



[ARIS11A]

ARIS Summary Report

Regional Geologist, Cranbrook

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ASSESSMENT REPORT: 25716

Mining Division(s): Golden, Fort Steele

Property Name: Shag

Location: NAD 27 Latitude: 50 38 00 Longitude: 115 30 00 UTM: 11 5809906 606083
NAD 83 Latitude: 50 38 00 Longitude: 115 30 04 UTM: 11 5810123 606001
NTS: 082J11W 082J12E

Camp:

Claim(s): Shag 1-4

Operator(s): Ecstall Mining Corporation

Author(s): Graf, Chris

Report Year: 1998

No. of Pages: 44 Pages

Commodities

Searched For: Lead, Silver, Zinc

General

GEOL, GEOC

Work Categories:

Work Done:

Geochemical

SAMP Sampling/assaying (9 sample(s);)

Elements Analyzed For : Multielement

Geological

PETR Petrographic (9 sample(s);)

Keywords: Cambrian, Carbonates, Dolostones, Galena, Lead isotopes, Lenses, Limestones, Sphalerite, Stratabound

Statement Nos.: 3123084

MINFILE Nos.: 082JNW002

Related Reports: 07036, 07382, 08091, 10143, 11170, 17814

**PETROGRAPHY AND CHEMICAL ANALYSIS OF A SUITE OF ROCK SAMPLES
FROM THE SHAG CLAIMS**

**SITUATED IN THE GOLDEN AND FORT STEELE MINING DIVISIONS
N.T.S. 82-J-11 & 12**

50°38' N;115°30'W

By Chris Graf, P.Eng.

for

ECSTALL MINING CORPORATION

**GEOLOGICAL SURVEY BRANCH
ASSESSMENT REPORT**

25,716

SUMMARY

The Shag lead-zinc-silver property is situated in the Golden and Fort Steele Mining Divisions at 50°38' N latitude and 115°30'W longitude on map area NTS 82J11 &12.

The mineralization is contained within Middle Cambrian carbonates in the middle ranges of the Rocky Mountains in southeastern British Columbia and was staked in August of 1977. Fourteen sphalerite-galena occurrences are known to exist along a 5 kilometre length of Shag Creek Valley. Twelve of these showings are stratabound and occur along two separate stratigraphic horizons as discontinuous, elongate lenses, or thin zones of mineralization that form in the upper part of a dolostone, at or near a limestone contact. There are numerous similar dolostone-limestone horizons within the claims group that are not mineralized. The reason for the development of the mineralized occurrences along only two stratigraphic horizons is not completely understood. The mineralized zones appear to have accumulated in dolomitized and early brecciated portions of a carbonate bank or shoal complex, along the edge of a shale basin.

The persistent nature and number of showings along two similar stratigraphic horizons suggest there is some potential that they are an expression of a "completely" blind ore body. Adequate testing of the mineralized C-4 horizon could require 1500 metres of drilling in ten to fifteen holes. The BM horizon also is not adequately tested on the west side of Shag creek where drill hole 79-6 bottomed in zinc mineralization within a large zinc soil anomaly. At least 1200 m of drilling in 6 holes 200 m deep are required to test this zone of mineralization.

During 1998 a sample of galena from the Redbed showing was analyzed for its lead isotopic composition and unexpectedly these results plotted off the growth curve in a Cretaceous, not middle Cambrian, age position. In August 1998 the property was accessed by helicopter and samples of galena-sphalerite were collected from several of the known showings. Nine of these samples, labeled Shag 1-9, were broken in half and equal size pieces were sent to both Chemex Labs Ltd. for 30 element ICP analysis, plus zinc, gallium, germanium assays, and to Vancouver Petrographics Ltd. for thin section examination, mineral identification and petrographic descriptions.

Sample Shag 1 was from the BM showing, samples Shag 2, Shag 6, and Shag 7 were from the C-4 showing, sample Shag 4 was from the C-3 showing and samples Shag 3, Shag 5, Shag 8 and Shag 9 were from the Redbed showings area.

The analytical data showed that many of the samples contained high concentrations of zinc and lead which was expected as they were well mineralized. Several samples also contained significant concentrations of silver (99 ppm), germanium (.03%, 300 ppm) and thallium (100 ppm).

Both the Chemex Ltd. analytical results and a petrographic report by John Payne of Vancouver Petrographics Ltd. are included in this report.

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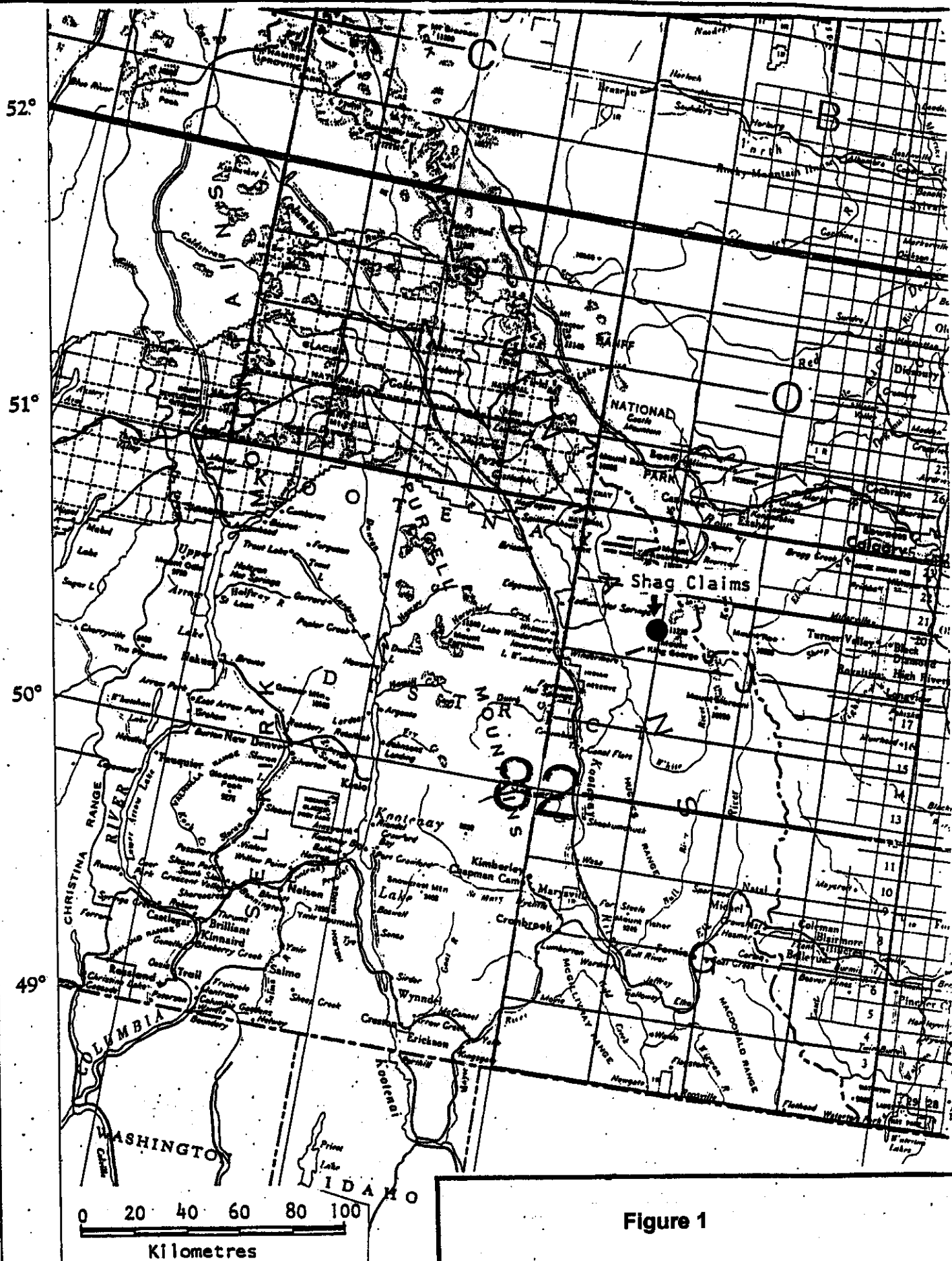
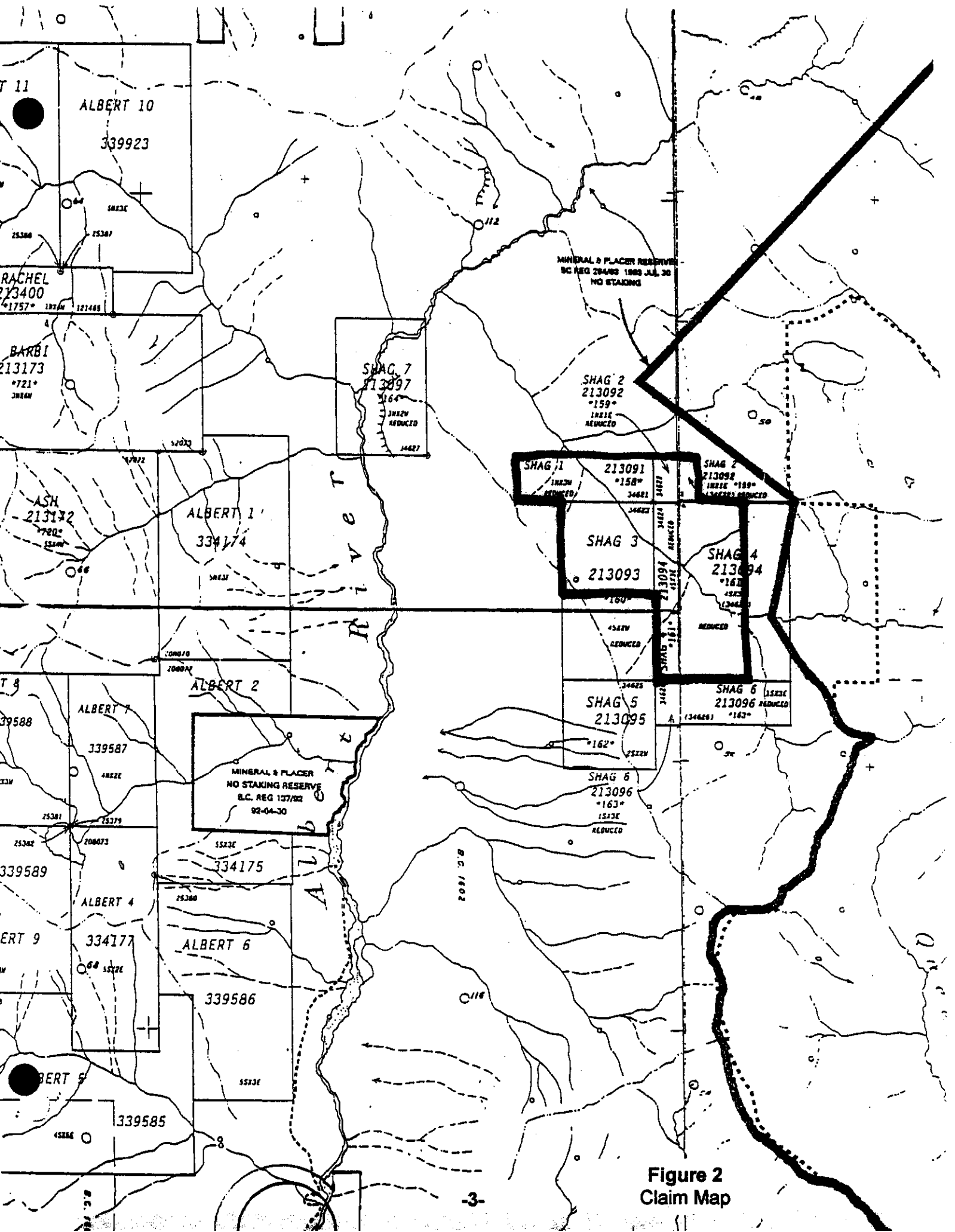


Figure 1

Location Map - Shag Claims
N.T.S. 82/J-11,12



LOCATION, ACCESS, PHYSIOGRAPHY AND TITLE

The claims are located near 50°38'N, 115° 30'W, in the Albert River drainage about 35 km east of Radium, B.C. (see figure 1, following page). The north end of the claims can be reached by logging roads, about 55 km from Canal Flats or 60 km from Radium. Higher elevations and the southern parts of the claim group are best approached by helicopter.

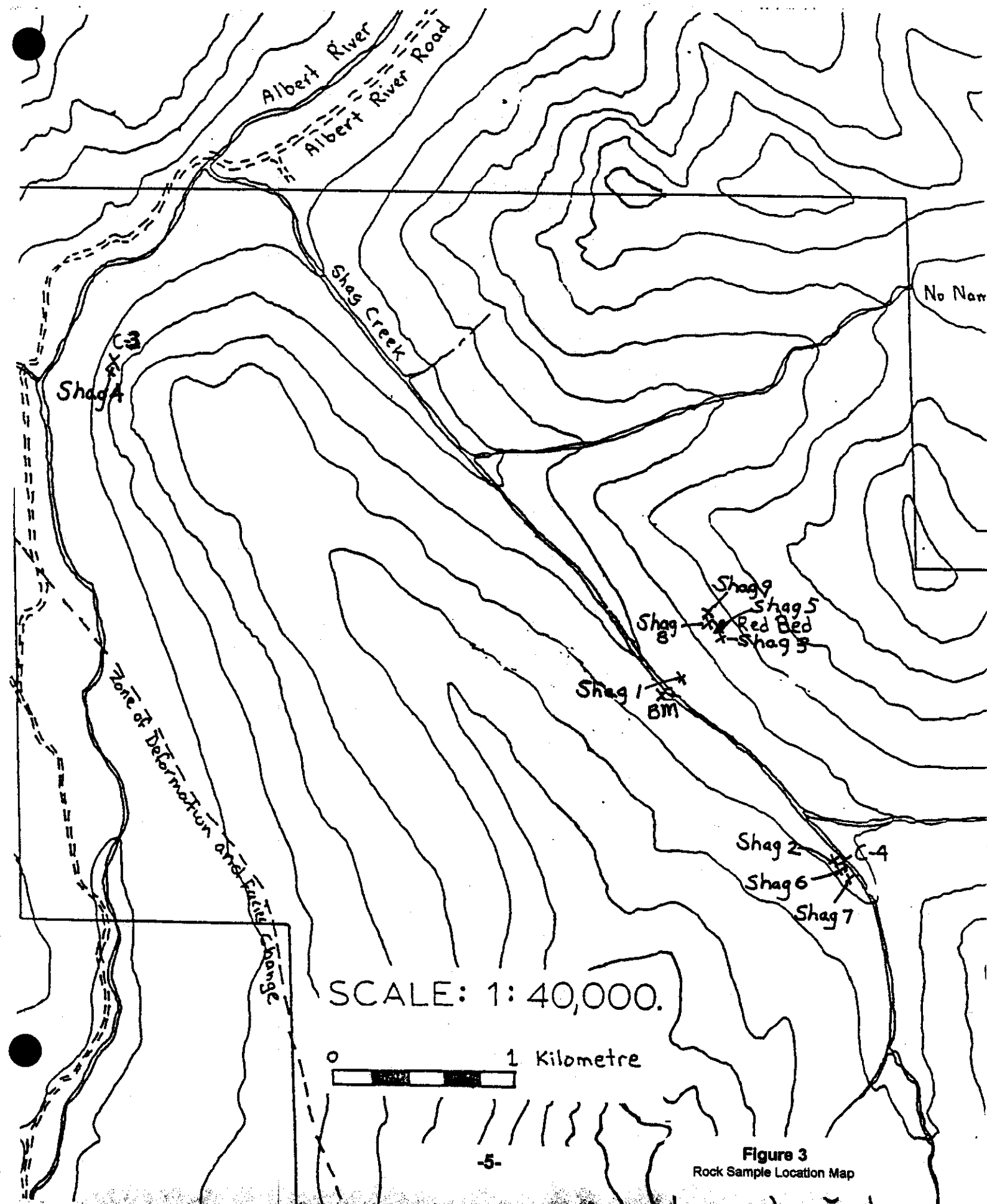
The claims are located within the middle Range of the Rocky Mountains at elevations 4,000 to 8,500 feet. Vegetation consists of spruce, fir and cedar trees with moderate underbrush. Numerous small creeks and springs drain the property area, all flowing into Shag Creek, which bisects the property and flows northwestwardly into the Albert River, which in turn flows southwesterly into the Kootenay River.

Moderate precipitation may be expected annually, with an accumulated snowfall in the order of 3-5 m over the winter months.

The table below, summarizes claim tenure.

CLAIM STATUS - SHAG 1-4

Shag 1	213091	3	August 15, 1999
Shag 2	213092	1	August 15, 1999
Shag 3	213093	4	August 15, 1999
Shag 4	213094	8	August 15, 1999
Total		16	





Vancouver Petrographics Ltd.

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Report for:

**Chris Graf,
Ecstall Mining Corp.,
307 - 475 Howe Street,
Vancouver B.C., V6C 2B3**

August, 1998

**Project: Shag Property,
MVT stratabound sedimentary Zn-Pb deposit,
Middle Cambrian Carbonates, Eastern B.C.**

Samples: 1-9

Summary:

The samples are recrystallized Middle Cambrian sedimentary rocks containing a variety of intergrowths of carbonates, quartz, and sulfides. Sphalerite is the dominant sulfide, being present in all samples, commonly as irregular, granular grains. Pyrite is widespread but not abundant. Galena is concentrated in a few samples, commonly as coarse, replacement or recrystallized patches, and as intergrowths with very fine-grained quartz. Some samples contain recrystallized zones or breccia matrix dominated by dolomite with lesser quartz and sphalerite. A few late carbonate veinlets are dominated by dolomite.

Carbonates were distinguished in part on the style and rate reaction on contact with dilute, cold HCl. Calcite begins to react immediately, and after a few seconds effervesces vigorously. Dolomite reacts immediately, but the reaction continues as a slow bubbling on the surface. Ankerite reacts more slowly than dolomite, with bubbles forming on the surface after several seconds' contact with the acid. Dolomite/calcite has a reactivity intermediate between that of calcite and dolomite. As well, the refractive index increases from calcite to dolomite to ankerite, although the presence of dusty inclusions in many samples changes the apparent relief and makes this not as useful a method to distinguish the carbonates as the reactivity with cold, dilute HCl.

A: Samples dominated by Carbonate (mainly Dolomite)

Sample Shag 1 is a quartz-bearing dolomite dominated by cryptocrystalline to extremely fine-grained dolomite, with minor to moderately abundant quartz, and scattered patches of sphalerite and disseminated pyrite grains. Coarser-grained recrystallized patches of dolomite contain scattered, irregular patches of sphalerite and one lens of pyrite.

Sample Shag 2 is moderately foliated, with lenses rich in dolomite/calcite enclosed in a matrix dominated by extremely fine-grained quartz with lesser dolomite and minor sericite/muscovite and pyrite. Sphalerite forms abundant, irregular, disseminated, granular grains and clusters. Galena occurs locally, mainly with sphalerite.

Sample Shag 4 contains fragments up to a few cm in size of very fine-grained dolomite enclosed in a matrix of commonly coarser grained dolomite/calcite and sphalerite.

Sample Shag 6 contains wavy bands dominated by very fine-grained dolomite/calcite, with lesser lenses and patches dominated by cryptocrystalline to extremely fine-grained quartz. Granular sphalerite occurs in both. Galena is concentrated strongly in some quartz-rich patches. Pyrite occurs in both as disseminated grains and clusters of a few grains. Ti-oxide forms disseminated patches, mainly in dolomite-rich layers. Sphalerite forms a few coarser replacement patches and lenses up to several mm across; these have minor recrystallized rims of quartz, calcite/dolomite, and muscovite.

Sample Shag 8 is dominated by very fine-grained dolomite containing minor patches of quartz and of sphalerite. The rock was fractured moderately, and fractures filled by coarser-grained, recrystallized veinlets and patches of dolomite, sphalerite, and quartz.

B: Samples dominated by Quartz

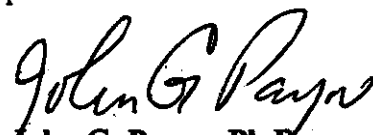
Sample Shag 3 is a banded rock dominated by very fine-grained quartz with lesser dolomite/ankerite and moderately abundant granular sphalerite. One band up to 2.5 mm wide contains 5% disseminated galena. A replacement patch is of coarse-grained galena bordered by quartz. In the hand sample are other replacement patches of galena(?) - quartz up to several mm across. Dolomite/ankerite is weathered to limonite, and galena is altered slightly to cerussite.

Sample Shag 5 is a banded rock dominated by very fine-grained quartz and lesser ankerite, with disseminated patches of sphalerite and minor ones of pyrite. A few replacement patches and lenses are dominated by galena with much less abundant sphalerite and quartz. It is similar to Sample Shag 3.

Sample Shag 7 is moderately banded. Most bands are dominated by cryptocrystalline to extremely fine-grained quartz and fine-grained granular sphalerite, with much less sericite intergrown with quartz and minor muscovite, mainly intergrown with sphalerite. In about 1/3 of the section, moderately abundant ankerite/dolomite is intergrown with quartz. Quartz also forms scattered coarser grains, in part prismatic. Galena is concentrated in certain layers and patches in intergrowths with the finer-grained variety of quartz.

Sample Shag 9 is coarsely banded, with layers dominated by quartz, sphalerite, and dolomite. Galena is concentrated in a few patches with quartz. Minor later veinlets are of dolomite.

A series of photographs was taken to illustrate typical and unique textures. The list of photographs follows the detailed petrographic descriptions.


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Sample Shag 1**Quartz-bearing Dolomite with Disseminated Sphalerite**

The sample consists of cryptocrystalline to extremely fine-grained dolomite with minor to moderately abundant intergrown quartz and scattered patches of sphalerite and disseminated pyrite grains. Coarser-grained recrystallized patches of dolomite contain scattered, irregular patches of sphalerite and one lens of pyrite.

dolomite	
cryptocrystalline/extremely fine	40-45%
fine-grained	40-45
quartz	12-15
sphalerite	1- 2 (colourless to medium orange)
pyrite	0.3
sericite/muscovite	trace

Much of the sample consists of cryptocrystalline to extremely fine-grained, dolomite. This has an apparent high relief, and may contain dusty opaque inclusions, giving the hand sample a dark grey to black colour. Many of these zones contain 1-5% disseminated quartz grains averaging 0.02-0.05 mm in size.

A few patches up to 2 mm in size are dominated by very fine-grained quartz with less abundant disseminated, cryptocrystalline to very fine-grained dolomite.

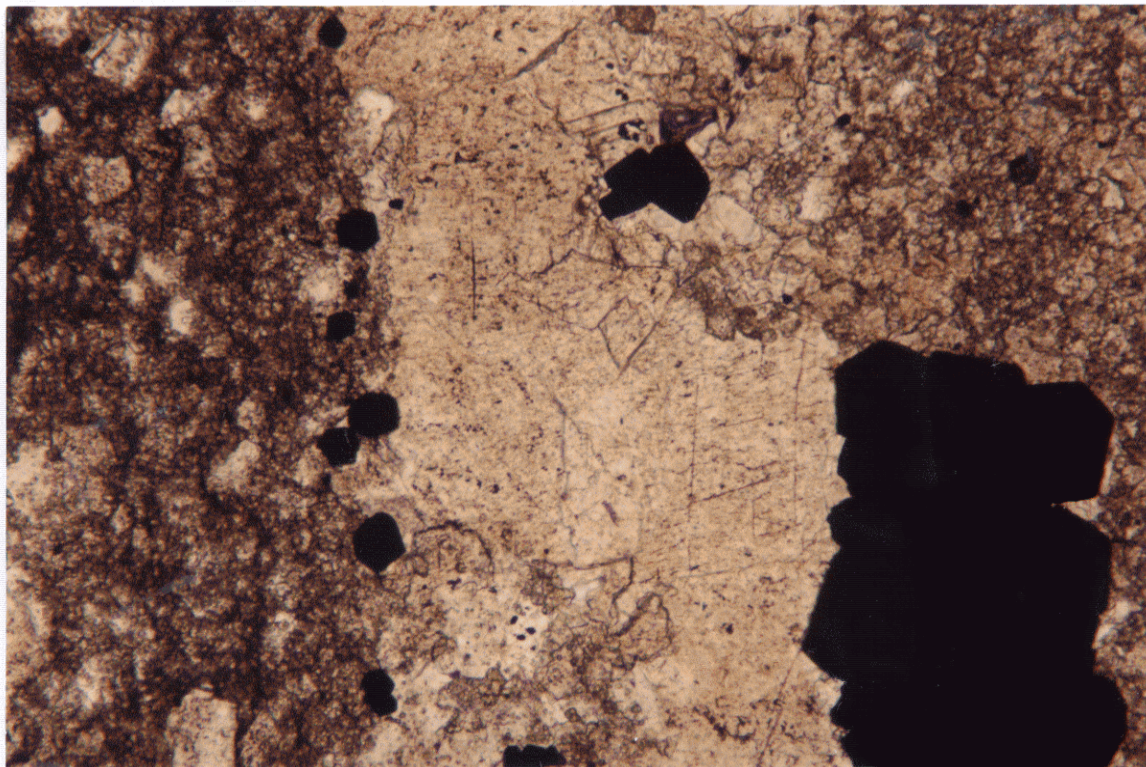
Sphalerite forms irregular patches averaging 0.05-0.15 mm in size, mainly intergrown with very fine-grained quartz, and patches averaging 0.03-0.05 mm in size intergrown with extremely fine-grained dolomite. Coarser patches averaging 0.1-0.3 mm in size and one 0.8 mm across are intergrown with recrystallized dolomite. Sphalerite varies in colour from colourless to medium orange, with some grains showing a vague growth zonation. A few coarser sphalerite grains contain one or two inclusions averaging 0.01 mm across of a light grey, opaque mineral, possibly tetrahedrite; the grains are too small for optical identification.

Pyrite forms disseminated, equant grains averaging 0.03-0.07 mm in size.

Muscovite forms a few subhedral flakes up to 0.07 mm long.

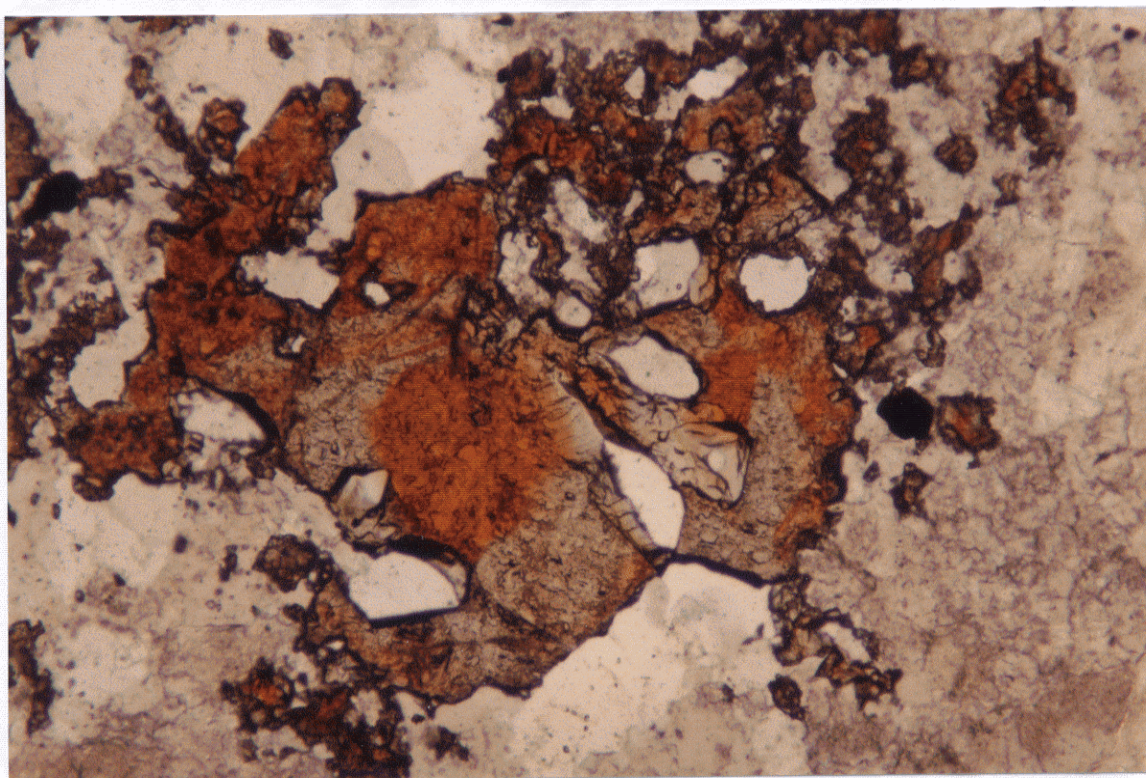
Recrystallized patches averaging 1-2 mm in size and up to several mm across are mainly of dolomite grains averaging 0.1-0.5 mm in size.

In one elongate lens of coarser grained dolomite is a lens 2 mm by up to 0.4 mm in size of subhedral pyrite grains averaging 0.05-0.1 mm in size. Some of the grains contain abundant, cryptocrystalline to extremely fine grained, disseminated inclusions of non-reflective material of unknown composition. Bordering the pyrite, mainly at one end of the lens, are minor patches of extremely fine-grained sericite and lesser quartz.



Shag 1

Cryptocrystalline to extremely fine-grained dolomite with minor quartz; recrystallized lens of coarser-grained dolomite with a lens of pyrite and disseminated pyrite grains and a patch of very fine-grained quartz. Plane light. Length of photo: 1.3 mm.



Shag 1

Irregular patch of varicoloured sphalerite intergrown mainly with quartz and surrounded by partly recrystallized dolomite, minor pyrite (opaque). Plane Light. Length of photo: 1.3 mm.

Sample Shag 2 Lensy, Dolomite/Calcite-Quartz-Sphalerite Rock

The sample is moderately foliated, with lenses rich in dolomite/calcite enclosed in a matrix dominated by extremely fine-grained quartz with lesser dolomite and minor sericite/muscovite and pyrite. Sphalerite forms abundant, irregular, disseminated, granular grains and clusters. Galena occurs locally, mainly with sphalerite.

dolomite/calcite	40-45%
quartz	40-45
sphalerite	8-10 (colourless)
sericite/muscovite	1- 2
pyrite	0.5
galena	minor

Dolomite/calcite occurs as lenses up to a few cm long and a few mm wide of extremely fine to very fine grains. In quartz-rich patches it also forms disseminated, anhedral to euhedral, rhombic porphyroblasts averaging 0.05-0.1 mm in size.

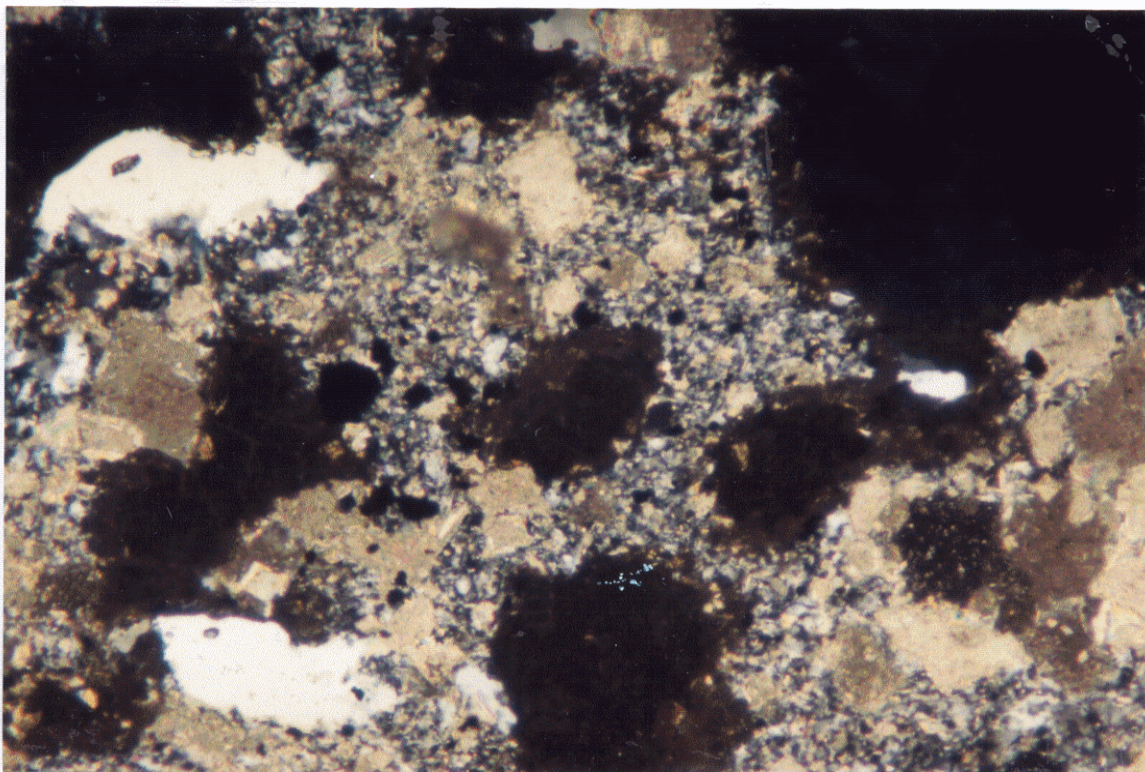
Quartz occurs mainly as aggregates of anhedral grains averaging 0.01 mm in size intergrown with minor sericite and minor to moderately abundant disseminated patches of carbonate. A few anhedral to subhedral prismatic grains from 0.1-0.5 mm long are associated mainly with patches of sphalerite.

Sphalerite forms equant, anhedral, commonly granular grains and clusters up to a few mm across of grains averaging 0.15-0.3 mm in size, and a few up to 0.7 mm across. Some are rimmed by a zone in which sphalerite is intergrown with muscovite and minor pyrite. A few contain minor inclusions of galena averaging 0.03-0.04 mm in size.

Galena also occurs in two patches up to 0.2 mm in size in which it forms intimate, skeletal intergrowths with quartz. A few irregular patches of galena up to 0.05 m in size are intergrown with quartz and carbonate away from sphalerite.

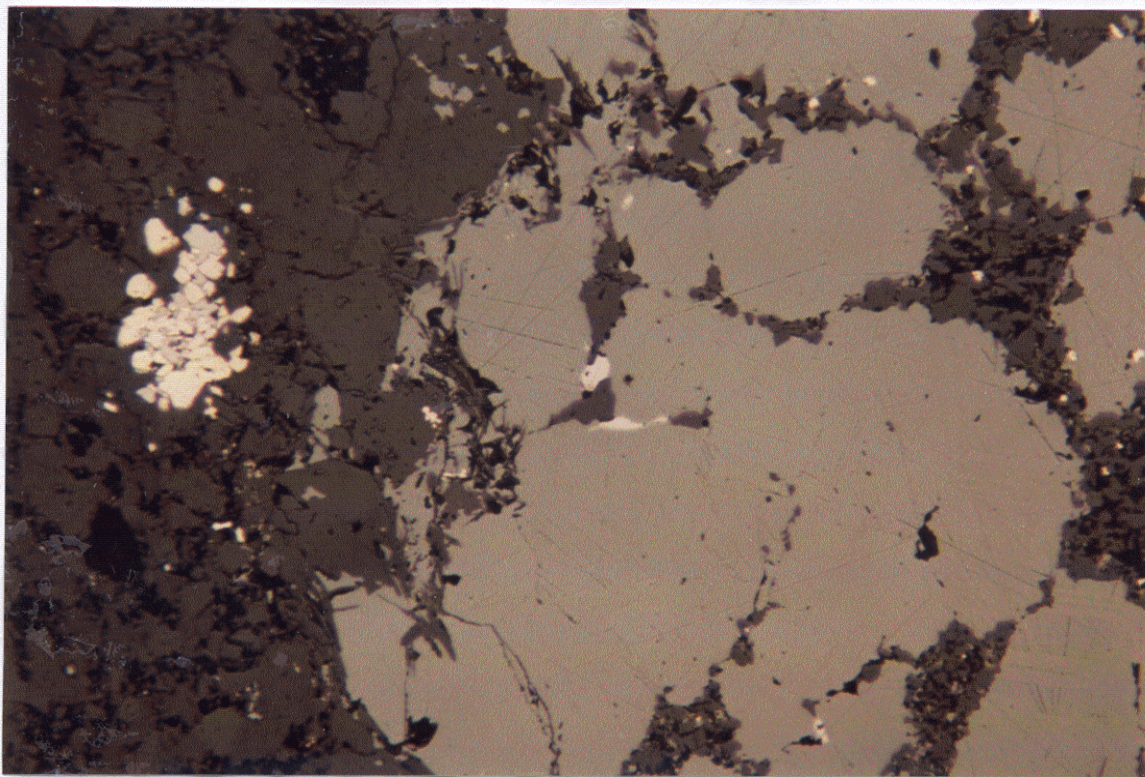
Pyrite forms disseminated, subhedral to euhedral grains averaging 0.01-0.015 mm in size. It is concentrated in a few clusters up to 0.15 mm across of grains averaging 0.03-0.05 mm in size. Some of these contain 20% interstitial patches of galena. One lens 2 mm long is dominated by pyrite grains averaging 0.02-0.05 mm in size, with interstitial patches of carbonate and minor ones of galena and of sphalerite.

Sericite/muscovite forms disseminated flakes averaging 0.015-0.03 mm in length intergrown with quartz and along grain borders of carbonates. It is concentrated slightly along borders of a few sphalerite-rich patches.



Shag 2

Extremely fine-grained quartz with minor pyrite and sericite intergrown with very fine-grained dolomite/calcite and irregular patches of fine to medium grained sphalerite. Two coarser grains of quartz. Crossed nicols, conosopic light. Length of photo: 1.3 mm



Shag 2

Patch of granular sphalerite grains with interstitial quartz, dolomite/calcite, and muscovite, minor patches of galena; adjacent in extremely fine grained carbonate is a patch of pyrite with interstitial galena. Reflected light. Length of photo: 1.3 mm.

**Sample Shag 3 Banded Quartz-Dolomite/Ankerite-Sphalerite Rock, one Galena-bearing band;
Replacement Patch of Galena-(Quartz)**

The sample is dominated by very fine-grained quartz with lesser dolomite/ankerite and moderately abundant granular sphalerite. One band up to 2.5 mm wide contains 5% disseminated galena. A replacement patch is of coarse-grained galena bordered by quartz. In the hand sample are other replacement patches of galena(?) - quartz up to several mm across. Dolomite/ankerite is weathered to limonite, and galena is altered slightly to cerussite.

quartz	62-67%
dolomite/ankerite	17-20
sphalerite	12-15 (pale orange)
galena	1-2
pyrite	0.1
sericite	minor

Quartz forms anhedral grains averaging 0.05-0.07 mm in size, with a few from 0.1-0.15 mm across. A few anhedral, prismatic grains are up to 0.2 mm long.

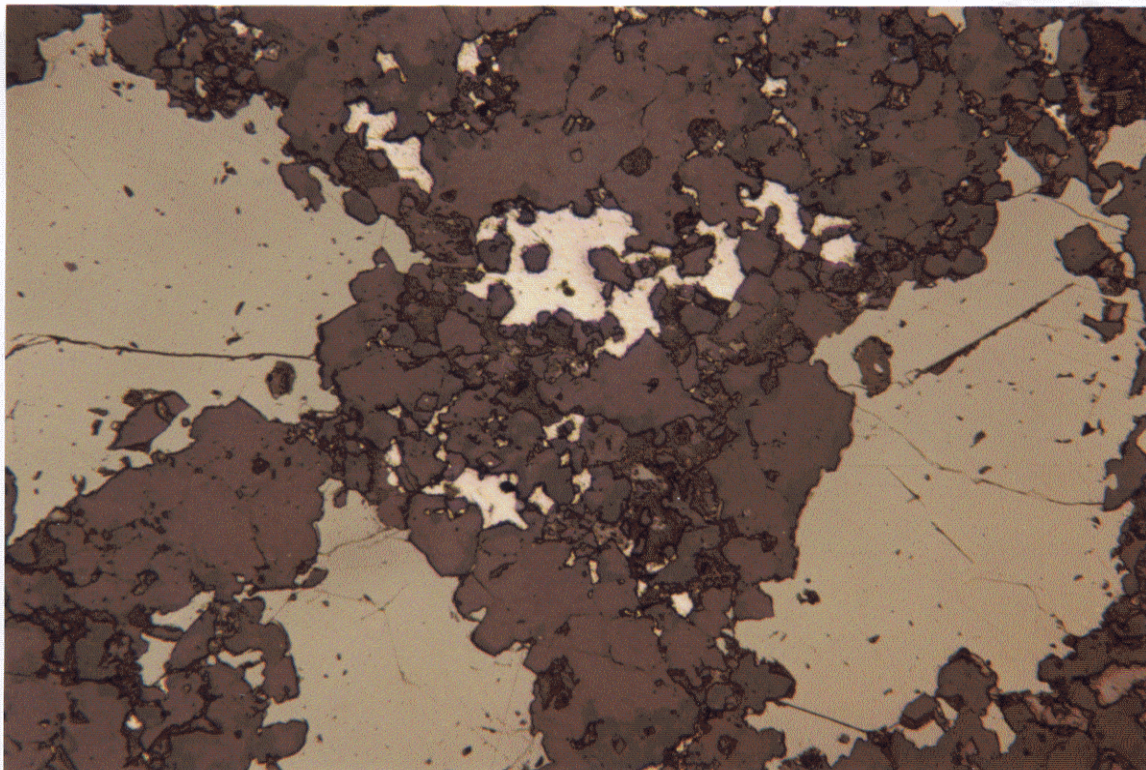
Dolomite/ankerite forms anhedral to locally euhedral grains averaging 0.03-0.05 mm in size, disseminated in quartz and concentrated locally in dolomite-rich patches up to a few mm across. In the weathered part of the section, it is altered strongly to completely to limonite and opaque iron oxides, indicating that the carbonate has a moderate iron content.

Sphalerite forms disseminated irregular grains averaging 0.2-0.4 mm in size, mainly intergrown with quartz. Some grains show slight colour zoning from colourless to light orange.

Sericite forms a few patches up to 0.1 mm in size of cryptocrystalline to extremely fine grains.

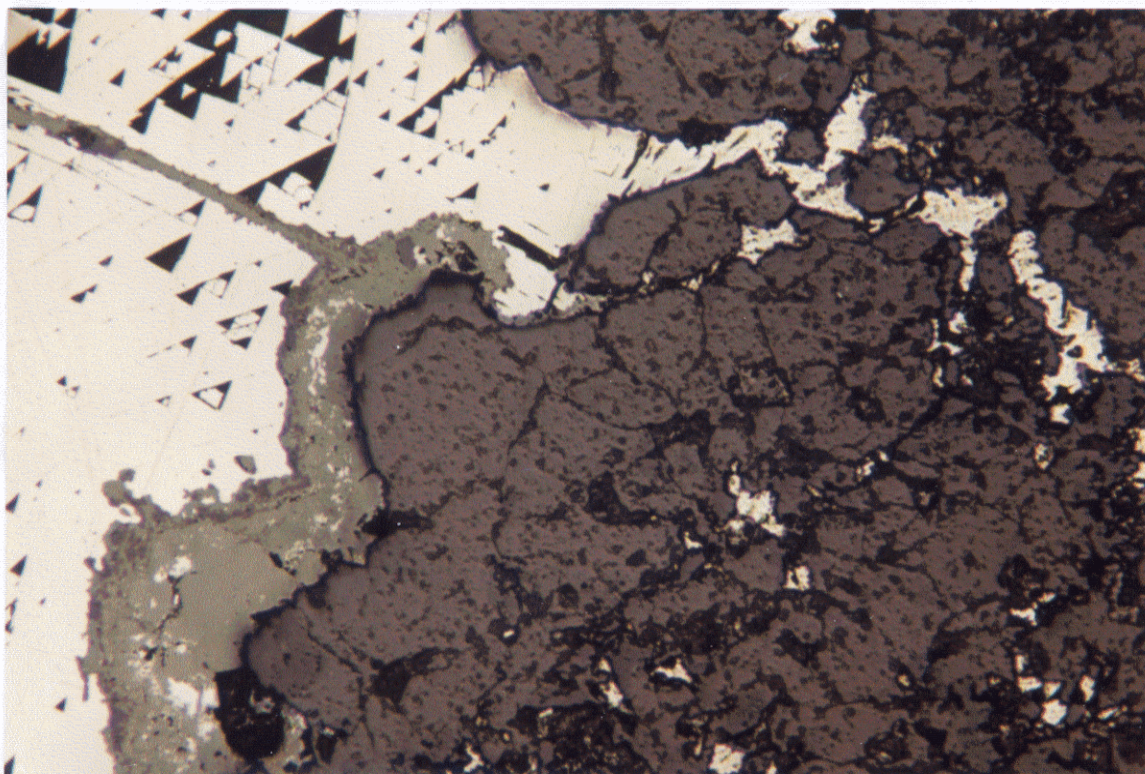
Pyrite forms disseminated grains averaging 0.02-0.05 mm in size; these are very irregularly distributed through the sample. A few coarser grains are up to 0.2 mm across. A few irregular, discontinuous seams up to 0.3 mm wide contain moderately abundant pyrite grains averaging 0.01-0.02 mm in size.

A few replacement patches up to a few mm across are of coarse-grained galena. It is fractured slightly and altered slightly along grain borders and fractures to cerussite. Galena is concentrated strongly in a band up to 2.5 mm wide in which it forms 5-10% interstitial patches averaging 0.05-0.1 mm in size between quartz and dolomite/ankerite grains. It is not spatially associated with nearby coarser grained sphalerite.



Shag 3

Irregular, granular sphalerite intergrown with quartz and much less dolomite/ankerite, with interstitial patches of galena in quartz-dolomite/ankerite matrix in the galena-rich band. Reflected light. Length of photo: 1.3 mm.



Shag 3

Coarse patch of galena (showing cleavage pits), altered along border and fractures to cerussite; adjacent to quartz-rich rock with lesser dolomite/ankerite with interstitial patches of galena. Dolomite/ankerite is altered moderately to non-reflective iron oxides. Reflected light. Length of photo: 1.3 mm.

Sample Shag 4 Brecciated Ankerite/Dolomite Rock; Matrix of Sphalerite-Dolomite/Calcite;

The sample was brecciated, and contains fragments up to a few cm in size of very fine-grained dolomite enclosed in a matrix of commonly coarser grained dolomite/calcite and sphalerite.

fragments	
dolomite	50-55%
sphalerite	0.5
pyrite	0.2
matrix	
dolomite/calcite	20-25
sphalerite	12-15 (colourless)
muscovite	minor
pyrite	minor
galena	trace

The fragments are dominated by equant, recrystallized dolomite grains averaging 0.03-0.05 mm in size. These grains are characterized by dusty inclusions, which give the grains a pale brownish hue. Some fragments are more reactive with dilute HCl than others, although their optical appearance does not appear significantly different.

Sphalerite is very irregularly distributed, with some patches of host rock containing up to 10% disseminated grains averaging 0.005-0.015 mm in size, and others virtually free of sphalerite.

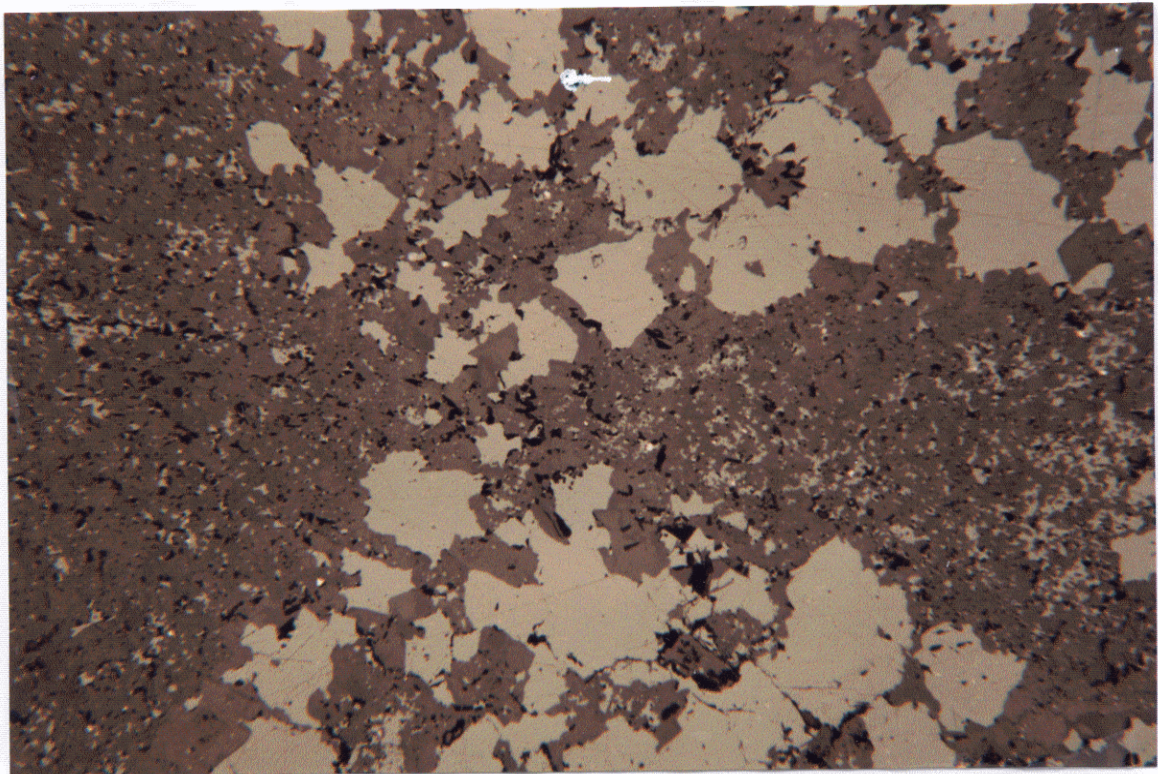
Pyrite forms disseminated grains averaging 0.005-0.01 mm in size, with a few from 0.02-0.05 mm across. Coarser grains are subhedral to euhedral. Several coarser grains are altered slightly along their margins to hematite.

A few very irregular stylolitic seams are defined by wispy patches of non-reflective opaque. A few diffuse seam up to 0.3 mm wide contain cryptocrystalline dolomite and minor, disseminated dusty to extremely fine-grained opaque (probably mainly Fe-oxides), and scattered, subhedral to euhedral grains of pyrite up to 0.1 mm in size. Another discontinuous lens up to 0.1 mm wide contains extremely fine-grained sericite bordered by non-reflective opaque.

A few (early?) replacement veins averaging 0.2 mm wide are of dolomite grains averaging 0.05-0.1 mm in size. Dolomite in these contains moderately to much fewer dusty inclusions than finer-grained dolomite in the fragments.

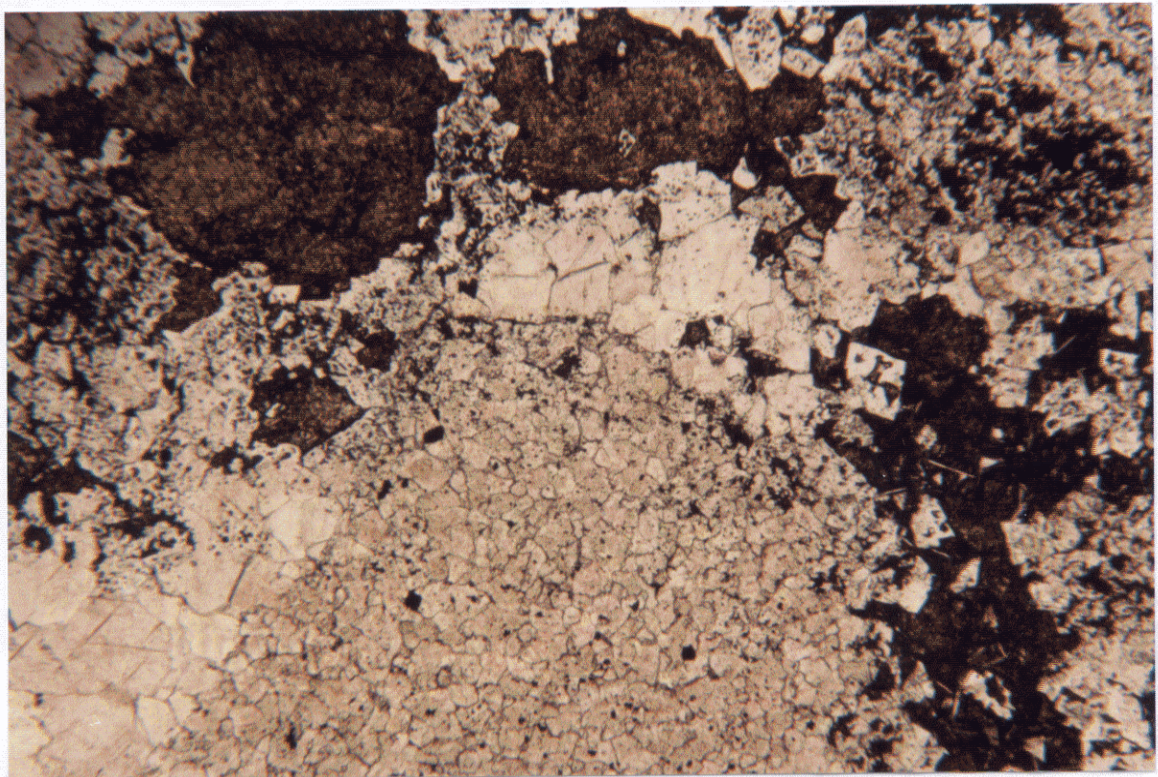
The fragments are healed by a coarser grained matrix containing sphalerite and dolomite/calcite. A few recrystallized patches up to several mm across are of dolomite grains averaging 0.2-1 mm in size with only minor sphalerite. Other patches are dominated by sphalerite as anhedral grains averaging 0.5-2 mm in size. Other patches, which border and extend in seams away from coarser sphalerite grains, contain extremely fine to very fine-grained sphalerite disseminated in dolomite. Dolomite/calcite in the matrix ranges from inclusion-free to containing about the same abundance of dusty inclusions as in the early(?) veinlets; most inclusion-free grains are interstitial to the coarser variety of sphalerite. Sphalerite commonly contains minor inclusions of pyrite averaging 2-5 microns in size, and a few grains contain minor irregular, commonly elongate inclusions of galena averaging 0.02-0.03 mm long.

A few sphalerite-rich patches contain minor to moderately abundant flakes and clusters of flakes up to 0.05 mm long of muscovite.



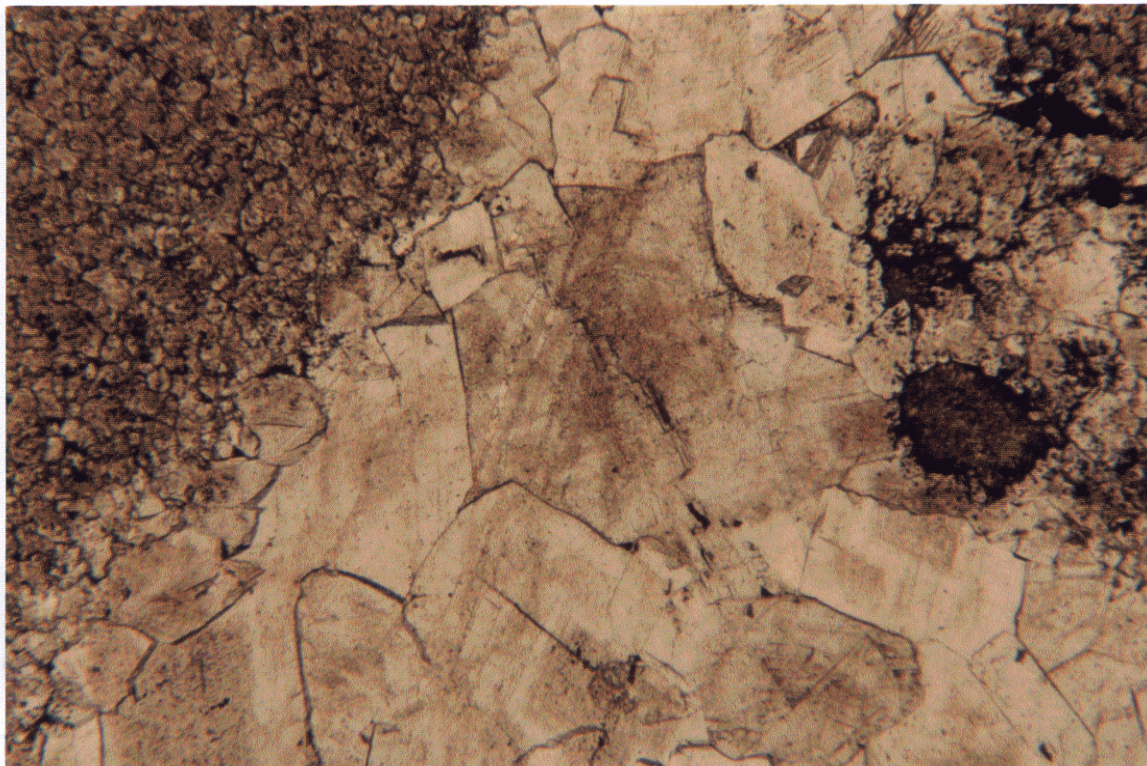
Shag 4

Small fragments of dolomite containing abundant disseminated, extremely fine-grained sphalerite and minor pyrite in a coarser-grained matrix dominated by sphalerite with lesser dolomite. Reflected light. Length of photo: 2.3 mm.



Shag 4

Fragment of very fine grained dolomite, variable matrix with patches of coarser grained dolomite (with fewer dusty inclusions), extremely fine sphalerite intergrown with dolomite, coarser sphalerite grains free of muscovite inclusions, and a patch of sphalerite containing several flakes of muscovite. Plane light. Length of photo: 2.3 mm.



Shag 4

Coarse recrystallized patch of dolomite (with variable abundance of dusty inclusions, much more abundant in cores of some grains) in very fine grained dolomite (with moderately abundant dusty inclusions), patches of sphalerite surrounded by zones of abundant, extremely fine-grained sphalerite in dolomite. Plane light. Length of photo: 2.3 mm.

Sample Shag 5 Banded Quartz-Ankerite-(Sphalerite) Rock; Replacement Patches of Galena

The sample is dominated by very fine-grained quartz and lesser ankerite, with disseminated patches of sphalerite and minor ones of pyrite. A few replacement patches and lenses are dominated by galena with much less abundant sphalerite and quartz.

quartz	65-70%
ankerite	17-20
sphalerite	7- 8 (colourless to pale orange)
pyrite	1- 2
leucoxene	minor
replacement patches	
galena	3- 4

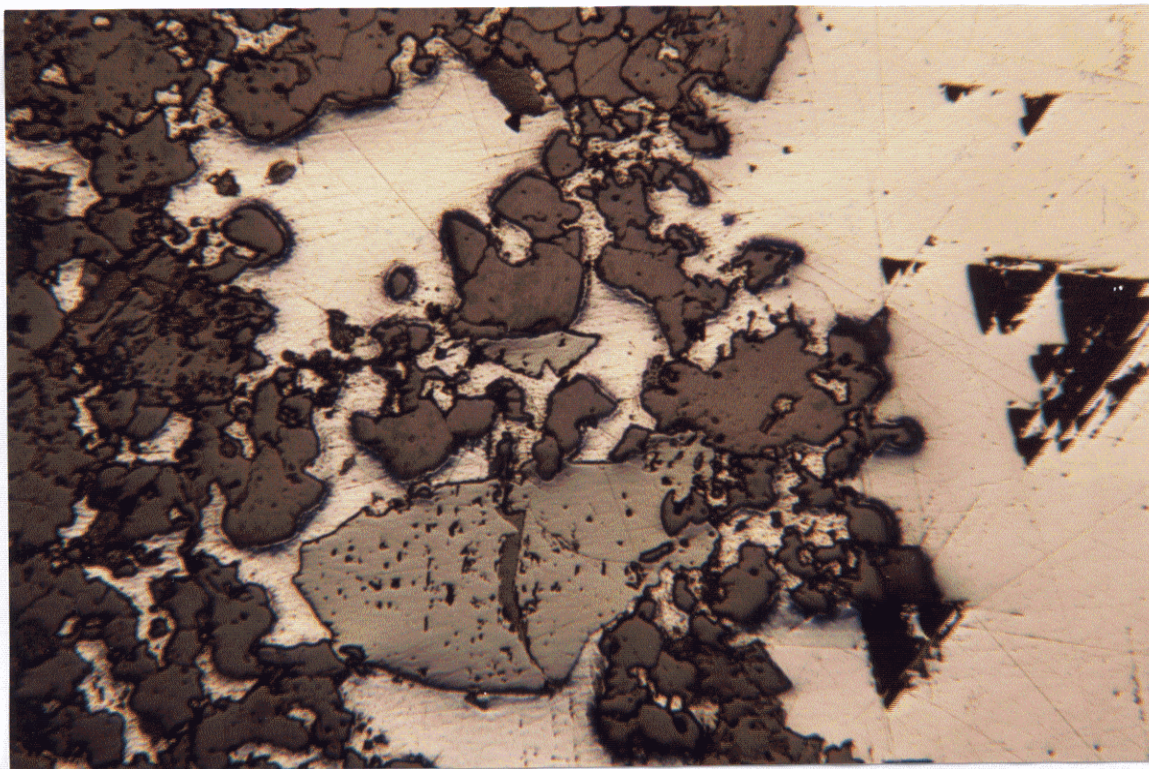
Quartz forms anhedral grains averaging 0.05-0.1 mm in size. Scattered coarser grains are from 0.1-0.25 mm in size, some of these are prismatic. Scattered patches up to 1.5 mm in size are of intergrowths of finer grained quartz averaging 0.03-0.05 mm in size; some of these grains are elongate.

Ankerite forms anhedral to subhedral grains averaging 0.03-0.08 mm in size, with a few up to 0.2 mm across. A few patches and discontinuous lenses up to a few mm in size are dominated by very fine-grained ankerite with much less abundant quartz. In a few irregular patches, ankerite is stained light orange by limonite.

Sphalerite forms disseminated grains averaging 0.2-0.5 mm in size and a few up to 0.8 mm across. Bordering a few of these are patches in which quartz and ankerite contain 5-15% irregular, much finer grained sphalerite. Some sphalerite grains are zoned from colourless to light orange.

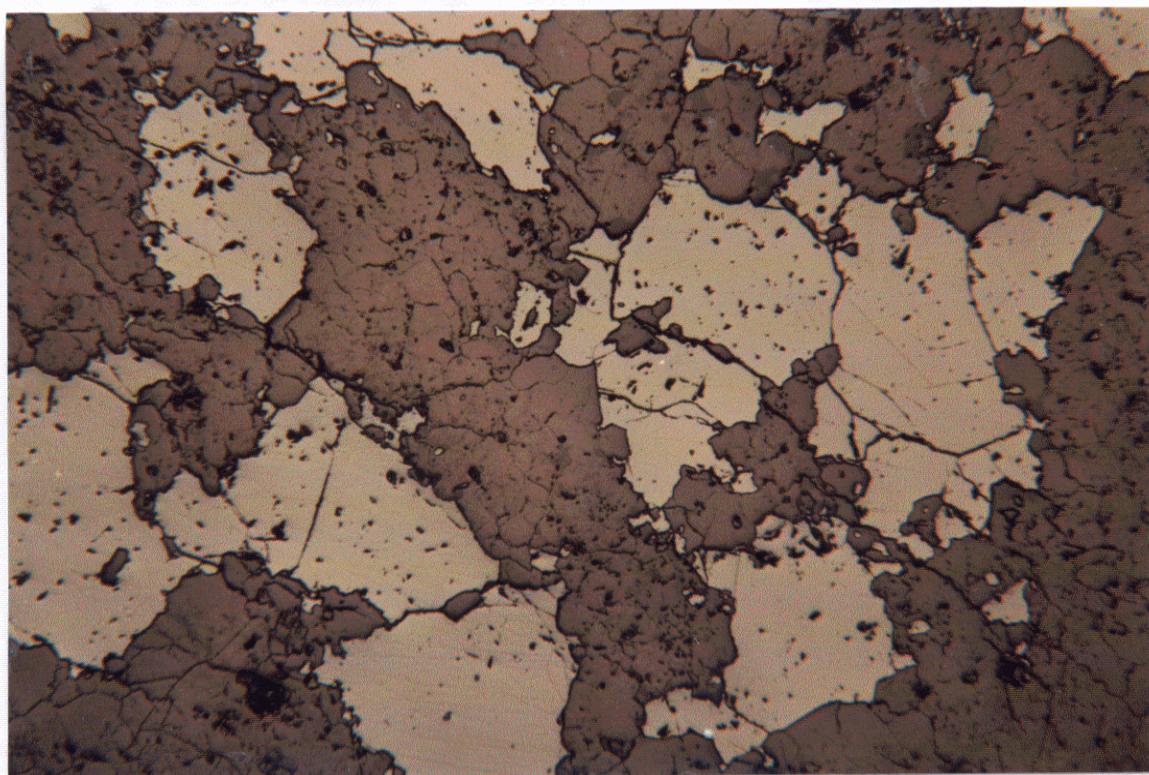
Pyrite is concentrated in a patch 1.5 x 0.6 mm in size in which it forms subhedral grains from 0.1-0.5 mm in size. It contains abundant inclusions of leucoxene. A few patches from 0.1-0.3 mm in size consist of clusters of pyrite grains averaging 0.02-0.05 mm in size surrounding a core of leucoxene. Pyrite also forms disseminated grains averaging 0.005-0.015 mm in size and a few up to 0.1 mm in size.

A few replacement patches up to several mm across are dominated by coarse-grained galena. Along some margins are intergrowths of quartz and lesser ankerite with abundant interstitial galena. Along some of the borders of the patch, galena is replaced slightly to moderately by cerussite.



Shag 5

Replacement patch of galena and minor sphalerite; intergrown with quartz and much less ankerite containing abundant interstitial galena. Reflected light. Length of photo: 2.3 mm.



Shag 5

Patches of granular sphalerite intergrown with quartz and minor ankerite. Reflected light. Length of photo: 2.3 mm.

**Sample Shag 6 Banded Dolomite/Calcite-Quartz-Sphalerite-(Galena-Pyrite-Ti-oxide) Rock;
Replacement Patches of Sphalerite**

The sample contains wavy bands dominated by very fine-grained dolomite/calcite, with lesser lenses and patches dominated by cryptocrystalline to extremely fine-grained quartz. Sphalerite occurs in both. Galena is concentrated strongly in some quartz-rich patches. Pyrite occurs in both as disseminated grains and clusters of a few grains. Ti-oxide forms disseminated patches, mainly in dolomite-rich layers. Sphalerite forms a few coarser replacement patches and lenses up to several mm across; these have minor recrystallized rims of quartz, calcite/dolomite, and muscovite.

dolomite/calcite	75-80%
quartz	10-12
sphalerite	3- 4 (colourless)
pyrite	0.5
Ti-oxide	0.3
galena	0.3
replacement patches	
sphalerite	5- 7
quartz	0.1
calcite/dolomite	minor
muscovite	trace

Dolomite/calcite forms equant, subhedral grains averaging 0.05-0.1 mm in size. Some patches up to 1 mm across are of extremely fine-grained dolomite/calcite. Some bands contain minor to moderately abundant, interstitial cryptocrystalline to extremely fine-grained quartz. Other bands contain minor to moderately abundant disseminated patches of leucoxene averaging 0.05-0.07 mm in size.

Several bands and patches are dominated by cryptocrystalline to extremely fine-grained quartz with minor to abundant disseminated grains of dolomite. A few quartz grains and clusters of a few grains average 0.05-0.1 mm in grain size.

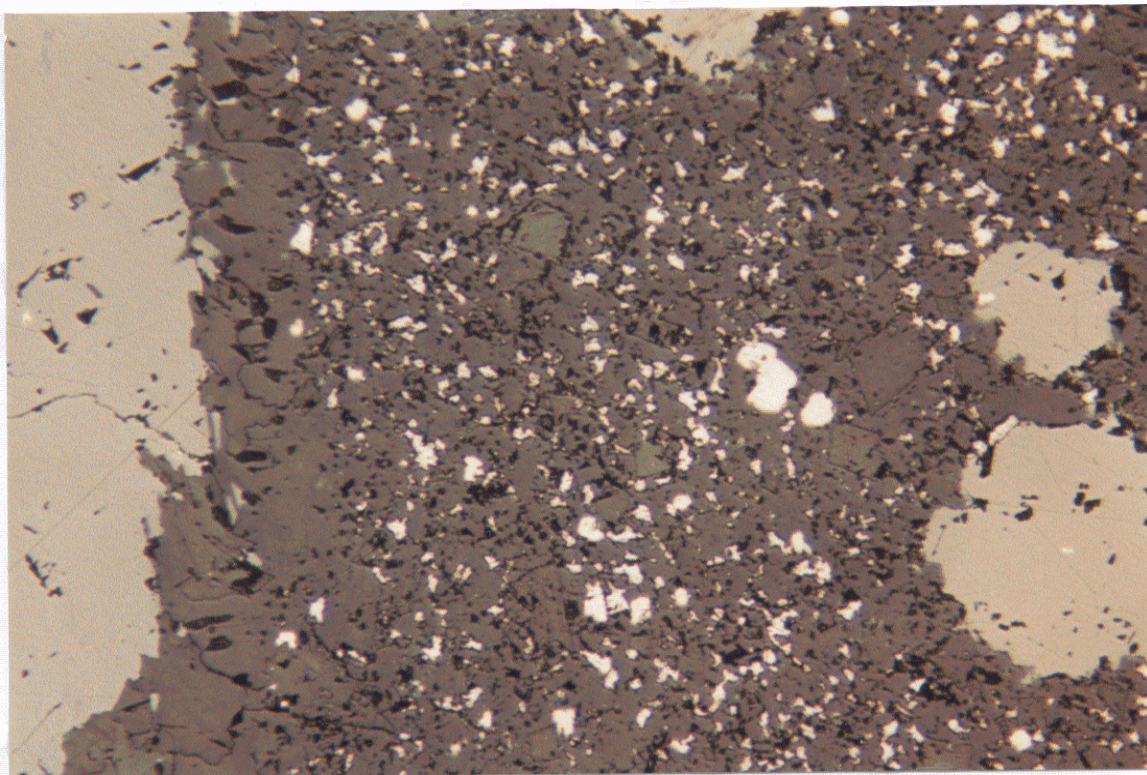
Sphalerite forms disseminated anhedral grains averaging 0.2-0.4 mm in size in both dolomite/calcite and quartz-rich bands.

Galena is concentrated strongly in quartz-rich patches as irregular, interstitial grains averaging 0.01-0.03 mm in size. It also occurs as irregular interstitial patches and seams with leucoxene in a few dolomite/calcite-rich layers.

Pyrite forms disseminated grains averaging 0.01-0.02 mm in size, and a few up to 0.05 mm across. It is concentrated moderately to strongly in a few bands. A few clusters up to 0.5 mm long contain anhedral grains averaging 0.03-0.05 mm in size.

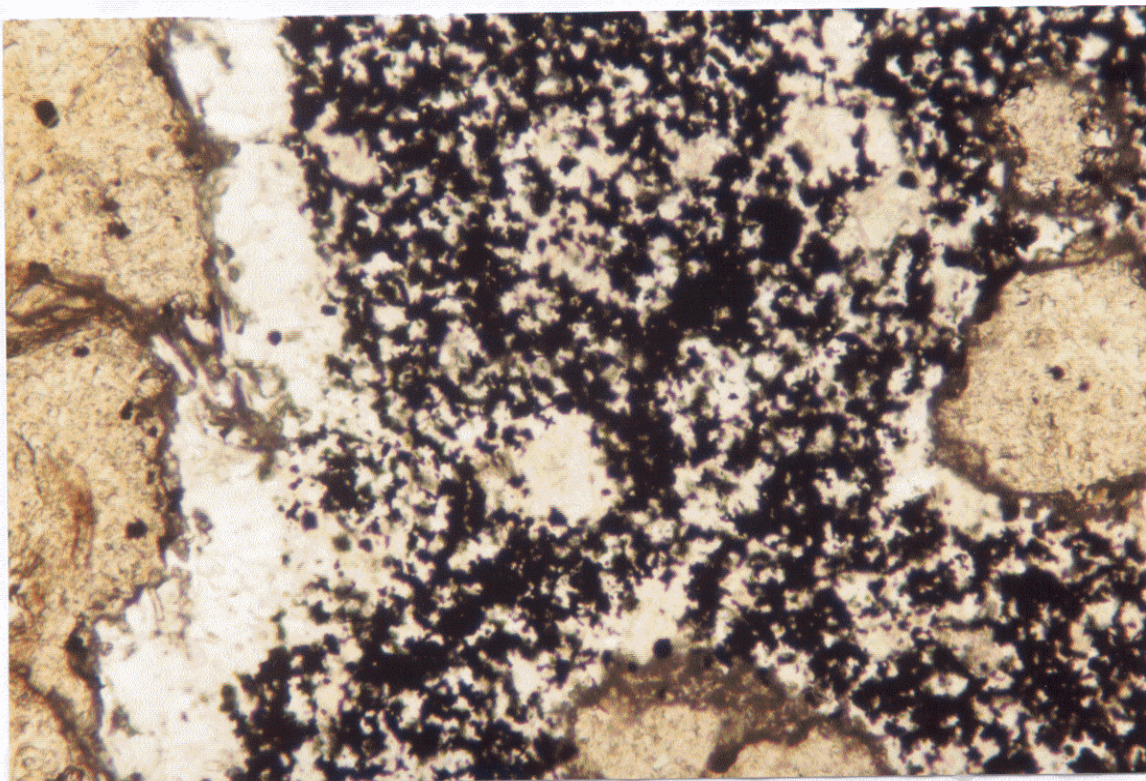
Ti-oxide/leucoxene forms disseminated patches averaging 0.05-0.07 mm in size interstitial to dolomite.

A few patches up to several mm across are of coarse-grained sphalerite. Bordering these are discontinuous, recrystallized rims averaging 0.1 mm wide of very fine-grained quartz and calcite. Locally bordering a few coarse sphalerite patches are rims dominated by muscovite flakes averaging 0.03-0.05 mm long.



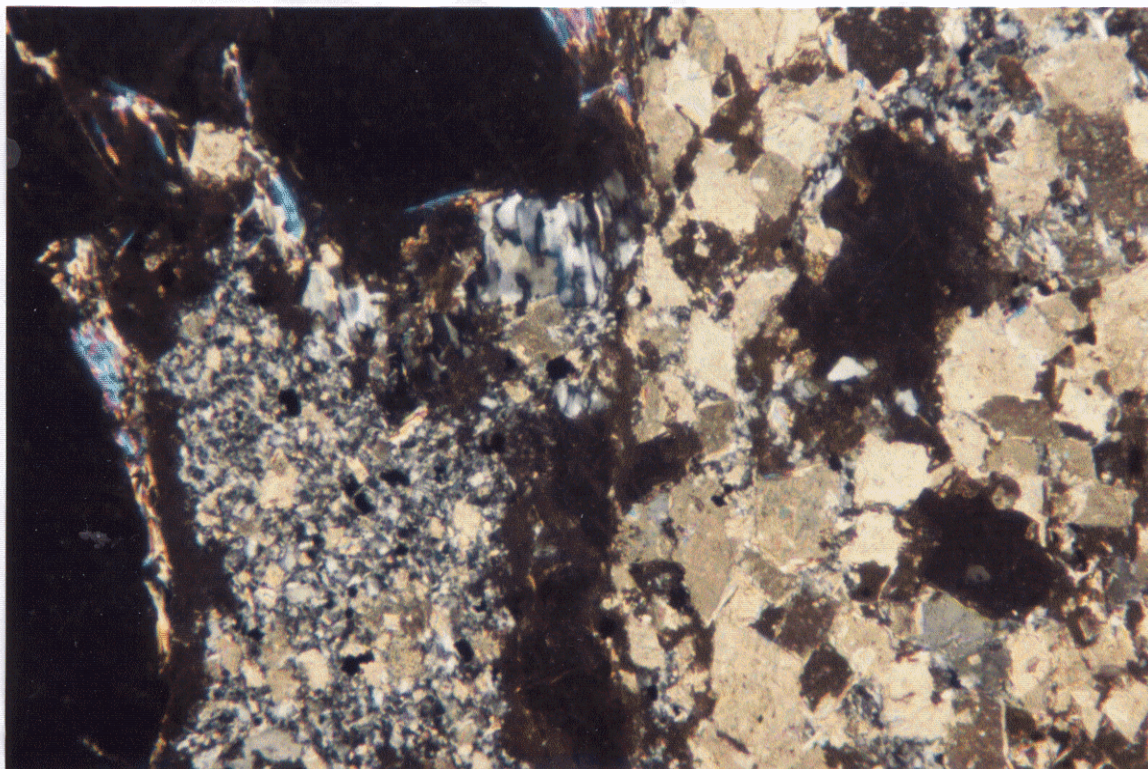
Shag 6

Coarse patch of sphalerite with thin rim of recrystallized quartz and lesser dolomite/calcite; bordering zone of cryptocrystalline quartz with abundant disseminated galena and minor pyrite, and containing coarser granular grains of sphalerite and scattered grains of dolomite/calcite. Reflected light. Length of photo: 1.3 mm.



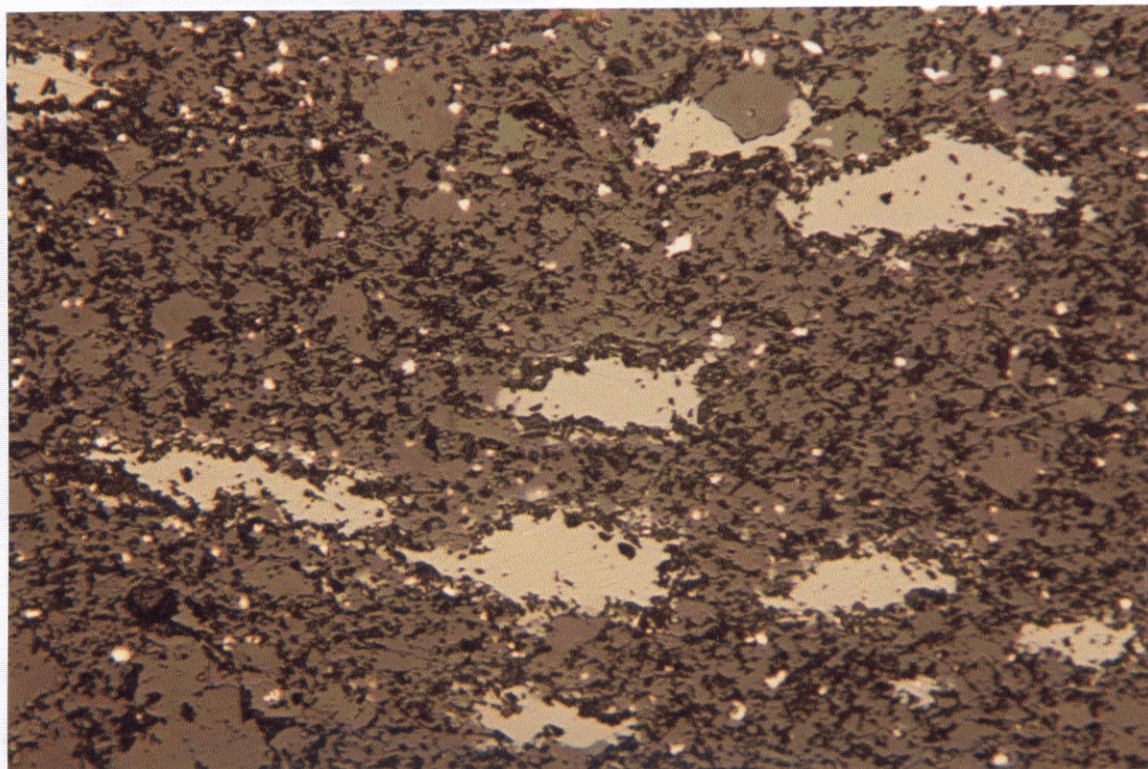
Shag 6

Approximately the same field of view as the above photo. Plane light. Length of photo: 1.3 mm.



Shag 6

Dolomite/calcite (subhedral to euhedral) intergrown with patches of sphalerite (opaque) and interstitial patches of cryptocrystalline to extremely fine-grained quartz; minor disseminated pyrite. Minor recrystallized quartz and muscovite along borders of a few large sphalerite grains. Transmitted light, crossed nicols. Length of photo: 1.3 mm.



Shag 6

Elongate lenses of sphalerite in band of cryptocrystalline dolomite/calcite, quartz, and sericite, with moderately abundant disseminated pyrite. Reflected light. Length of photo: 1.3 mm.

Sample Shag 7 Banded Quartz-Sphalerite-(Ankerite-Sericite) Rock

The sample is moderately banded. Most bands are dominated by cryptocrystalline to extremely fine-grained quartz and fine-grained granular sphalerite, with much less sericite intergrown with quartz and minor muscovite, mainly intergrown with sphalerite. In about 1/3 of the section, moderately abundant ankerite/dolomite is intergrown with quartz. Quartz also forms scattered coarser grains, in part prismatic. Galena is concentrated in certain layers and patches in intergrowths with the finer-grained variety of quartz.

quartz	
cryptocrystalline/extremely fine-grained	40-45%
very fine-grained	4- 5
sphalerite	30-35
ankerite/dolomite	10-12
sericite/muscovite	3- 4
galena	1
pyrite	1
leucoxene	trace

Quartz occurs in two main modes. More abundant are interlocking grains averaging 0.005-0.015 mm in size. Much less abundant are disseminated grain sand clusters of a few grains averaging 0.05-0.15 mm in size; some of these have prismatic outlines.

Sphalerite forms irregular, granular grains averaging 0.2-0.5 mm in size, with several up to 1 mm across. Most have ragged borders, which are intergrown moderately with extremely fine-grained quartz. A few much coarser grains are up to 3 mm across. A few grains contain minor inclusions of galena averaging 0.03-0.05 mm in size, and locally up to 0.15 mm long.

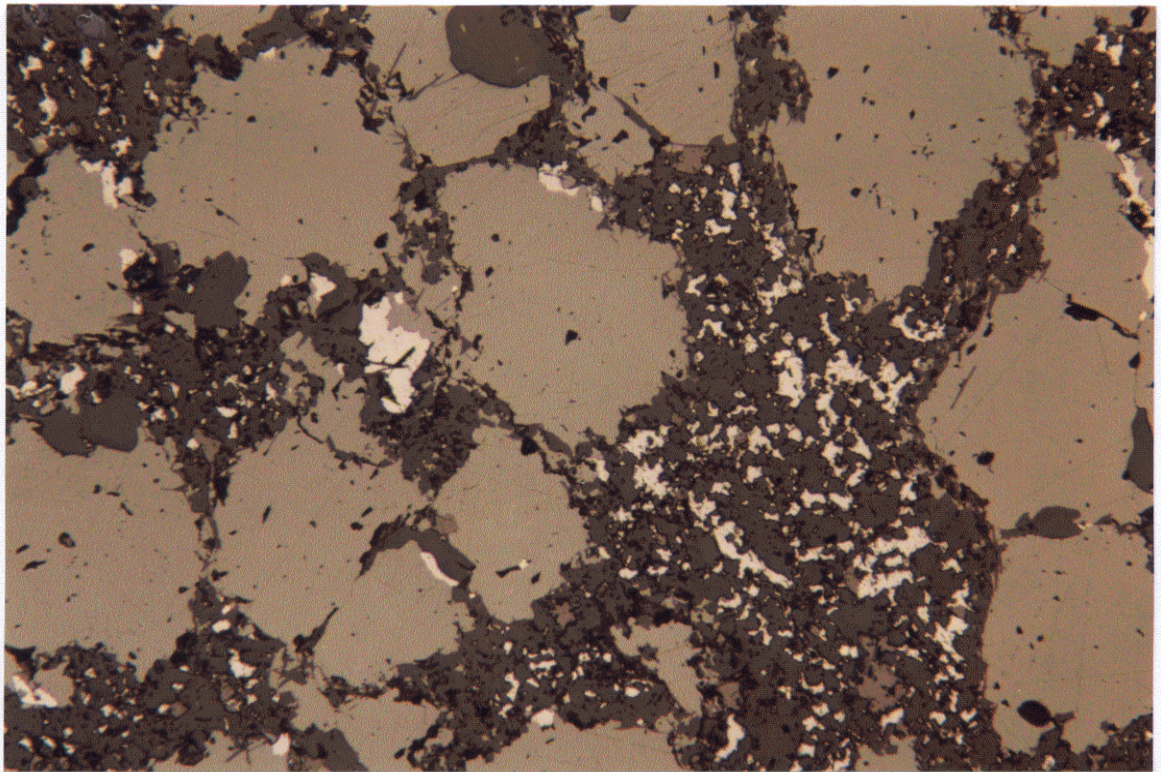
Ankerite/dolomite is concentrated in about 1/3 of the section as cryptocrystalline to extremely fine grains and a few subhedral to euhedral grains averaging 0.05-0.08 mm in size intergrown with quartz.

Pyrite forms disseminated grains averaging 0.01-0.05 mm in size and a few up to 0.2 mm across. It forms a few clusters and lenses up to 0.5 mm in length of similar grains. Many larger grains are overgrowths on patches of cryptocrystalline leucoxene. One patch 0.8 mm long consists of an outer zone of extremely fine-grained pyrite and a core of very fine-grained quartz.

Galena forms scattered inclusions averaging 0.02-0.03 mm in size in sphalerite. It is concentrated in a few patches and bands in which it forms up to 5% irregular inclusions in cryptocrystalline to extremely fine-grained quartz and patches up to 0.1 mm in size in sphalerite.

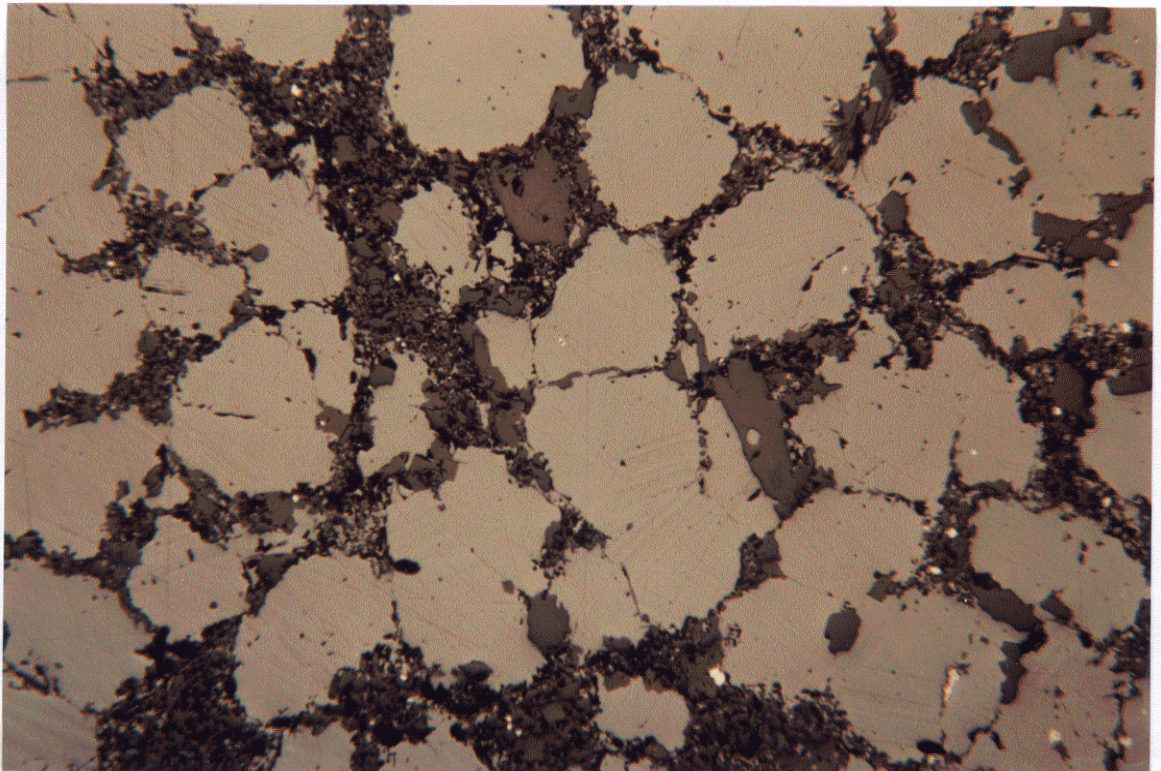
Muscovite forms scattered clusters of slender flakes averaging 0.05-0.07 mm in length. Sericite forms clusters of cryptocrystalline flakes intergrown intimately with the finer-grained variety of quartz.

Bordering a few coarser sphalerite grains are patches of very fine grained quartz and patches of subparallel, elongate muscovite flakes averaging 0.07-0.1 mm long oriented subperpendicular to the grain borders of sphalerite.



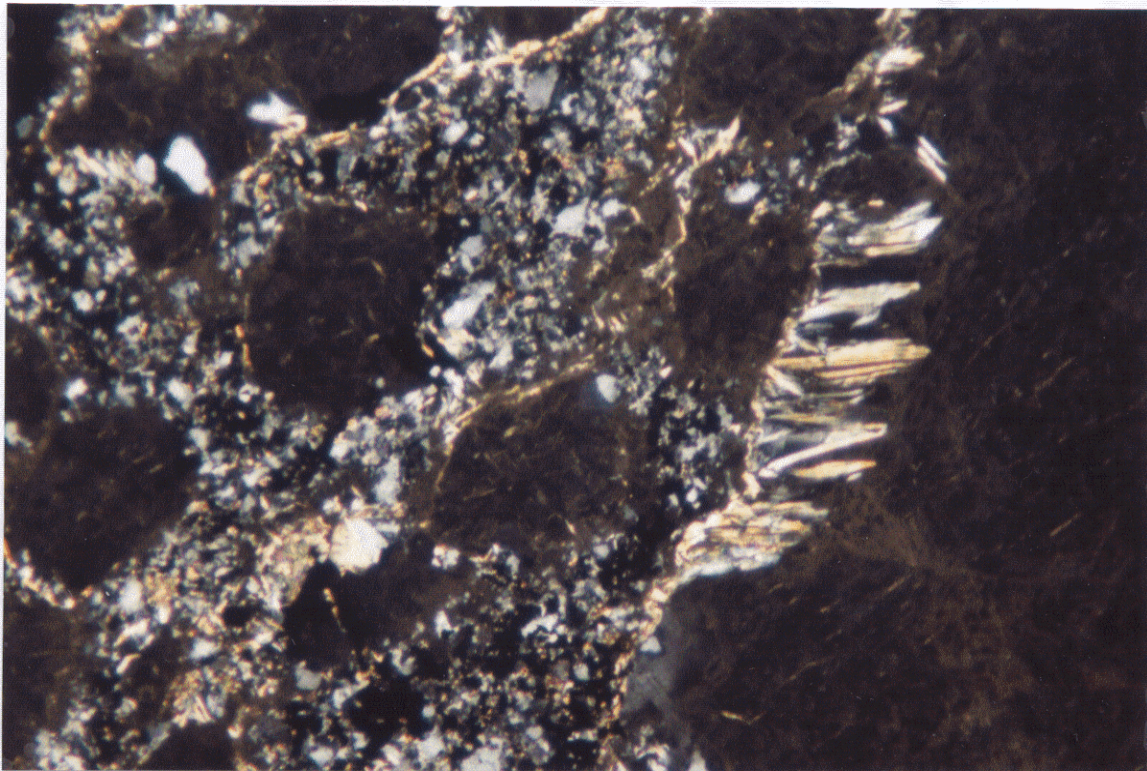
Shag 7

Granular sphalerite (containing minor inclusions of galena) intergrown with cryptocrystalline to extremely fine-grained quartz containing moderately abundant interstitial galena and trace pyrite, a few very fine quartz grains. Reflected light. Length of photo: 1.3 mm.



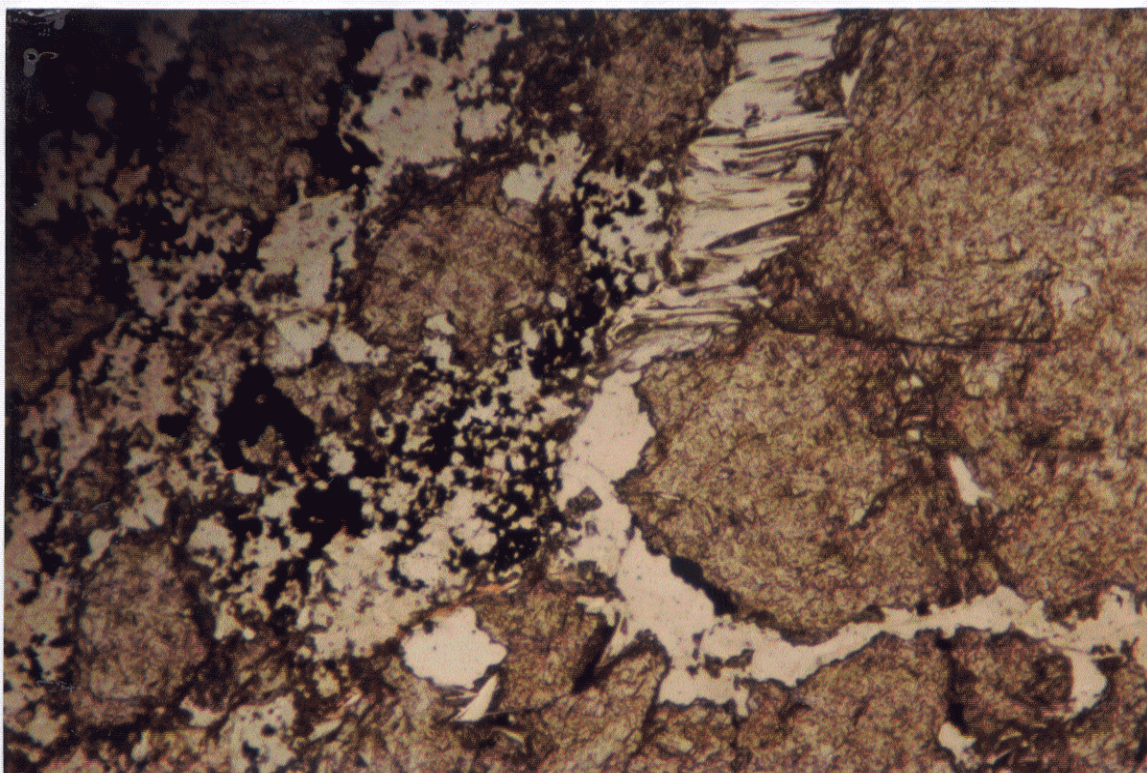
Shag 7

Granular sphalerite with less abundant interstitial quartz and ankerite and minor muscovite, a few coarser prismatic quartz grains, trace pyrite. Reflected light. Length of photo: 2.3 mm.



Shag 7

Sphalerite (isotropic) with interstitial quartz and galena (opaque), with minor muscovite and ankerite. Muscovite is concentrated along the border of a coarse sphalerite grain. Plane light, crossed nicols. Length of photo: 1.3 mm.



Shag 7

Approximately the same field of view as the above photo. Plane light. Length of photo: 1.3 mm.

**Sample Shag 8 Fractured Siliceous, Sphalerite-bearing Dolomite;
Recrystallized Patches and Veinlets of Dolomite-Quartz-Sphalerite**

The sample is dominated by very fine-grained dolomite containing minor patches of quartz and of sphalerite. Moderately abundant, coarser-grained, recrystallized veinlets and patches are of dolomite, sphalerite, and quartz.

dolomite	65-70%
quartz	1- 2
sphalerite	1- 2 (light to locally medium orange)
pyrite	0.3
hematite	minor
recrystallized patches	
dolomite	17-20
sphalerite	5- 7 (colourless to pale orange)
quartz	4- 5

Dolomite forms anhedral to subhedral grains averaging 0.07-0.2 mm in size. Many grains contain moderately abundant dusty (carbonaceous?) inclusions, which give this a black colour in hand sample.

Quartz forms interstitial grains and patches averaging 0.07-0.1 mm in size.

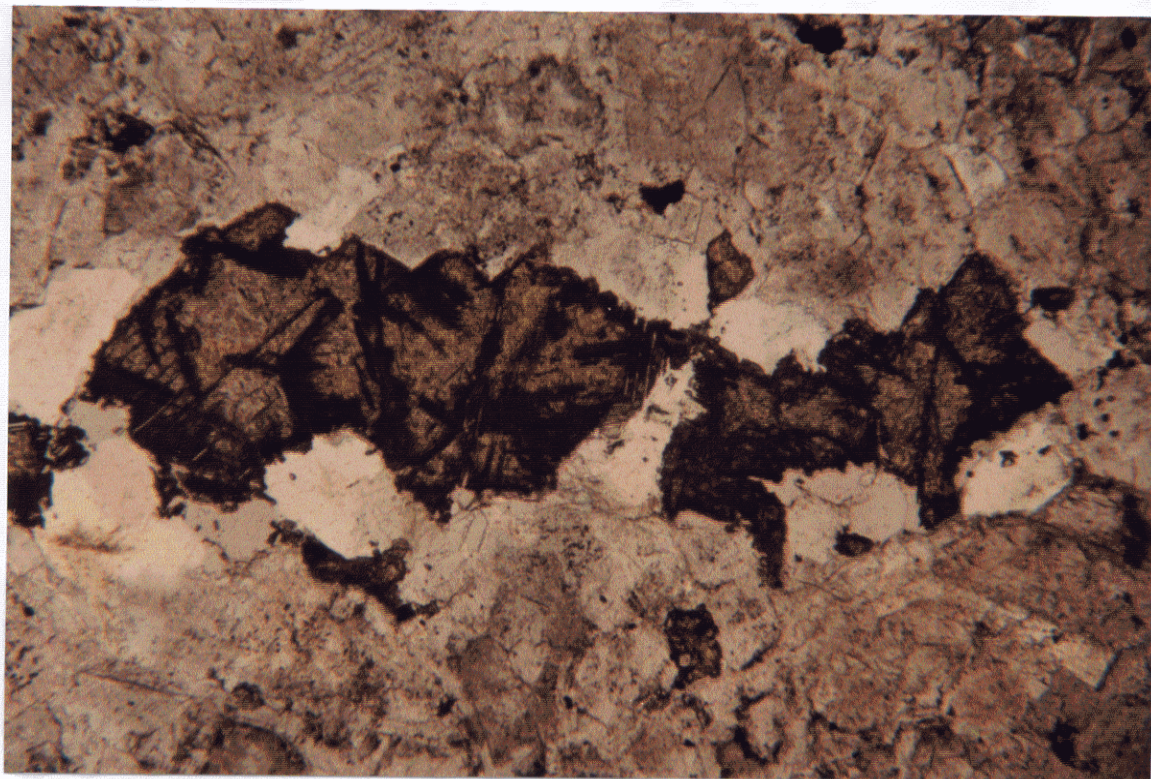
Sphalerite forms disseminated, irregular grains averaging 0.05-0.2 mm in size. It also forms scattered patches up to 1 mm in size in which it forms very irregular, extremely fine-grained intergrowths with dolomite; the latter has a light to medium orange colour.

Pyrite forms disseminated grains averaging 0.02-0.05 mm in size and a few up to 0.1 mm across. A few coarser patches up to 0.15 mm across consist of a core of hematite rimmed by pyrite.

Recrystallized veinlets and patches consist of coarser grained dolomite, sphalerite, and quartz. Dolomite forms grains averaging 0.3-1 mm in size, and one grain 3 mm long. Most recrystallized dolomite grains contain less abundant dusty inclusions than finer-grained dolomite in the host rock, giving the veins and replacement patches a white to cream colour in hand sample.

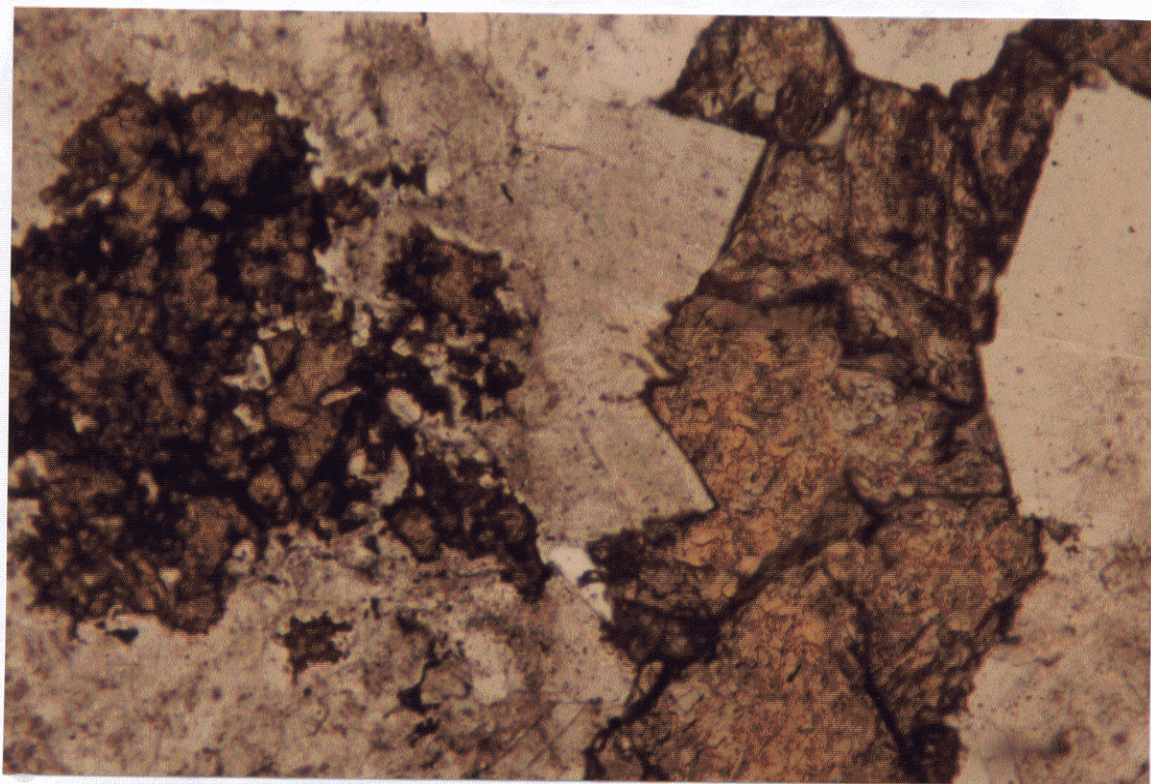
Sphalerite forms anhedral grains averaging 0.2-0.5 mm in size and a few up to 1 mm across; in several patches it occurs in the core of the replacement patch. Grains are colourless to zoned moderately in irregular patches from colourless to pale or light orange.

Quartz forms anhedral grains averaging 0.1-0.3 mm in size, which commonly occur in clusters. A few quartz grains have subhedral to euhedral terminations against dolomite.



Shag 8

Replacement vein of sphalerite-quartz cutting very fine grained dolomite containing minor disseminated patches of sphalerite. Conoscopic light. Length of photo: 2.9 mm.



Shag 8

Very fine grained dolomite with irregular patch of very fine grained, medium orange sphalerite; recrystallized patch of coarser grained dolomite and colourless to very pale orange sphalerite. Conoscopic light. Length of photo: 1.3 mm.

Sample Shag 9 Banded Quartz-Sphalerite-Dolomite Rock

The sample is coarsely banded, with layers dominated by quartz, sphalerite, and dolomite. Galena is concentrated in a few patches with quartz. Minor later veinlets are of dolomite.

quartz	65-70%
sphalerite	12-15
dolomite	10-12
galena	2-3
veinlets	
dolomite	0.3

Quartz forms an unoriented aggregate of interlocking grains averaging 0.02-0.07 mm in size, with less abundant grains from 0.1-0.2 mm in size. Some of the coarser grains have subhedral, prismatic outlines.

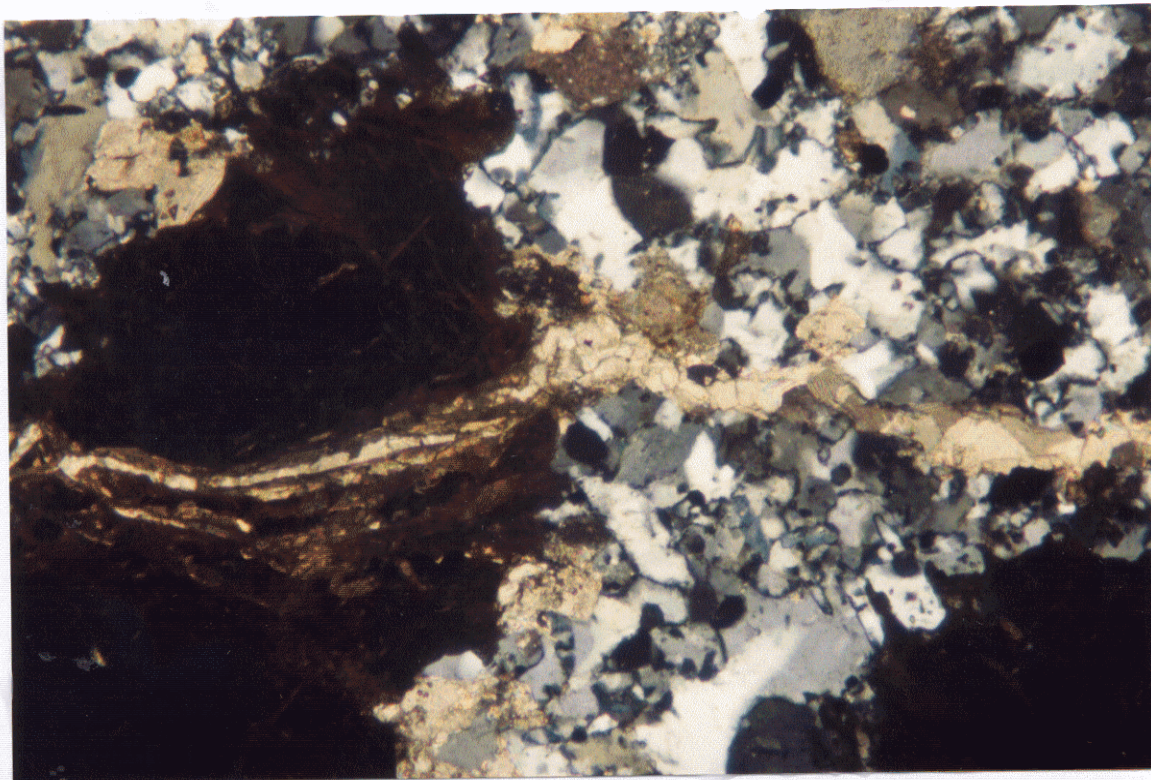
Dolomite is concentrated in patches and layers as grains averaging 0.07-0.2 mm in size. It also forms disseminated grains in quartz-rich layers; these grains average 0.03-0.1 mm in size, with a few up to 0.3 mm across. A few coarser grained patches of dolomite contain grains up to 1.5 mm in size.

Sphalerite forms anhedral grains averaging 0.3-1 mm in size, with a few up to 2.5 mm across. Grains are irregularly zoned from colourless to light and locally medium orange.

Galena is concentrated in a few patches up to a few mm across in which it forms irregular patches and seams interstitial to very fine-grained quartz. A few coarser galena patches are up to 0.7 mm across.

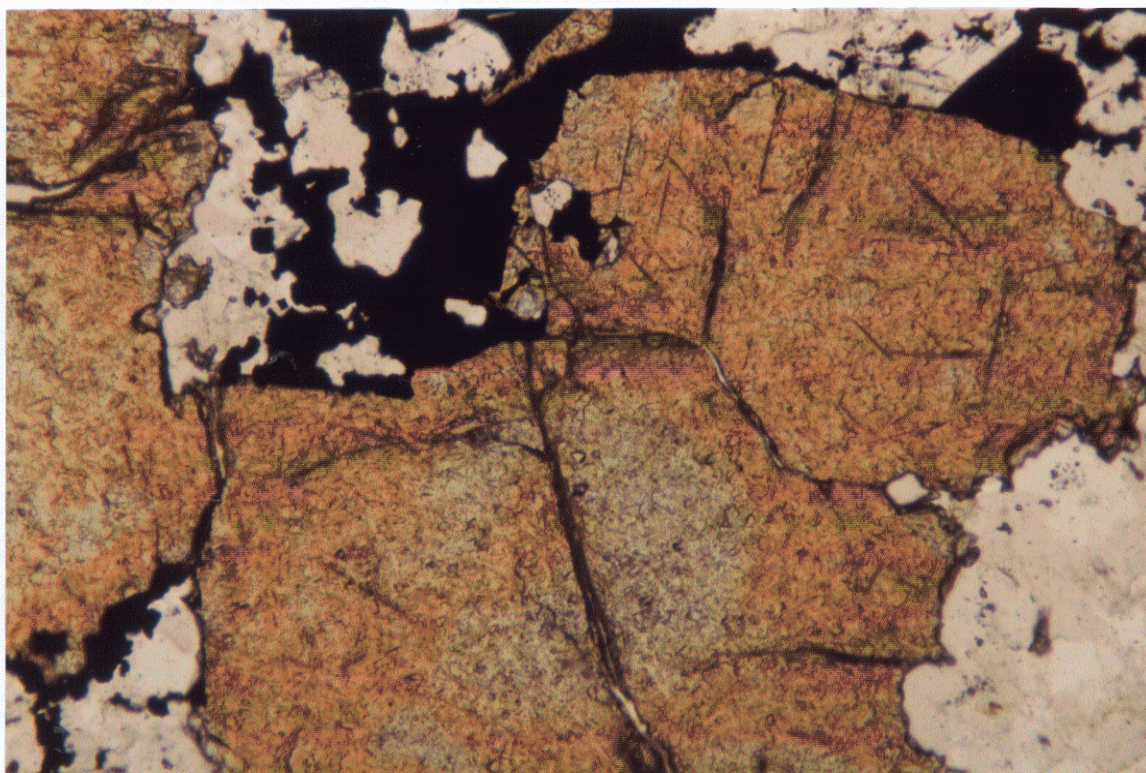
Pyrite forms disseminated, subhedral grains averaging 0.02-0.03 mm in size.

Veinlets averaging 0.02-0.03 mm wide are of extremely fine-grained dolomite, which has a slightly higher relief than dolomite in the host rock.



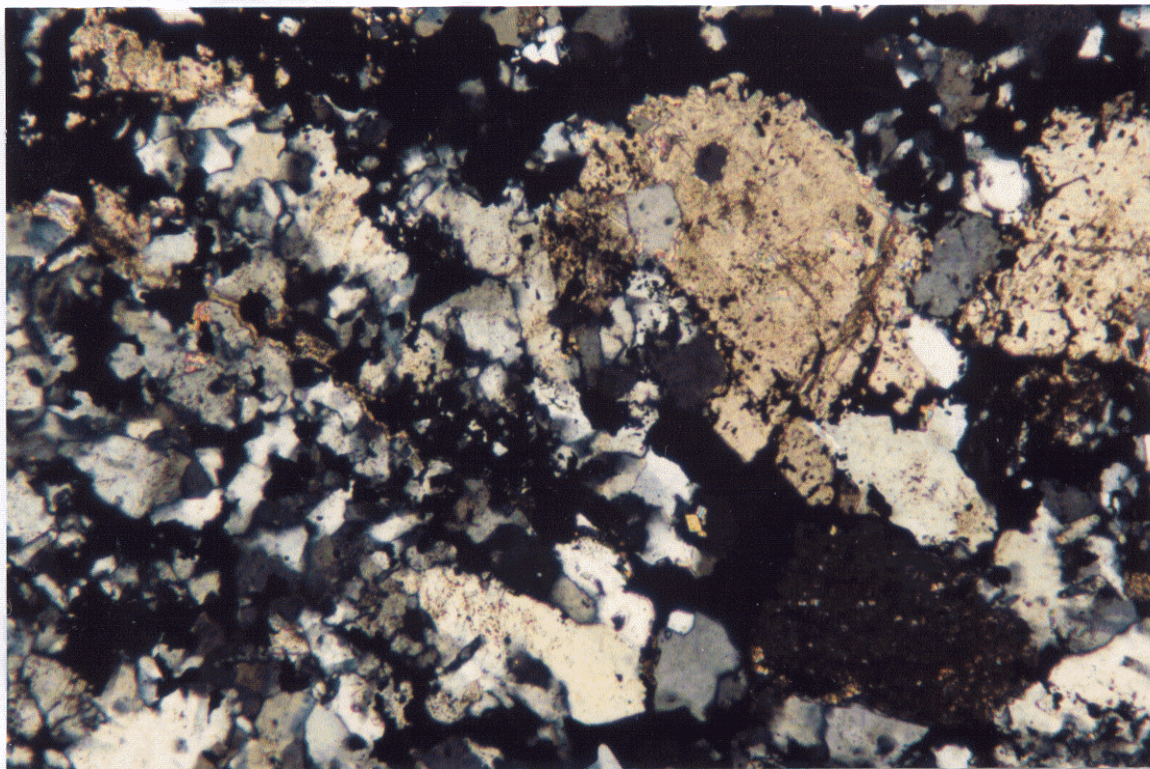
Shag 9

Quartz-rich patch with interstitial seams and patches of galena and several coarser grains of dolomite. Transmitted light, crossed nicols. Length of photo: 1.3 mm.



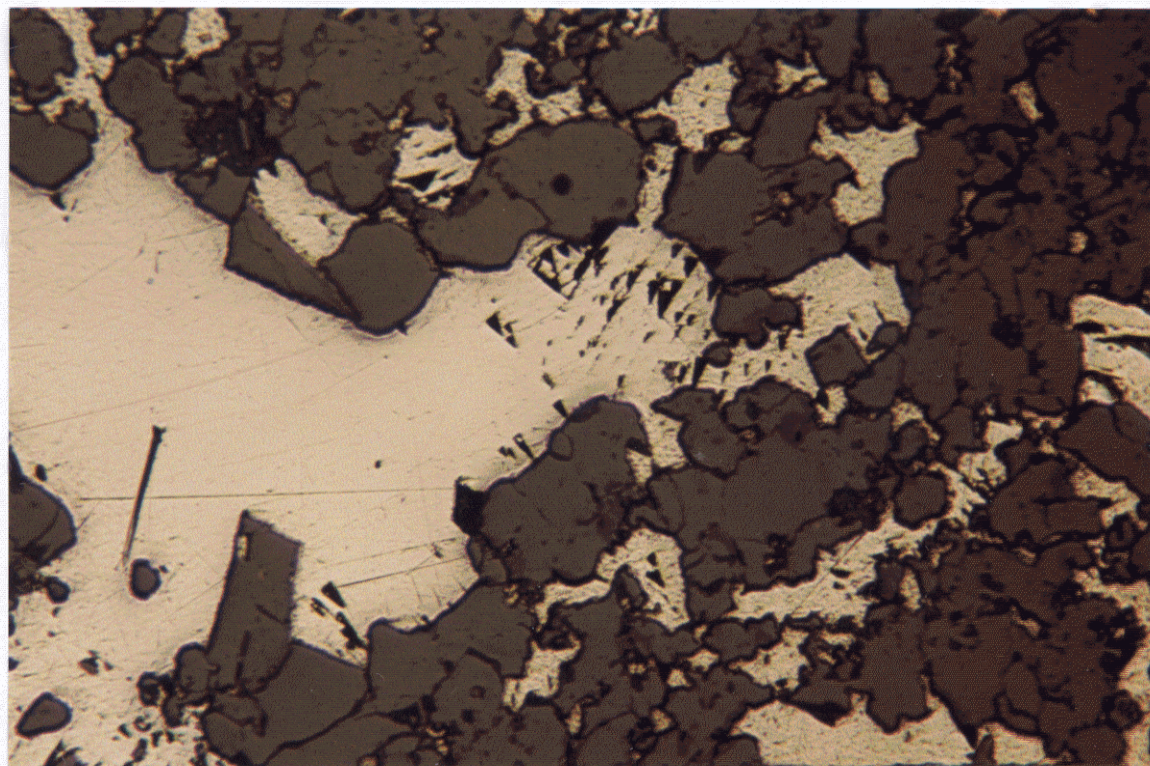
Shag 9

Intergrowth of galena and quartz with minor dolomite. Reflected light. Length of photo: 1.3 mm.



Shag 9

Sphalerite patches in very fine grained quartz and much less dolomite; cut by veinlet of dolomite. Transmitted light, crossed nicols. Length of photo: 1.3 mm.



Shag 9

Sphalerite showing weak, patchy colour zonation intergrown with very fine-grained quartz, galena and lesser dolomite. Conoscopic light. Length of photo: 1.3 mm.

ECSTALL MINING CORP.-X98

JOB: V98-0004R

31 March, 1998

LEAD ISOTOPIC COMPOSITION

LAB NO	FIELD NO	$^{206}\text{Pb}/^{204}\text{Pb}$	$^{207}\text{Pb}/^{204}\text{Pb}$	$^{208}\text{Pb}/^{204}\text{Pb}$
R98:13	MK97-1	18.763	15.066	38.958
R98:14	FROC 97-1	19.027	15.683	39.287
R98:15	GR97-1	21.817	15.006	44.507
R98:16	SHAG 97-1	19.235	15.814	39.823

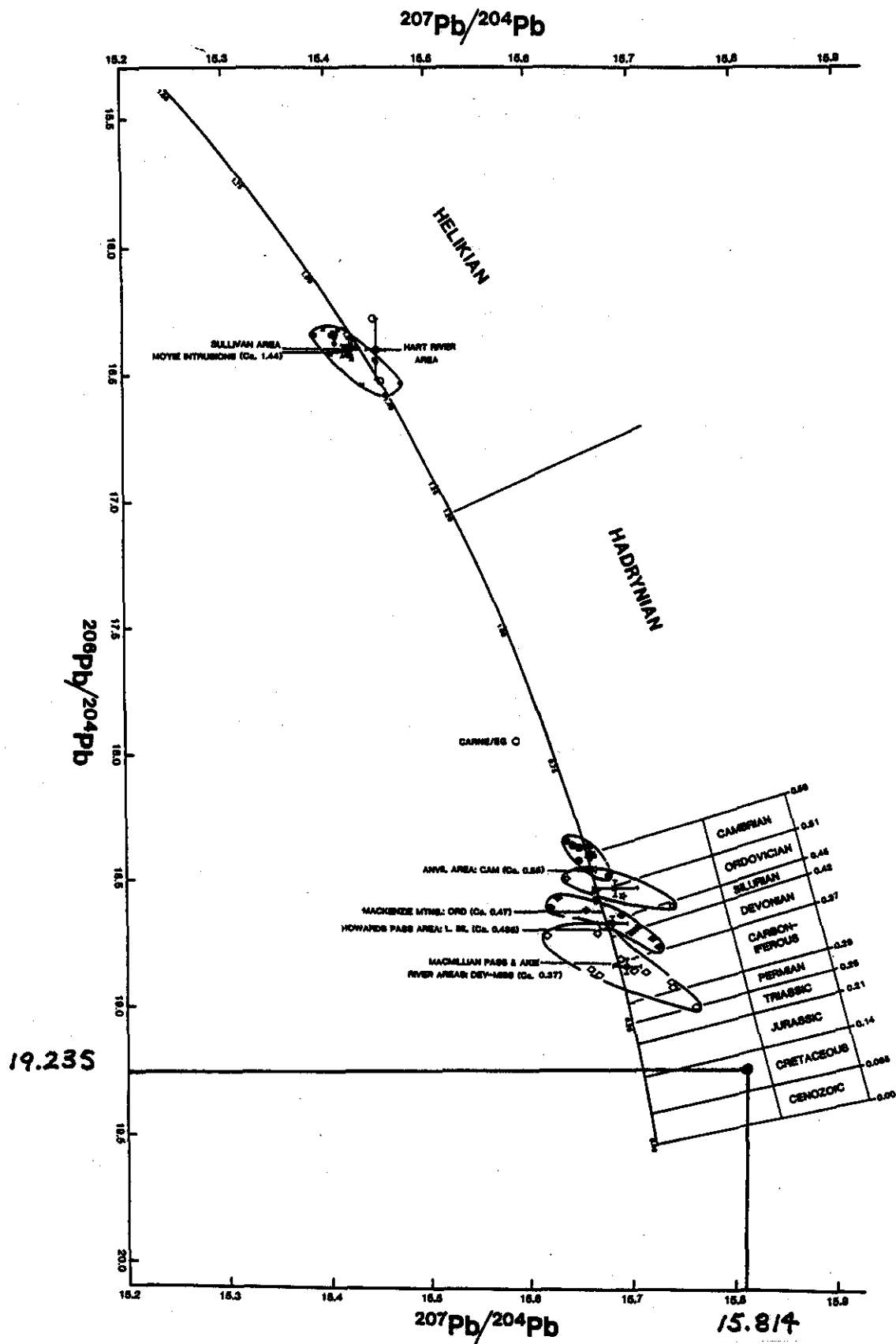


Figure 4
Lead isotope Plot
 $^{206}\text{Pb}/^{204}\text{Pb}$ - $^{207}\text{Pb}/^{204}\text{Pb}$

Pb ISOTOPE GROWTH CURVES, CANADIAN CORDILLERA

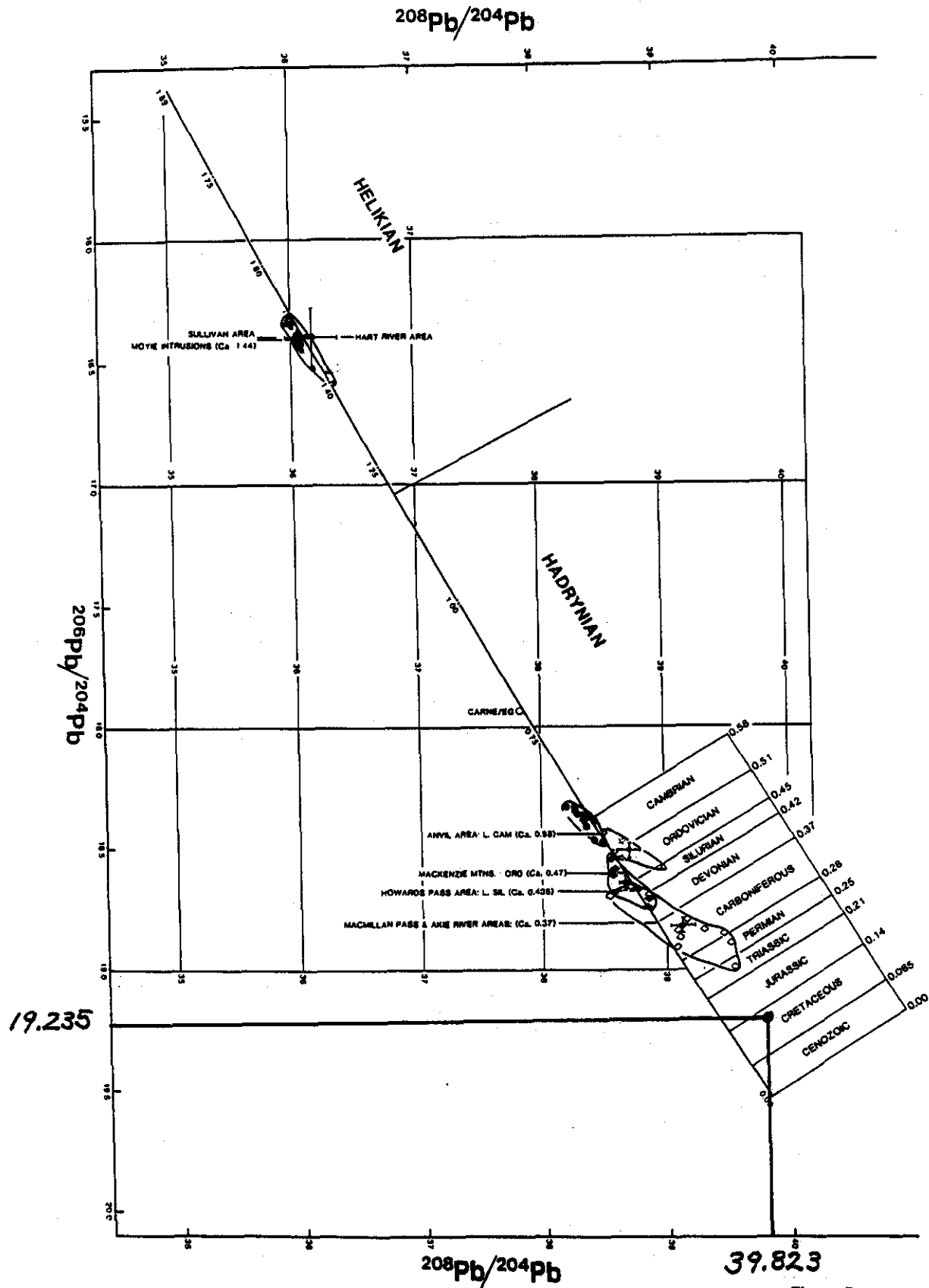


Figure 5
Lead isotope Plot
 $^{206}\text{Pb}/^{204}\text{Pb}$ - $^{208}\text{Pb}/^{204}\text{Pb}$

APPENDIX I

ANALYTICAL RESULTS



Chemex Labs Ltd.

Analytical Chemists * Geochemists * Registered Assayers

212 Brooksbank Ave., North Vancouver
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307 - 475 HOWE ST.
VANCOUVER, BC
V6C 2B3

A9828421

Comments: ATTN: CHRIS GRAF

CERTIFICATE

A9828421

(IID) - ECSTALL MINING CORP.

Project
P.O.#:

Samples submitted to our lab in Vancouver, BC.
This report was printed on 13-OCT-1998.

SAMPLE PREPARATION

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION
208	9	Assay ring to approx 150 mesh
226	9	0-3 Kg crush and split
3202	9	Rock - save entire reject
233	9	Assay AQ ICP digestion charge

NOTE 1.

The 32 element ICP package is suitable for trace metals in soil and rock samples. Elements for which the nitric-aqua regia digestion is possibly incomplete are: Al, Ba, Be, Ca, Cr, Ga, K, La, Mg, Na, Sr, Ti, W.

ANALYTICAL PROCEDURES

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION	METHOD	DETECTION LIMIT	UPPER LIMIT
4001	9	Ag ppm: A30 ICP package	ICP-AES	1	200
4002	9	Al %: A30 ICP package	ICP-AES	0.01	15.00
4003	9	As ppm: A30 ICP package	ICP-AES	10	50000
4004	9	Ba ppm: A30 ICP package	ICP-AES	20	20000
4005	9	Be ppm: A30 ICP package	ICP-AES	5	100
4006	9	Bi ppm: A30 ICP package	ICP-AES	10	50000
4007	9	Ca %: A30 ICP package	ICP-AES	0.01	30.0
4008	9	Cd ppm: A30 ICP package	ICP-AES	5	1000
4009	9	Co ppm: A30 ICP package	ICP-AES	5	50000
4010	9	Cr ppm: A30 ICP package	ICP-AES	10	20000
4011	9	Cu ppm: A30 ICP package	ICP-AES	5	50000
4012	9	Fe %: A30 ICP package	ICP-AES	0.01	30.0
4013	9	Hg ppm: A30 ICP package	ICP-AES	10	10000
4014	9	K %: A30 ICP package	ICP-AES	0.01	10.00
4015	9	Mg %: A30 ICP package	ICP-AES	0.01	30.0
4016	9	Mn ppm: A30 ICP package	ICP-AES	10	50000
4017	9	Mo ppm: A30 ICP package	ICP-AES	5	50000
4018	9	Na %: A30 ICP package	ICP-AES	0.01	20.0
4019	9	Ni ppm: A30 ICP package	ICP-AES	5	50000
4020	9	P ppm: A30 ICP package	ICP-AES	100	10000
4021	9	Pb ppm: A30 ICP package	ICP-AES	5	50000
4022	9	Sb ppm: A30 ICP package	ICP-AES	10	10000
4023	9	Sc ppm: A30 ICP package	ICP-AES	5	10000
4024	9	Sr ppm: A30 ICP package	ICP-AES	5	10000
4025	9	Ti %: A30 ICP package	ICP-AES	0.01	10.00
4026	9	Tl ppm: A30 ICP package	ICP-AES	20	10000
4027	9	U ppm: A30 ICP package	ICP-AES	20	10000
4028	9	V ppm: A30 ICP package	ICP-AES	20	50000
4029	9	W ppm: A30 ICP package	ICP-AES	20	10000
4030	9	Zn ppm: A30 ICP package	ICP-AES	5	50000



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Project:

Comments: ATTN: CHRIS GRAF

Page Number : 1-A
Total Pages : 1
Certificate Date: 31-AUG-1998
Invoice No. : I9828421
P.O. Number :
Account : IID

CERTIFICATE OF ANALYSIS

A9828421

SAMPLE	PREP CODE	Ag ppm	Al %	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Hg ppm	K %	Mg %	Mn ppm	Mo ppm	Na %	Ni ppm
SHAG 1	208 226	< 1	0.07	< 10	< 20	< 5	< 10	15.10	10	< 5	20	40	0.28	10	0.04	8.60	170	5	0.04	< 5
SHAG 2	208 226	6	0.21	< 10	< 20	< 5	< 10	6.91	305	5	20	25	0.73	120	0.16	3.83	240	< 5	0.03	5
SHAG 3	208 226	52	0.15	10	< 20	< 5	< 10	8.64	170	< 5	40	75	0.40	60	0.01	5.00	260	5	0.03	5
SHAG 4	208 226	1	0.08	10	< 20	< 5	< 10	17.05	245	< 5	< 10	5	0.87	< 10	0.03	9.32	620	< 5	0.03	5
SHAG 5	208 226	55	0.13	< 10	< 20	< 5	< 10	3.01	165	< 5	90	65	0.39	60	0.01	1.76	120	< 5	0.03	5
SHAG 6	208 226	6	0.28	< 10	< 20	< 5	< 10	8.56	265	5	10	15	0.76	90	0.19	4.67	310	< 5	0.03	5
SHAG 7	208 226	19	0.11	< 10	< 20	< 5	< 10	1.11	720	5	20	30	0.42	280	0.08	0.52	40	5	0.03	5
SHAG 8	208 226	25	0.08	10	< 20	< 5	< 10	17.70	185	< 5	< 10	75	0.41	120	0.01	10.25	480	< 5	0.06	< 5
SHAG 9	208 226	99	0.09	< 10	< 20	< 5	< 10	5.16	250	< 5	50	125	0.35	130	0.02	2.93	180	< 5	0.04	5

CERTIFICATION:

Harry Richler



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Total Pages : 1
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A9828421

SAMPLE	PREP CODE		P ppm	Pb ppm	Sb ppm	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm
SHAG 1	208	226	< 100	< 5	10	< 5	40	< 0.01	< 20	20	< 20	< 20	9610
SHAG 2	208	226	500	2450	< 10	< 5	15	< 0.01	20	< 20	< 20	< 20	>50000
SHAG 3	208	226	< 100	19150	< 10	< 5	20	< 0.01	20	< 20	< 20	< 20	>50000
SHAG 4	208	226	< 100	195	< 10	< 5	60	< 0.01	< 20	20	< 20	< 20	>50000
SHAG 5	208	226	< 100	44200	< 10	< 5	10	< 0.01	20	< 20	< 20	< 20	>50000
SHAG 6	208	226	500	2140	10	< 5	15	< 0.01	< 20	20	< 20	< 20	>50000
SHAG 7	208	226	800	10700	10	< 5	< 5	< 0.01	100	< 20	< 20	< 20	>50000
SHAG 8	208	226	< 100	115	< 10	< 5	25	< 0.01	< 20	< 20	< 20	< 20	>50000
SHAG 9	208	226	< 100	6100	< 10	< 5	10	< 0.01	60	< 20	< 20	< 20	>50000

CERTIFICATION: Hart R. Richler



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Account : IID

CERTIFICATE OF ANALYSIS

A9829064

SAMPLE	PREP CODE	Zn %										
SHAG 2	244 --	20.0										
SHAG 3	244 --	9.49										
SHAG 4	244 --	12.50										
SHAG 5	244 --	10.20										
SHAG 6	244 --	18.20										
SHAG 7	244 --	47.7										
SHAG 8	244 --	8.94										
SHAG 9	244 --	14.70										

CERTIFICATION:

Said Leina



Chemex Labs Ltd.

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A9829666

Comments:

CERTIFICATE

A9829666

(IID) - ECSTALL MINING CORP.

Project:
P.O.#:

Samples submitted to our lab in Vancouver, BC.
This report was printed on 21-SEP-1998.

SAMPLE PREPARATION

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION
244	9	Pulp; prev. prepared at Chemex

ANALYTICAL PROCEDURES

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION	METHOD	DETECTION LIMIT	UPPER LIMIT
370	9	Ga %: Assay	NAA	0.005	100.0
872	9	Ge %: NAA	NAA	0.001	100.00



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P.O. Number :
Account : IID

CERTIFICATE OF ANALYSIS

A9829666

SAMPLE	PREP CODE		Ga NAA %	Ge %								
SHAG 1	244	--	< 0.005	< 0.001								
SHAG 2	244	--	< 0.005	< 0.001								
SHAG 3	244	--	< 0.005	< 0.001								
SHAG 4	244	--	< 0.005	< 0.001								
SHAG 5	244	--	< 0.005	< 0.001								
SHAG 6	244	--	< 0.005	0.010								
SHAG 7	244	--	< 0.005	0.030								
SHAG 8	244	--	< 0.005	< 0.001								
SHAG 9	244	--	< 0.005	0.020								

CERTIFICATION: *Alexandra Alexander*

APPENDIX II

COST STATEMENT

COST STATEMENT

ROCK SAMPLE DATA

Vancouver Petrographics Ltd., Petrographic study	\$1,435.86
Chemex Labs Ltd., Assay analysis	\$700.21
Cominco lead isotope analysis	\$240.75

TRANSPORTATION

Helicopter	\$1,700.00
Air transportation, Vancouver-Cranbrook return	\$605.00

GEOLOGICAL CONSULTANTS

Chris Graf 3 days @ \$600	\$1,800.00
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<u>REPORT PREPARATION</u>	\$100.00
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TOTAL	\$6,581.82
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APPENDIX III


CERTIFICATE OF QUALIFICATION


STATEMENT OF QUALIFICATIONS

I, Chris Graf, of Suite 307 - 475 Howe Street, Vancouver, British Columbia, Canada, hereby certify that the work described in this report was carried out under my supervision and that:

1. I carried out the field work and sampling and I am qualified to write this report.
2. I graduated with a B.Ap.Sc. (Geological Engineering) from the University of British Columbia.
3. I am a registered member of the Association of Professional Engineers of British Columbia, and have been since 1980.
4. I have been practicing my geological engineering profession since 1974.

Signed in Vancouver, British Columbia, on the 19th day of October, 1998.


Chris Graf, B.Ap.Sc., P.Eng.



The seal is circular with a double border. The outer border contains the text "PROFESSIONAL" at the top and "ENGINEER" at the bottom. The inner border contains "PROVINCE OF" at the top and "BRITISH COLUMBIA" at the bottom. In the center, the name "D.W. GRAF" is printed.