Direktoratet for mineralforvaltning
med Bergmesteren for Svalbard
Postboks 3021, N-7441 Trondheim

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Results of exploration, 1998, Evje area, Southern Norway

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Robyn, Thomas L.	07.10 1998	America Mineral Fields

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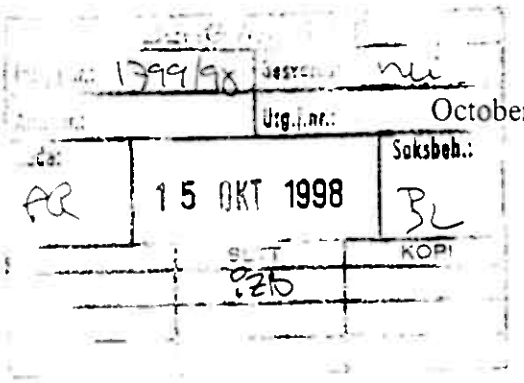
Fagområde	Dokument type	Forekomster
Geologi	Rapport	Flåt

Råstoffgruppe	Råstofftype
Malm/metall	Ni, Cu

Sammendrag / innholdsfortegnelse

The HEM survey and subsequent ground follow-up work did not locate any targets of interest for America Mineral Fields. Therefore, AMF has no interests in retaining the mutinger in this area and will not renew them in 1999. The mutinger were originally applied for under the name of MIL Investments of Luxembourg on behalf of America Mineral Fields, and title was subsequently transferred to AMF Holdings Two.

ST CONSULTING GROUP, INC.



Per Zakken Brekke, Bergmester
Bergvesenet
Leiv Eirikssons vei 39
P.b. 3021 Lade
N-7002 Trondheim, Norway

October 6, 1998

Dear Mr. Brekke:

Enclosed is the report on America Mineral Field's activities in the Evje area of southern Norway during 1998. The data from the HEM survey flown in June by SIAL Geosciences were sent to the Bergvesenet in August.

The HEM survey and subsequent ground follow-up work did not locate any targets of interest for America Mineral Fields. Therefore, AMF has no interest in retaining the mutinger in this area and will not renew them in 1999. The mutinger were originally applied for under the name of MIL Investments of Luxembourg on behalf of America Mineral Fields, and title was subsequently transferred to AMF Holdings Two.

The Bergvesenet has our permission to release the data from the HEM survey and subsequent work without delay.

Thank you for your assistance with our programs.

Sincerely,

Thomas L. Robyn, Senior Consultant
America Mineral Fields

Enclosure

Cc: Mark Collins, with enclosure
Jim Bahan, without enclosure

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RESULTS OF EXPLORATION, 1998
EVJE AREA, SOUTHERN NORWAY

Introduction: The Evje project area lies in south central Norway, 65 kilometers north of Kristiansand. The area has been described as underlain by an intrusive complex of gabbro metamorphosed to amphibolite, and undeformed and unmetamorphosed diorite intrusions (Bjørlykke, 1947; Nixon, 1975; Pedersen, 1985). At least 22 small nickel-copper occurrences are known in the area. In addition, the Flåt nickel mine lies in the northwestern part of the area and is hosted by diorite.

The America Mineral Fields exploration program described in this summary report was designed to test the area mapped as metamorphosed and unmetamorphosed mafic intrusions for massive nickel-copper deposits. The targets were magnetic conductors that potentially indicate massive nickel-copper mineralization.

An HEM survey at Evje was completed in early June. SIAL Geosciences, Inc. of Quebec was the contractor. No major delays were encountered, although rain, fog and wind did cause some delays. The data from the survey, on CD-ROM and paper maps, were submitted to the Bergvesenet in August 1998.

Several weak EM anomalies were detected during the airborne survey and were ground checked during June and July, and results are described below. Ground checks in this area are hampered by heavy forest cover and rolling terrain, which results in limited outcrops. This is typical shield terrain, and mires, lakes, trees and brush cover much of the area.

The geologic observations referred to in this summary were made to determine the depositional environment of the rocks and were not made with the intent to make a geologic map. These observations were focussed on understanding the mineralization processes related to nickel-copper sulfide mineralization in the area.

Geologic Observations: The Evje area has been described as underlain by an intrusive complex of gabbro metamorphosed to amphibolite, with younger gabbro bodies being successively less deformed. The intrusive sequence reportedly ended with the youngest intrusion, which is the undeformed and unmetamorphosed diorite hosting the Flåt mine.

Geologic field work done during June and July demonstrates that the area reportedly underlain by metamorphosed and deformed mafic intrusions (norite, gabbro and amphibolite) also includes abundant metasediments. Only a small percentage of the area is underlain by mafic intrusions, most notably the Flåt and Mølland areas.

The remainder of the area is underlain by metasediments with occasional intercalated mafic rocks, which probably include reworked tuffs and lava flows. Rock types seen include magnetite-feldspar-quartz gneiss; graphitic garnet gneiss; leucocratic biotite-amphibole gneiss; mafic amphibolite; magnetite-feldspar gneiss; magnetite-quartz gneiss;

massive quartz gneiss; slightly pyritic biotite schist and gneiss; and, biotite-rich schist. The rocks are complexly deformed and banded in cm-to-dm thick layers.

Several outcrops were seen that expose possible sedimentary structures, such as graded bedding, cross bedding and flute casts. Deformation has obscured many of these structures, but they occur frequently enough that their origin is believed to be sedimentary in origin and not due to metamorphism or deformation.

Silicic intrusive rocks in the area include pink K-spar granite, porphyritic granitic gneiss, pegmatite and aplite. Pegmatites are extremely abundant in the area. Mafic intrusive rocks in the area include fine-to-medium grained amphibolite, coarse-grained amphibolitite (ex-dunite?), foliated feldspar diorite (augen gneiss), and feldspar porphyritic diorite containing magnetite and pyrite (Mykelås diorite).

These rocks indicate two intrusive periods. The first was intrusion of mafic magmas after peak deformation of the sedimentary sequence and near the end of deformation. These are the nickel bearing intrusions associated with the Flåt mine, the Mølland occurrence, and some of the nickel occurrences. The mafic magmas intruded the complexly deformed metasediments.

The second period of intrusion is indicated by the intrusions of pegmatite, aplite and granite. The Mykelås diorite contains several pegmatites, indicating it is older than the pegmatites. Geologic traverses made across the area during this program indicate that evidence of partial melting increases to the east, where granitization textures are prominent (especially at the intersection of roads 405 and 406 east of Vegusdal). The abundance of pegmatites in the Evje area is inferred to be due to partial melting of the metasediments in many small localities over the entire project area.

Geochemical Results: Samples were submitted for assay to determine not only nickel and copper contents, but also other elements of potential interest. Two sets of assays are given in Appendix 1. The first are results from OMAC Laboratories of Ireland, where samples of 1-2 kg size were submitted.

The second set of assays from Acme Analytical Laboratories of Vancouver was done on small samples from petrographic blocks. These assays were done in order to have results directly from samples that had been examined petrographically.

The assays show some variation in results, mainly because the samples assayed are not exactly the same. For example, EV98-3 assayed by OMAC yielded 1.77% Ni and 0.73% Cu on a larger volume sample, whereas Acme obtained 2.39% Ni and 1.73% Cu on the EV98-3 petrographic block. Both results are correct for the samples assayed, and demonstrate the natural variability between samples of differing volume.

Petrographic Descriptions: Several samples collected in the area were examined petrographically in order to provide a clearer understanding of the rock types and mineralization in the Evje area. Samples were sent to Spectrum Petrographics, Inc. of

Winston, Oregon, USA. Descriptions of individual rocks with color microphotographs are given in Appendix 2.

Samples EV-FOD1 and EV-FOD2 are from outcrops of the Mykelås diorite at the Flåt mine site, and show the rock to be quartz-bearing diorite containing 4-10% quartz. The rock is slightly altered, with plagioclase weakly altered to sericite, primary biotite moderately altered to hornblende + magnetite + quartz, and pyrrhotite, pyrite and chalcopyrite weakly altered to magnetite.

Samples EV98-3, EV98-5, T. Crebs 1, T. Crebs 2, TR Flåt 1 and TR Flåt 2 are mineralized samples taken from various dumps at the Flåt mine. These are altered mafic igneous rocks containing varying amounts of actinolite, chlorite, quartz, biotite, apatite, sphene, epidote, pyrrhotite, magnetite, specular hematite, hemo-ilmenite, pyrite, chalcopyrite and possibly bravoite. These samples are inferred to be altered and mineralized Mykelås diorite. Sample EV98-5 is "iron ore" rock. Pentlandite was not reported by Spectrum, although its presence is known from previous work.

Sample EV98-2 is from the southern part of the area, where a large magnetic high occurs that has a similar magnetic expression as the Mykelås diorite. However, the rocks in the area are thinly to thickly-banded quartz-magnetite gneiss. The rock contains plagioclase, quartz, actinolite, magnetite, biotite, hemo-ilmenite, apatite, zircon and traces of K-feldspar, pyrite and hematite/goethite. The minerals are consistent with a protolith of quartz diorite intrusive or compositionally equivalent feldspathic clastic rock. However, the field relationships indicate the rock is a meta-sediment, probably an arkosic sandstone. The high magnetite content in the rock yields the strong magnetic signature.

Sample EV98-1 is from the Heståsen occurrence, and is an altered amphibolite containing actinolite, pyrrhotite, magnetite, pyrite, chalcopyrite and traces of plagioclase and biotite.

Description of HEM Anomalies: The anomalies described below were detected during the HEM survey and ground checked with geologic traverses and rapid VLF and magnetic lines. The VLF and magnetic data from these lines are referred to in the text, but the data are not included in this report due to their limited usefulness. The locations of these anomalies are shown on Figure 1. Figure 1 is not the final, processed magnetic map and shows magnetic patterns that are not real. Analysis of the magnetic data should be done with the final SIAL data presented to the Bergvesenet separately.

Hauge: This anomaly lies in the northern part of the area 2½ km east of the Flåt nickel mine. It is a single-point anomaly located in an area of limited outcrop. Five nickel occurrences are known in the immediate vicinity, the closest of which is located 200 meters southeast of the anomaly. This occurrence, the Heståsen occurrence, contains fracture-controlled sulfide mineralization with chalcopyrite.

Four Genie and magnetic lines were surveyed over the Hauge HEM anomaly. Two weak conductive zones were detected, both trending NE. Given the depth limitation of the

Genie system compared to the HEM system, these conductors might represent the HEM conductor. Dalsegg (1998) gives the factual data results of the Genie and magnetic data.

The Hauge anomaly occurs along the contact between magnetic and less-magnetic bedrock. Bedrock in the vicinity is poorly exposed. Outcrop mapping revealed a combination of magnetic and non-magnetic gneiss and amphibolite. Several structural measurements indicate the rocks are nearly isoclinally folded with a shallow southerly plunge to the fold axes.

The presence of the anomaly at or near the contact between non-magnetic amphibolite and magnetic gneiss (metamorphosed sediments) indicates a possible sulfide concentration at the contact of the two rock types or alternatively a contact effect.

Sampling of two nickel occurrences in the vicinity of Hauge (Heståsen and Lomstjerne) revealed elevated Pt and Pd concentrations, up to 1.6 ppm combined Pt-Pd. Plotting Pd concentrations vs. Ni/(Ni+Cu) concentrations shows that these occurrences are compositionally distinct from samples collected at and near the Flåt mine and Mølland occurrence (Figure 2). Moreover, plotting Pt concentrations vs. Ni/(Ni+Cu) concentrations (Figure 3) shows a distinct subset within the "Flåt type", where samples from the Flåt mine have low Pt concentrations but samples from Mølland and vicinity have Pt concentrations at or below detection level of 3 ppb. These data indicate that there are possibly three separate mafic magmas, with the Hauge type of magma being more primitive. This observation raises the possibility that sulfide mineralization related to the Hauge anomaly may have significant PGM contents.

The mineralization at Flåt mine is hosted by an undeformed diorite. If a similar body occurs near the Hauge area, additional mineralization of interest might be present. However, the final processed magnetic data from the airborne survey indicate that the bedrock in the vicinity of the anomaly does not contain a significant volume of rock suitable to host a deposit of the size required by America Mineral Fields.

Because there is no large competent body in the area, no significant accumulation of sulfide mineralization is likely. Although the grades of Cu, Ni, Pt and Pd in the occurrences are attractive, it is unlikely that a sizeable body of mineralization at these grades will be found. The N-S linearity of the occurrences indicates a structural control, but the HEM data do not indicate any massive concentration of sulfides in the structure.

However, it is possible that the Hauge anomaly represents slightly massive to disseminated sulfide mineralization, possibly with elevated Pt and Pd concentrations.

Marielle: This anomaly is located on the northeast side of Gjegningheia, in the center of the area. It is a single-point, weakly conductive anomaly with a very high magnetic signature. The closest known nickel occurrences are 3 km to the southeast.

Bedrock in the area is a combination of leucocratic banded biotite-amphibolite gneiss, coarse-grained banded mafic amphibolite, and occasional thin layers of coarse quartz

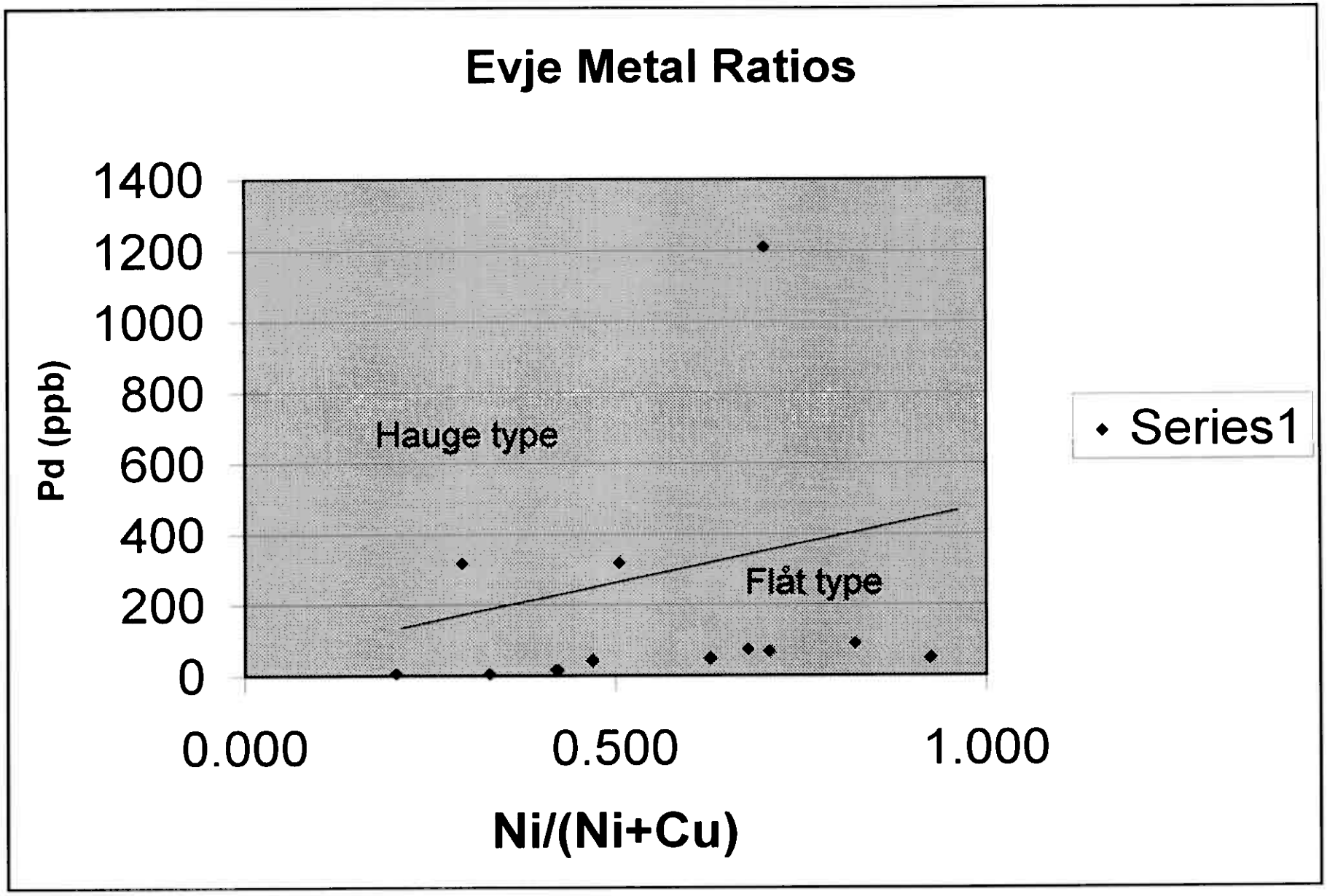
Evje Metal Ratios
1400
1200
1000
800
600
400
200
0
Pd (ppb)
Hauge type
Flåt type
Series1
0.000
0.500
1.000
Ni/(Ni+Cu)

Figure 2

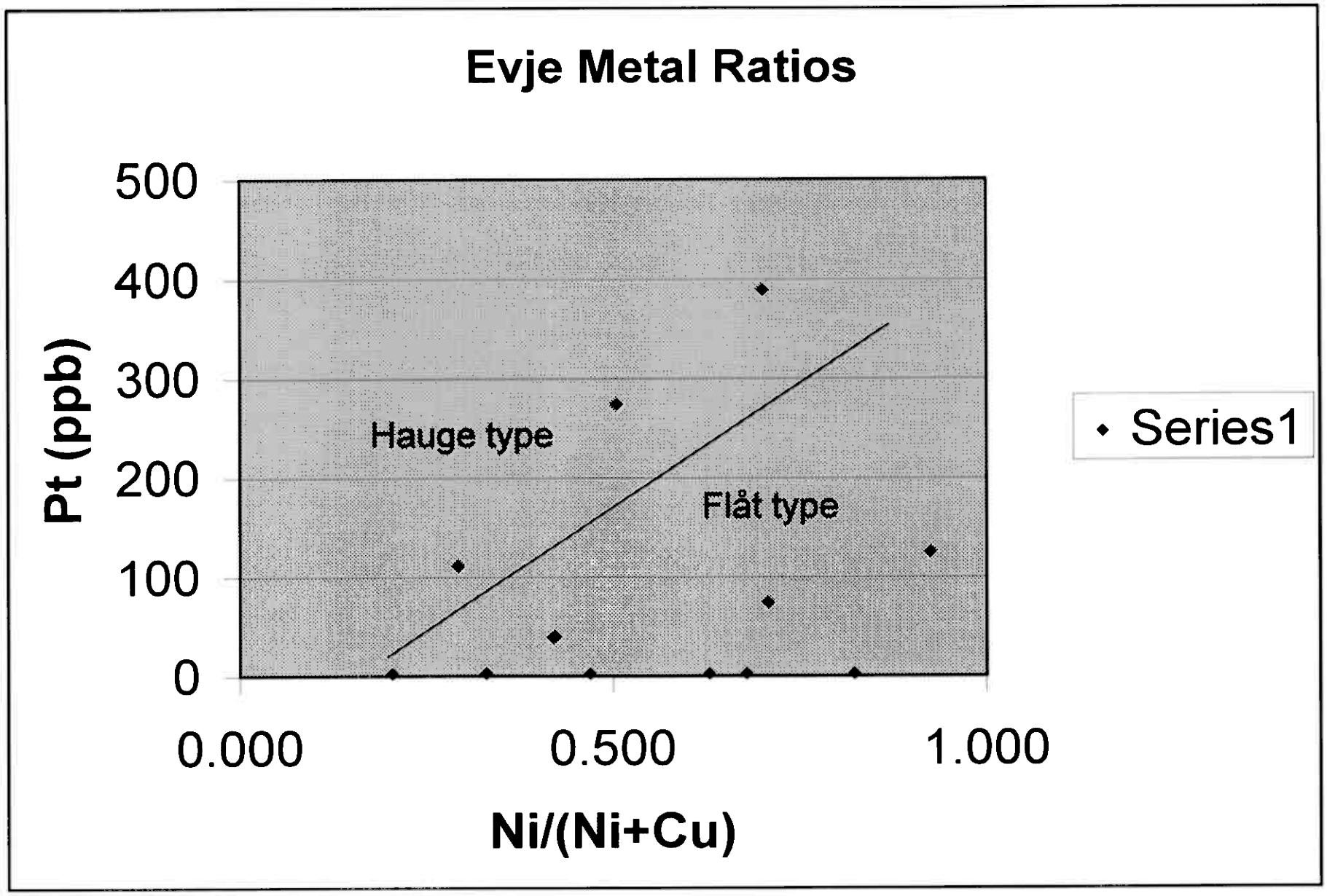
Evje Metal Ratios
500
400
300
200
100
0
Pt (ppb)
Hauge type
Flåt type
Series1
0.000
0.500
1.000
Ni/(Ni+Cu)

Figure 3

Evje Metal Ratios

Ni, ppm	Cu, ppm	Pt, ppb	Pd, ppb	Sample #	Locality
4900	6700	40	16	9511973	Flåt mine
220	860	3	7	9511974	Søråna
350	710	3	5	9511975	Klepptjarn
1220	720	3	49	9511976	Klepptjarn
7400	3500	3	74	9511977	Mølland
5300	6000	3	43	9511978	Orreknappen
11600	2500	3	90	9511979	Orreknappen
17700	7313	74	68	EV98-3	Flåt mine
34400	2793	125	50	EV98-4	Flåt mine
6300	8719	39	17	EV98-5	Flåt mine
9996	9795	274	318	EV98-1	Heståsen
12900	5501	389	1210	EV98-6	Lomstjerne
5285	12760	111	317	EV98-7	Lomstjerne

Ni/Ni+Cu	Pt, ppb	Ni/Ni+Cu	Pd, ppb	Locality
0.422	40	0.422	16	Flåt mine
0.204	3	0.204	7	Søråna
0.330	3	0.330	5	Klepptjarn
0.629	3	0.629	49	Klepptjarn
0.679	3	0.679	74	Mølland
0.469	3	0.469	43	Orreknappen
0.823	3	0.823	90	Orreknappen
0.708	74	0.708	68	Flåt mine
0.925	125	0.925	50	Flåt mine
0.419	39	0.419	17	Flåt mine
0.505	274	0.505	318	Heståsen
0.701	389	0.701	1210	Lomstjerne
0.293	111	0.293	317	Lomstjerne

Note: Samples 9511973-9511979 are extracted from Diamond Fields Resources report "Norway Projects Review, October, 1995" dated December 12, 1995. This report is in the Bergvesenet files.

gneiss with magnetite grains 2-4 mm in size. The rocks are deformed like other rocks in the area, foliated with shallowly plunging isoclinal folds. Extensive, large bodies of pegmatite intrude the bedrock sequence.

Three VLF-mag lines were surveyed, two N-S and the third NNW to cross the first two lines. Strong crossovers and magnetic responses were obtained. The VLF crossovers occur at the edges of a mire, and the magnetic anomalies are in the same vicinity.

The causes of the anomalies are uncertain. While a conductive mire could create the VLF crossovers, this would not explain the magnetic anomalies unless the bogs are so reduced that native iron was being precipitated – an unlikely prospect. The pegmatites may have metamorphosed an adjacent sulfide body, which would make the body become a magnetic high and weak conductor. This process was noted in the Flåt mine (Bjørlykke, 1947). The anomalies may also result from the coincidence of a conductive mire and highly magnetic bedrock, a combination completely unrelated to mineralization. A fourth possibility is that there is a sulfide concentration in amphibolite adjacent to the pegmatites, a phenomenon that was noted in other exposures in the area during this work.

Møllandsåsen: This anomaly is located in the southern part of the area. It consists of two weak conductors with moderate magnetic expression. The anomaly lies about 1,000 meters SW of the Mølland nickel occurrence.

Bedrock in the area is a combination of banded amphibolite, felsic gneiss and banded magnetite-rich quartz gneiss (EV98-2). Magnetite content in the gneiss is typically 5-10%, and commonly reaches 20%. This bedrock is inferred to be the cause of the magnetic high in the southern part of the Evje project area. The rocks were probably originally mafic to felsic sediments or a layered felsic intrusion. Deformation is so extensive that the original rock type cannot be distinguished. In this area, no evidence of metamorphosed mafic intrusions was seen.

Two VLF-mag lines were surveyed across the trend of the conductors. A strong VLF crossover with a magnetic high was obtained on one line, which is associated with banded gneiss with a high magnetite content.

Unni: This anomaly is located in the center of the area, about 1½ km SSW of the Marielle anomaly. It consists of a single weak conductor with a magnetic high. The closest known nickel occurrences lie 2½ km to the ESE.

Bedrock is similar to that at Marielle and like Marielle the Unni anomaly lies on the margin between relatively magnetic bedrock and non-magnetic bedrock.

One VLF line was surveyed without mag. Surveying was restricted by periodic heavy rain. Readings were dominantly positive, possibly due to base line shift. If there is a base line shift, the line yielded a single crossover that is located about 300 meters north of the helicopter HEM anomaly.

No reason for the HEM anomaly could be seen.

Salen: This anomaly is located in the southeastern portion of the area, 500 meters SE of the hill named Salen. It consists of an E-W trend of two weak conductors of strong to low magnetic response. Several nickel occurrences lie within 1,000 meters of the anomaly.

Bedrock in the area is dominantly amphibolite and leucocratic gneiss, with abundant intrusions of pegmatite. Several pegmatite mines are in this area.

Three VLF-mag lines were run across the trend, and VLF results appear to correlate with the presence of mires. Magnetic highs were obtained on two lines, possibly related to magnetite in bedrock.

Einer: This anomaly is located on the top of Einerhaugane in the extreme southern part of the area. It is a single-point anomaly defined by a very weak conductor and weak magnetic response. It is within the most magnetic bedrock of the southern area, and on a densely forested ridge.

The area was examined on a day of heavy rain, and no VLF or magnetic surveying was done.

Bedrock in the area is mostly massive, medium-grained, magnetite-feldspar-quartz gneiss. Biotite gneiss is also seen occasionally. Exposure is generally good, with knobs of outcrop occurring frequently in the forest.

Very near the plotted vicinity of the anomaly, an outcrop of slightly pyritic, magnetite-feldspar-quartz gneiss occurs. The rock weathers with a color that indicates the rock contains graphite, but graphite was not recognized in the rock. However, the weathered color and presence of pyrite indicate the rock is a graphitic gneiss and it is inferred to be the cause of the weak anomaly.

Tolle: This is a single point anomaly with a moderate magnetic expression. It lies about 500 meters SE of Tolleknuten and almost 2,000 meters NE of Hauge.

Bedrock in the area consists of coarse K-spar granite, granitic gneiss, narrow amphibolite dikes and pegmatite. The rocks are complexly intermixed and there is little lateral consistency to the rocks.

Two power lines run parallel to the road, in an E-W direction, at the location of the conductor. No other reason can be seen for this anomaly.

Summary and Conclusions: The HEM survey conducted by America Mineral Fields resulted in the detection of several weak anomalies in the Evje area. Ground checks of these anomalies did not result in any targets of significance. The program was directed at discovery of massive nickel-copper sulfide bodies, with magnetic conductors the primary

targets. No evidence was found on the ground in the vicinity of the weak conductors that would indicate the presence of large mineralized bodies.

Mineralization at Flåt mine was controlled by the Mykelås diorite. From the results of this work and earlier studies, the diorite is inferred to have been intruded during peak metamorphism while surrounding metasediments were deformed in a plastic manner. The diorite was enriched in sulfides and massive to disseminated sulfide mineralization formed in the body.

The magnetic data from this survey indicate that there is not another large body within the survey area that would make a suitable host. The only exception to this statement is the large magnetic body in the south related to quartz-magnetite gneiss, which is too silicic to generate massive sulfide mineralization if the original rock was an intrusion and not sediments as inferred. Moreover, no conductors of interest were detected in this body.

The Hauge anomaly may have potential for a disseminated sulfide body with elevated PGM content. However, the expected potential tonnage and grade do not meet the investment criteria set forth by America Mineral Fields.

No further work is planned by AMF in this area.

Dr. Thomas L. Robyn, Senior Consultant
America Mineral Fields
ST Group, Inc., Agent
1551 Prairie Owl Road
Parker, CO 80138 USA
October 7, 1998

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APPENDIX 1

Geochemical Data

EVJE ROCK SAMPLES
Description and Location

Sample # And type	1:5,000 Map Sheet	NGO X coord.	NGO Y coord.	Sample Description
EV-1 Mill tails	?	?	?	Flåt mine tailings
EV-2 Mill tails	?	?	?	Flåt mine tailings
EV98-1 Dump grab	Åvesland BJ 014-5-2	66515 (Heståsen occur.)	-27375	Massive sulfide
EV98-2 Rock chip	Tortveit BJ 012-5-4	54160	-28750	Mt-rich qtz gneiss
EV98-3 Dump rock	?	?	?	Massive sulfide
EV98-4 Dump rock	?	?	?	Massive sulfide
EV98-5 Dump rock	?	?	?	"iron ore" dump rock
EV98-6 Dump rock	Åvesland BJ 014-5-2	66250 (Lomstj. occurr.)	-27150	Massive sulfide
EV98-7 Dump rock	Åvesland BJ 014-5-2	66250 (Lomstj. occurr.)	-27150	Massive sulfide
EV98-8 Slag	?	?	?	Flåt smelter site
EV98-9 Sand slag	?	?	?	Flåt smelter site
EV-FOD1 Flåt mine	?	?	?	Mykelåsen diorite
EV-FOD2 Flåt mine	?	?	?	Mykelåsen diorite
T. Crebs 1 Dump rock	?	?	?	Flåt mine
T. Crebs 2 Dump rock	?	?	?	Flåt mine
TR Flåt 1 Dump rock	?	?	?	Flåt mine
TR Flåt 2 Dump rock	?	?	?	Flåt mine

ACME ANALYTICAL LABORATORIES LTD. 852 E. HASTINGS ST. VANCOUVER BC V6A 1R6 PHONE(604)253-3158 FAX(604)253-1716
(ISO 9002 Accredited Co.)

WHOLE ROCK ICP ANALYSIS

Spectrum Petrographics, Inc. File # 9803422
2 - 499 Dillard Gardens R, Winston OR U.S.A. 97496 Submitted by: Michael DePangher

SAMPLE#	SiO2 %	Al2O3 %	Fe2O3 %	MgO %	CaO %	Na2O %	K2O %	TiO2 %	P2O5 %	MnO %	Cr2O3 %	Ba ppm	Ni ppm	Sr ppm	Zr ppm	Y ppm	Nb ppm	Sc ppm	LOI %	C/TOT %	S/TOT %	FeO %	SUM %
EV-FOD1	51.23	15.83	11.14	4.38	7.40	3.79	1.22	2.63	1.25	.14	.031	1008	58	1192	289	28	<10	11	.5	.03	.15	6.44	99.85
EV-FOD2	44.04	14.67	12.56	5.06	9.89	3.38	1.21	3.58	3.55	.12	.034	896	684	1514	137	21	<10	<10	1.3	.09	.96	6.40	99.78
EV98-1	44.49	3.53	21.51	16.02	7.27	.71	.04	.25	.15	.44	.235	16	1753	23	32	13	<10	32	3.7	.02	4.98	15.24	98.58
EV98-2	59.67	14.66	10.69	1.95	5.74	3.45	.46	1.57	.56	.15	.017	309	49	358	766	48	<10	19	.8	.06	.07	4.94	99.91
EV98-3	20.00	4.15	47.68	3.31	2.54	.15	.10	3.33	1.38	.09	.057	250	24014	72	147	19	<10	<10	11.7	.02	18.79	14.80	97.60
EV98-5	14.29	5.25	58.82	3.63	5.24	.04	.09	6.81	1.28	.21	.099	89	3765	571	123	<10	<10	10	2.4	.05	1.08	12.26	98.73
T. CREBS 1	21.50	5.92	46.87	4.21	6.43	.07	<.04	8.70	2.28	.26	.100	38	9099	114	187	14	<10	13	1.8	.02	1.09	14.72	99.34
T. CREBS 2	18.83	4.48	47.03	2.99	1.94	.04	.16	4.12	1.30	.09	.050	483	20520	73	161	15	<10	10	13.6	.01	20.37	14.06	97.32
TR FLAT 1	14.11	2.49	53.57	1.59	.93	.02	<.04	2.82	.69	.06	.044	423	17853	47	71	<10	<10	<10	18.8	.02	29.30	10.44	97.45
TR FLAT 2	20.07	5.17	50.32	3.90	5.67	.03	<.04	6.70	1.99	.20	.092	52	27006	114	149	13	<10	11	2.1	.01	1.93	10.42	99.72
STANDARD SO-15/CSA	49.27	12.74	7.33	7.26	5.89	2.42	1.86	1.64	2.71	1.40	1.064	1959	62	398	710	16	13	<10	5.9	3.95	5.09	2.20	99.86

.200 GRAM SAMPLES ARE FUSED WITH 1.5 GRAM OF LIBO2 AND ARE DISSOLVED IN 100 MLS 5% HNO3. OTHER METALS ARE SUM AS OXIDES.
TOTAL C & S BY LECO (NOT INCLUDED IN THE SUM). FEO BY DICHROMATE TITRATION.

- SAMPLE TYPE: ROCK Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

DATE RECEIVED: AUG 12 1998 DATE REPORT MAILED: Aug 20/98 SIGNED BY. . . . . D. TOYE, C.LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

 Data___ FA ___

ACME ANALYTICAL LABORATORIES LTD. 852 E. HASTINGS ST. VANCOUVER BC V6A 1R6 PHONE(604)253-3158 FAX(604)253-1716
(ISO 9002 Accredited Co.)

GEOCHEMICAL ANALYSIS CERTIFICATE

Spectrum Petrographics, Inc. File # 9803422

2 - 499 Dillard Gardens R, Winston OR U.S.A. 97496 Submitted by: Michael DePangher

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	Al %	Na %	K %	W ppm	Zr ppm	Sn ppm	Y ppm	Nb ppm	Be ppm	Sc ppm
EV-F001	<2	52	26	154	.6	61	26	994	7.43	6	<10	<4	4	1240	.8	<5	<5	155	5.29	.535	72	114	2.62	1055	1.50	8.20	2.94	1.13	<4	31	2	37	12	2	15
EV-F002	<2	787	116	192	.8	868	56	804	7.51	<5	<10	<4	4	1572	1.4	<5	<5	150	7.06	1.438	82	121	3.02	944	1.77	7.48	2.62	1.04	<4	15	<2	30	5	1	11
EV98-1	<2	10553	8	215	2.3	2070	150	3142	14.76	<5	24	<4	<2	24	.9	10	10	141	5.20	.013	2	1453	8.55	19	.14	1.71	.54	.07	<4	7	<2	18	<2	<1	38
EV98-2	<2	73	8	151	.5	59	17	1100	7.51	<5	<10	<4	<2	360	.9	<5	<5	107	4.28	.239	30	21	1.19	326	.92	7.80	2.72	.48	<4	9	2	64	15	1	24
EV98-3	3	17263	40	209	13.2	23861	594	813	31.65	6	<10	<4	6	75	.6	<5	<5	277	1.87	.447	64	290	2.20	238	1.99	2.24	.11	.08	<4	2	<2	25	6	<1	14
EV98-5	<2	8296	51	163	5.3	3389	258	1450	19.46	7	<10	<4	2	542	<.4	8	<5	320	3.65	.364	20	627	2.14	79	2.63	2.47	.06	.04	<4	7	<2	11	3	<1	12
T. CREBS 1	<2	3481	14	211	1.0	9248	497	1834	20.35	5	<10	<4	<2	111	.6	<5	<5	340	4.40	.610	40	639	2.39	33	3.01	2.78	.07	.02	<4	3	<2	18	<2	<1	15
T. CREBS 2	<2	20470	23	152	11.9	21087	966	737	31.16	<5	19	<4	5	69	<.4	<5	<5	275	1.32	.385	51	300	1.76	235	2.08	2.14	.04	.12	<4	3	<2	19	5	<1	13
TR FLAT 1	3	17141	30	128	11.3	18051	1712	563	35.59	<5	<10	<4	4	49	<.4	<5	5	205	.68	.221	25	223	1.07	170	1.71	1.35	.03	.09	<4	<2	<2	10	4	<1	9
TR FLAT 2	<2	1021	15	174	.8	27556	347	1509	20.51	<5	<10	<4	2	111	<.4	<5	<5	340	3.85	.617	36	615	2.24	51	2.78	2.46	.06	.03	<4	<2	<2	15	3	<1	13
STANDARD CT3	26	65	42	186	6.1	40	12	958	4.07	59	24	<4	27	241	22.2	23	25	135	1.63	.099	25	254	.98	1052	.40	7.21	1.91	2.07	32	48	21	17	18	5	11
STANDARD G-2	<2	5	17	50	.7	9	4	723	2.28	<5	<10	<4	7	764	<.4	<5	<5	53	2.89	.092	23	73	.72	984	.24	8.17	2.72	3.21	<4	7	<2	18	17	1	6

ICP - .250 GRAM SAMPLE IS DIGESTED WITH 10ML HCLO4-HNO3-HCL-HF AT 200 DEG. C TO FUMING AND IS DILUTED TO 10 ML WITH DILUTED AQUA REGIA. THIS LEACH IS PARTIAL FOR MAGNETITE, CHROMITE, BARITE, OXIDES OF AL,W,ZR & MN AND MASSIVE SULFIDE SAMPLES. AS, CR, SB, AU SUBJECT TO LOSS BY VOLATILIZATION DURING HCLO4 FUMING.
- SAMPLE TYPE: ROCK Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

DATE RECEIVED: AUG 12 1998 DATE REPORT MAILED: Aug 20/98 SIGNED BY ..... D. TOYE, C.LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

Data___ FA ___

OMAC Laboratories Ltd.,
Athenry Road, Loughrea, Co. Galway, Ireland.
Telephone: 353-91-841741, 841457
Fax: 353-91-842146
e mail: 100104.3405@compuserve.com

CERTIFICATE OF ANALYSIS 6/7/98

TO: Geologiske Tjenester A/S., INVOICE: Same

ATTN: B. Flood

CODE: EV1 - OG-98-4 **Aqua Regia ICP**

BATCH NO. EF49
NO. SAMPLES 7 Rock/Tailings

LAB. NO.	SAMPLE NO.	ppm Ag	% Al	ppm As	ppm B	ppm Ba	ppm Be	ppm Bi	% Ca	ppm Cd	ppm Ce	ppm Co	ppm Cr	ppm Cu	% Fe	ppm Ga	ppm Ge	ppm Hg	% K	ppm La	ppm Li	% Mg	ppm Mn	ppm Mo
1	EV 1	<.5	1.68	8	<5	709	<1	<5	1.01	<1	87	10	202	164	7.53	7	<2	<1	0.76	42	10	1.62	175	<1
2	EV 98-1	2.0	0.18	<5	<5	18	<1	<5	0.42	<1	9	690	139	9795	30.28	<5	<2	3	0.06	3	<2	0.26	55	1
3	EV 2	0.8	0.76	9	<5	472	<1	<5	1.31	<1	73	6	361	252	11.27	5	<2	<1	0.47	32	4	0.75	118	<1
Upper Calibration Limit		500.0	12.50	20000	500	5000	500	500	25.00	500	500	2500	5000	20000	40.00	500	500	500	12.50	500	5000	12.50	50000	500

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CERTIFICATE OF ANALYSIS 6/7/98

TO: Geologiske Tjenester A/S., INVOICE: Same

ATTN: B. Flood

CODE: EV1 - OG-98-4 **Aqua Regia ICP**

BATCH NO. EF49
NO. SAMPLES 7 Rock/Tailings

LAB. NO.	SAMPLE NO.	% Na	ppm Nb	ppm Ni	% P	ppm Pb	ppm Rb	% S	ppm Sb	ppm Sc	ppm Sn	ppm Sr	ppm Te	ppm Th	ppm Tl	ppm Tl	ppm U	ppm V	ppm W	ppm Y	ppm Zn	ppm Zr
1	EV 1	0.05	<5	321	0.445	22	<50	0.30	<5	3	<5	72	<5	<5	3672	6	<5	114	<5	9	74	4
2	EV 98-1	0.01	<5	9996	0.073	12	<50	9.07	<5	<1	<5	8	<5	<5	180	<5	<5	7	<5	3	103	12
3	EV 2	0.04	<5	229	0.673	22	<50	0.76	<5	2	<5	81	<5	<5	3467	<5	<5	178	<5	11	51	6
Upper Calibration Limit		12.50	500	2500	5.000	20000	5000	12.50	500	500	500	5000	500	500	10000	500	500	500	250	500	20000	5000

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CERTIFICATE OF ANALYSIS 6/7/98

TO: Geologiske Tjenester A/S., INVOICE: Same

ATTN: B. Flood

CODE: EV1 - OG-98-4

BATCH NO. EF49
NO. SAMPLES 7 Rock/Tailings

		Fire Assay/ICP		
		ppm	ppm	ppm
LAB. NO.	SAMPLE NO.	Au	Pd	Pt
1	EV 1	0.032	<0.005	0.005
2	EV 98-1	0.011	0.318	0.274
3	EV 2	0.013	<0.005	0.006

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CERTIFICATE OF ANALYSIS 15/7/98

Geologiske Tjenester A/S., INVOICE: Same

B. Flood

EV98-2 to EV98-9 **Aqua Regia ICP**

BATCH NO. EF71
NO. SAMPLES 8 Rock

SAMPLE NO.	ppm Ag	% Al	ppm As	ppm B	ppm Ba	ppm Be	ppm Bi	% Ca	ppm Cd	ppm Ce	ppm Co	ppm Cr	ppm Cu	% Fe	ppm Ga	ppm Ge	ppm Hg	% K	ppm La	ppm Li	% Mg	ppm Mn	ppm Mo
EV98-2	<.5	1.14	9	<5	238	<1	<5	0.97	<1	26	32	27	192	6.24	7	<2	<1	0.34	11	9	0.72	541	3
EV98-3	4.1	1.63	<5	<5	114	<1	<5	0.85	<1	32	558	291	7313	27.47	<5	<2	1	0.08	17	3	1.33	368	<1
EV98-4	1.7	0.90	<5	<5	99	<1	<5	0.61	<1	30	364	300	2793	39.97	<5	<2	2	0.13	17	3	0.75	138	<1
EV98-5	4.4	3.45	<5	<5	53	1	<5	3.16	<1	52	266	376	8719	21.14	15	<2	<1	0.02	27	6	2.75	527	2
EV98-6	1.1	0.52	<5	<5	13	<1	<5	0.24	<1	5	1392	67	5501	35.74	<5	<2	<1	0.01	<2	5	0.15	61	2
EV98-7	2.7	3.29	<5	<5	21	<1	<5	1.98	<1	3	414	87	12760	17.83	<5	<2	1	0.19	<2	14	0.87	189	2
EV98-8	0.9	3.73	<5	7	530	1	<5	2.74	<1	70	506	435	1309	23.89	10	<2	<1	0.59	43	15	3.08	1139	2
EV98-9	5.0	3.57	101	402	939	5	<5	8.07	7	94	588	580	2148	25.43	25	<2	<1	0.64	40	18	2.36	3742	82
Calibration Limit	500.0	12.50	20000	500	5000	500	500	25.00	500	500	2500	5000	20000	40.00	500	500	500	12.50	500	5000	12.50	50000	500

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CERTIFICATE OF ANALYSIS 15/7/98

TO: Geologiske Tjenester A/S., INVOICE: Same

ATTN: B. Flood

CODE: EV98-2 to EV98-9 **Aqua Regia ICP**

BATCH NO. EF71
NO. SAMPLES 8 Rock

LAB. NO.	SAMPLE NO.	% Na	ppm Nb	ppm Ni	% P	ppm Pb	ppm Rb	% S	ppm Sb	ppm Sc	ppm Sn	ppm Sr	ppm Te	ppm Th	ppm Tl	ppm Tl	ppm U	ppm V	ppm W	ppm Y	ppm Zn	ppm Zr
1	EV98-2	0.17	<5	650	0.225	12	<50	0.55	<5	7	<5	23	<5	<5	2519	<5	<5	96	<5	34	123	3
2	EV98-3	0.01	<5	17700	0.279	26	<50	9.75	<5	3	<5	39	<5	<5	2507	<5	<5	139	<5	5	173	8
3	EV98-4	0.01	<5	34400	0.202	34	<50	8.69	<5	2	<5	21	<5	<5	1627	<5	<5	102	<5	5	167	12
4	EV98-5	0.01	<5	6300	0.836	46	<50	1.03	<5	3	<5	385	<5	<5	7389	<5	<5	216	<5	11	261	8
5	EV98-6	0.03	<5	12900	0.033	12	<50	12.39	<5	<1	<5	16	<5	<5	407	<5	<5	34	<5	<1	71	10
6	EV98-7	0.30	<5	5285	0.041	11	<50	6.36	<5	2	<5	181	<5	<5	567	<5	<5	29	<5	<1	136	6
7	EV98-8	0.91	<5	1490	0.296	56	<50	0.92	<5	12	10	500	<5	<5	16932	<5	<5	215	<5	20	429	44
8	EV98-9	1.20	<5	455	0.206	2871	<50	0.95	38	8	1286	584	<5	<5	8323	<5	<5	149	27	19	19998	36
Upper Calibration Limit		12.50	500	2500	5.000	20000	5000	12.50	500	500	500	5000	500	500	10000	500	500	500	250	500	20000	5000

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CERTIFICATE OF ANALYSIS 15/7/98

TO: Geologiske Tjenester A/S., INVOICE: Same

ATTN: B. Flood

CODE: EV98-2 to EV98-9

BATCH NO. EF71
NO. SAMPLES 8 Rock

		Fire Assay/ICP		
		ppm	ppm	ppm
LAB. NO.	SAMPLE NO.	Pt	Pd	Au
1	EV98-2	<0.005	<0.005	<0.005
2	EV98-3	0.074	0.068	0.035
3	EV98-4	0.125	0.050	0.013
4	EV98-5	0.039	0.017	0.008
5	EV98-6	0.389	1.210	0.013
6	EV98-7	0.111	0.317	0.055
7	EV98-8	0.006	0.013	0.011
8	EV98-9	<0.005	0.006	0.009

APPENDIX 2

Petrographic Descriptions

Petrographic Report #HMZ

September 8, 1998

for

Thomas L. Robyn
ST Group, Inc.
1551 Prairie Owl Rd.
Parker, CO 80134

by

Michael DePangher, Ph.D.
Spectrum Petrographics, Inc.

Comments

"EV" Samples

All of these samples can be regarded as essentially the same. The protolith is unclear, but appears to have been dominated by mafic minerals. The protolith was probably dominantly biotite + hornblende and/or clinopyroxene. Mafic mineral alteration shows multiple types superimposed. Hornblende/clinopyroxene is altered first to [actinolite + quartz + opaques]. The secondary actinolite is then altered to secondary biotite, which is subsequently altered to [chlorite + sphene]. Timing of various sulfide and oxide opaques is indeterminate, except that euhedral overgrowths of specular hematite on hemo-ilmenite seem to be very late. Chalcopyrite commonly occurs intergrown with secondary biotite, suggesting that chalcopyrite was introduced during the "potassic" alteration event that produced the secondary biotite. Apatite is almost certainly secondary, but the timing of its introduction is indeterminate.

Lithogeochemical Analyses

As noted in the original analysis certificates, the "geochemical" analyses involved a digestion procedure that is probably incomplete for certain minerals in some types of samples. The lithium metaborate fusion and digestion achieves complete breakdown of all minerals and is therefore the better of the two when comparing "geochemical" versus "whole rock ICP" analyses for a single element.

Key to Petrographic and Photomicrographic Descriptions

Clay minerals common in altered rocks must often be identified by X-ray diffraction either because their optic properties are not diagnostic or because they are too fine grained to be reliably identified by optical methods. The term "clay" is used herein to denote fine grained phyllosilicates in general. Under ideal conditions, it is often possible to optically discriminate between 4 major groups: kaolinite, smectite, mica (including illite), and chlorite. This is done whenever conditions permit.

The term "sericite" is applied to fine grained colorless phyllosilicates that show upper 2nd order maximum interference colors. These could include muscovite, illite, paragonite, lepidolite, margarite, clintonite, pyrophyllite, and talc. The term "intermediate clay" is applied to fine grained very pale or colorless phyllosilicates that show upper 1st order maximum interference colors. These are probably dominated by chlorite, smectite, and mixed-layer illite/smectite.

The term "opaques" is used to refer to all materials opaque (and sometimes semi-opaque) to transmitted light. The term "FEOH" is herein used to indicate fine grained, yellowish to reddish brown, earthy materials of varying opacity in transmitted light. FEOH is probably mostly Fe oxy-hydroxides but may sometimes include sphalerite, realgar, orpiment, jarosite, a number of Mn oxy-hydroxides, and organic matter.

Particle size distributions are given as (A-B-C μm), where A, B, and C are the smallest, median, and largest particle sizes, respectively, in microns. A question mark (?) in the position of A, B, or C indicates that the value of A, B, or C was indeterminate, probably because of excessively large or small particle size or statistically insignificant numbers of particles.

Mineral abundances are visual estimates. For multi-lithologic materials (cuttings, etc...), mineralogy, textures, and alteration are described only for the dominant lithology.

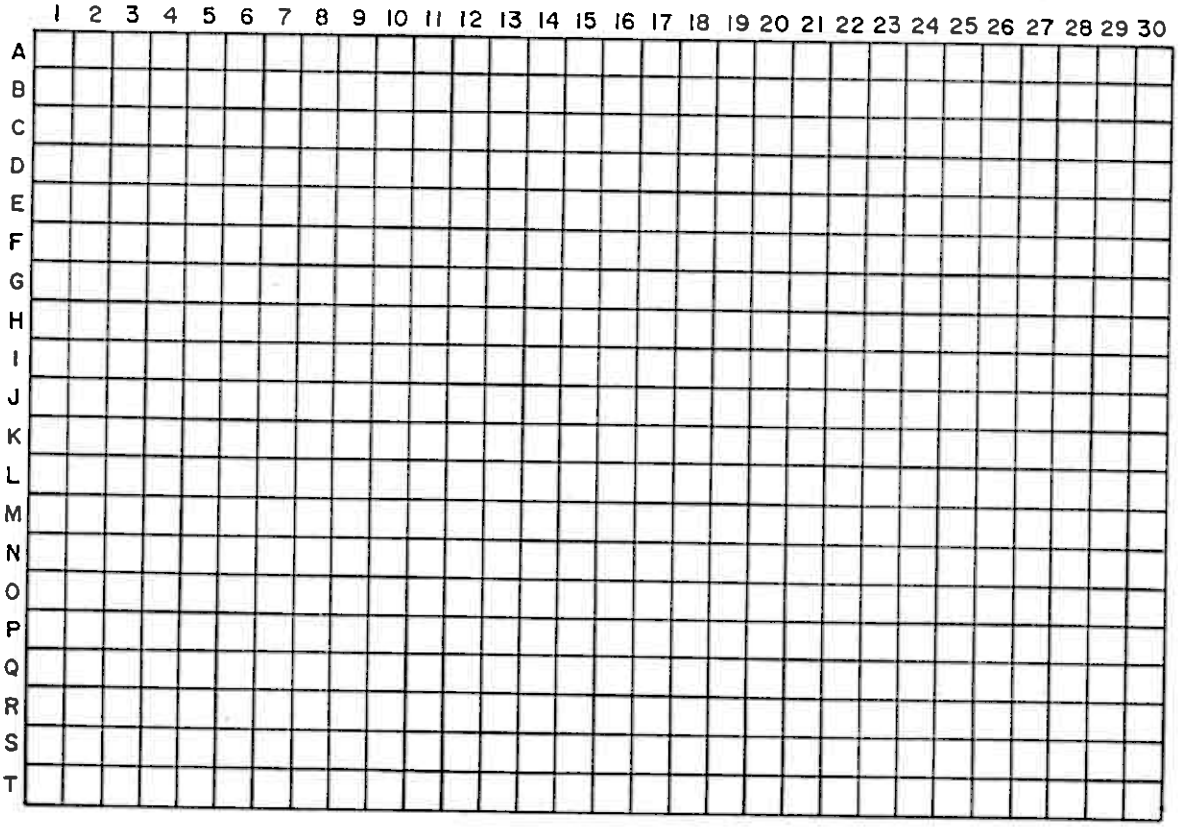
Section preparation codes are as follows: (1) Format: 27 x 46 mm, 51 x 76 mm, or 1" round; (2) Finish: standard lapping (STD) or polished (POL); (3) Stains: sodium cobaltinitrite (SCN), alizarin red S (ARS), potassium ferricyanide (PF), and barium chloride + potassium rhodizonate (BCPR); and (4) Cover: none, permanent Loctite acrylic (PLA), or removable Canada Balsam (RCB).

Photomicrograph captions/labels contain the following items of information in consecutive order separated by forward slashes: (1) sample identification, (2) film roll number, (3) frame number, (4) type of illumination, (5) field of view (FOV) or the magnification on the color print, which is given as the number of times actual size (ie., 32X), and (6) the job identification number. "PPL" indicates plane-polarized light; "XPL indicates cross-polarized light. "R" indicates reflected light. "550" means that a 550 nanometer wavelength plate was inserted to highlight features of extremely low birefringence. "C" indicates that the substage condenser was in (sometimes used for Fe-oxides). "O" indicates substage condenser in an oblique position. These various illuminations can be combined. "CON" indicates conoscopic illumination. For normal photography of hand specimens, the focal length of the lens used is given rather than the magnification. POL means that a polarizing filter was used with the lens, and DAY means the sample was photographed in diffused daylight.

Features on photomicrographs can be located by overlaying the accompanying orthogonal plastic grid. A block of squares is marked by referencing the uppermost left and lowermost right corners of the block, ie. A6-E15. Linear features are marked by designating the extent of the feature from beginning to ending points, ie. B6 to L19.

A question mark after a rock or mineral name in a petrographic description means that there is some degree of uncertainty about the identification of that rock or mineral.

The size of an alteration selvege around a vein is given as a half-width (the width of a selvege on one side of the vein) expressed as a fraction of the associated vein width (vw).



For proper photo grid registration, align the top and left sides of the grid with the top and left sides of the photo.

SAMPLE # EV-FOD1 September 8, 1998

ROCK NAME ALTERED DIORITE -- probably formed by alteration (secondary hornblende + quartz + magnetite + sericite + hematite/goethite) of a fine to medium grained diorite intrusive rock.

MINERALS Plagioclase (45%) + hornblende (17%) + biotite (15%) + quartz (10%) + magnetite (4%) + hemo-ilmenite (4%) + apatite (3%) + sericite (1%) + pyrite (1%) + hematite/goethite (1%) + zircon (<1%) + chalcopyrite (<1%). Hemo-ilmenite shows fine specular hematite exsolution lamellae.

TEXTURES Phaneritic, holocrystalline, seriate, allotriomorphic, fine to medium grained, non-directed fabric.

ALTERATION The following alteration features are present but of indeterminate relative ages: (1) plagioclase weakly altered to sericite; (2) primary biotite moderately altered to hornblende + magnetite + quartz; (3) pyrite and chalcopyrite moderately altered to hematite/goethite.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN + ARS + PF Cover: PLA
Format: 27 x 46 mm Finish: POL Stains: none Cover: none

PHOTOS EV-FOD1/98017/02/DAY/3X/HMZ ALTERED DIORITE showing typical appearance of hand specimen.

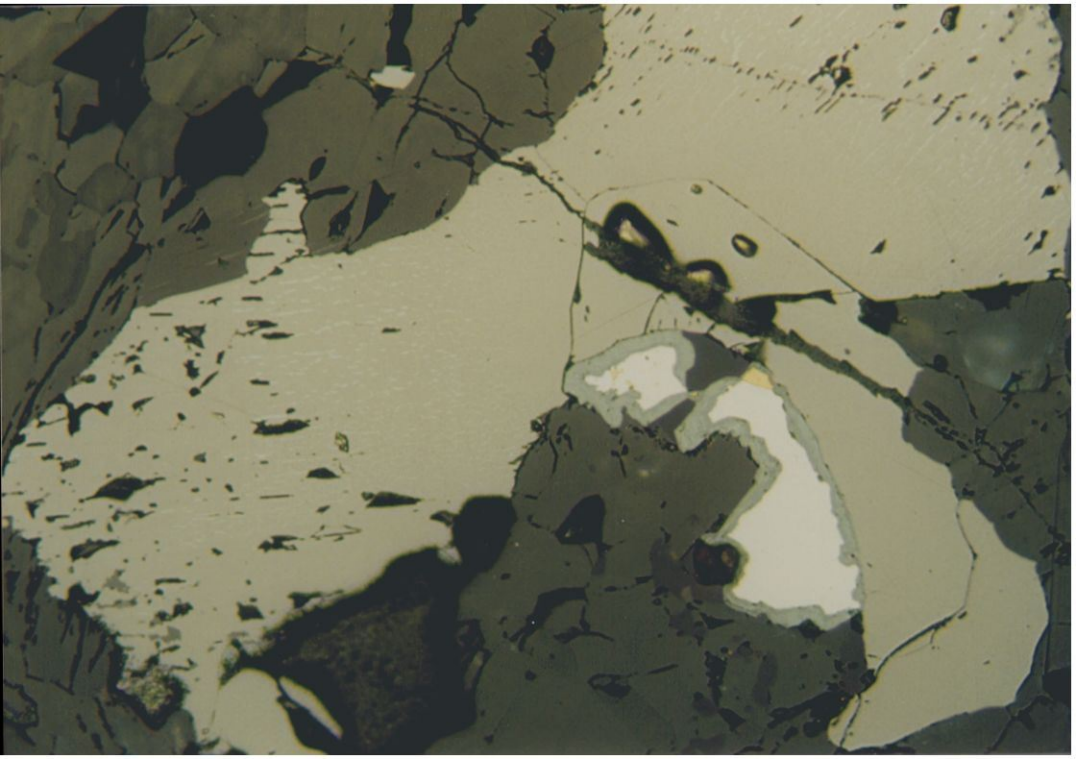
EV-FOD1/98019/31/XPL/28X/HMZ ALTERED DIORITE showing typical less altered appearance with primary biotite (K22) moderately altered to [hornblende + magnetite + quartz] (M22-O23).

EV-FOD1/98019/32/PPL+R/227X/HMZ ALTERED DIORITE showing typical appearance of hemo-ilmenite exsolution (H9-K14) and pyrite (O21) and chalcopyrite (J20) moderately altered to (rimmed by) hematite/goethite (K17).

Spectrum Petrographics, Inc. 499 Dillard Gardens Road, Suite 2 · Winston · OR · 97496 · USA Phone (800) 625-2476

EV-F0D1/98017/02/DAY/3X/HMZ
ALTERED DIORITE showing typical appearance of hand specimen.

EV-FOD1/98019/31/XPL/28X/HMZ
ALTERED DIORITE showing typical less altered appearance with primary biotite (K22) moderately altered to [hornblende + magnetite + quartz] (M22-023).



EV-F0D1/98019/32/PPL+R/227X/HMZ
ALTERED DIORITE showing typical appearance of hemo-ilmenite exsolution (H9-K14) and pyrite (021) and chalcopyrite (J20) moderately altered to (rimmed by) hematite/goethite (K17).

SAMPLE # EV-FOD2 September 8, 1998

ROCK NAME ALTERED DIORITE -- probably formed by alteration (secondary hornblende + quartz + sericite + magnetite + chlorite + sphene) of a fine to medium grained diorite intrusive rock.

MINERALS Plagioclase (50%) + hornblende (16%) + biotite (10%) + hemo-ilmenite (6%) + quartz (4%) + sericite (4%) + apatite (4%) + magnetite (2%) + chlorite (1%) + pyrite (1%) + pyrrhotite (1%) + chalcopyrite (1%) + zircon (<1%) + sphene (<1%) + unknown opaque (<1%). An unknown white isotropic opaque occurs as inclusions within pyrrhotite. Chemistry shows no unusual concentration of metals that would explain it. Magnetite + pyrite + pyrrhotite + chalcopyrite + unknown occur intergrown with each other. Hemo-ilmenite shows coarse exsolution domains of specular hematite but only rare inclusions or intergrowths with any other opaques.

TEXTURES Phaneritic, holocrystalline, equigranular, allotriomorphic, fine to medium grained, non-directed fabric.

ALTERATION The following alteration features are present but of indeterminate relative ages: (1) plagioclase weakly altered to sericite; (2) primary biotite moderately altered to [hornblende + magnetite + quartz] (late magmatic ?) or weakly altered to [chlorite + sphene] (post-magmatic ?); and (3) pyrrhotite, pyrite, and chalcopyrite weakly altered to magnetite.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN + ARS + PF Cover: PLA
Format: 27 x 46 mm Finish: POL Stains: none Cover: none

PHOTOS EV-FOD2/98017/03/DAY/3X/HMZ ALTERED DIORITE showing typical appearance of hand specimen.

EV-FOD2/98019/33/XPL/28X/HMZ ALTERED DIORITE showing typical appearance with abundant large apatite crystals (E11, E14, L11, R8).

EV-FOD2/98019/34/PPL+R/57X/HMZ ALTERED DIORITE showing typical appearance of hemo-ilmenite exsolution (K15-M18) and pyrrhotite (O9), pyrite (I9), and chalcopyrite (K23) weakly altered to magnetite (F21).

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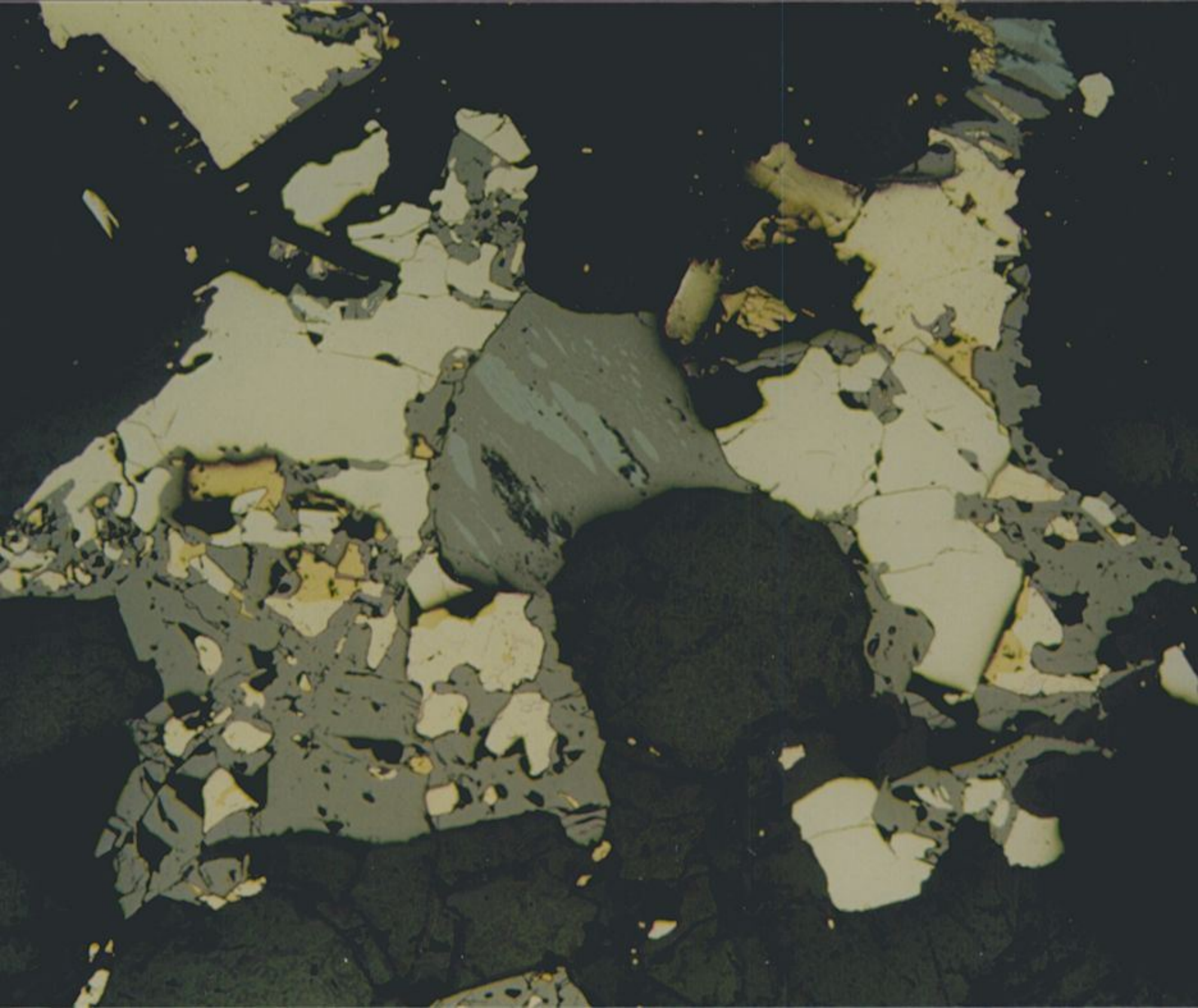
EV-FOD2/98017/03/DAY/3X/HMZ
ALTERED DIORITE showing typical appearance of hand specimen.

EV-F002/98019/33/XPL/28X/HMZ
ALTERED DIORITE showing typical appearance with abundant large apatite crystals (E11, E14, L11, R8).



EV-FOD2/98019/34/PPL+R/57X/HMZ
ALTERED DIORITE showing typical appearance of hemo-ilmenite exsolution (K15-M18) and pyrrhotite (O9), pyrite (I9), and chalcopyrite (K23) weakly altered to magnetite (F21).

SAMPLE # EV98-1 September 8, 1998

ROCK NAME ALTERED AMPHIBOLITE -- probably formed by regional metamorphism of a mafic igneous (diorite ?) protolith.

MINERALS Actinolite (93%) + pyrrhotite (4%) + magnetite (1%) + pyrite (1%) + chalcopyrite (1%) + plagioclase (<1%) + biotite (<1%).

TEXTURES Phaneritic, equigranular, hypidiomorphic, fine grained, non-directed fabric.

ALTERATION The following alteration features are also present but of indeterminate relative ages: (1) primary biotite strongly altered to actinolite.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN + ARS + PF Cover: PLA
Format: 27 x 46 mm Finish: POL Stains: none Cover: none

PHOTOS EV98-1/98017/04/DAY/3X/HMZ ALTERED AMPHIBOLITE showing typical appearance of hand specimen.

EV98-1/98019/35/XPL/28X/HMZ ALTERED AMPHIBOLITE showing typical appearance of massive actinolite.

EV98-1/98019/36/PPL+R/114X/HMZ ALTERED AMPHIBOLITE showing typical appearance of pyrrhotite (P1-T5) and chalcopyrite (D13).

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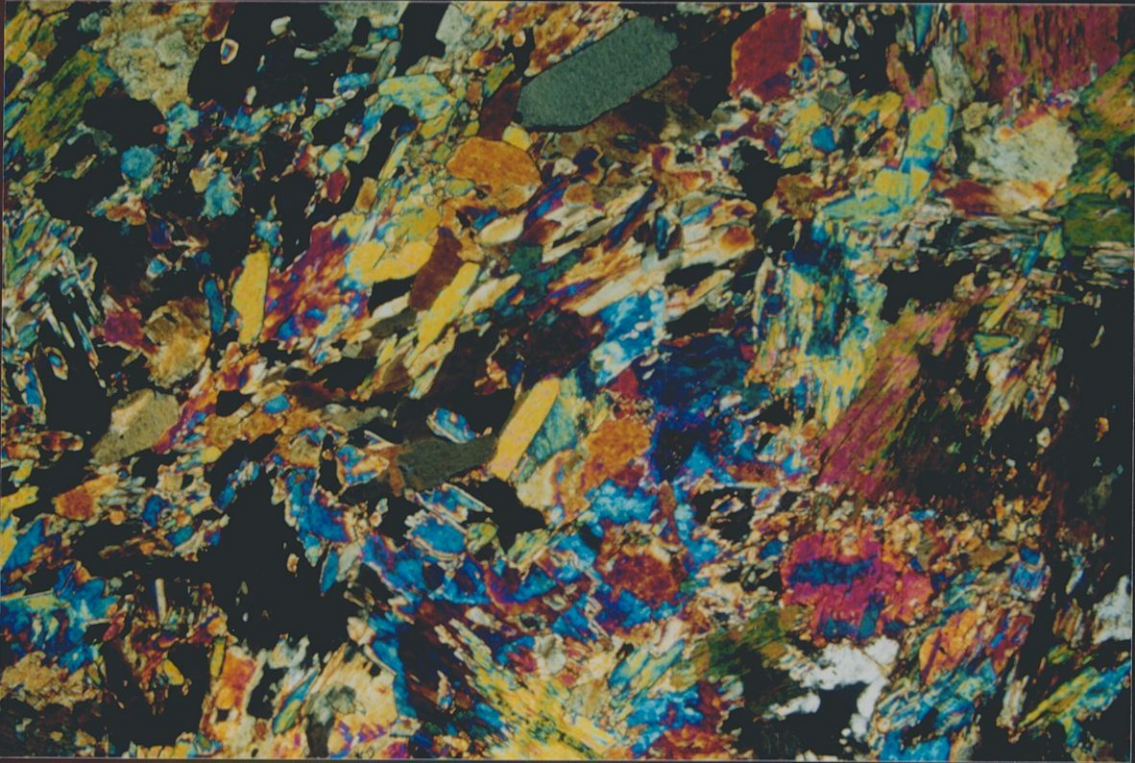
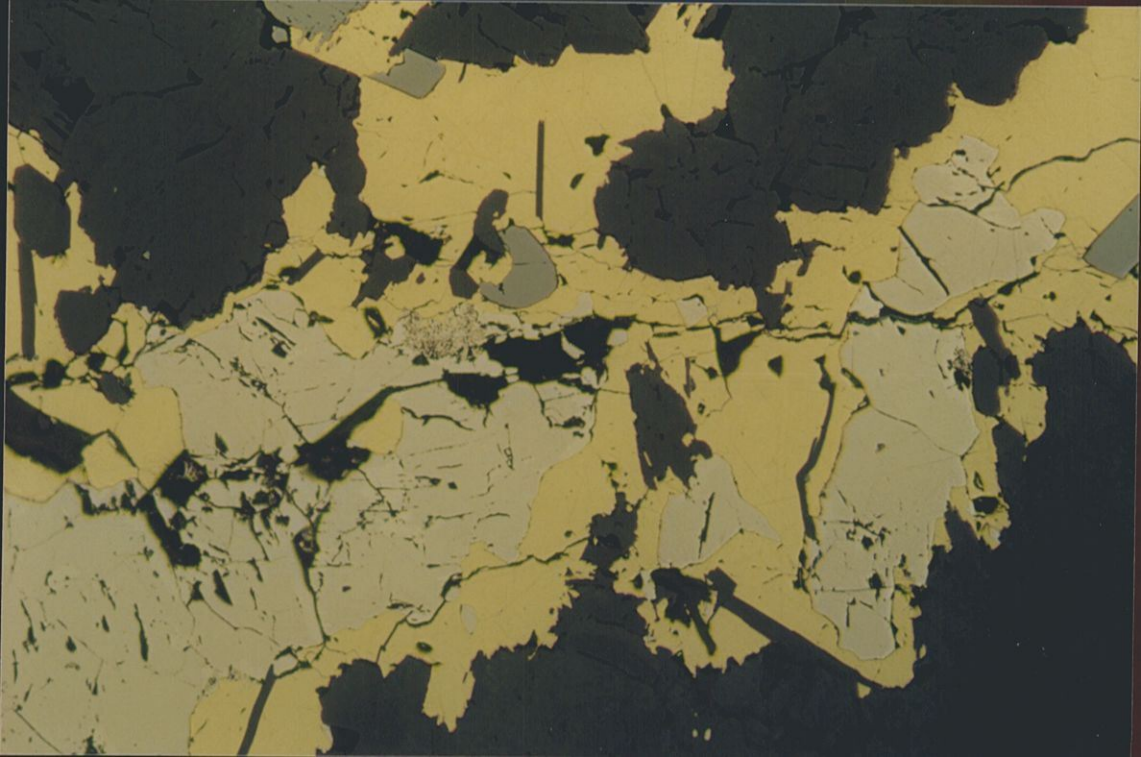
EV98-1/98017/04/DAY/3X/HMZ
ALTERED AMPHIBOLITE showing typical appearance of hand specimen.



EV98-1/98019/35/XPL/28X/HMZ
ALTERED AMPHIBOLITE showing typical appearance of massive actinolite.



EV98-1/98019/36/PPL+R/114X/HMZ
ALTERED AMPHIBOLITE showing typical appearance of pyrrhotite (P1-T5) and chalcopyrite (D13).

SAMPLE # EV98-2 September 8, 1998

ROCK NAME ACTINOLITE-PLAGIOCLASE SCHIST -- probably formed by regional metamorphism (secondary hematite/goethite) of a quartz diorite intrusive rock or equivalent feldspathic clastic rock.

MINERALS Plagioclase (51%) + quartz (15%) + actinolite (15%) + magnetite (6%) + biotite (5%) + clinopyroxene (4%) + hemo-ilmenite (2%) + apatite (1%) + zircon (1%) + K-feldspar (<1%) + pyrite (<1%) + hematite/goethite (<1%).

TEXTURES Phaneritic, holocrystalline, granoblastic, fine grained, moderately directed metamorphic fabric.

ALTERATION The following alteration features are present but of indeterminate relative ages: (1) clinopyroxene strongly altered to actinolite + quartz + magnetite; and (2) pyrite moderately altered to hematite/goethite.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN + ARS + PF Cover: PLA
Format: 27 x 46 mm Finish: POL Stains: none Cover: none

PHOTOS EV98-2/98017/05/DAY/3X/HMZ ACTINOLITE-PLAGIOCLASE SCHIST showing typical appearance of hand specimen.

EV98-2/98020/01/XPL/28X/HMZ ACTINOLITE-PLAGIOCLASE SCHIST showing typical appearance.

EV98-2/98020/02/PPL+R/114X/HMZ ACTINOLITE-PLAGIOCLASE SCHIST showing typical appearance of magnetite (H5-L20) and hemo-ilmenite (O16-R17, S23).

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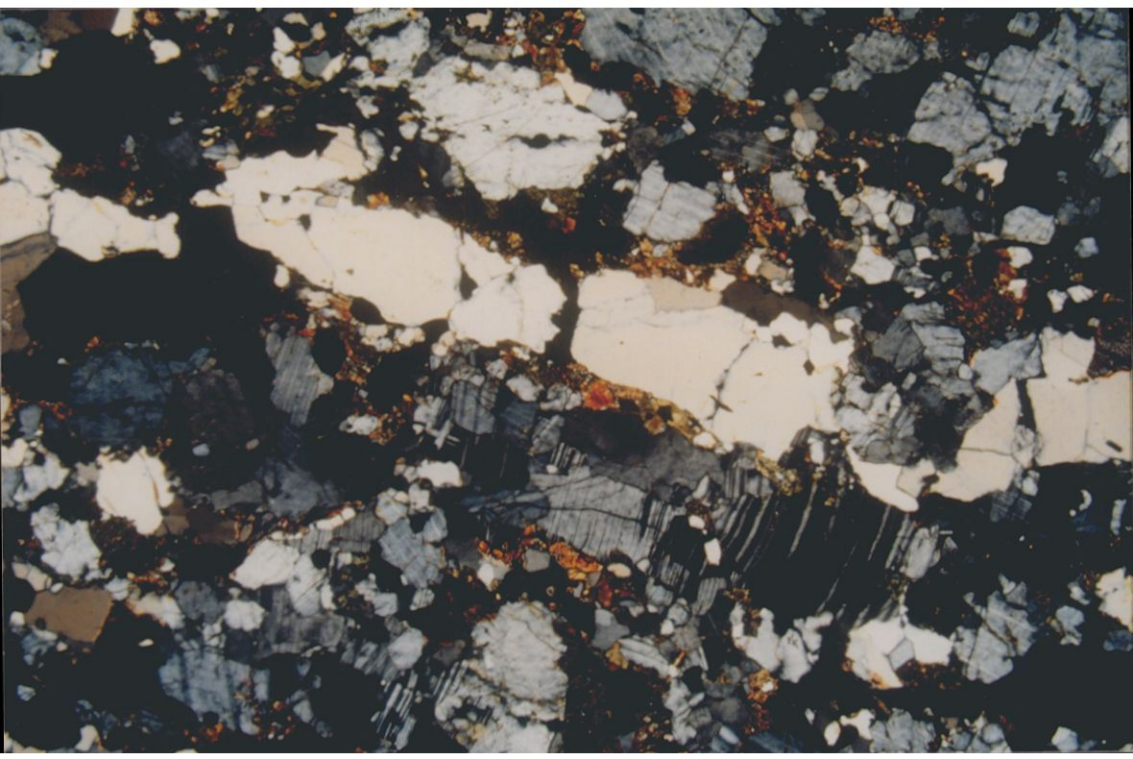
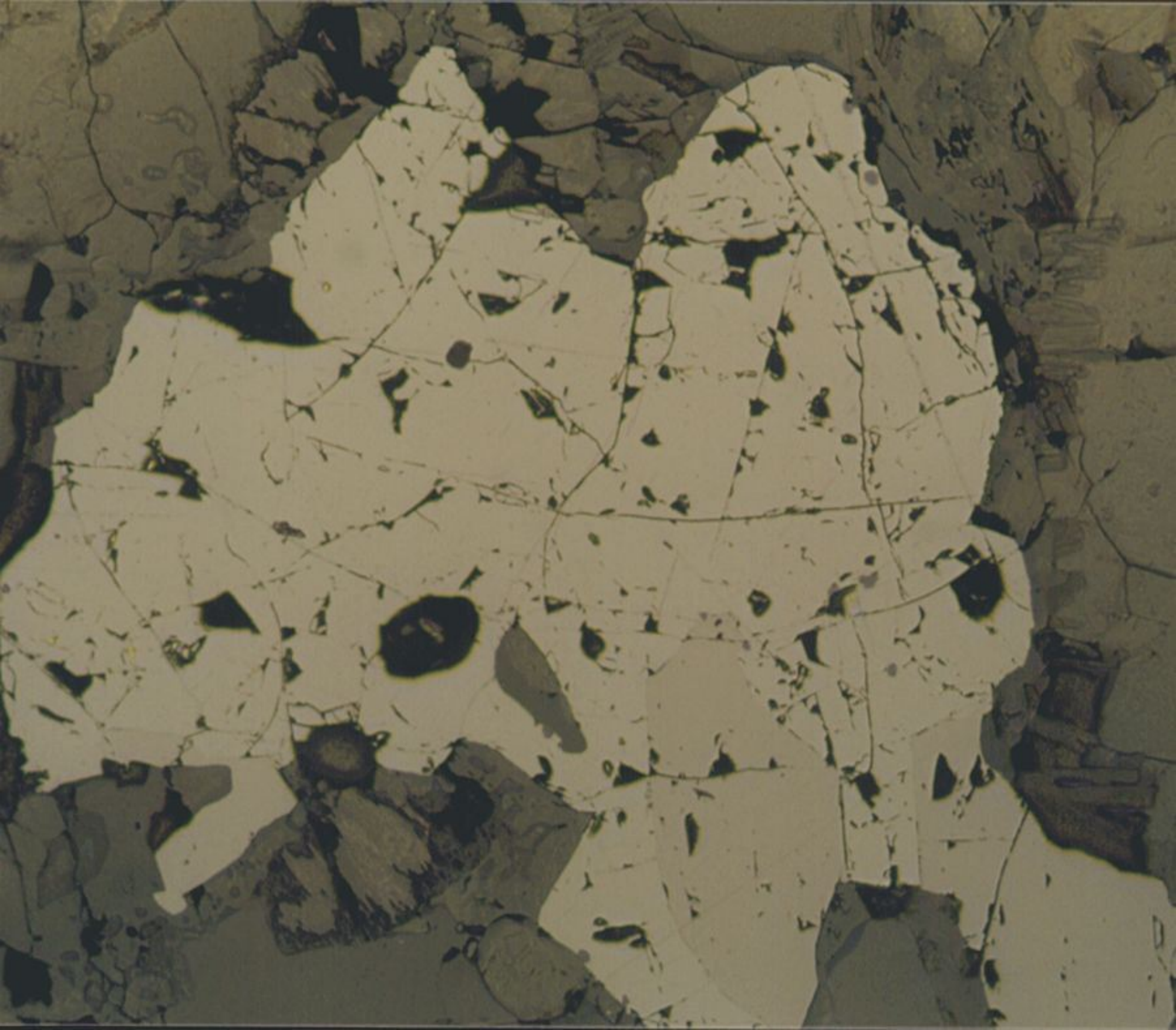
EV98-2/98017/05/DAY/3X/HMZ
ACTINOLITE-PLAGIOCLASE SCHIST showing typical appearance of hand specimen.



EV98-2/98020/01/XPL/28X/HMZ
ACTINOLITE-PLAGIOCLASE SCHIST showing typical appearance.



EV98-2/98020/02/PPL+R/114X/HMZ
ACTINOLITE-PLAGIOCLASE SCHIST showing typical appearance of magnetite (H5-L20) and hemo-ilmenite (016-R17, S23).

SAMPLE # EV98-3 September 8, 1998

ROCK NAME ALTERED MAFIC IGNEOUS ROCK (?) -- probably formed by regional metamorphism and alteration (secondary chlorite + pyrite + hematite + quartz + pyrrhotite + chalcopyrite + biotite + sphene) of an amphibolite (?) precursor.

MINERALS Actinolite (18%) + chlorite (18%) + pyrite (16%) + quartz (10%) + magnetite (no exsolution) (9%) + pyrrhotite (7%) + chalcopyrite (7%) + hemo-ilmenite (6%) + biotite (mostly secondary) (5%) + apatite (3%) + sphene (1%). All opaques occur intergrown with each other. Hemo-ilmenite shows fine exsolution lamellae of specular hematite.

TEXTURES Phaneritic, equigranular, granoblastic, fine grained, non-directed fabric.

ALTERATION The following alteration features are also present but of indeterminate relative ages: (1) primary clinopyroxene (?) completely altered to actinolite + quartz + opaques; (2) primary biotite strongly altered to chlorite + opaques + quartz + sphene; (3) actinolite moderately altered to chlorite + sphene + opaques + quartz; (4) pyrrhotite and pyrite in an indeterminate reaction relationship; (5) pyrite, pyrrhotite, and chalcopyrite moderately altered to magnetite; and (6) secondary biotite and chlorite and actinolite in an indeterminate reaction relationship.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN + ARS + PF Cover: PLA
Format: 27 x 46 mm Finish: POL Stains: none Cover: none

PHOTOS EV98-3/98017/06/DAY/3X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of abundant sulfides in hand specimen.

EV98-3/98020/03/XPL/28X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of chlorite (blue, H11-K13) + actinolite (J16) + opaques + large apatite crystals (Q11, K14).

EV98-3/98020/04/XPL/28X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of chlorite (blue, O9-S14) + actinolite (H14) + opaques.

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EV98-3/98017/06/DAY/3X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of abundant sulfides in hand specimen.

EV98-3/98020/03/XPL/28X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of chlorite (blue, H11-K13) + actinolite (J16) + opaques + large apatite crystals (Q11, K14).

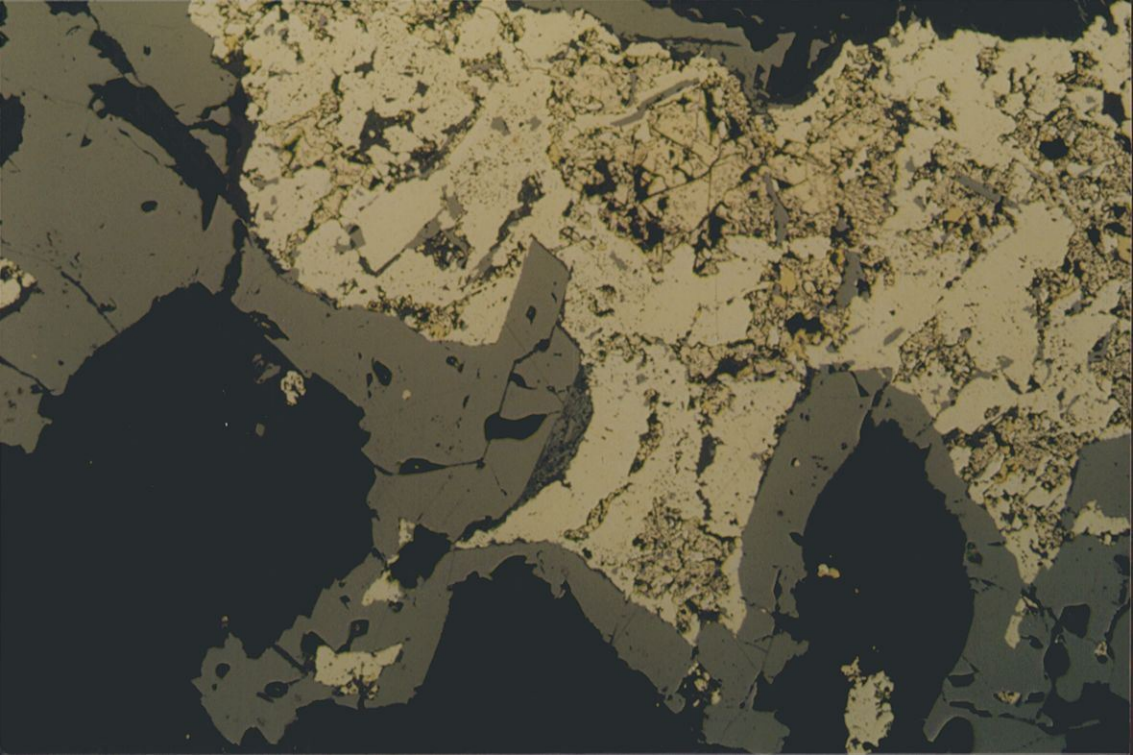
EV98-3/98020/04/XPL/28X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of chlorite (blue, 09-S14) + actinolite (H14) + opaques.

SAMPLE # EV98-3 continued September 8, 1998

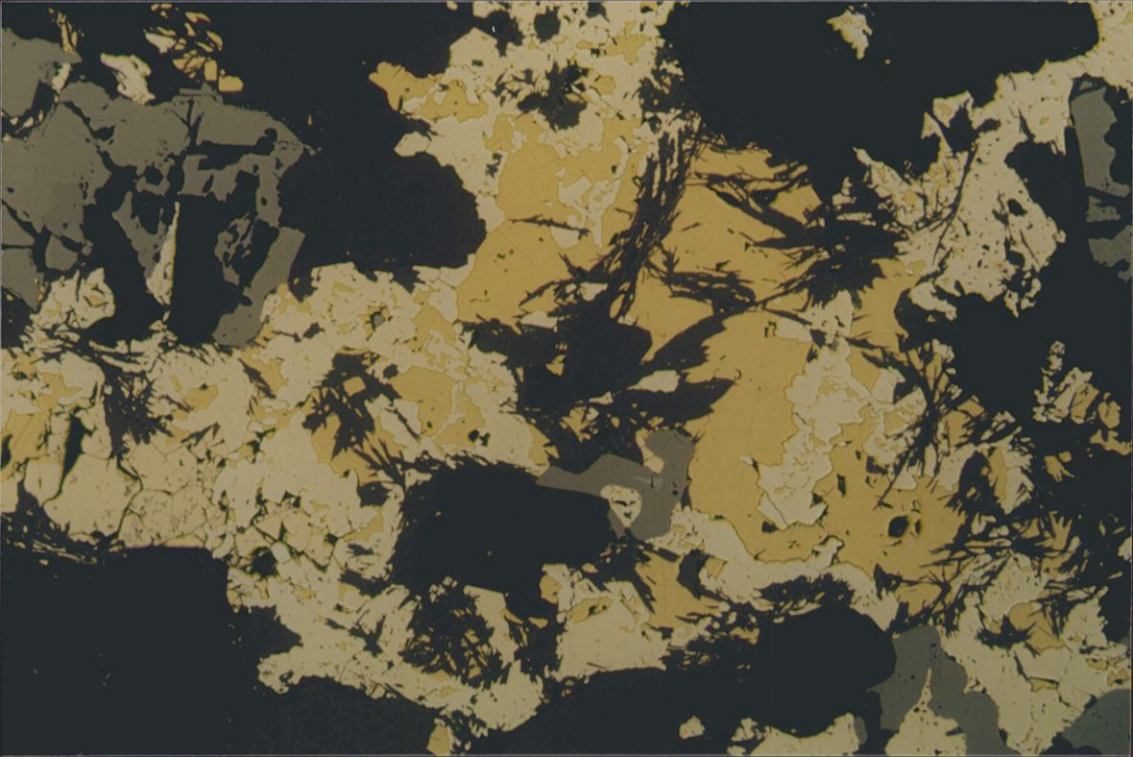
PHOTOS

EV98-3/98020/05/PPL+R/114X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of pyrite (M16) and pyrrhotite (D18) moderately altered to (rimmed by) magnetite (K12).

EV98-3/98020/06/PPL+R/114X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of intergrown [chalcopyrite (L20) + secondary biotite (G17) + pyrite (M8) + pyrrhotite (N5).



EV98-3/98020/05/PPL+R/114X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of pyrite (M16) and pyrrhotite (D18) moderately altered to (rimmed by) magnetite (K12).



EV98-3/98020/06/PPL+R/114X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of intergrown [chalcopyrite (L20) + secondary biotite (G17) + pyrite (M8) + pyrrhotite (N5).

SAMPLE # EV98-5 September 8, 1998

ROCK NAME ALTERED MAFIC IGNEOUS ROCK (?) -- probably formed by regional metamorphism and alteration of a mafic igneous intrusive protolith.

MINERALS Specular hematite (no exsolution) (33%) + actinolite (21%) + chlorite (20%) + hemo-ilmenite (11%) + apatite (5%) + magnetite (no exsolution) (3%) + chalcopyrite (3%) + sphene (2%) + epidote (2%) + biotite (<1%) + pyrrhotite (<1%). Hemo-ilmenite shows fine specular hematite exsolution lamellae.

TEXTURES Phaneritic, equigranular, granoblastic, fine to medium grained, non-directed fabric.

ALTERATION The following alteration features are also present but of indeterminate relative ages: (1) biotite strongly altered to [chlorite + sphene + epidote + opaques]; (2) hornblende/pyroxene (?) completely altered to actinolite + apatite + opaques; (3) pyrrhotite and chalcopyrite both moderately altered to magnetite and/or hematite; and (4) hemo-ilmenite moderately altered to and overgrown by euhedral specular hematite.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN + ARS + PF Cover: PLA
Format: 27 x 46 mm Finish: POL Stains: none Cover: none

PHOTOS EV98-5/98017/07/DAY/3X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hand specimen with abundant euhedral specular hematite (O6).

EV98-5/98020/07/XPL/28X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of chlorite (B9-G10) + actinolite (P11) + euhedral specular hematite (E17).

EV98-5/98020/08/PPL+R/57X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hemo-ilmenite (N12-14) moderately altered to and overgrown by euhedral specular hematite (P8, H9, A19).

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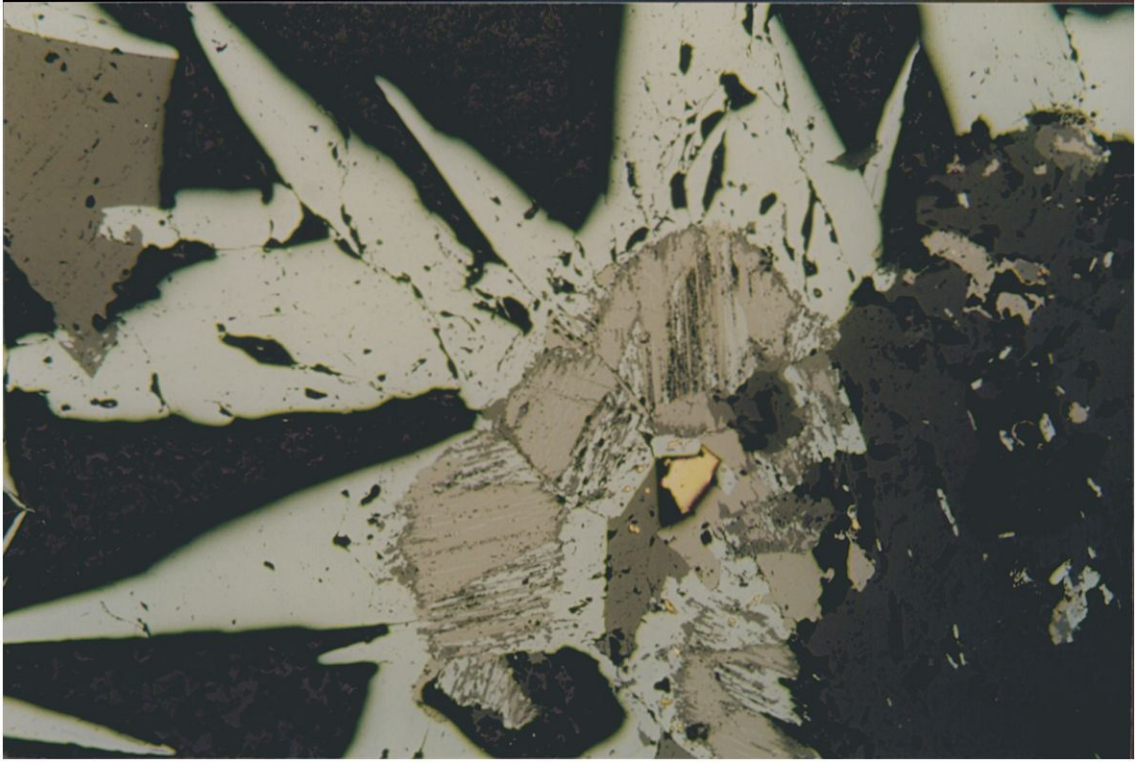
EV98-5/98017/07/DAY/3X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hand specimen with abundant euhedral specular hematite (06).

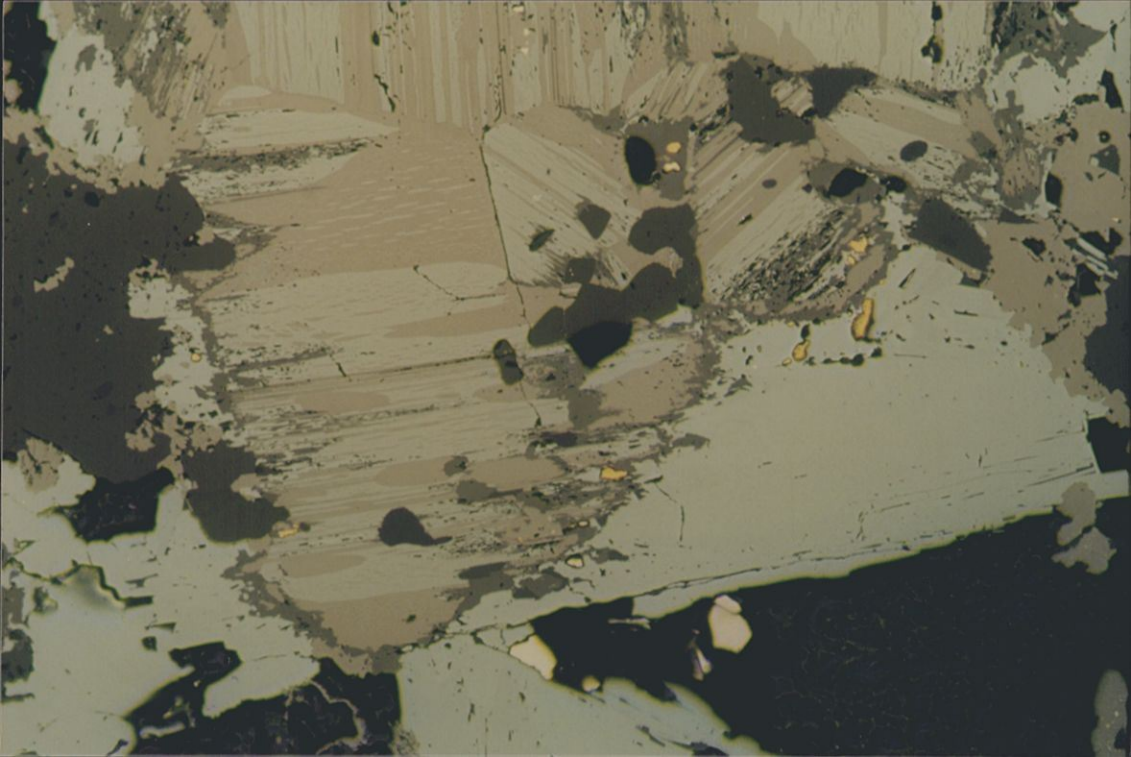
EV98-5/98020/07/XPL/28X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of chlorite (B9-G10) + actinolite (P11) + euhedral specular hematite (E17).



EV98-5/98020/08/PPL+R/57X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hemo-ilmenite (N12-14) moderately altered to and overgrown by euhedral specular hematite (P8, H9, A19).

SAMPLE # EV98-5 continued September 8, 1998

PHOTOS EV98-5/98020/09/PPL+R/114X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hemo-ilmenite exsolution (F9-L13) composed of ilmenite host (darker gray, G13) and exsolved specular hematite (H11).



EV98-5/98020/09/PPL+R/114X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hemo-ilmenite exsolution (F9-L13) composed of ilmenite host (darker gray, G13) and exsolved specular hematite (H11).

SAMPLE # # T. Crebs 1

September 8, 1998

ROCK NAME ALTERED MAFIC IGNEOUS ROCK (?) -- probably formed by regional metamorphism and alteration of a mafic igneous intrusive protolith (probably the same as EV98-5).

MINERALS Actinolite (25%) + chlorite (25%) + hemo-ilmenite (17%) + specular hematite (no exsolution) (17%) + apatite (5%) + magnetite (3%) + quartz (3%) + sphene (3%) + pyrrhotite (1%) + chalcopyrite (1%) + biotite (<1%) + epidote (<1%) + unknown white opaque (possibly bravoite ?) (<1%). Hemo-ilmenite shows extremely fine specular hematite exsolution lamellae.

TEXTURES Phaneritic, equigranular, granoblastic, fine to medium grained, non-directed fabric.

ALTERATION The following alteration features are also present but of indeterminate relative ages: (1) biotite strongly altered to [chlorite + sphene + epidote + opaques]; (2) hornblende/pyroxene (?) completely altered to [actinolite + quartz + apatite + opaques]; (3) pyrrhotite and chalcopyrite both moderately altered to magnetite and/or hematite; and (4) hemo-ilmenite moderately altered to and overgrown by euhedral specular hematite.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN + ARS + PF Cover: PLA
Format: 27 x 46 mm Finish: POL Stains: none Cover: none

PHOTOS T. Crebs 1/98017/16/DAY/3X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hand specimen with distinctive secondary euhedral specular hematite (N12).

T. Crebs 1/98020/28/XPL/28X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of chlorite (J13) + actinolite (Q23) + large apatite crystals (F12, N8, R8, S13, C19).

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T. Crebs 1/98017/16/DAY/3X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hand specimen with distinctive secondary euhedral specular hematite (N12).

T. Crebs 1/98020/28/XPL/28X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of chlorite (J13) + actinolite (Q23) + large apatite crystals (F12, N8, R8, S13, C19).

SAMPLE # # T. Crebs 1 continued September 8, 1998

PHOTOS

T. Crebs 1/98020/29/PPL+R/114X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of inclusions of an unidentified "white" opaque mineral (F17) in pyrite (N20).

T. Crebs 1/98020/30/PPL+R/114X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hemo-ilmenite (J19-N22) moderately altered to and overgrown by euhedral specular hematite (C3).

T. Crebs 1/98020/31/PPL+R/114X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing magnetite (D8), pyrite (Q15), chalcopyrite (I14), and specular hematite (I16).

T. Crebs 1/98020/29/PPL+R/114X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of inclusions of an unidentified 'white' opaque mineral (F17) in pyrite (N20).

T. Crebs 1/98020/31/PPL+R/114X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing magnetite (D8), pyrite (Q15), chalcopyrite (I14), and specular hematite (I16).

T. Crebs 1/98020/30/PPL+R/114X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hemo-ilmenite (J19-N22) moderately altered to and overgrown by euhedral specular hematite (C3).

SAMPLE # # T. Crebs 2

September 8, 1998

ROCK NAME ALTERED MAFIC IGNEOUS ROCK (?) -- probably formed by regional metamorphism and alteration of a mafic igneous intrusive protolith (probably the same as EV98-5 and T. Crebs 1).

MINERALS Chlorite (29%) + pyrite (24%) + biotite (10%) + actinolite (10%) + hemo-ilmenite (8%) + quartz (5%) + apatite (4%) + chalcopyrite (4%) + pyrrhotite (4%) + sphene (2%). Hemo-ilmenite shows sparse extremely fine specular hematite exsolution lamellae. Discrete Ni minerals were not observed.

TEXTURES Phaneritic, equigranular, granoblastic, fine to medium grained, non-directed fabric.

ALTERATION The following alteration features are also present but of indeterminate relative ages: (1) biotite strongly altered to [chlorite + sphene + opaques]; (2) hornblende/pyroxene (?) completely altered to [actinolite + quartz + opaques], which is subsequently strongly altered to biotite, which is subsequently strongly altered to [chlorite + sphene]; and (3) pyrite, pyrrhotite, and chalcopyrite weakly altered to magnetite.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN + ARS + PF Cover: PLA
Format: 27 x 46 mm Finish: POL Stains: none Cover: none

PHOTOS T. Crebs 2/98017/17/DAY/3X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hand specimen dominated by chlorite (in dark areas) + pyrite.

T. Crebs 2/98020/32/XPL/28X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of chlorite (blue, H11, M19, E22) + actinolite (D13).

T. Crebs 2/98020/33/PPL+R/114X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of [pyrite (K16) + pyrrhotite (L22) + chalcopyrite (O17) weakly altered to (rimmed by) magnetite (K6)].

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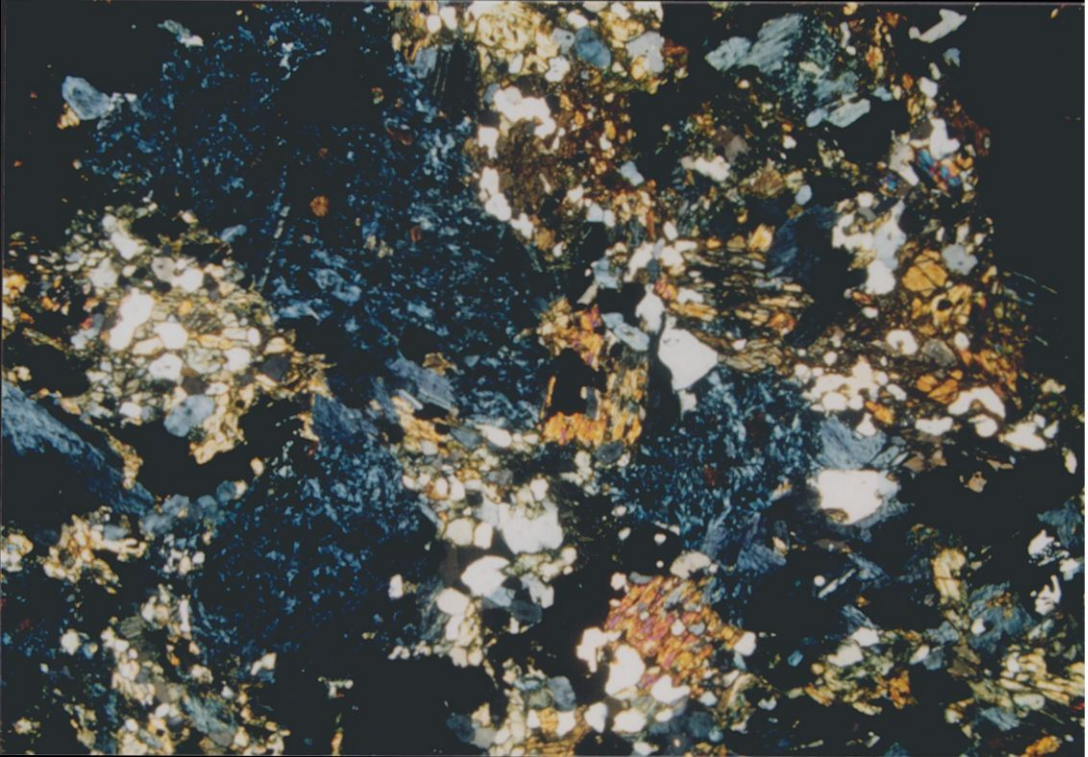
T. Crebs 2/98017/17/DAY/3X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hand specimen dominated by chlorite (in dark areas) + pyrite.



T. Crebs 2/98020/32/XPL/28X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of chlorite (blue, H11, M19, E22) + actinolite (D13).

T. Crebs 2/98020/33/PPL+R/114X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of [pyrite (K16) + pyrrhotite (L22) + chalcopyrite (017) weakly altered to (rimmed by) magnetite (K6)].

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SAMPLE # # TR Flat 1

September 8, 1998

ROCK NAME ALTERED MAFIC IGNEOUS ROCK (?) -- probably formed by regional metamorphism and alteration of a mafic igneous intrusive protolith.

MINERALS Pyrite (26%) + chlorite (15%) + biotite (15%) + actinolite (8%) + quartz (8%) + hemo-ilmenite (8%) + chalcopyrite (8%) + pyrrhotite (8%) + apatite (3%) + sphene (1%) + unknown white opaque (possibly bravoite ?) (<1%). Hemo-ilmenite shows specular hematite exsolution lamellae.

TEXTURES Phaneritic, equigranular, granoblastic, fine to medium grained, non-directed fabric.

ALTERATION The following alteration features are also present but of indeterminate relative ages: (1) biotite moderately altered to [chlorite + sphene + opaques]; (2) hornblende/pyroxene (?) completely altered to [actinolite + quartz + opaques]; and (3) pyrite, pyrrhotite, and chalcopyrite are intergrown with hemo-ilmenite.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN + ARS + PF Cover: PLA
Format: 27 x 46 mm Finish: POL Stains: none Cover: none

PHOTOS TR Flat 1/98017/18/DAY/3X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hand specimen with abundant sulfide.

TR Flat 1/98020/34/XPL/28X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of chlorite (blue, D6) + secondary biotite (K21).

TR Flat 1/98020/35/PPL+R/114X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of pyrite (P23), pyrrhotite (L4), magnetite (I11), and [chalcopyrite (A17) intimately intergrown with secondary biotite (I18)].

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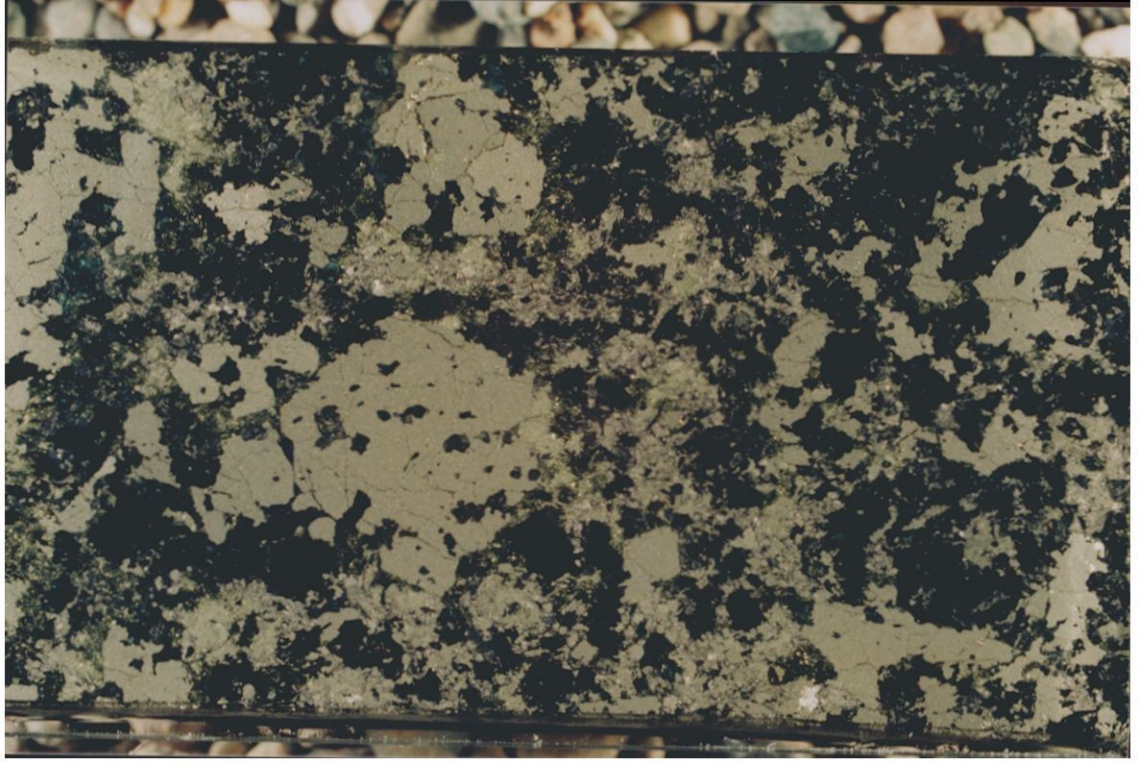
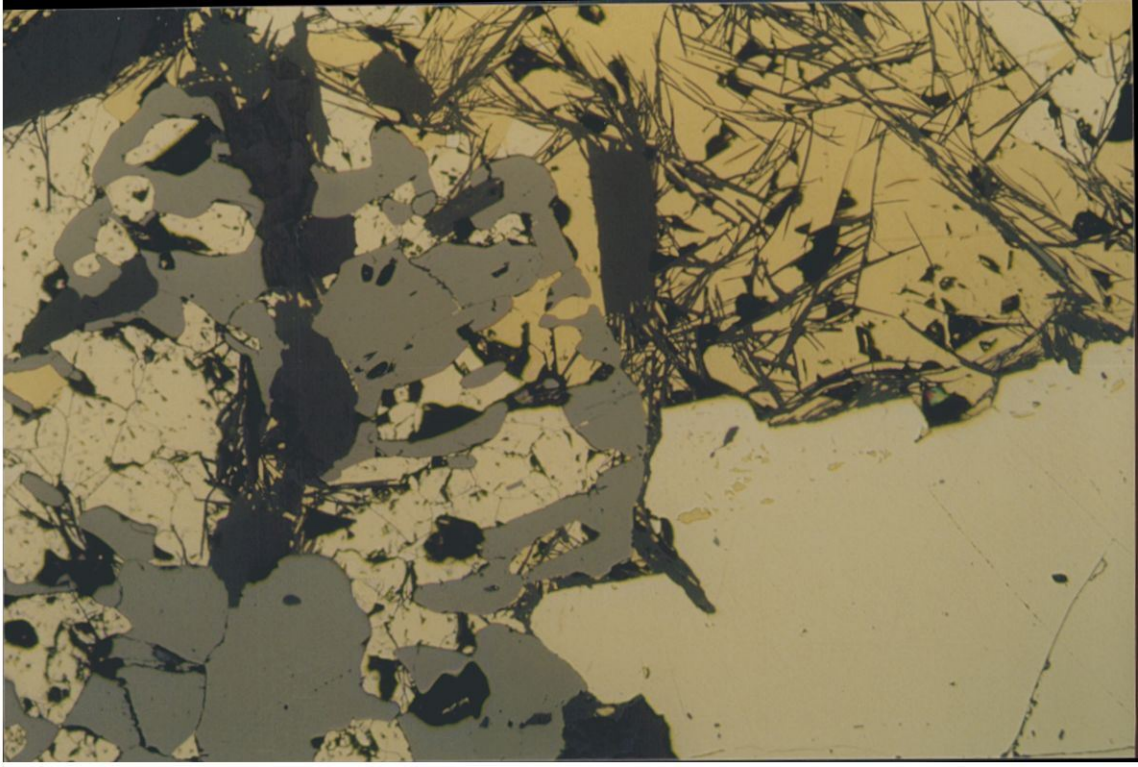


TR Flat 1/98017/18/DAY/3X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance
of hand specimen with abundant sulfide.

TR Flat 1/98020/34/XPL/28X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of chlorite (blue, D6) + secondary biotite (K21).



TR Flat 1/98020/35/PPL+R/114X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of pyrite (P23), pyrrhotite (L4), magnetite (I11), and [chalcopyrite (A17) intimately intergrown with secondary biotite (I18)].

SAMPLE # # TR Flat 2

September 8, 1998

ROCK NAME ALTERED MAFIC IGNEOUS ROCK (?) -- probably formed by regional metamorphism and alteration of a mafic igneous intrusive protolith.

MINERALS Hematite (32%) + chlorite (22%) + actinolite (13%) + hemo-ilmenite (10%) + apatite (7%) + quartz (5%) + pyrrhotite (5%) + sphene (3%) + magnetite (3%) + biotite (<1%) + chalcopyrite (<1%). Hemo-ilmenite shows extremely specular hematite exsolution lamellae.

TEXTURES Phaneritic, equigranular, granoblastic, fine to medium grained, non-directed fabric.

ALTERATION The following alteration features are also present but of indeterminate relative ages: (1) biotite strongly altered to [chlorite + sphene + opaques]; (2) hornblende/pyroxene (?) completely altered to [actinolite + quartz + opaques]; (3) pyrrhotite strongly altered to magnetite and/or hematite; and (4) hemo-ilmenite moderately altered to and overgrown by euhedral specular hematite.

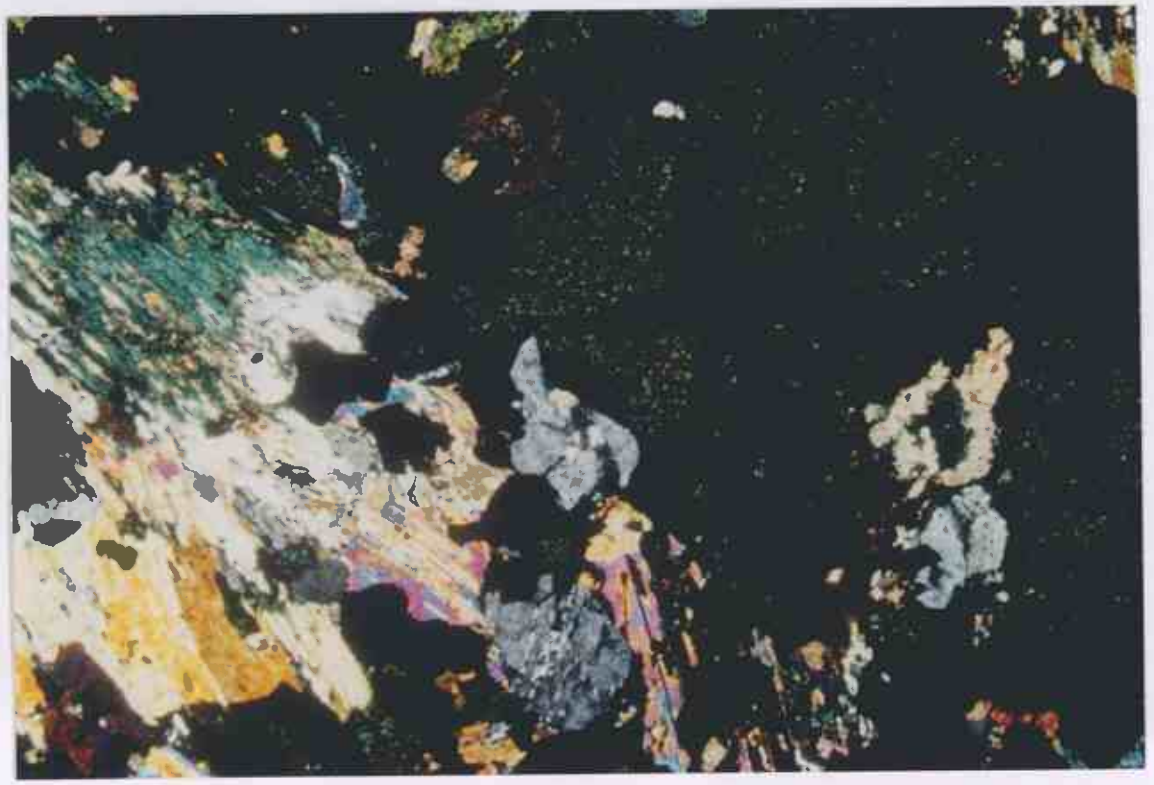
SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN + ARS + PF Cover: PLA
Format: 27 x 46 mm Finish: POL Stains: none Cover: none

PHOTOS TR Flat 2/98017/19/DAY/3X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hand specimen with distinctive secondary specular hematite (O14-Q16).

TR Flat 2/98020/36/XPL/28X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of chlorite (F16) + actinolite (O11) + euhedral specular hematite (H19).

TR Flat 2/98020/37/PPL+R/114X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hemo-ilmenite (J11-K15) moderately altered to and overgrown by euhedral specular hematite (A8-G14).

Spectrum Petrographics, Inc. 499 Dillard Gardens Road, Suite 2 · Winston · OR · 97496 · USA Phone (800) 625-2476



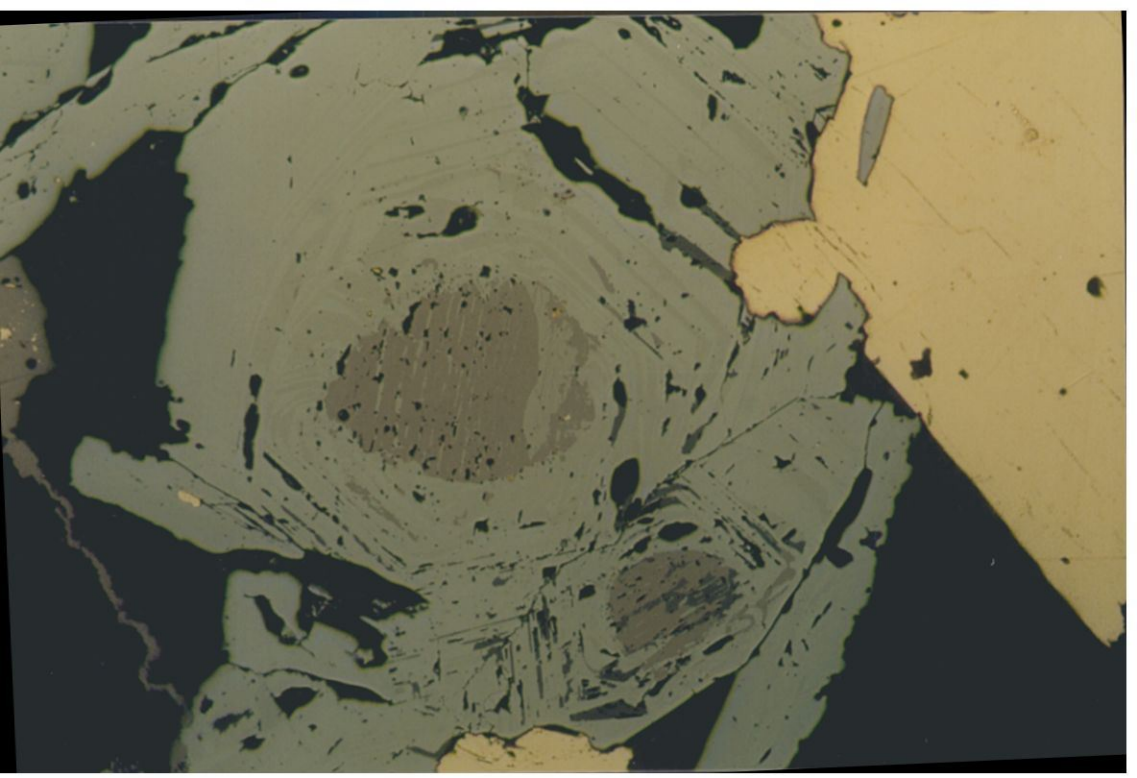
TR Flat 2/98017/19/DAY/3X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hand specimen with distinctive secondary specular hematite (014-016).

TR Flat 2/98020/38/PPL+R/57X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hemo-ilmenite (M9-N11) moderately altered to and overgrown by euhedral specular hematite (R10,16)

TR Flat 2/98020/36/XPL/28X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of chlorite (F16) + actinolite (O11) + euhedral specular hematite (H19).

SAMPLE # # TR Flat 2 continued September 8, 1998

PHOTOS TR Flat 2/98020/38/PPL + R/57X/HMZ ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hemo-ilmenite (M9-N11) moderately altered to and overgrown by euhedral specular hematite (R10,16)



TR Flat 2/98020/37/PPL+R/114X/HMZ
ALTERED MAFIC IGNEOUS ROCK (?) showing typical appearance of hemo-ilmenite (J11-K15) moderately altered to and overgrown by euhedral specular hematite (A8-G14).