842053

Memorandum

Vancouver, B. C.
1984-11-15

Re: Cataract diatreme - is it a kimberlite?

H. WOBER:

The large breccia of the Cataract East Zone which is known to contain a high proportion of accidental clasts of probable basement derivation also contains garnet peridotite nodules. We should investigate the nature of the latter garnet and other garnet phases indicated in the breccia.

The possibility that pyrope garnet is present should be looked at closely, pyrope being a diamond indicator mineral. Garnet peridotite is most likely far-traveled - of probable deep crust or mantle derivation. If pyrope is present, we should view the exposed breccia as the volcanic facies of a kimberlite.

Attached is a plan of the breccia and available thin sections. Section locations are shown on the attached plan.

R. U. BRUASET

RUB:am
Attach.

Proved to be non-mantle Sperrantine garnets

a8/08.

Ste Cataract 518

MEMORANDUM

Box 446
La Habra, CA 90631
February 4, 1985

TECHNICAL MEMORANDUM
SPESSARTINE GARNETS FROM A
MIOCENE RESURGENT CALDERA,
CATARACT PROPERTY,
BRITISH COLUMBIA

RESTRICTED TO COMPANY USE

MR. E. D. DODSON:
Chevron Canada Resources, Vancouver

The attached technical memorandum contains electron microprobe analyses of spessartine garnets collected from a Miocene caldera. The unusual Mn-rich composition of these garnets is briefly interpreted.

This work was requested by Mr. R. U. Bruaset.

L. C. Bonham/RHH

L. C. BONHAM
COFRC

JLW:ez

Attach: TM85000123

File-4+4

cc w/attach:
C. Dahlstrom (Chevron Resources, San Francisco)
P. B. Hubbard (Chevron Resources, Englewood)
J. H. Spotts (Chevron Resources, San Francisco)
R. U. Bruaset (Chevron Canada Resources, Vancouver)
F. L. Campbell

RESTRICTED TO COMPANY USE

Chevron Oil Field Research Company
La Habra, California

TECHNICAL MEMORANDUM SPESSARTINE GARNETS FROM A MIOCENE RESURGENT CALDERA, CATARACT PROPERTY, BRITISH COLUMBIA

By J. L. Warner and B. E. Wawak

TM85000123
January 1985

SUMMARY

Garnets present in volcanic tuffaceous breccias and garnet-epidote rock from the Cataract Property, British Columbia are spessartine, i.e., Mn, Al, silicates with a garnet structure.

INTRODUCTION

Five rocks and covered thin sections were received from Mr. R. U. Bruaset, Chevron Resources, Vancouver for analysis of garnets contained within the rocks. The five samples are listed below along with each sample's rock type determined by Vancouver Petrographics:

Tuffaceous quartz breccia
- 1217C
- RB82-19
- TL82-32 (or TL82-23)
- RB82-131 (thin section destroyed during polishing)

Garnet peridotite (really garnet-epidote rock)
- TL82-95

Note that TL82-95 is a garnet-epidote rock. It is not a garnet peridotite. No olivine and no pyroxene appears to be present in the thin section. The major mineral is a dark green

epidote (ca. 70%). Identification of the mineral as epidote was confirmed using the electron microprobe. Epidote occurs as coarse-grained crystals up to several mm across. Spessartine garnet is the second most abundant mineral (ca. 25%). It occurs as euhedral crystals ranging from 0.5 to 2 mm across. Hornblende is the third most abundant mineral making up a few percent of the rock. Hornblende occurs as elongated prisms (0.2x3 mm) that are highly altered to chlorite. Minor minerals include quartz, pyrite, and sphene. There is no evidence of the presence (or former presence) of either olivine or pyroxene in this sample. Vancouver Petrographics may have been misled by the rock's deep green color (which they mistook for olivine or pyroxene) and the rock's high density.

The samples are from the East Zone, Cataract Property, British Columbia which is a Miocene caldera that has undergone collapse followed by resurgence. A large diatreme is suspected on the caldera margin and the five samples are from that diatreme.

The diatreme is a target for epithermal gold mineralization, but interest in the garnets was raised because of the possibility of diamonds. Diamond-bearing kimberlites have been found in southeastern British Columbia and the Cataract diatreme contains inclusions of alleged garnet peridotite of possible mantle origin. Chemical composition of garnets have been used as an indicator of diamonds.

The five thin sections were received with mounted cover slips. During polishing for electron microprobe analysis, one sample, RB82131, was destroyed. Results for the four remaining samples follow.

RESULTS

Garnets in all four samples are spessartine, Mn-Al garnets (Table 1 and Figure 1). All four samples display similar analyses that are indistinguishable. Cores and rims of several garnets in each sample were analyzed. No zoning was apparent, although there is a range of Fe-Mn ratio in garnets in each sample.

DISCUSSION

The observation that garnets in the tuffaceous quartz breccia and the garnet-epidote rock are the same indicates that the garnets in the tuff breccia are xenocrysts from a source similar to the garnet-epidote rock inclusions. The lack of zoning with a range in chemical composition is also suggestive that the garnets in the tuff breccias are abraded inclusions.

Spessartine is found in all types of metamorphosed rocks and in pegmatites and aplites. The spessartine composition of the garnets and the abundance of epidote suggests that the garnet-epidote rock is a metamorphic rock originating in the lower crust.

Spessartine is not typical of mantle materials. Mantle garnets typically are pyrope, a Mg-Al garnet. Garnets associated with diamonds are Cr-rich pyrope, commonly containing almost 10 wt.% Cr_2O_3. The garnets from the Cataract Property are nothing like that.

The spessartine composition of these garnets reinforces the known Mn anamaly in the region.

JLW/BEW:ez
Table 1
Figures 1a & 1b

TABLE 1

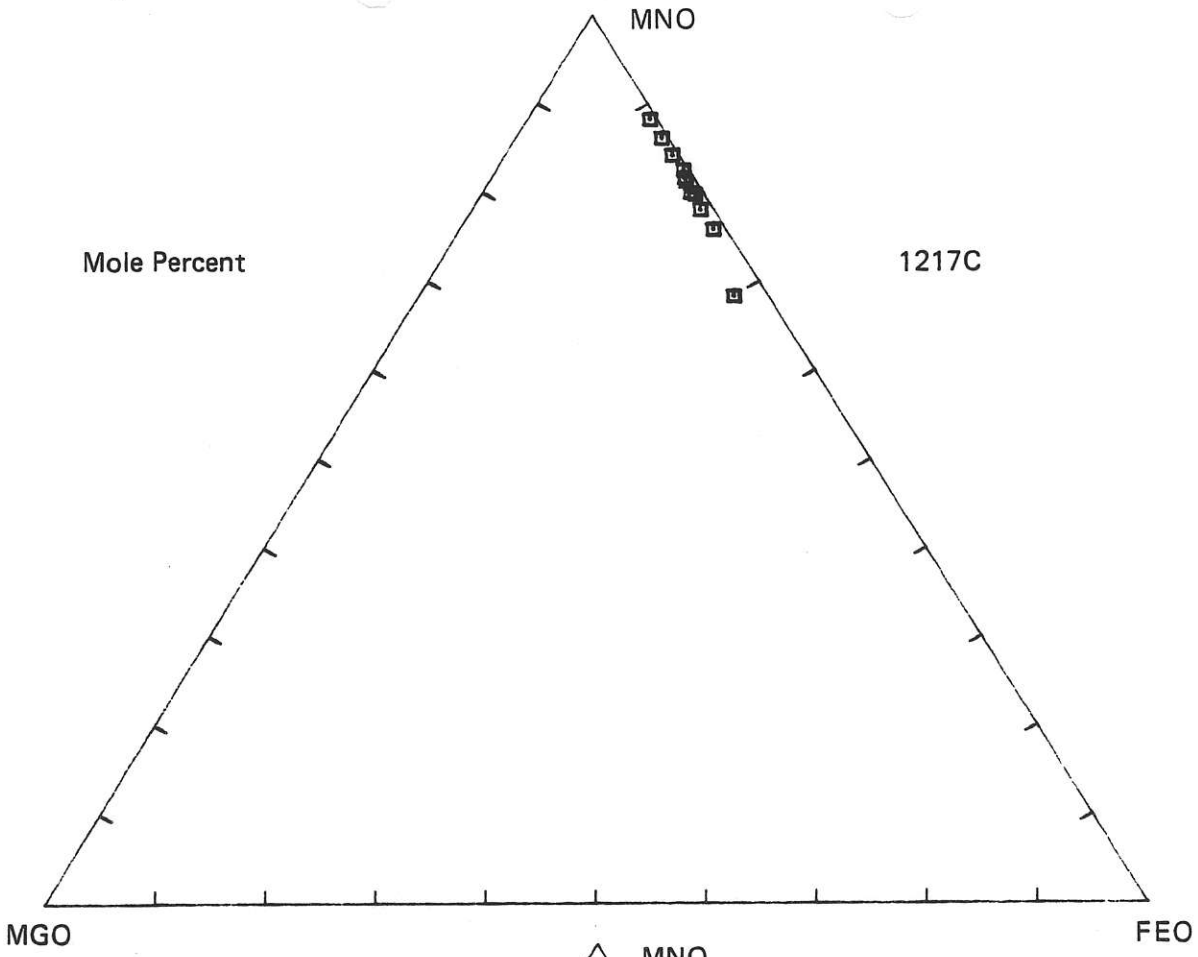
ELECTRON MICROPROBE ANALYSES OF GARNETS
WITH STRUCTURAL FORMULA

	TL82-32	1217C	RB82-19	TL82-95
SiO_2	35.25 (.79)	37.16 (1.2)	35.55 (1.3)	34.66 (1.1)
TiO_2	.43 (.31)	.21 (.21)	.03 (.06)	.69 (.27)
Al_2O_3	21.09 (.61)	21.28 (1.1)	21.85 (1.4)	19.80 (.77)
CR_2O_3	.10 (.02)	.08 (.02)	.11 (.03)	.11 (.06)
FeO	7.47 (1.0)	6.90 (1.2)	5.16 (.87)	5.72 (1.2)
MnO	33.86 (1.5)	30.51 (.85)	32.68 (2.1)	35.88 (2.7)
MgO	.34 (.09)	.20 (.05)	.18 (.06)	.13 (.08)
CaO	.90 (.32)	3.78 (.64)	3.41 (.78)	2.59 (.68)
SUM	99.44	100.12	98.97	99.58

STRUCTURAL FORMULA CALCULATED TO 24 OXYGENS

Si	5.836	6.013	5.851	5.791
Al (TET)	.164	-.013	.149	.209
Al (OCT)	3.952	4.072	4.089	3.691
Ti	.054	.026	.004	.087
Cr	.013	.010	.014	.015
VI SUM	4.019	4.108	4.107	3.792
Fe+2	1.034	.934	.710	.799
Mn	4.749	4.182	4.556	5.078
Mg	.084	.048	.044	.032
Ca	.160	.655	.601	.464
VIII SUM	6.027	5.819	5.912	6.373
SUM	16.046	15.927	16.019	16.165

Numbers in parenthesis are 1 standard deviation.



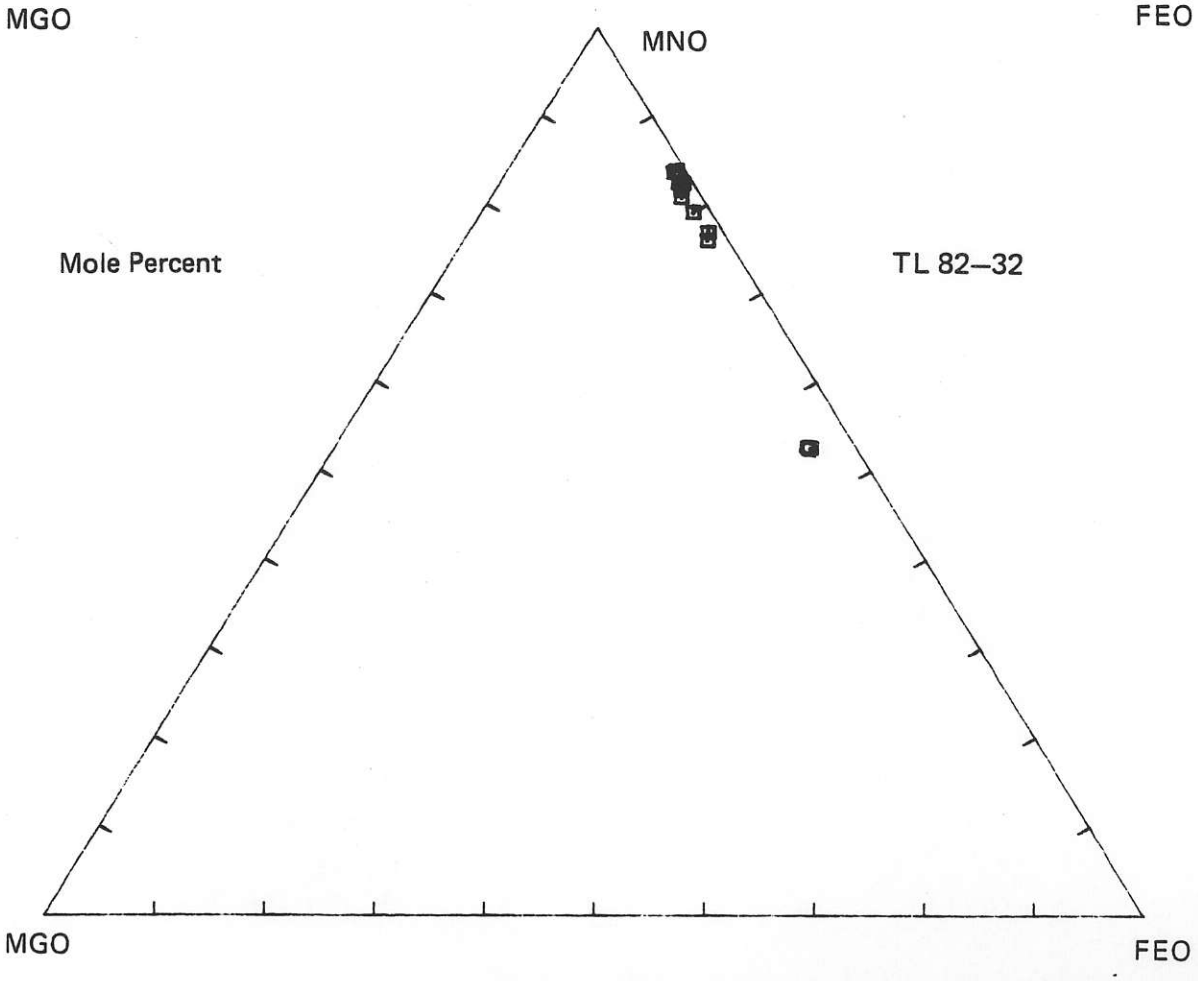
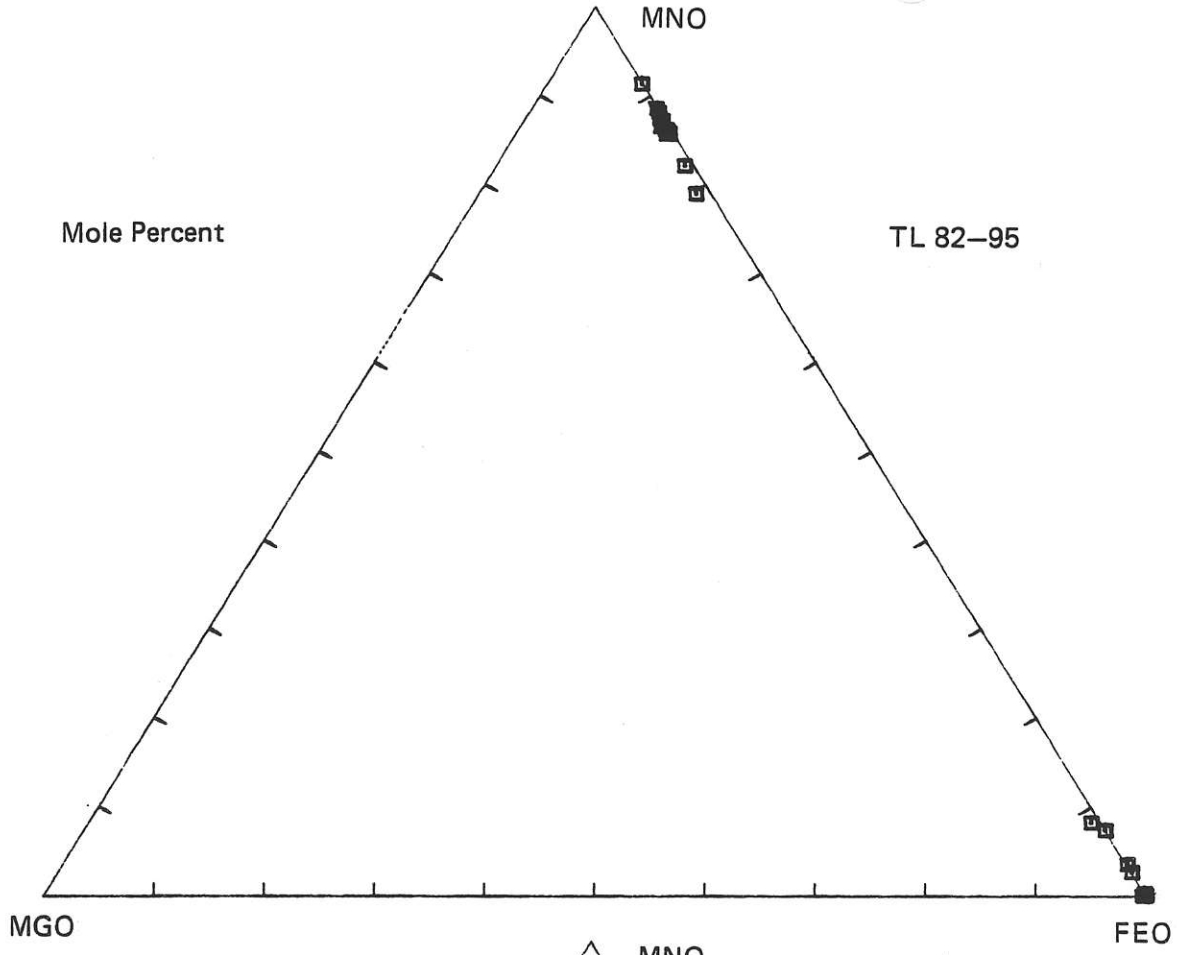


Figure 1a
Composition Diagrams For Spessartine Garnets

LE 84–12760



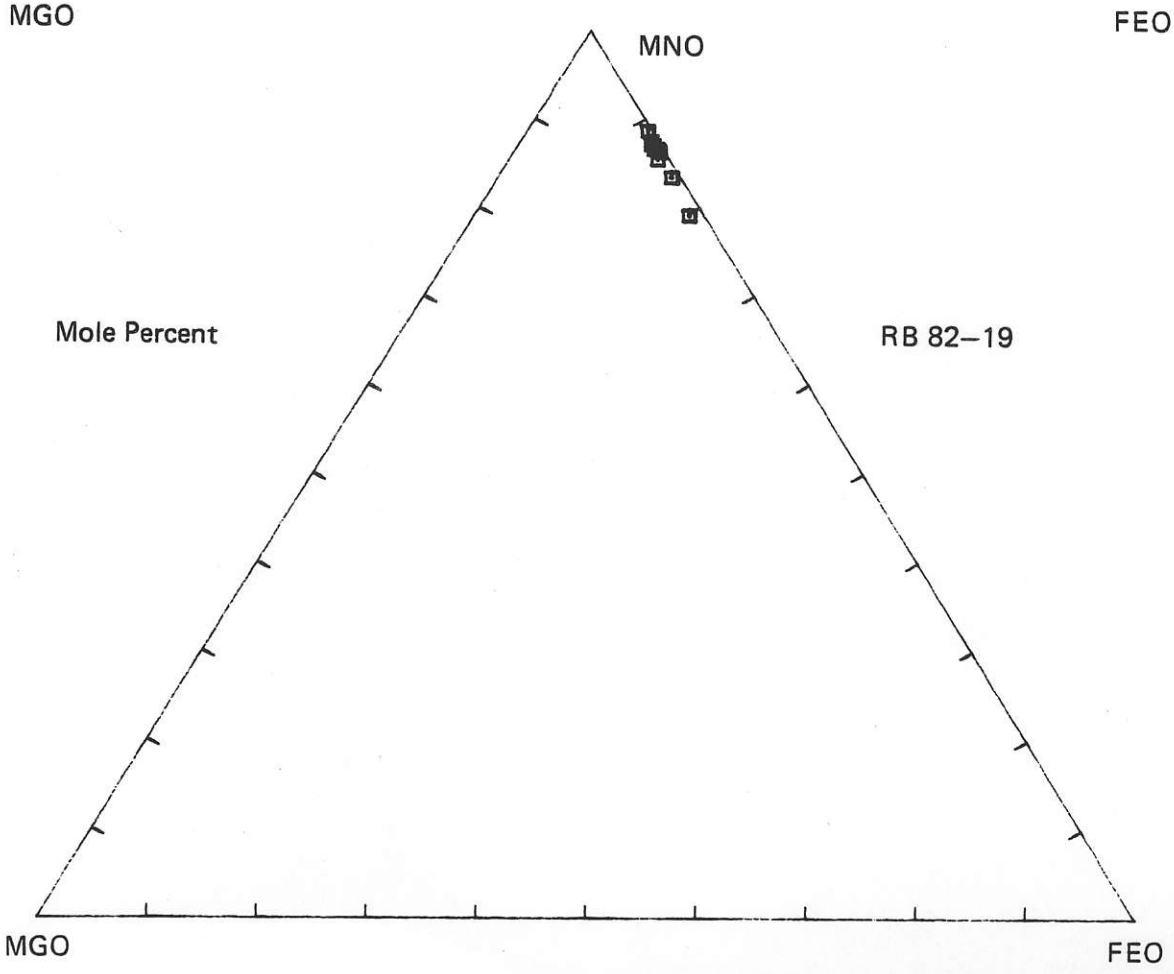


Figure 1b
Composition Diagrams For Spessartine Garnets

LE 84–12761