MAR 20120017: CROWSNEST NORTH

Crowsnest North - A report on precious metal exploration in the Crowsnest Pass area, southwest Alberta.

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PART B

TECHNICAL REPORT

A report for Assessment in reference to Metallic and Industrial Minerals Permit 9304091032

Crowsnest North Project

Submitted by
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October 12, 2012

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Project Summary

This report details an exploration work program carried out on Metallic and Industrial Minerals Permit 9304091032.

Testing was carried out by the author or by others under his direction on samples gathered from a talus slope in Metallic and Industrial Minerals Permit 9304091032 at approximately 49 48' 10.87" N and 114 33' 30.63" W. Samples were gathered in July and August of 2011 with lab examination through September 2011 and the summer of 2012.

As part of the ongoing exploration on this permit samples were collected and evaluated for their potential economic value. Part of that evaluation is to determine if a viable product can be produced. As part of the economics of a deposit co-products and/or by-products need to be evaluated during exploration. Samples were collected and evaluated for the potential that a by-product precious metals concentrate could be produced from the waste stream from decorative rock production.

The testing proved that the two main product source rocks are unlikely to yield economic precious metals as a by-product.

Further work has been recommended and is ongoing with evaluation and exploration of the deposit for decorative rock use.

Introduction

Further to earlier studies submitted for assessment on this same permit in 2006 and 2010 to assess the potential for Crowsnest Volcanic rock to be used for decorative crushed rock and for decorative rock slabs for interior and exterior use a study of other potential value was undertaken.
The primary reason for the investigation was to follow-up on data from studies in the late 1980's and early 1990's that indicated sulphide linked gold values in the Crowsnest Volcanics. The discovery of that sulphide link lead to a major mineral staking rush throughout the Crowsnest Pass, south the US border and north to past the Old Man River. The studies at that time identified the link but considered it uneconomic. Part of the reasoning for this study is to determine if there might be sufficient by-product sulphide and hopefully gold from the waste from the decorative rock production. This would be crusher fines, cutting saw fines, cut rock waste and perhaps polishing waste. The cost to excavate and deliver rock to the plant would already be covered by decorative rock production and a large part of the waste product is represented by rock fines created as part of the process. This means that sulphides and perhaps gold would be essentially liberated and ready for capture with very little additional cost.

This program was carried out over 2011 and 2012 with sample acquisition and preliminary evaluation in the fall of 2011 and follow up evaluation in the summer of 2012.

Expenditures for Assessment

EXPENDITURE STATEMENT
BY ACTIVITY

AMOUNT SPENT	
1. Prospecting	$10,242.00
2. Geological mapping & petrography	$0
3. Geophysical Surveys	
a. Airborne	$0
b. Ground	$0
4. Geochemical Surveys	$0
5. Trenching and Stripping	$0
6. Drilling	$0
7. Assaying & whole rock analysis	$285.00
8. Other Work General Lab Work	$3,143.00
SUBTOTAL	**$13670.00**
9. Administration (10% of subtotal)	$1367.00
TOTAL	**$15037.00**

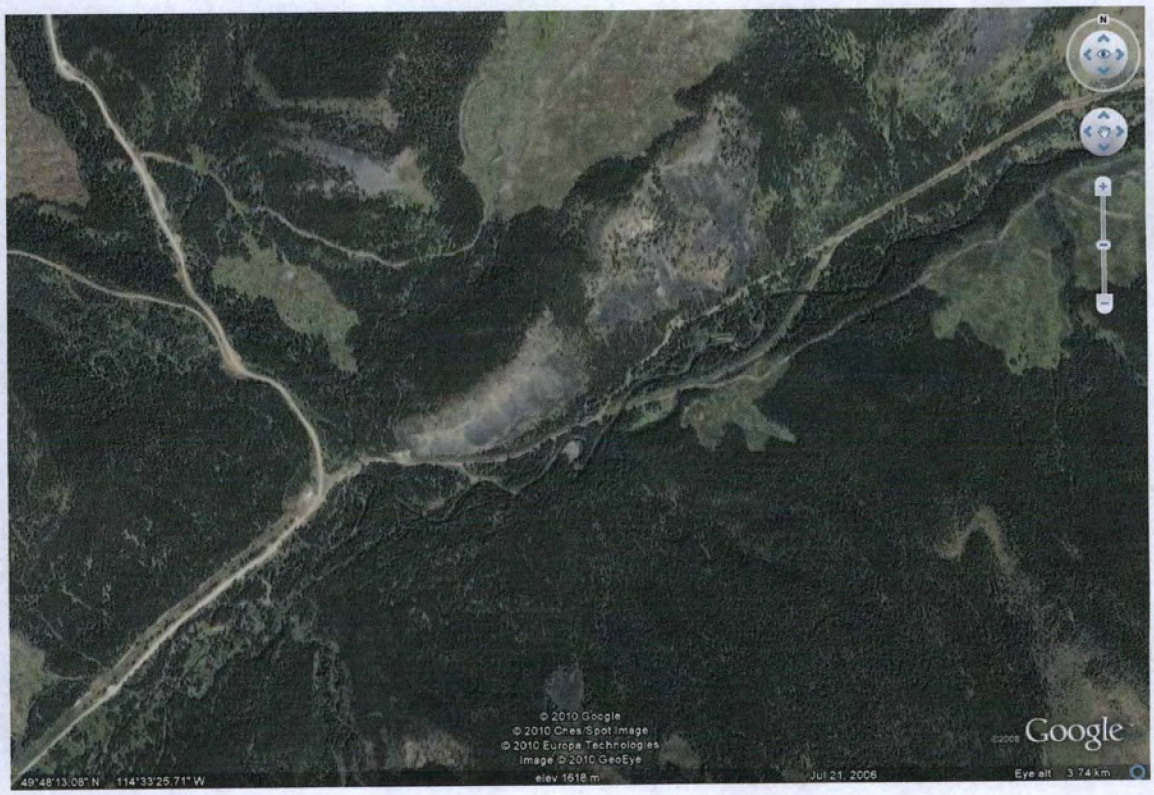
[redacted]
SIGNATURE

Oct. 12/2012
DATE

Location

The site is located in the south west part of Alberta 20 km north of Highway 3

The samples were taken from the base of a talus slope made up of various types of volcanic rock at approximately 49 48' 10.87" N and 114 33' 30.63" W. A larger map is attached to this document giving greater detail on the location.
The Forestry Trunk road goes north from Hwy 3 to a pipeline that comes through the Racehorse Pass. A road branches east from where the pipeline intersects the Trunk Road and can be used to access the base of the talus slope referred to above. The location is show in the Google Earth image below and can be referenced in the attached map as well.



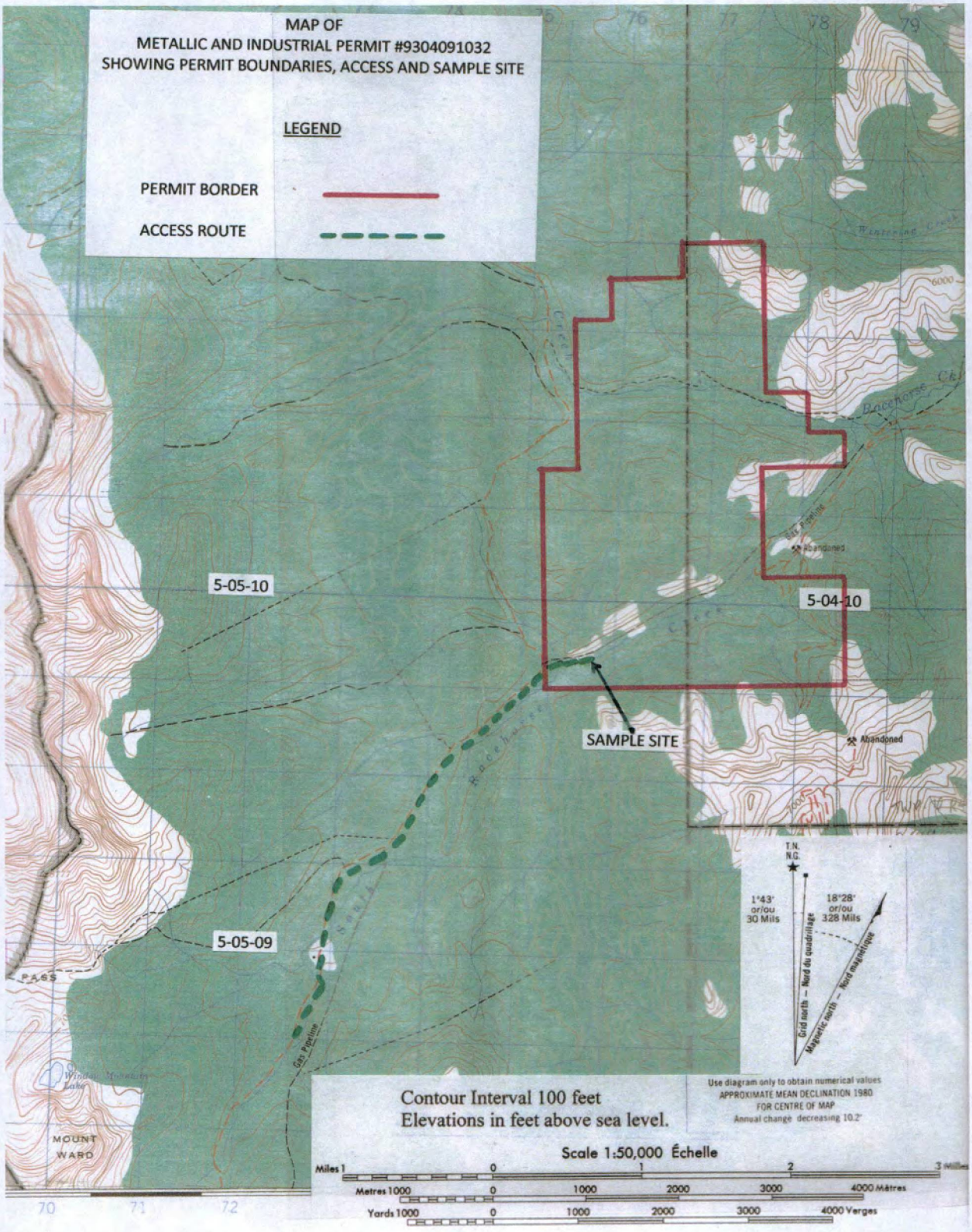
Google Earth view of sample site – the site is located along the base of the talus slope immediately to the east of the main road and north of the pipeline road

MINERAL AGREEMENT DETAIL REPORT

Agreement Number: 093 9304091032 **Agreement Area**: 1136.0000

LAND / ZONE DESCRIPTION

5-04-010: 07L9-L10,SE,SW,NW;18L9-L10,L15,SW,NW;19SW,NW
5-05-010: 12;13L11,L14,SE,SW,NE;24L3,L6,L9-L10,SE


MAP OF
METALLIC AND INDUSTRIAL PERMIT #9304091032
SHOWING PERMIT BOUNDARIES, ACCESS AND SAMPLE SITE
LEGEND
PERMIT BORDER
ACCESS ROUTE
5-05-10
5-04-10
5-05-09
SAMPLE SITE
Abandoned
PASS
MOUNT WARD
Contour Interval 100 feet
Elevations in feet above sea level.
Scale 1:50,000 Échelle
Miles 1 0 1 2 3
Metres 1000 0 1000 2000 3000 4000 Mètres
Yards 1000 0 1000 2000 3000 4000 Verges
T.N.
N.G.
1°43' or/ou 30 Mils
18°28' or/ou 328 Mils
Grid north – Nord du quadrillage
Magnetic north – Nord magnétique
Use diagram only to obtain numerical values
APPROXIMATE MEAN DECLINATION 1980
FOR CENTRE OF MAP
Annual change decreasing 10.2'

Geology

The rocks chosen for this study are from a volcanic unit defined by Robin Adair in his 1989 Master's thesis for the University of Alberta as the "Upper Member".
Adair describes that rock unit as "a thick sequence of massive pyroclastic breccias and minor agglomerates." The upper member is a prominent ridge former in the area and can be tracked for many kilometres in a north south trend from north of the study area to south of Hwy 3.
Samples of two rock types were chosen for examination. One sample group is from a green coloured layer of volcanic rock and another from a pinkish coloured layer.
The green rock unit corresponds with Adair's definition of the "Upper Member" while the pink rock has characteristics similar to units he ascribes to the "Lower Member".
For the purposes of this study no further attempts were made to refine the categorization as examination in the field was meant to only locate and secure representative rock types that could offer bulk samples that would approximate what would be used to produce decorative rock products and the resulting potential by-product waste stream.
Samples were gathered from a talus slope in the permit area. (See location map and Google Earth Image)
A large sample from this area was gathered for a previous study but that sample has been fully committed to research for the decorative rock market and a significant portion of that sample is out for field testing.

Testing Protocol

1. Raw rock crushed and ground to minus 100 tyler mesh.
2. Splits from the ground rock concentrated by gravity on a shaker table
3. Concentrate examined in a gold pan for sulphide and visible free gold
4. Concentrate dried
5. Concentrate examined under microscope – selected mineral grains imaged
6. Concentrate coned and quartered to produce 3 sub fractions for scorification
7. Sub fractions scorified and cupeled
8. Evaluation of result

Sample Acquisition

An initial two day visit to the area was used to scout out access and the site for the sample program. One day was spent gathering pieces of rock from the bulk sample site and stockpiling them near the access trail to get a start on the sample collection process.
In a second three day program two bulk bags were filled by hand at the site with the intention of having them picked up by a picker truck and transported to the testing site near Edmonton, Alberta.
When the picker truck arrived the operator was reluctant to drive to the sample site and it was necessary to haul the rock to the truck by quad. The trucker had a suitable bulk bag on board so the rock samples were taken out of one of the filled bulk bags and taken to the truck where the extra bulk bag was filled. The second bulk bag was treated the same way with one of the now empty bulk bags serving as the new container at the truck. With two quads operating and a three man crew this was an inconvenience but not too much of a delay.

Approximately 2800 kg of bulk sample represented by rocks picked by hand from the talus slope was then transported to a site west of Edmonton for testing.

Bulk bags arrive at test site

As has been done in the past sorting was by colour with pinks and a darker brownish almost maroon colour being one fraction and light to dark green being a second fraction.
At first glance the very large boulders strewn down the slope can seem overwhelming but the site offers ample small material for hand picking for the person willing to spend the time.

Sample Preparation and Processing

Because the 1988 information (*personal communication Bob Cantin and Ron Stewart*) indicated that sulphides were linked to precious metals values it was determined that a heavy mineral concentrate would be produced for examination and analysis. This heavy mineral concentrate was to be examined directly for free gold and then sulphide volumes. Follow-up analysis would be done to determine precious metals values if warranted. The sample was first crushed in a small jaw over rolls Keene Engineering portable crusher. The jaw size is 6 by 4 inches and was able to handle most of the rocks we had gathered. Oversize rocks were simply broken into suitable sizes with a sledge hammer.

4x6 Jaw over rolls crusher at work

Second pass to produce fine feed for shaker table

The crusher produced a good fine product suitable for concentrating if the material from a first crush was put through the crusher a second time. A sub fraction of the crushed material from the bulk sample

was also run through a Bico Pulverizer. The pulverizer can make a very fine and uniform grind and for this fraction we made a sample that was 100% passing 120 Tyler Mesh. The ground rock was then processed on a shaker table to produce a heavy mineral concentrate for examination.

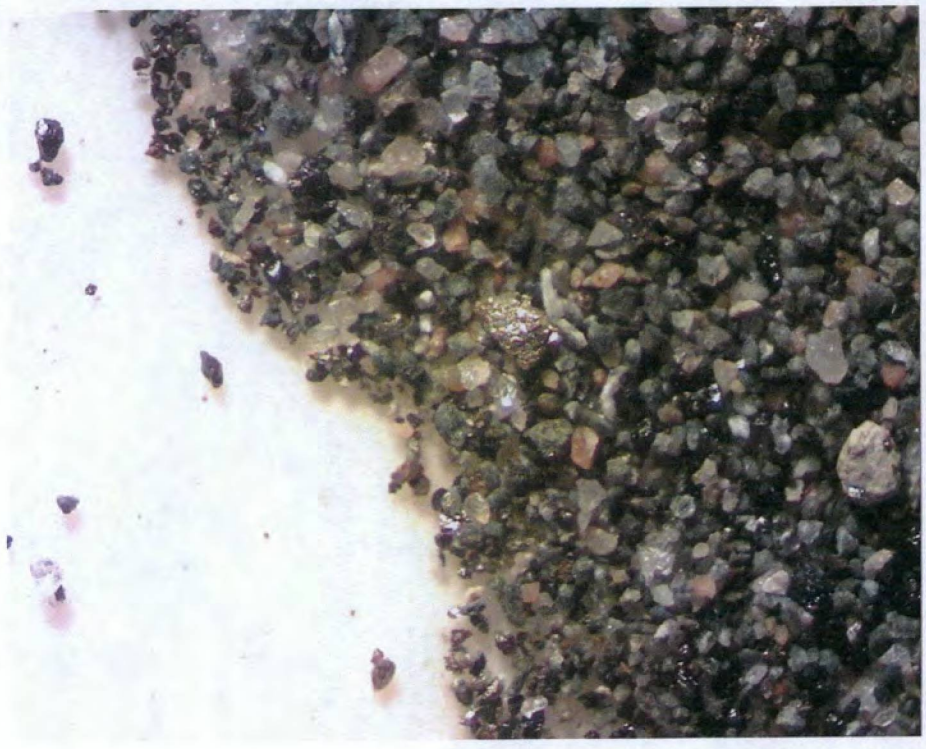
Bico grinder producing consistent minus 120 mesh

Samples run on the shaker table did not show any advantage to going to the BICO so that extra level of grinding was not continued.
The first concentration tests were done on a Gemini Table but the Gemini relies on a buildup of heavy minerals in collection grooves to displace lighter material and upgrade the heavy concentrate. It was found that the amount of heavy mineral available in the ground rock was not sufficient to give a good concentration. An RP-4 Shaker Table was then tested and its flat table with raised riffle design proved much more effective.
Sample raw weight and final concentrate weight were recorded and the concentrate from each sample was first examined in a gold pan to check for obvious free gold or other metallic minerals and to get an idea on the general mineral makeup including the amount of sulphides. From there the samples were dried and prepared for microscopic examination.
Selected samples from a preliminary microscope exam were then prepared for imaging with a USB microscope camera mounted in one eyepiece of a stereo microscope.

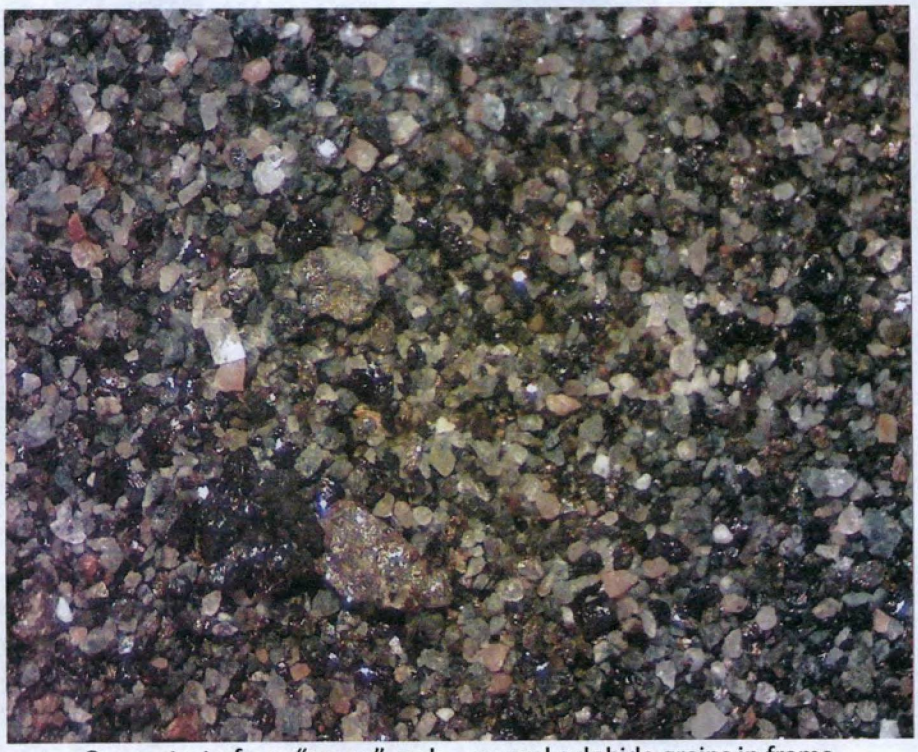
Observations on the Shaker Table

Overall the sulphide levels were quite low in the samples processed. In running raw samples there was a definite sulphide "glitter" on the upper part of the table but getting a good high grade line was difficult. A groove type table top (Gemini Table) was not able to give a good concentration ratio. Even on a raised riffle table like the RP-4 a "dirty concentrate" was the best that could be achieved on a first run to get a split containing the sulphides. Even when run as a dirty concentrate it was not uncommon to have the

heavy fraction on a first run represent an 800:1 concentration ratio. (One gram of concentrate for 800 grams of raw feed)
An attempt to upgrade the concentrate by running it again was marginally successful in upgrading because the high population of garnet with a specific gravity close to the sulphides made getting a clean sulphide line impossible. A large part of the garnet fraction is melanite – a black coloured, titanium rich form of andradite garnet- and that fraction can make getting a clean sulphide split problematic when there is not a high percentage of sulphides to help displace lighter materials. The specific gravity of andradite is 3.8 to 3.9, iron pyrite at 4.9, chalcopyrite at 4.2, arsenopyrite at 6; close enough to garnet that unless the percentage is high getting a clean line between them on a table is difficult. There was some indication of very occasional silver-white coloured sulphides riding slightly higher on the table. The assumption at the time was that the grains were arsenopyrite or perhaps even galena but they were so rare that they were not given anything more than a passing examination on the table as the operator was watching for free gold grains. Nevertheless concentration ratios exceeding 1000:1 from raw to finished concentrate were common. While that concentration ratio appears significant the low heavy mineral content of the raw ore was more the contributing factor than the concentration system. Some of the lower grade concentrate was also examined to determine other mineral contributors to the heavy fractions, as mentioned, melanite garnet being the largest part of the heavy mineral fraction.
Final concentrate from both the green fraction and the pink did not appear to be very different. The pink fraction had significant amounts of green mineral grains reporting to the heavy mineral fraction and both rock types had a large amount of melanite. In concentrate the pink feldspar grains that give the pink fraction its colour in the raw rock are rare, having been eliminated in the concentration process.



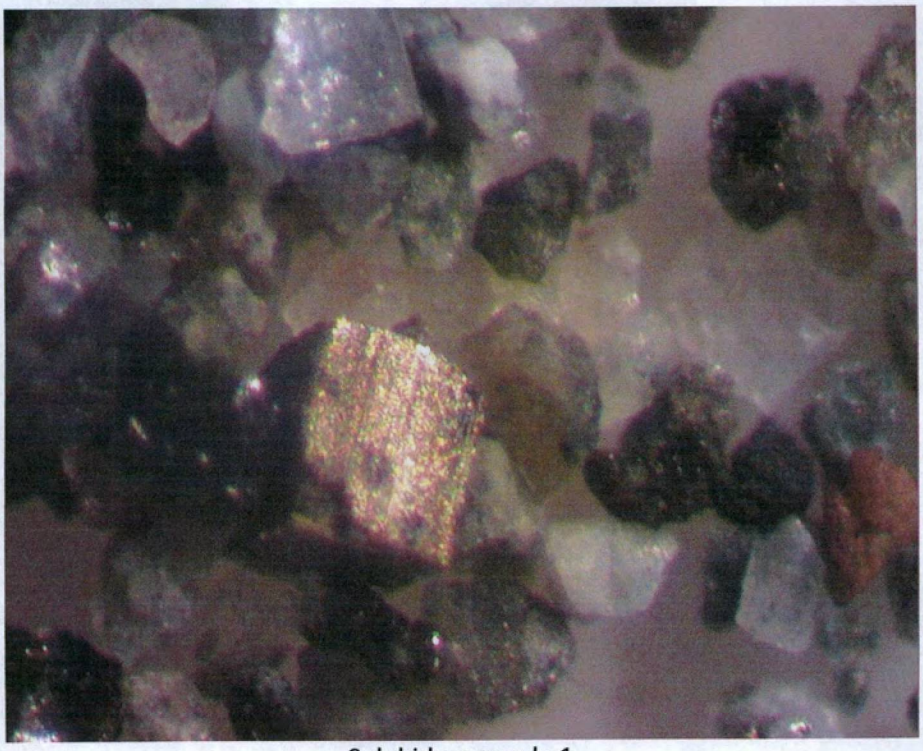
Concentrate from "pink" rock - sulphide grain in centre of frame



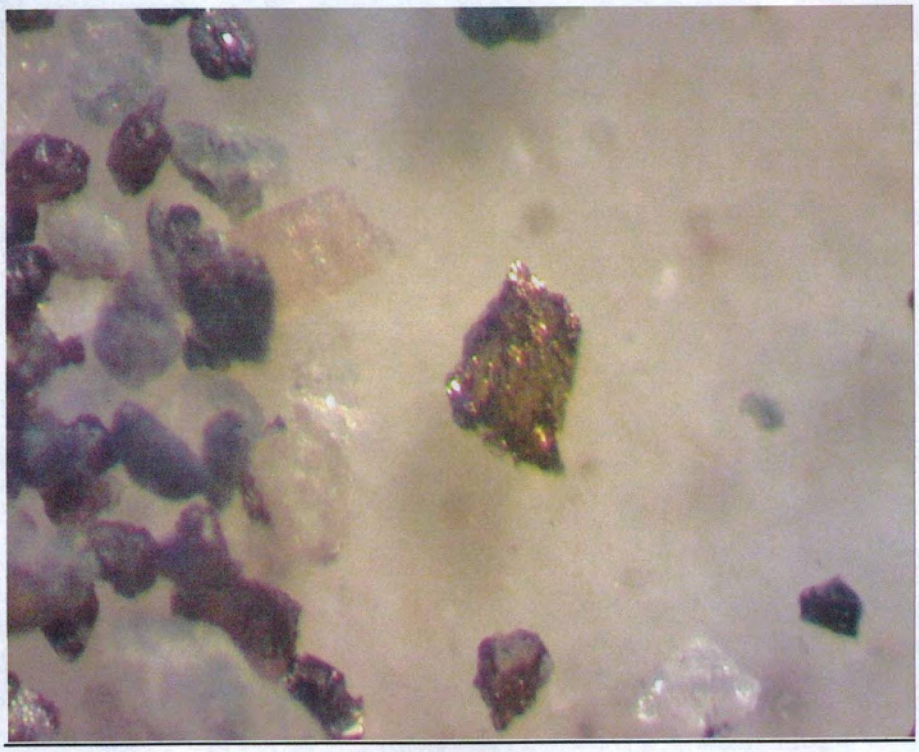
Concentrate from "green" rock – several sulphide grains in frame

Microscope observations

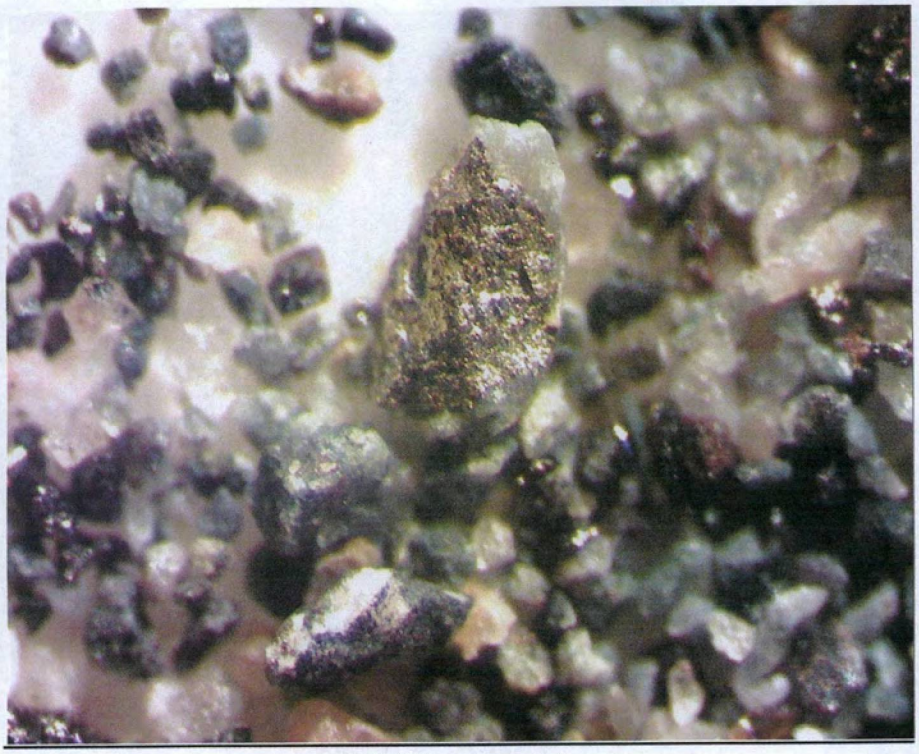
Despite the designation as a sulphide "rich" concentrate when compared to the bulk of the concentrate sulphides were quite rare. Mineral grain counts put the sulphide grains at between 0.7% and 1.1% in the samples examined. On the table the sulphides look like they are a much higher percentage because they tend to glitter on the table surface while the darker coloured grains are hidden by a dark coloured table top as found on an RP-4. Sulphides appeared to be a mix of iron pyrite, arsenopyrite and chalcopyrite. There is also a potential for galena but the mineral grains offering the potential to be heavy enough to be galena were very rare. The only way that they were even noticed is that their weight caused them to ride higher on the upper edge of the concentrate line but one could process kilograms of raw material and might only notice five or six of these heavy grains. Other than determining that sulphides were there and getting some pictures of various examples no attempt was made to segregate or identify the various mineral grains in any detail. The idea being that unless testing indicated a gold link in the concentrate significant enough to indicate the potential for economic return that in depth examination was not warranted.



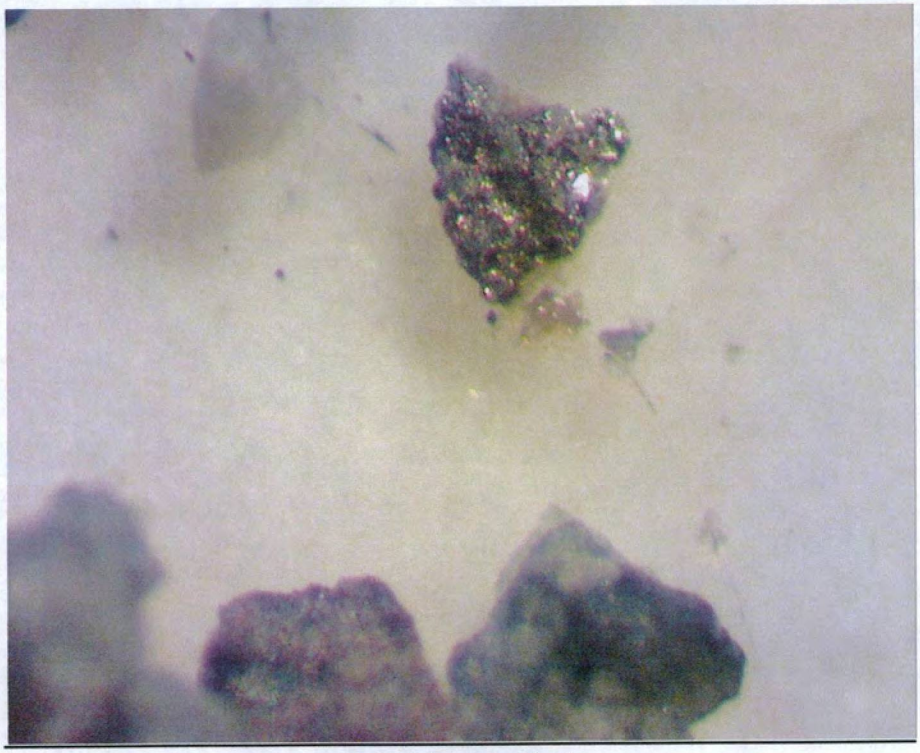
Sulphide example 1



Sulphide example 2



Sulphide example 3



Sulphide example 4

First Level Precious Metals Testing

First observations were for free gold grains moving on the shaker table. None of the samples showed visible gold grains on the table which would have been obvious by how high on the table they would be moving. From the table heavy mineral concentrates were examined using a gold pan to feather the concentrate out and backwash to reveal any free gold of visible size. No visible gold was noted in any samples.
Some barely visible potential grains were recovered but under magnification proved to be sulphides.

Second Level Precious Metals Testing

Each sample was coned and quartered repeatedly to produce a heavy mineral sub samples of 3.5 grams. The remainder of the sample was reserved and the 3.5 gram sub samples then scorified.
Scorification is somewhat like a mini fire assay with the benefit of being able to deal with a wide range of ores in a very simple manner. In these tests 3.5 grams of ore mixed with 1 gram of borax were wrapped in 30 grams of silver free lead foil and charged to a clay scorification dish. In the scorification process the lead first melts in the open topped shallow dish under reducing conditions and sulphides and other minerals float to the surface. The furnace is then switched to an oxidizing condition where the available air oxidizes the floating minerals at the same time that it creates lead oxide which also acts to break down and destroy mineral combinations. The minerals break down, i.e. the sulphides give up their sulphur, and lead absorbs gold, silver, lead and perhaps several other metals. As the process continues the melted lead pool gradually closes over with a layer of lead oxide and once totally covered the charge is poured into a suitable mold. The resulting lead slug or "button" is then hammered into a square shape to liberate it from any remaining slag and potential contamination and then it is placed in a cupel and returned to the furnace. In the cupel the lead button melts and the lead soaks into the cupel leaving a gold/silver bead behind. That bead can be further refined using nitric acid to help determine actual gold content but for the purposes of quick ore evaluation even seeing a gold coloured bead in the cupel is a very positive thing.
Despite numerous tests no gold bead was found in any scorification test.

Conclusions

The intent of this examination was to determine if there was economic potential to recover precious metals as a by-product of decorative rock production to be economic.
Work in the late 1980's indicated that there was a link between sulphides and gold.
Concentrates from the targeted product source rock did have low sulphide content.
Sulphides were typically lower than 1% of a 1000:1 concentrate.
There was no real difference between concentrates made from either the pink or the green source rock.
No gold or other precious metal was recovered in any of the test samples. None of the testing to date would indicate that there is a potential to recover precious metals as a by-product from the waste stream of fines produced during decorative rock production.

Recommendations

If there is a gold and sulphide link there is not enough sulphide in the rock to represent a significant source nor did the sulphides that were recovered indicate the potential for precious metals recovery. No further evaluation for precious metal by-product recovery is recommended.

Statement of Qualifications

I, Tom Bryant, am the author of this report and either carried out the work detailed herein or caused that work to be done.
I am a mineral exploration and development professional with over 35 years of experience as prospector, project operator, public and private exploration company upper management and consultant to industry.

_____
Tom Bryant

REFERENCES

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Sept. 12, 2006
By Tom Bryant

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1986
By Robin Adair

Recovery and Refining of Precious Metals
C.W. Amen
Published by Van Nostrand Reinhold Company Inc.
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