris Caron	Nov 29 2004	6400
1237464	Venturi	AMP Inc.	Chris Caron	Dec 08 2004	1600
1237462	Venturi	AMP Inc.	Chris Caron	Jun 28 2005	1440
1237465	Venturi	AMP Inc.	Chris Caron	Dec 08 2004	800
1214616	Venturi	AMP Inc.	John Slack	Jun 25 2005	400
1214615	Venturi	AMP Inc.	John Slack	Jun 25 2005	800
1198340	Venturi	AMP Inc.	John Slack	Jun 30 2005	800
1198154	Venturi	AMP Inc.	John Slack	Oct 26 2006	987
1136165	Venturi	AMP Inc.	John Slack	May 31 2005	400
Mining Leases	Township	Owner	ship <u>Record</u>	ed Holder	

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Those wishing to stake mining came should consult with the Provincial Mining Recorders' Office of the Ministry of Northern Development and Mines for additional information on the status of the lands shown herefor. This map is not intended for navigational, survey, or land title determination purposes as the information shown on this map is complete from various sources. Completeness and accuracy are not guaranteed. Additional information may also be obtained through the local Land Titles or Registry Office, or the Ministry of Natural Resources.

Contact Information: Toil Free Msp Datum: NAD 83 Frownolai Mining Recordern' Office Tei: 1 (886) 415-9845 ext 51/#ttejection: UTM (6 degree) Willet Green Miller Centre 533 Rameey Lake Road Fax: 1 (877) 67C-1444 Sudavy ON P3E 685 Home Page: www.mndm.gov.on.ca/MNDM/MINESLANDS/inlsmnpge.htm

This map may not show unregistered land tenure and interests in land including certain patents, leases, easements, right of ways, flooding rights, licences, or other forms of disposition of rights and interest free the Crown. Also contain land tource and and uses that restrict or prohibit free entry to stake mining daims may not be mining the statement of the statement of

The information shown is derived from digital data available in the Provincial Mining Recorders' Office at the time of downloading from the Ministry of Northern Development and Mines web site.

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# Figure: 2

359399	Venturi	AMP Inc.	AMP Inc.
359400	Venturi	AMP Inc.	AMP Inc.
377231	Venturi	AMP Inc.	AMP Inc.
378212	Venturi	AMP Inc.	AMP Inc.
378894	Tofflemire	AMP Inc.	AMP Inc.
378893	Tofflemire	AMP Inc.	AMP Inc.

#### **GENERAL GEOLOGY OF SPANISH RIVER COMPLEX**

The Spanish River Carbonatite emplacement occurred between  $1790 \pm 90$  Ma to  $1883 \pm 95$  Ma the same time as the Sudbury norite. This suggests that the to alkalic magmatic events are related and the Sudbury eruptive may account for the alkaline glasses of the Onaping Formation.

The Spanish River Carbonatite Complex is enveloped in a halo of fenitized granitic rocks. Carbonatite rocks with a high silicate mineral content occur along the periphery of the body. Lower silicate carbonatite occurs toward the core. The contact between fenitized wall rock and carbonatite appears to be over a maximum thickness of 300 metres. This observation is based on the trenching program and the Union Carbide drill hole. This area is referred to as the "Transition Zone" and is a banded and brecciated assemblage of layered biotite sovite, fenite and mafic rocks. The transition zone appears to be a result of contact metamorphism and metasomatism. Discreet lenses bands and veins of high purity sovite have been located in this zone. The sovites in this area appear to have higher quantities of magnetite, vermiculite and apatite. The second classification of the complex is referred to as the "Outer Core". This classification is used for the purpose of describing the trenching program and is adopted from a drill hole completed in 1968, by Union Carbide. The outer core is very similar to the transition zone with exception of a marked increase in sovite (calcite). The third and last classification of the complex is the "Inner Core", comprised almost entirely of sovite.

The main characteristic that distinguishes the Spanish River Carbonatite from other carbonatite complexes in northern Ontario is the very high content of sovite verses mafic rock components.

## **REGIONAL STRUCTURAL GEOLOGY**

The Spanish River Complex Carbonatite Complex lies within the Abitibi Subprovince of the Superior Province of the Canadian Shield. The complex occurs along a north-south striking fault zone along the west side of the Sudbury Basin. According to the 1987 O.G.S. Study 30 this fault system maybe a graben structure branching off the Ottawa-Bonnechere graben, a system hosting carbonatite-alkalic rock complexes in the Nipissing area.

Airphotos of the region also suggest the complex occurs at the point of intersection of a number of regional lineaments.

#### SPANISH RIVER COMPLEX STRUCTURE

Shearing and brecciation of the enveloping quartz monzonite is common. Fractures are commonly filled with mafic pyroxenes, amphiboles and calcite. There is evidence in the trenching and the Union Carbide drill hole that blocks of fenite have peeled of the walls and are incorporated into the complex. Banding of fenites and sovite is common.

Post faulting has not been encountered at this time. The heterogeneous mixture and lack of outcrop makes it very difficult at this time to suggest that post faulting has occurred.

#### FENITIZED QUARTZ MONZONITE

The host rock enclosing the Spanish River Complex is massive, medium grained pink quartz monzonite. In contact with the complex the quartz monzonite has been fenitized. The granitic rock becomes mottled pink and green-blue in colour. Sodic amphibole and pyroxene have replaced the quartz in the quartz monzonite.

The fenitized quartz monzonite is brecciated and intruded by dark green mafic veins. Carbonate is commonly associated with the veins and fracture fills. The closer to the intrusive the greater the number of mafic and calcite filled fractures and veins.

#### SPANISH RIVER CARBONATITE COMPLEX – TRANSITION ZONE

The transition zone is predominantly fenite, but exhibits less brecciation and more banding. There is a marked increase of sovite veins, lenses and bands. The purity of the sovite in this zone varies from 45% CaCO3 to nearly pure. The variations and types of accessory mineral found in the sovite is as follows:

- Vermiculite 0 to 15%
- Biotite -0 to 15%
- Magnetite -0 to 5%
- Pyrrhotite 0 to 5%
- Apatite 0 to 5%

Numerous lenses and veins of clean calcite (sovite) have been located through the trenching program, which occur in what previously would have been described as the transition zone. It is from one of these lenses that the 1996 bulk sample was taken.

#### SPANISH RIVER CARBONATITE COMPLEX - OUTER CORE

The actual contact between the transition zone and outer core is not well defined and is based on the degree of sovite verses fenite present and overburden thickness. Where there is a sharp increase in overburden is the logical location for the contact between the complex and altered host rock. The approximate thickness of the outer core based on the above observations would be 200 metres. The outer core appears only to outcrop along the road where Vein No.3 is located. A vertical rotary percussion hole (TP-2) drilled, in 1975, in this vicinity encountered 15 feet of overburden. This is also in the vicinity of test pits, which exposed decomposed sovite very similar to TP-2.

In the O.G.S. Study, "Spanish River Carbonatite Complex" the outer core is described as the Outer Phase. The outer phase based on this report is comprised of syenite, pyroxenite, ijolite and biotite sovite.

For the purpose of this report the description of the composition for the outer core is from the Union Carbide drill hole.

"The Outer Core of the carbonatite-filled diatreme, composed of biotite amphibole sovite with some phyrrhotite and minor chalcopyrite and gramphite. There is no appreciable magnetite between 1066'4" and 1339'. Between 1339' and 1495' coarse magnetite is present in both sovite and the gramphite. For the purpose of logging this core, 3 rock types are recognized, gramphite, sovite inclusions, which may be either sovite with a high proportion of inclusions, or gramphite, which has been carbonated. In either case, the dark minerals constitute up to 50% of the rock. The proportions of sovite, inclusions and gramphite in this section are: 22%, 32% and 46% respectively."

All previous trenching, geological mapping, bulk sampling has been located in the outer core. Outcrop exposure was poor. Trenching has located sovite mineralization in four separate areas. Prospecting and geological mapping has located sovite bedrock in two localities.

The 1996 trenching program was carried out almost entirely over this zone covering 800 metres of strike length along the western contact of the complex. The approximate thickness of the transition zone – outer core is approximately 300 metres.

The trenching program located several areas of economic interest. For the purpose of describing these areas they will be described as follows:

- Zone No. 1 area where the 100 tonne bulk sample was taken and the best continuous high grade CaCO3 has been located to date.
- Zone No. 2 area that had been stripped for a potential bulk sample in 1996, contained a blend of calcite, apatite, biotite, vermiculite with minor silicocarbonatite and pyroxenitic rocks. In 2000 a 1000 tonne bulk sample was taken. In 2001 the area is the Burns Mine current quarry location.
- Zone No. 3 area that was originally sampled in 1993 and contained mineral composition similar to Zone No.2. The main difference is a marked increase in biotite and vermiculite content. This are contains large reserves of residuum.

- Zone No. 4 area of fracture filled sovite and pyroxenite veins within well fenitized quartz monzonite. Large sovite reserves anticipated under fine stratified sand along borders of this zone.
- Road Zone area of high purity calcite banded with magnetite, pyroxene rich sovite.
- Residual Vermiculite this area measures 82m x 32m and is comprised of at least 50% fine vermiculite.

#### **SPANISH RIVER COMPLEX – INNER CORE**

The inner core of the Spanish River Complex is entirely covered by a thick layer, +100 feet, of overburden. Descriptions provided from various sources all relate back Union Carbide diamond drill hole. All descriptions use calcite content to describe and classify the inner core. Concentrations of calcite (sovite) increase closer to the centre of the complex.

For the purpose of this report Union Carbide's description (refer to Appendix 8) was used to describe the inner core. Union Carbide describes the inner core being comprised almost entirely of biotite/magnetite sovite, with minor sections of gramphite. Accessory minerals found were pyrrhotite, chalcopyrite and apatite.

## LITHOLOGIC UNITS FOR THE SPANISH RIVER CARBONATITE

## **CENOZOIC**

## PLEISTOCENE AND RECENT

River deposits, stream and swamp deposits, Glacial Deposits - sand and gravel

**Unconformity** 

## PROTEROZOIC

## SPANISH RIVER CARBONATITE COMPLEX

Inner Core

Outer Core

Fracture fillings

## ARCHEAN

Fenitized and brecciated quartz monzonite



## Carbonatite Complex - Inner Core

Clean Sovite - white massive, fine grain to decomposed granular texture, in excess of 50% CaO. Minor iron oxide and magnetite, .5% to 5% P2O5, minor to abundant vermiculite and biotite.

## Carbonatite Complex - Outer Core

Biotite Sovite - white to grey with black banding, moderate to abundant biotite & vermiculite, 5% iron oxide, 2% to 5% P2O5. Often interbanded with biotite pyroxene.

## Alteration Zone - Transition Zone

Fenite - altered quartz monzonite, fine to coarse grain unit. Carbonatite veins present, 2% to 5% K2O.

**Reverse Circulation Drill Hole** 

Venturi Tp. - Tofflemire Tp.

## Property Geology Map

Agricultural Mineral Prospectors Inc.

#### Quartz monzonite

(Adapted from Table: 1 pg 10, OGS Study 30, Spanish River Carbonatite Complex, Ron Sage, 1987)

#### 2004 EXPLORATION PROGRAM

#### **GEOLOGICAL MAPPING**

Geological mapping occurred over a period from August 21<sup>st</sup> to October 20<sup>th</sup> 2004. Mapping comprised of set traverses over claims 3002843, 121615, 1198340, 1198154, 121616, 1237462 and 1237465.

Based on previous seismic surveys and trenching located on the leased claims the likelihood of locating outcrop was poor. The entire area is part of a reforestation of jack pine and red pine. The density of this reforestation made locating potential bedrock exposures difficult.

Two major landforms were encountered coarse rounded gravel intermixed with coarse to fine sand usually represented by topographical highs. Immediately flanking these gravel topographical highs are large areas of stratified sand. Both these landforms are lodged between steep granite ridges and knobs.

It appears that large amounts of till have been deposited on the lee side of these granite ridges. The gravel hills appear to represent and ice contact moraine possible associated with the Cartier 1 moraine system. Multiple ridges maybe the result of slight changes in the ice margins. The Cartier 1 moraine is a remarkably continuous glaciofluvial system extending from north of Sault Ste. Marie to east of Caperol.

The stratified sand deposits were deposited by flowing melt water associated with the ice contact. The well-sorted bedded sand represents cavity filling of the soft, eroded centre of the Spanish River Carbonatite Complex. A previous seismic survey suggested depth to bedrock at the centre of the complex to be 250 feet.

A second interpretation to explain overburden characteristics is sand and gravel deposition by the Spanish River. Post glaciation would have resulted in a landscape represented by a deep scoured cavity represented by the Spanish River Complex surrounded by steep granite ridges. These granite bluffs would have impeded the fast moving Spanish River. This would have resulted in deposition of well washed coarse rounded gravel. This is the case of the gravel deposits located on claim 3002843. Waters from the Spanish River latent with sand, silt and clay would have been carried into the Carbonatite complex cavity where this material would have settled into stratified beds.



Steep quartz monzonite bluffs were mapped on claims 3002843, 1198340 and 1237462. In all cases these steep bedrock exposures plunged quickly into deep stratified sand. The country rock mapped was commonly pink in color and composed of plagioclase, quartz and microcline.

Minor alteration halos were located with the most significant alteration zone found immediately east of the Union Carbide drill hole collar, (claim 1198154). Here the host granitic rocks were fine grain grey aegirine and sodic amphibole with a significant loss of quartz. The altered rocks were fractured with fracture filling comprised of sovite and biotite-pyroxenite veins. Further exploration is recommended in this vicinity.

Π



Claim maps indicate that this area falls outside of our claim boundary, this is not the case. It is recommended that a detailed GPS survey be conducted to accurately locate corner posts for the entire property.

The granite bluff located on claim 1237462 though in direct contact with sovite residuum mineralization did not exhibit the same intensity of alteration. Sovite residuum along the entire eastern flank of this hill may have been pushed up against the granite hill in front of an ice-margin. This would support the idea that current land features are the result of glaciation, dominated by an ice margin position represented by the Cartier 1 moraine.

## TRENCHING

At the time of staking claim 1198154 and number of sub outcrops containing fenitized quartz monzonite and dolomitized sovite was located. These apparent outcrops coincided with a topographical high located within the interpreted transition zone between host quartz monzonite and the Spanish River Carbonatite complex. The purpose of the 2004-trenching program like the 2003 work was to commence exploration outside of the quarry limits with the prospect of locating further deposits of calcite, apatite, biotite and vermiculite for industrial and agricultural use.

Approximately 1000 metres of new roads, 15 test pits and one long trench was excavated to define what is referred to as the drill hole zone. This area falls within the vicinity of the 1968 Union Carbide Exploration 1746-foot drill hole collar and reverse circulation drilling program in 1975 by International Minerals and Chemical Corp. Fitting the 1975 grid as it relates to known physical features the location of the drill hole has been approximated. As well as the trenching, geological mapping, prospecting and preliminary scintillometer surveys were run over this area.

The trenching activities were unable to locate outcrop. The topographical high appears to be the result of either an end moraine or outwash gravel and sand deposited by the Spanish River. All test pits and trenching uncovered till comprised of clean sharp sand intermixed with rounded gravel and boulders.





Unconsolidated Material Coarse sand to fine silt, stratified.

Coarse gravel, boulders in coarse sand matrix

Sovite - fine grain, massive to granular, crushed calcite. Traces of green fiberous amphibole along

Often in contact with dark green to black pyroxene. Clean to abundant Iron oxide inclusions, Blotite and apatite absent.

Fenite - fine grain grey aegirine with dark green to black pyroxene/amphibole and sovite ocurring

Granite - unaltered quartz monzonite, fractured iron oxide stained. Pink in color, predominantly plagloclase, quartz and microcline

2004 Geology and Trenching Exporation Program

Agricultural Mineral Prospectors Inc.

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Figure 1 4



Unconsolidated Material

Coarse gravel, boulders in coarse

Coarse sand to fine silt, stratified.

Trench & Name

Test Pit and Name

Diamond Drill Hole

Claim Boundary

2004 Trenching Program Drill Hole Zone Agricultural Mineral Prospectors Inc.

0	200 metres
	Flgure 1 5

Spanish River Carbonatite Complex - Longitudinal of Drill Hole Zone



One very curious phenomenon, which led us to believe that this area was underlain by bedrock, was the lack of vegetation. Two very large clearings exist and are associated with large angular fragments of fenite, sovite and biotite – pyroxenite.



## Preliminary Scintillometer Survey

The reasoning behind the scintillometer survey was to aid in verification of fenite float source and test its potential for possibly locating potential residual apatite deposits.

Rock phosphate applications to agricultural soils are increasing in response to the growth in organic food production. This demand will increase beyond the organic sector as ornamental chemical fertilizer use is restricted, environmental legislation affecting agriculture becomes more stringent and continued research is able to demonstrate the agronomical benefits, (reactivity, contaminant levels, soil system enhancement) over soluble fertilizers.

All rock phosphate deposits are unique. Mineralogy characteristics are the result of deposit genesis, which is influenced by host rock, trace element constituents and historical weather patterns. These influences are major contributors to phosphate mineralogy and reactivity. To predict reactivity potential of a rock phosphate source requires a comprehensive review of:

- Mineral Genesis understanding the genesis of rock formations and the mineral constituents of the rocks have a direct bearing on weathering rates.
- Mineralogy and Crystal Habit crystal structure, hardness, cleavage, fracturing diagnostics, gravity, trace catalytic elements all effect reactivity and dissolution rates.
- Microbial Influences on Dissolution microorganisms directly or indirectly will cause mineral assimilation or weathering orders of magnitude higher than model mineral analogy.

The reactivity behavior of phosphate minerals within the soil can only be measured by evaluating the system and phosphorous utilization within the system.

The phosphate content of residuum quarried at the Spanish River Complex is currently 3.14% and the phosphate content in underlying bedrock is averaging 5%. Unlike other carbonatites evaluated there is not apatite accumulating in the residual sands. Further geological and mineralogical interpretation is required to describe this very unique phenomenon. The geological aspects of the Spanish River Carbonatite that may explain why apatite concentrations in the residuum are low is:

- 1. The intrusion has very low fluorine content suggested by the absence of the mineral pyrochlore (Ca,Na)<sub>2</sub>(Nb,Ta)<sub>2</sub>O<sub>6</sub>F (Hogarth, 1989).
- 2. Uranium, thorium, cadmium, arsenic and other heavy metal contents are low (Sage 1897a) particularly compared with other Carbonatite complexes (Hogarth, 1989, Sage 1987b).

These observations are important, particularly low fluorine content, which precludes the formation of pyrochlore and the corresponding accumulation of radioactive ions and heavy metals (Hogarth 1989). Low fluorine also results in the substitution of chlorine for fluorine in the apatite mineral. Chlorapatite is considered more soluble then fluorapatite (Veldhuyzen, 2002). The complex is almost entirely comprised of sovite, (igneous calcite). This would result in a higher proportion of volatile elements (OH, CO2). With the lack of fluorine, OH and carbonate substitution is also likely. These geological conditions would result in the formation of very reactive apatite and thus no accumulation of apatite in the residual sands.

As well as influencing the size and shape of the apatite crystal carbonate substitution weakens the crystal structure therefore resulting in increased solubility. 'High carbonate substitution is advantage in francolites; "it allows the use of such a phosphorite by "direct application" or, in other words, the use of this phosphorite as a fertilizer without chemical pre-treatment," (Pg. 281 Nriagu J.O. and Morre P.B. (1984) Phosphate Minerals).

Though detailed mineralogical analysis is pending current postulation suggests that residuum phosphate mineralogy is cryptocrystalline, chlorapatite, carbonate apatite and carbonate-hydroxylapatite. Current field trials suggest the apatite component in Spanish River Carbonatite is reactive; the general trend is increased phosphorous content in plants.

The make of the scintillometer is a McPhar Geophysics, model TV-1. The TV-1 is a three threshold scintillometer. Measurements are based on the special characteristics or energy levels of gamma radiation from radioactive elements. The instrument is designed primarily for reconnaissance. The selective thresholds however provide the capability to differentiate between gamma radiations emanating from uranium and thorium and to provide quantitative information about each.

The detecting element is a 1 by 1-1/2 inch sodium iodide crystal coupled to a photomultiplier tube. The sensitivity of the instrument, on threshold 2, registers approx. 50 counts per minute on an insitu measurement, (2pi geometry) over homogeneous material containing 5 ppm U or Th. The threshold for full spectrum is 1 count (K, U, Th), with background 2000 to 3000 counts per second.

The fenitized rocks located in the trenching are was very high at 10000 cpm. This is the first indication of high gamma radiation associated with the Spanish River Carbonatite Complex. This maybe indicative of an alteration phenomena or buried residual apatite in this vicinity. Further work is highly recommended in this area. This would include geophysics followed by reverse circulation drilling.

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The original 1975 reverse circulation drill hole in this area indicated Carbonatite bedrock at 156 feet. Drill recovery from 98 feet to 156 feet appears to have been poor. This maybe indicative of clay enriched phosphates occurring in microcrystalline, cryptocrystalline, or amorphous forms and includes hydroxylapatite and carbonate-hydroxylapatite. The very fine grain nature of this type of material would result in very poor core recovery.

#### **CONCLUSIONS & RECOMMENDATIONS**

Geological mapping over the core of the Spanish River Complex was unable to locate any bedrock exposure. Two hypotheses have been postulated for the physiographic features overlying the Spanish River Carbonatite Complex.

- The gravel hills appear to represent and ice contact moraine possible associated with the Cartier 1 moraine system. Multiple ridges maybe the result of slight changes in the ice margins. The stratified sand deposits associated with were deposited by flowing melt water associated with the ice contact. The well-sorted bedded sand represents cavity filling of the soft, eroded centre of the Spanish River Carbonatite Complex.
- 2. Post glaciation would have resulted in a landscape of a deep scoured cavity represented by the Spanish River Complex surrounded by steep granite ridges. These granite bluffs would have impeded the fast moving Spanish River. This would have resulted in deposition of well washed coarse rounded gravel against granite bluffs. Waters from the Spanish River latent with sand, silt and clay would have been carried into the carbonatite complex cavity where this material would have settled into stratified beds.

The depth of the unconsolidated sand and gravel deposits is between 50 and 250 feet. Previous seismic surveys show a very steep contact between the host granitic rocks and overlying till.

All mapped outcrop occurred as steep granite ridges surrounding the complex. Residuum sovite mineralization located on claims 377231 and 1237462 differs from the main quarry area in that host quartz monzonite shows little alteration. It maybe possible that this residual material is the result of ice contact deposition.

The trenching activities were unable to locate outcrop. The topographical high appears to be the result of either an end moraine or outwash gravel and sand deposited by the Spanish River. All test pits and trenching uncovered till comprised of clean sharp sand intermixed with rounded gravel and boulders.

Preliminary scintillometer readings of the fenitized rocks located in the trenching area were very high at 10000 cpm. This maybe indicative of an alteration phenomena or buried residual apatite in this vicinity. Further work is highly recommended in this area. This would include geophysics followed by reverse circulation drilling.

Detailed geochemical and petrographic analysis is also recommended on this fenitized float. This is the first locality on the property that has had appreciable amounts of radioactive minerals. Large areas of clean white to grey silica sand was also located in this vicinity. Further work is recommended to evaluate the potential for this material in turf grass, bunker sand, golf green top dressing and sand blasting applications.

## REFERENCES

Sage R.P., (1987) Spanish River Carbonatite Complex, Study 30, Ontario Geological Survey, Ministry of Northern Development and Mines.

Heinrich, E. Wm., (1966) The Geology of Carbonatites, Rand McNally & Co.

Proudfoot David, (1971) Petrology of the Carbonatite Complex in Township 107-108, Carleton University

Barnett P.J. and Bajc A.F., (2000) Chapter 3 Quaternary Geology, The physical Environment of the City of Greater Sudbury, Ontario Geological Survey, Special Volume 6

Erdosh George, (1975) Exploration Work on Township 107 Carbonatite Complex, International Minerals & Chemical Corp.

Appendix 1

Letter of Authorization

## I John Slack;

- 1. Supervised trenching, geological mapping, prospecting activities on mining claims 3002843, 1214615, 1198340, 1198154, 1214616, 123462 and 1237465 in Tofflemire and Venturi Township, District of Sudbury.
- 2. The work was performed between the dates August 21st and November 21st 2004.
- 3. I concur with all information contained in this report and is an accurate description of work performed.
- 4. I am a mining technologist and have been practicing my profession since 1984
- 5. I reside in the town of Erin, County of Wellington, Ontario.

Date: \_\_\_\_\_\_ Signature: \_\_\_\_\_

Appendix 2

Statement of Man Hours and Costs

## **Summary of Field Activities**

## Work Report

## Expenditures

Date	Description	Manpower	Equipment
Aug 21 2004	Geological Mapping	Chris Caron	Toyota Car
Aug 22 2004	Geological Mapping	Chris Caron	Toyota Car
Aug 28 2004	Geological Mapping	Chris Caron	Toyota Car
Aug 29 2004	Geological Mapping	Chris Caron	Toyota Car
Oct 17 2004	Geological Mapping	John Slack	Rental Car
Oct 18 2004	Geological Mapping	John Slack	Rental Car
Oct 19 2004	Geological Mapping	John Slack	Rental Car
Oct 20 2004	Geological Mapping	John Slack	Rental Car
Nov 5 2004	mobilization from Hillsburgh Ontario	Doug Codlin	Toyota Truck
			Chainsaw
Nov 6 2004	road construction	Doug Codlin	Toyota Truck
	trenching		Backhoe
			Chainsaw
Nov 7 2004	road construction	Doug Codlin	Toyota Truck
	trenching		Backhoe
	demobilization		Chainsaw
Nov 12 2004	mobilization from Hillsburgh Ontario	Doug Codlin	Toyota Truck
Nov 13 2004	trenching	Doug Codlin	Toyota Truck
			Backhoe
			Chainsaw
Nov 14 2004	trenching	Doug Codlin	Toyota Truck
	demobilization		Backhoe
			Chainsaw
	mobilization	John Slack	Ford 550
Nov 15 2004	trenching	John Slack	Ford 550
Nov 16 2004	trenching		Backhoe
	road construction		Chainsaw
Nov 17 2004	trenching	John Slack	Ford 550
			Backhoe
			Chainsaw
Nov 18 2004	trenching	John Slack	Ford 550
	-	Chris Caron	Backhoe
			Chainsaw
Nov 19 2004	mobilization from Hillsburgh Ontario	Doug Codlin	Toyota Truck
Nov 20 2004	trenching	Doug Codlin	Toyota Truck
	prospecting	Chris Caron	Backhoe

Date	Description	Rate	Hours	Amount	
Aug 21 2004	Manpower	\$200/day	10	\$	200.00
	Toyota Car	\$50/day	10	\$	50.00
Aug 22 2004	Manpower	\$200/day	10	\$	200.00
	Toyota Car	\$50/day	10	\$	50.00
Aug 28 2004	Manpower	\$200/day	10	\$	200.00
	Toyota Car	\$50/day	10	\$	50.00
Aug 29 2004	Manpower	\$200/day	10	\$	200.00
	Toyota Car	\$50/day	10	\$	50.00
Oct 17 2004	Manpower	\$200/day	5	\$	100.00
	Rental Car	\$50/day	5	\$	50.00
	Room Board	\$75/day	5	\$	75.00
Oct 18 2004	Manpower	\$200/day	10	\$	<b>200</b> .00
	Rental Car	\$50/day	10	\$	50.00
	Room Board	\$75/day		\$	75.00
Oct 19 2004	Manpower	\$200/day	10	\$	200.00
	Rental Car	\$50/day	10	\$	50.00
	Room Board	\$75/day		\$	75.00
Oct 20 2004	Manpower	\$200/day	10	\$	200.00
	Rental Car	\$50/day	10	\$	50.00
Nov 5 2004	Manpower	\$200/day	5	\$	100.00
	Chainsaw	\$20/day	5	\$	10.00
	Toyota	\$75/day	5	\$	37.50
	Room and Board	\$75/day	5	\$	75.00
Nov 6 2004	Manpower	\$200/day	10	\$	100.00
	Chainsaw	\$20/day	10	\$	20.00
	Toyota	\$75/day	10	\$	75.00
	Room and Board	\$75/day	10	\$	75.00
	Backhoe	\$500/day	10	\$	500.00
Nov 7 2004	Manpower	\$200/day	13	\$	200.00
	Chainsaw	\$20/day	10	\$	20.00
	Toyota	\$75/day	10	\$	75.00
	Room and Board	\$75/day	10	\$	75,00
	Backhoe	\$500/day	8	\$	500.00
Nov 12 2004	Manpower	\$200/day	5	\$	100.00
	Chainsaw	\$20/day	5	\$	10.00
	Toyota	\$75/day	5	\$	37.50

## Work Report

Date	Description	Manpower	Equipment
Nov 21 2004	trenching	Doug Codlin	Toyota Truck
	prospecting	Chris Caron	Backhoe
	demob		Chainsaw
Nov 22 2004	report preparation	John Slack	
Nov 23 2004	report preparation	John Slack	
Nov 24 2005	report preparation	John Slack	
Nov 25 2005	report preparation	John Slack	
Nov 26 2004	report preparation	John Slack	

Note: All vehicle rentals include mileage and fuel Report preparation includes materials

## **Expenditures**

Date	Description	Rate	Hours	Amount	
Nov 13 2004	Manpower	\$200/day	10	\$	200.00
	Chainsaw	\$20/day	10	\$	20.00
	Toyota	\$75/day	10	\$	75.00
	Room and Board	\$75/day	10	\$	75.00
	Backhoe	\$500/day	10	\$	500.00
Nov 14 2004	Manpower	\$200/day	18	\$	200.00
	Manpower	\$200/day	5	\$	100.00
	Chainsaw	\$20/day	10	\$	20.00
	Toyota	\$75/day	10	\$	75.00
	Room and Board	\$75/day	10	\$	75.00
	Backhoe	\$500/day	8	\$	500.00
	Ford 550	\$250/day	5	\$	125.00
Nov 15 2004	Manpower	\$200/day	10	\$	200.00
	Chainsaw	\$20/day	10	\$	20.00
	Ford 550	\$250/day	10	\$	250.00
	Room and Board	\$75/day	10	\$	75.00
	Backhoe	\$500/day	10	\$	500.00
Nov 16 2004	Manpower	\$200/day	10	\$	200.00
	Chainsaw	\$20/day	10	\$	20.00
	Ford 550	\$250/day	10	\$	250.00
	Room and Board	\$75/day	10	\$	75.00
	Backhoe	\$500/day	10	\$	500.00
Nov 17 2004	Manpower	\$200/day	10	\$	200.00
	Chainsaw	\$20/day	10	\$	20.00
	Ford 550	\$250/day	10	\$	250.00
	Room and Board	\$75/day	10	\$	75.00
	Backhoe	\$500/day	10	\$	500.00
Nov 18 2004	Manpower	\$200/day	10	\$	200.00
	Manpower	\$200/day	10	\$	200.00
	Chainsaw	\$20/day	10	\$	20.00
	Ford 550	\$250/day	10	\$	250.00
	Room and Board	\$75/day	10	\$	75.00
	Backhoe	\$500/day	10	\$	500.00
Nov 19 2004	Manpower	\$200/day	5	\$	100.00
	Toyota	\$75/day	5	\$	37.50
	Room and Board	\$75/day	5	\$	75.00
Nov 20 2004	Manpower	\$200/day	10	\$	200.00

<u>Work Repo</u>	<u>rt</u>			Expenditure	s				
Date	Description	Manpower	Equipment	Date	Description	Rate	Hours	An	nount
					Manpower	\$200/day	10	\$	200.00
					Chainsaw	\$20/day	10	\$	20.00
					Toyota	\$75/day	10	\$	75.00
					Room and Board	\$75/day	10	\$	75.00
					Backhoe	\$500/day	10	\$	500.00
				Nov 21 2004	Manpower	\$200/day	10	\$	200.00
					Manpower	\$200/day	10	\$	200.00
					Chainsaw	\$20/day	10	\$	20.00
					Toyota	\$75/day	10	\$	75.00
					Room and Board	\$75/day	10	\$	75.00
					Backhoe	\$500/day	10	\$	500.00
				Nov 22 2004	Manpower	\$200/day	10	\$	200.00
				Nov 23 2004	Manpower	\$200/day	10	\$	200.00
				Nov 24 2004	Manpower	\$200/day	10	\$	200.00
				Nov 25 2004	Manpower	\$200/day	10	\$	200.00
				Nov 26 2005	Manpower	\$200/day	10	\$	200.00
				Total				\$1	3,832.50



## Work Report Summary

Transaction No:	W0470.01874	Status:	APPROVED
Recording Date:	2004-NOV-29	Work Done from:	2004-AUG-21
Approval Date:	2005-FEB-15	to:	2004-NOV-26

Client(s):

195010	SLACK, JOHN MALCOLM
392355	CARON, CHRISTOPHER MICHAEL
393265	AGRICULTURAL MINERAL PROSPECTORS INC.

Survey Type(s):

			GEOL		PTRNCH					
Wo	ork Report D	etails:								
Claim#		Perform	Perform Approve	Applied	Applied Approve	Assign	Assign Approve	Reserve	Reserve Approve	Due Date
s	1198154	\$11,707	\$11,707	\$0	\$0	\$11,144	<b>1</b> 1,144	\$563	\$563	2005-OCT-26
s	1198340	\$250	\$250	\$0	\$0	\$250	250	\$0	\$0	2005-JUN-30
s	1214615	\$325	\$325	\$0	\$0	\$325	325	\$0	\$0	2005-JUN-25
s	1214616	\$325	\$325	\$0	\$0	\$325	325	\$0	\$0	2005-JUN-25
s	1237462	\$500	\$500	\$0	\$0	\$500	500	\$0	\$0	2005-JUN-28
s	1237463	\$0	\$0	\$800	\$800	\$0	0	\$0	\$0	2005-DEC-08
s	1237464	\$0	\$0	\$1,600	\$1,600	\$0	0	\$0	\$0	2005-DEC-08
s	1237465	\$500	\$500	\$800	\$800	\$0	0	\$500	\$500	2005-DEC-08
s	1237466	\$0	\$0	\$3,169	\$3,169	\$0	0	\$0	\$0	2005-AUG-29
s	1237467	\$0	\$0	\$6,400	\$6,400	\$0	0	\$0	\$0	2005-AUG-29
S	3002843	\$225	\$225	\$0	\$0	\$225	225	\$0	\$0	2005-MAY-13
		\$13,832	\$13,832	\$12,769	\$12,769	\$12,769	\$12,769	\$1,063	\$1,063	-

External Credits:

Reserve:

\$1,063 Reserve of Work Report#: W0470.01874

\$1,063 Total Remaining

\$0

Status of claim is based on information currently on record.



41112NE2034 2.28869

TOFFLEMIRE

Ministry of Northern Development and Mines Ministère du Développement du Nord et des Mines

Date: 2005-FEB-15



GEOSCIENCE ASSESSMENT OFFICE 933 RAMSEY LAKE ROAD, 6th FLOOR SUDBURY, ONTARIO P3E 6B5

AGRICULTURAL MINERAL PROSPECTORS INC. GENERAL DELIVERY ERIN, ONTARIO N0B 1T0 CANADA Tel: (888) 415-9845 Fax:(877) 670-1555

Submission Number: 2.28869 Transaction Number(s): W0470.01874

Dear Sir or Madam

## Subject: Approval of Assessment Work

We have approved your Assessment Work Submission with the above noted Transaction Number(s). The attached Work Report Summary indicates the results of the approval.

At the discretion of the Ministry, the assessment work performed on the mining lands noted in this work report may be subject to inspection and/or investigation at any time.

Note, in subsequent submission containing a geology report, please ensure that the map(s) illustrating the field work results are at a scale between 1:10 and 1:5,000.

If you have any question regarding this correspondence, please contact STEVEN BENETEAU by email at steve.beneteau@ndm.gov.on.ca or by phone at (705) 670-5855.

Yours Sincerely,

Sheila Lessard Acting Senior Manager, Mining Lands Section

Cc: Resident Geologist

John Malcolm Slack (Claim Holder)

Agricultural Mineral Prospectors Inc. (Claim Holder)

Assessment File Library

Christopher Michael Caron (Claim Holder)

Agricultural Mineral Prospectors Inc. (Assessment Office)

