

CCH RESOURCES LIMITED

ASSESSMENT REPORT

GEOLOGICAL AND GEOCHEMICAL SURVEYS

MAHTIN CLAIMS 1 TO 24

115-P-15

63°55'N 136°50'W

DAWSON AREA
YUKON TERRITORY

Brian Paul
April 7, 1981.

090808

Note: Re Claim Ownership



At the time the majority of work described in this report was carried out, the Mahtin claims were owned by CCH Resources Ltd., a subsidiary of Campbell Chibougamau Mines Ltd., on behalf of the Cortin Joint Venture.

Since then, Campbell Chibougamau Mines Ltd. has changed its name to Campbell Resources Inc., and a major corporate re-organization initiated. Legal requirements have resulted in a number of changes in claim ownership.

Presently the claims are being transferred from Campbell Resources Inc. to CCH Minerals Ltd. CCH Minerals Ltd. is a federally chartered company registered to do business in the Yukon, and in time will become the Campbell Group's dominant operating exploration subsidiary in western Canada.

A handwritten signature in black ink, appearing to read "Gordon Ford".

Gordon Ford
Exploration Manager-West
CAMPBELL RESOURCES INC.
CCH MINERALS LTD.

090808



This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of \$ 12,000.00

R. DeBicki A. Reg. Geol.
Resident Geologist or
Resident Mining Engineer June 18/81

Considered as representation work under Section 53 (4) Yukon Quartz Mining Act.

B. R. BAXTER
Supervising Mining Recorder

[Signature]
Commissioner of Yukon Territory



RECEIVED BY *Dawson*

Supervising Mining Recorder of Whitehorse, Y.T.

TYPED AREA:

NEW APPL'N for PLACER LEASE to PROSPECT Name:

LEASE NO.

RENEWAL APPL'N PLACER LEASE to PROSPECT Name:

LEASE NO.

AFFIDAVIT of EXPENDITURE on PLACER LEASE Name:

ASSIGNMENT of PLACER LEASE No.

From:

To:

GROUPING APPL'N UNDER SEC. 52(2) PLACER MINING ACT.

Owner:

DIAMOND DRILL LOGS

Claims:

Claim sheet no.

QUARTZ ASSESSMENT REPORT

Claims: *Makten 1-24*

Claim sheet no. *115 P. 15.*

Type of report:

Submitted by:

Geological & Geochemical Surveys.

C.C.H. Resources Ltd.

Work performed on:

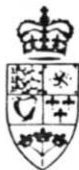
Fee for report: *\$12,000.00*

Makten 1-24



Stan Baker
Signature of *D.F. Jennings*
Mining Recorder
Date Rec'd _____

ACTION



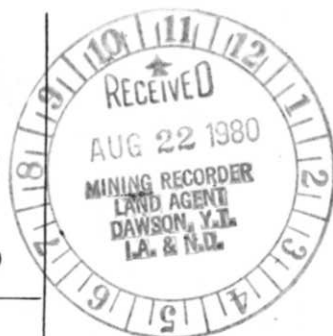
Department of Indian Affairs and Northern Development

YUKON QUARTZ MINING ACT

FORM "C" - APPLICATION FOR A CERTIFICATE OF WORK

(This form required in duplicate with sketch showing location of work.)

Q 86060



I (Name)	A. WOODSEND	Occupation	GEOLOGIST
(Postal Address)	P.O. Box 37, MAYO, YUKON		

OFFICE DATE STAMP

MAKE OATH AND SAY, THAT:-

1. I am the owner, or agent of the owner, of the mineral claim(s) to which reference is made herein.

2. I have done, or caused to be done, work on the following mineral claim(s):

(Here list claims on which work was actually done by number and name)

MAHTIN 1 to 24 , YA 47192 to YA 47215

situated at BIG CREEK Claim Sheet No. 115-P-15
 in the DAWSON Mining District, to the value of at least \$ 26,847.00
 dollars, since the 2 day of JUNE 19 80.

to represent the following mineral claims under the authority of Grouping Certificate No. _____

(Here list claims to be renewed in numerical order, by grant number and claim name, showing renewal period requested).

MAHTIN 1 to 24 , YA 47192 to YA 47215
 ALL FOR 5 YEARS

3. The following is a detailed statement of such work: (Set out full particulars of the work done indicating dates work commenced and ended in the twelve months in which such work is required to be done as shown by Section 53.)

PERIOD	JUNE 2 nd to JUNE 21	1980	\$
1143	Soil samples analysed for Sn, W, Cu, Zn, Ag, As @ \$13.55		15,487
4	assistants for 20 days @ \$50/day		4,000
1	geologist for 20 days @ \$60/day		1,200
14	hrs helicopter @ \$440/hr		6,160
			<u>\$ 26,847</u>

Sworn before me at MAYO Y.T.
 this 19 day of AUGUST 1980

 Notary Public

 Applicant.

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Illustrations

- Mahtin, Claim Location Map	½ mile=1"	1981	Attached
Map 713-2 - Mahtin, Sn Geochemistry	1:5000	1981	In Pocket
Map 713-3 - Mahtin, W Geochemistry	1:5000	1981	In Pocket
Map 713-4 - Mahtin, Cu Geochemistry	1:5000	1981	In Pocket
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Map 713-7 - Mahtin, As Geochemistry	1:5000	1981	In Pocket
Map 713-9 - Mahtin, Geology	1:10000	1981	In Pocket



Bolivia Creek, June 1980. Hill in centre of photo is main mass of biotite quartz monzonite, while sharp peak to the left forms part of the eastern intrusive complex.

Introduction

The Mahtin claim group lies in an area between Sprague and Big Creeks, its eastern side abutting on to the boundary between the Mayo and Dawson Mining Districts. The claims are owned by Campbell Resources Incorporated of Toronto, Ontario.

The work outlined in this report was conducted from June 2 to June 21, 1980. A geological survey at 1:10000 scale was completed over the claim group and surrounding territory, and over 1100 soils collected for tin, tungsten, copper, zinc, silver and arsenic analyses. An amount totalling \$26,847.00 has been claimed for assessment purposes.

Exploration History

No exploration activity is reported in the area of the Mahtin claims prior to 1979. Galena bearing veins were discovered at the north end of East Ridge in 1948 by the Geological Survey of Canada, and the presence of very old claim posts along the ridge forming the eastern boundary of the Mahtin Group suggests that the area has been previously examined.

The Ram and Wolf claims were staked during 1979 by E. Weiz and L. Havranek, who reported bulldozer trenching later on in the year - these claims are in the Mayo Mining District, immediately adjacent to the Mahtin Group. AMAX Exploration were active on the HI Group, north of Sprague Creek, also during 1979.

CCH Resources Limited staked the Mahtin Group upstream from high tin, tungsten and arsenic values in Bolivia Creek in 1979, and the Group was extended during 1980. The Group presently totals 32 claims.

Summary

The property is underlain by a north to north-westerly dipping sedimentary sequence of Ordovician age. These sediments young to the north, passing from shallow water siltstones, chert and limestone into a clastic, deeper water sequence composed mainly of argillite and calcarenite. They are autochthonous sediments of the North American platform. Allochthonous sedimentary rocks, largely psammitic, of the Proterozoic Yukon Group occur in the extreme southeastern corner of the property, having been thrust northwards over the younger sediments. The thrust contact trends northeast/southwest in the area immediately south of the claim group.

This combined sedimentary package has been subsequently intruded by a large body of biotite quartz monzonite, as well as an east/west trending dyke swarm of monzonitic to syenitic composition. Both intrusive systems are thought to be late Cretaceous (100 my) in age.

Northwest/southeast trending faults are inferred along Bolivia and Horseshoe Creeks, trending at right angles to the thrust and presumably related to it.

Skarn and hornfels are moderately well developed adjacent to the quartz monzonite intrusive, which is itself cut by late arsenopyrite bearing fractures. No tin or tungsten minerals have been identified to date.

Bedded Rocks

The property is largely underlain by North American platform sediments of Ordovician age. These sediments young to the north and pass from shallow water siltstones, chert and limestone into a deeper water clastic sequence composed of argillite and gritty calcarenite. Thrust over top of

these rocks in the southeastern corner of the property are psammitic rocks of the Proterozoic Yukon Group.

Yukon Group (4)

Psammitic rocks of the Yukon Group are found only in the extreme southeastern corner of the property, but comprise all of the sedimentary rocks south of the property limits. In this area they form a rather monotonous sequence of rusty, thinly bedded quartz and quartz-mica schists which are occasionally tourmalinized near the southern margin of the quartz monzonite intrusive body. These rocks are of Proterozoic age and have been thrust northwards over younger sedimentary rocks which underlie the remainder of the Mahtin Group.

Type "A" Sediments

These rocks are equivalent to Unit 8 of Bostock (1964) and are of Ordovician age, possibly older. They form a finely laminated sequence of siltstone, argillaceous and calcareous siltstone, nodular siltstone, cherty siltstone, limestone, nodular limestone, chert, black argillaceous chert and sulphidic chert. Fine bedding or lamination is consistent throughout the sequence, with individual laminae seldom exceeding three or four millimetres in thickness. Slaty cleavage is commonly developed in rocks of this unit, as are bedding crenulations, boudinage structures and ripple cross laminations. Sulphidic cherty horizons with sharp lower boundaries and gradational upper margins indicate that tops in this sequence are facing to the north. Some of the thinly bedded rocks in the vicinity of the thrust contact may in fact be siliceous mylonites (cf Templeman-Kluit, 1979).

Type "B" Sediments

These rocks are equivalent to Bostock's Unit 9 and are also of Ordovician age, though younger than the type "A" sediments. They form a deeper water, clastic sequence comprised of shales, slate, argillite, quartzite and gritty, often fragmental calcarenites (Plate #1). Flame structures and graded bedding can be recognized on occasion and the sequence as a whole probably has some turbidite affinities. These rocks are best exposed beyond the property limits to the north and west.

Transition Rocks

As previously described by Bostock (1964), the contact between Units "A" and "B" is far from definitive. Lack of outcrop in the vicinity of the contact (Type "B" sediments are well exposed only outside the property limits) has hindered mapping, and the contact as shown on Map 713-9 is somewhat arbitrary. That this boundary is transitional rather than a sharp break, seems almost certain. Black argillaceous cherts are found throughout the Type "A" sequence, but increase in abundance towards the transition zone where they are commonly interbedded with more normal chert and siltstone (Plate # 2). Syn-sedimentary conglomerates with abundant rip-up structures are fairly common within the transition zone, as are rusty sulphidic cherts. The chert horizons, if mapped in detail, could prove to be useful marker horizons very near the top of the Type "A" sequence.



Plate # 1 . Argillaceous fragments
in gritty calcarenite,
typical of Unit B.



Plate # 2. "Zebra" rock, western intrusive complex.
Interbedded chert, white cherty siltstone
and argillite.

Intrusive Rocks

The intrusive rocks found in the vicinity of the Mahtin Group, although quite varied on a local scale, are rather easily summarized. The dominant feature is a large triangular biotite quartz monzonite stock which is flanked to the north by an east-west trending dyke swarm of monzonitic to syenitic composition. Slightly older and more basic igneous rocks, including diabase, gabbro and biotite pyroxenite are also present within the map area.

The hypabyssal rocks remain somewhat unsorted at the time of writing. Texturally quite variable, they are all very potassic and appear deficient in free silica. All of the various intrusive types indicated on the accompanying geologic map can be readily differentiated in the field, despite their apparent compositional similarity. Petrographic descriptions have been based on slabbed and stained hand specimens- a small collection of thin sections has been assembled, but the majority of these have yet to be examined. Of particular concern in this case is the amount of fine grained, groundmass quartz in these rocks, which may affect the original field classification.

Porphyritic rocks of monzonitic and syenitic composition are commonly found adjacent to batholithic masses of more granitic character, and the presence here of a dyke swarm flanking a large stock of quartz monzonite composition is not unusual. The flanking dykes may in fact be desilicated, apophysal equivalents of the quartz monzonite. Lamprophyric dyke rocks show evidence of extensive assimilation of metasedimentary material, as might be expected for rocks of this composition.

Following are brief descriptions of the various intrusive units.

Jurassic and/or Cretaceous

Diabase/Gabbro:

Medium grained igneous rocks of gabbroic affinity containing equivalent amounts of amphibole, biotite and plagioclase are found in two locations in the southeastern corner of the property. These rocks are dark coloured and variable in texture, contain significant amounts of pyrite and tend to be skarned along their margins. Found only as loose boulder rubble, they probably represent portions of a single dyke.

Biotite Pyroxenite:

A seven metre wide dyke of probable ultra-basic composition is traceable over two kilometres through the western half of the property and into the adjoining creek valley. It consists of coarse columnar pyroxene, abundant biotite or phlogopite, and rounded white phenocrysts of plagioclase feldspar(?).

Cretaceous

Biotite Quartz Monzonite/Adamellite:

The large triangular stock in the vicinity of the Mahtin Group is a medium to coarse grained, granitic textured, quartz monzonite containing about 20% quartz, 35% K-feldspar, 35% plagioclase and 10% mafic minerals.

Finer grained, more leucocratic varieties are present in several areas within the stock, but it is essentially a single phase homogeneous intrusive. Biotite is the dominant mafic, but clinopyroxene and hornblende are present in small amounts; zircon, apatite and sphene are present as accessories.

Megacrystic Hornblende-Biotite Quartz Monzonite:

Coarse grained megacrystic quartz monzonite is found as a small plug within the eastern intrusive complex. K-feldspar occurs in megacrysts as large as $\frac{1}{2}$ X1 centimetre, while plagioclase is generally interstitial. Both hornblende and biotite-rich varieties have been noted. Although quartz monzonites, they are very close to being granitic in composition.

Quartz Eye/Biotite/K-Feldspar Porphyry:

These are porphyritic to sub-porphyritic, generally quite rusty, dyke rocks of variable composition and appearance. Quartz occurs in small "eyes" to 4mm in diameter and does not appear to be present in the groundmass. K-feldspar is present as large euhedral phenocrysts, and plagioclase as smaller subhedral crystals. Sulphide (pyrite/pyrrhotite) is generally present in accessory amounts.

Fine-grained, Dark Grey Monzonite:

Found southeast of the property limits, this is dark grey, fine-grained dyke rock containing about 20% mafic minerals (biotite-pyroxene), 40% plagioclase and 35% K-feldspar. Quartz appears to be present in only minor amounts, and pyrrhotite is a common accessory. The rock has a faint diabasic texture and small biotized inclusions are common.

Buff Weathering Syenite:

These rocks are fine to medium grained and generally granitic textured. K-feldspar is present in euhedral crystals as large as 4 x 8 mm, while the plagioclase crystals are generally smaller and subhedral. The groundmass in these rocks appears to be quite feldspathic and quartz phenocrysts are rare. Biotite is the dominant mafic, while sulphide minerals are usually present in accessory amounts.

Medium Grained Biotite/K-Feldspar Syenite:

The rocks of this unit are buff-weathering and quite similar to the above syenites. Zoned K-feldspar phenocrysts to 7 x 18 mm in size are occasionally present, while plagioclase occurs as subhedral crystals within the groundmass. Biotite is common in amounts up to 10%; quartz is present in amounts up to 5%.

Biotite/K-Feldspar Porphyry:

Biotite/K-feldspar porphyries are common dyke rocks in the Mahtin area (Plate #3). Grey in colour and buff-weathering on occasion, they contain K-feldspar phenocrysts as large as 10 x 15 mm. Biotite is the lone mafic, occurring in amounts up to 10%, while subhedral plagioclase crystals 2-3 mm in size are confined to the groundmass. Quartz phenocrysts to 2 mm in diameter are rare.

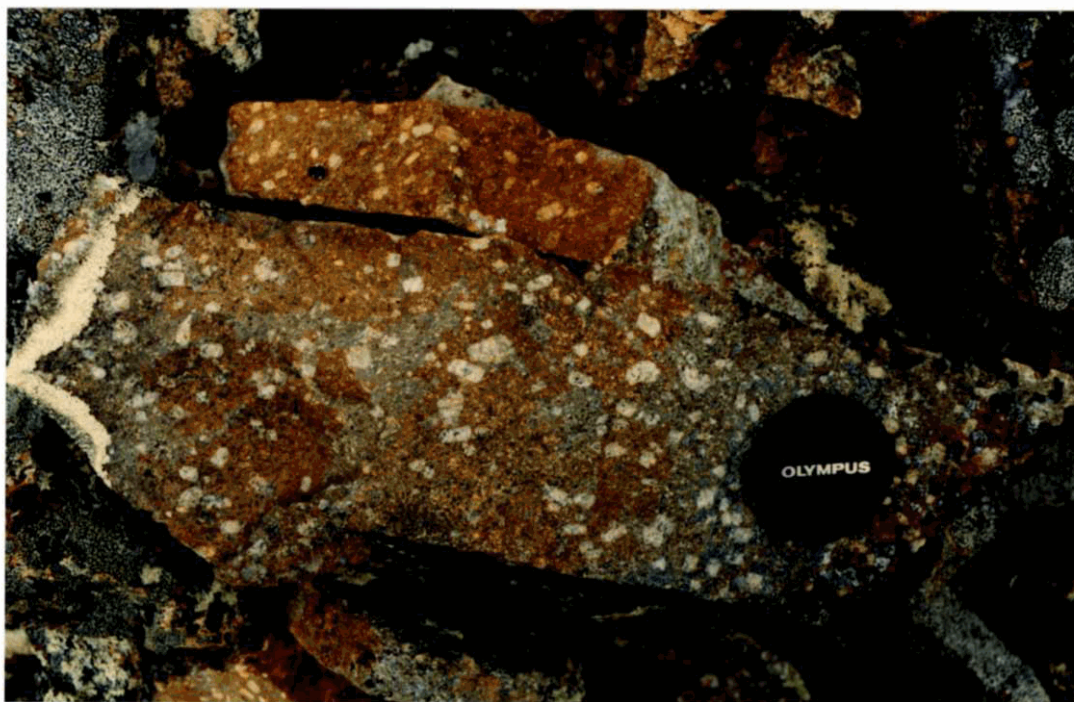


Plate # 3. Buff weathering K-feldspar porphyry from western intrusive complex.

Porphyritic Hornblende Syenite:

These dyke rocks are found most commonly in the vicinity of the eastern intrusive complex. They are comprised of white K-feldspar phenocrysts to 5 x 7 mm in size, and black hornblende phenocrysts (to 2 mm) which sit in a fine grained feldspathic groundmass. The colour of these dykes varies from grey to light brown.

White Quartz Eye/K-Feldspar Porphyry:

Dyke rocks of this variety are found in the southwestern corner of the property. Quartz eyes from 1-3 mm in diameter are present in amounts up to 7 or 8%. K-feldspar phenocrysts are present in sizes up to 10 x 15 mm, and both biotite and pale green acicular amphibole have been noted as accessories.

"Rotten" Quartz/Sericite Porphyry:

Originally K-feldspar porphyries, these dyke rocks have been intensely altered and are now little more than quartz-sericite rocks. Similar alteration is observed on the Jabberwock Group.

Biotite Lamprophyre:

These rocks are probably the youngest intrusions on the property as they can be seen cutting some of the earlier dyke phases. Relatively potassic and mafic, with abundant phenocryst biotite, they frequently have included small fragments of altered metasedimentary material.

Brecciated Rocks

Crackle breccias of rather limited extent are found adjacent to a number of the porphyry dykes and also in some areas along the periphery of the quartz monzonite intrusive body. These breccias are inevitably mineralized. Intrusive breccias, as illustrated in plate #4, are present at the western end of the quartz monzonite, in the vicinity of the eastern intrusive complex and also along the margins of a few of the porphyry dykes. A single "hydrothermal" veinlet breccia with a comminuted rock flour matrix was discovered within type "A" sediments very near the eastern intrusive complex. All of these breccia types are described in the section on structure.

Structure

A major thrust fault, trending northeast/southwest, occurs in the vicinity of the Mahtin Group, barely cutting the southeastern corner of the property. Nowhere in this area is the fault exposed - thinly laminated siltstones in the vicinity of the thrust may in fact be siliceous mylonites (cf. Templeman-Kluit, 1979). Allochthonous Yukon Group metasediments of Proterozoic age were thrust over North American platform sediments in late Jurassic to early Cretaceous time, and the thrust contact is presumed to dip to the southeast. The large body of biotite quartz monzonite apparently straddles this fault and may have been intruded along it. Similarly, a great majority of



Plate # 4 . Intrusive breccia, eastern intrusive complex. Rounded metasedimentary fragments in a medium grained biotite quartz monzonite matrix.

the porphyry dykes in this area are intruded parallel and very near to the thrust contact, suggesting some sort of intrusive relationship. Northwest/southeast trending faults are inferred along Bolivia and Horseshoe Creeks, from offsets in sedimentary units "A" and "B". The presence of rusty brecciated gouge(?), quartz-carbonate veining, minor folding and steepened bedding along Horseshoe Creek make faulting here almost a certainty. The faulting along Bolivia Creek is much less convincing. Most of the movement appears to have been of the right lateral, strike slip variety and these faults may be tears related to overthrusting.

The most noticeable structural feature on the property is the east-west trending porphyry dyke swarm. Dyking appears to be most intense in the vicinity of the thrust contact/intrusive margin, again suggesting intrusion along a pre-existing structural weakness.

The majority of sedimentary rocks dip to the north and northwest at moderate to steep angles. Bedding is locally parallel to the intrusive contacts, and is often vertical to overturned in these areas. Steeply dipping beds are also found along Horseshoe Creek, presumably adjacent to a fault in this area. The planar feature in these sediments is generally bedding (or lamination), but slaty cleavage is well-developed in the sediments of both unit "A" and

unit "B". Minor folding, bedding crenulations and boudinage structures are fairly common; although many of these minor structures are syn-sedimentary in origin, a few are probably related to late faulting. No major folds were observed on the property - minor fold axes, when present, are inevitably found within the bedding planes. The sedimentary sequence faces north as deduced from sulphidic chert horizons with sharp lower contacts and gradational upper boundaries.

Crackle breccias are common adjacent to many of the porphyry dykes and also in areas close to the margin of the quartz monzonite intrusive body. These breccias are commonly mineralized with matrix sulphide and appear to be synchronous with skarn formation in many localities. A northeast/southwest trending fracture vein system cuts both the quartz monzonite intrusive and its adjacent metasedimentary rocks in the southeastern corner of the property. The veining is most intensive near the eastern extremity of the intrusive body and gradually diminishes towards its centre. Parallel fracturing is also prevalent along the margins of many of the individual porphyry dykes.

Intrusive breccias are found at the eastern end of the quartz monzonite body, and also in the vicinity of the eastern intrusive complex. Rounded metasedimentary fragments, stoped off near the intrusive contacts, are

included in a medium to coarse grained quartz monzonite matrix. Small rounded sedimentary fragments are commonly included along the margins of many of the porphyry dykes as well.

A single "hydrothermal" veinlet breccia with an altered, comminuted rock flour matrix was discovered within type "A" sediments adjacent to the eastern intrusive complex.

Alteration

Most of the sedimentary structures in units "A" and "B" have been maintained, and the composition and grain size of these sediments is such that only high-grade thermal or regional metamorphism would have been effective in altering their appearance. Laminated siltstones and cherts of unit "A" are occasionally hornfelsed in the vicinity of the quartz monzonite intrusive body. The resultant rocks are deep purple in colour, commonly rusted, recrystallized and quite hard. They contain trace amounts of pyrite and arsenopyrite, and are examples of what happens to rocks in this sedimentary unit when they lack sufficient carbonate to produce a skarn assemblage. Spotted contact schists are more prevalent among the psammitic rocks of the Yukon Group.

The calc-silicate rocks are best developed, once again, near the periphery of the biotite quartz monzonite, but occur along some of the porphyry dyke margins as well.

Silicate skarns of three types are recognized:

- (1) aphanitic diopside skarn containing interbeds of chert
- (2) almandine-diopside skarn in bedded and massive garnet vein varieties
- (3) almandine-diopside-tremolite skarn

Pyrrhotite, chalcopyrite and arsenopyrite are present in minor amounts within these skarns - the calcite content is quite variable.

Sulphide skarns containing arsenopyrite, scorodite and lesser amounts of pyrite have been found in a number of localities, and usually show some degree of brecciation. Crackle brecciation along the margin of one porphyry dyke has resulted in the enclosure of almandine and diopside-bearing skarn fragments in a matrix assemblage of chalcopyrite, pyrite, bornite and chalcocite. Banded arsenopyrite-pyrrhotite skarns are found on occasion in the southeast corner of the claim group, and are thought to have replaced an interbedded carbonate/argillite host. These skarns are again commonly crackle brecciated, the late veinlets being infilled with sulphide.

Phyllic alteration identical to that seen on the Jabberwock Group has affected at least one, and possibly several, of the porphyry dykes within the property limits. Originally K-feldspar porphyries, these dykes have been intensely altered and are now little more than medium-grained quartz sericite rocks.

Tourmaline is a common accessory of sulphide within fractures in the quartz monzonite. It also occurs as massive to veinlet-like replacements in schists south of the quartz monzonite contact.

Mineralization

The Mahtin Group was acquired during 1979, primarily for its tin and tungsten potential. To date, cassiterite has been identified only in panned concentrate samples from Bolivia Creek and the bedrock source for these anomalies is not readily apparent. No scheelite (with the exception of a few grains in a panned soil sample) has been discovered either, despite the abundance of skarn within the property limits. Wolframite has not been identified and is considered unlikely.

The mineralization in existence is intrusive-related, and can be divided into two types. Arsenopyrite, pyrite, stibnite, chalcopyrite and an unidentified copper silicate are found in association with quartz, calcite, tourmaline and sericite in late

fracture veinlets from one to five centimetres in width within the quartz monzonite. Fracturing is most intense in the eastern (apical?) portions of the quartz monzonite, gradually diminishing towards the centre of this body where only the occasional hairline fractures are found. Veinlets with cockscomb or ribbon textures are quite common; true breccia veinlets are much rarer. A few of the richer arsenopyrite samples were submitted for gold and silver analyses - one of these ran greater than 100 ppm silver, but gold values were uniformly low. Additional samples, including several skarns, have been submitted and we are presently awaiting the results.

Pyrrhotite, pyrite, arsenopyrite and chalcopyrite are found in accessory amounts with almandine, diopside, calcite and tremolite in the many individual skarn horizons on the Mahtin Group. More massive skarns, or sulphide replacements, consisting mainly of pyrite and arsenopyrite are found in a number of localities, and are commonly crackle brecciated. These replacements show affinities to both the fracture vein and skarn-type mineralization. Crackle brecciation on the margin of one porphyry dyke has resulted in the enclosure of almandine and diopside-bearing fragments in a matrix assemblage of chalcopyrite, pyrite, bornite and chalcocite. Banded arsenopyrite and pyrrhotite bearing skarns are found on occasion near the periphery of the quartz monzonite intrusive.

A single six centimetre wide quartz-carbonate breccia vein carrying appreciable quantities of arsenopyrite and pyrite was discovered along Horseshoe Creek, presumably related to faulting in this area.

The tin anomalies in Bolivia and Horseshoe Creeks remain unexplained - cassiterite may occur in accessory amounts along with arsenopyrite in fractures within the quartz monzonite. A limited amount of followup is planned in 1981, with emphasis being on the location of in-situ cassiterite on the Mahtin Group.

Geochemistry

Methods

Soil samples were collected from the B horizon wherever possible. Areas of well developed A horizon (in excess of 1/3 metre) are widespread on the Mahtin Group, being especially abundant on the poorly drained slopes in the northwestern and northcentral portions of the property. Approximately one-third of the samples collected were estimated to contain greater than 25 percent organic material. Nevertheless, the very small number of samples containing insufficient material for analysis suggests that our samplers were generally successful in obtaining enough residual soil to produce meaningful results.

Minus 80 mesh fractions were analyzed for tin, tungsten, copper, zinc, silver and arsenic by Bondar-Clegg and Company Limited in Whitehorse and North Vancouver.

Tin analyses were done using ammonium iodide fusion and atomic absorption spectrometry after the method of Stanton and MacDonald(1961), and Smith(1967).

Copper, zinc and silver were analyzed by atomic absorption spectrometry following standard digestion by nitric and hydrochloric acids.

Tungsten analyses were done using a standard colourimetric technique, which involves fusion with sodium carbonate and complexing with zinc dithiol.

Arsenic was analyzed by a colourimetric method, after digestion by nitric and perchloric acids, in Bondar-Clegg's North Vancouver laboratory.

Stream sediment sampling and heavy mineral orientation studies were conducted along Bolivia and Horseshoe Creeks during 1979, duplicate samples being sent to the United States Geological Survey for independent study. These survey costs have not been incorporated into the Statement of Expenditures and the results are omitted from this report. Stream sediment samples were again collected during 1980, where the individual grid lines crossed a stream course and these results are shown on the accompanying maps.

Results

Tin, tungsten, copper, zinc, silver and arsenic were analyzed in soils on a 50 metre X 100 metre grid covering the full extent of the claim group. All of this work was completed in June of 1980. Included with the report are maps 713-2(tin), 713-3(tungsten), 713-4(copper), 713-5(zinc), 713-6(silver) and 713-7(arsenic), all at 1:5000 scale, showing contoured results for the various elements.

A large circular arsenic anomaly, approximately 700 metres in diameter, occurs in the extreme southeastern corner of the claim group. Arsenopyrite is abundant in this area as fracture fillings within a quartz monzonite intrusive body, and also as a constituent of skarn. Although the soil anomaly is centred over the most intensely mineralized area at the eastern end of the intrusive, it would also seem to follow the intrusive contact around to the southwest. A very pronounced dispersion trail is present along the upper reaches of Bolivia Creek, and anomalous amounts of arsenic are present in the majority of stream sediment samples collected along the two creeks draining the property. This mobility makes arsenic an ideal "pathfinder" element: in-fill

stream sediment sampling along Bolivia and Horseshoe Creeks was prompted by the presence of anomalous arsenic (105 ppm) in a sample collected 2½ km west of the present claim group, and led to the acquisition of these claims.

Tin values in soil are generally quite low, but moderately anomalous values do show some coincidence with the area of high arsenic. Highly anomalous values are present within stream sediment and panned concentrate samples from Bolivia and Horseshoe Creeks, and are seemingly concentrated in the flat area towards the junction of these two creeks. The presence of anomalous stream sediment values in an area of relatively low tin in soils remains unexplained.

Tungsten values are generally low, as are silver and copper, but weakly anomalous values again show some coincidence with the large arsenic anomaly in the southeastern corner of the claim block.

Zinc values in soil are negligible throughout the property.

Recommendations for Future Work

As of July 1980, most of the surface work on the Mahtin Group had been completed. Eight additional claims were staked during August of 1980, and a limited amount of soil geochemistry on these claims should be successful in closing off the arsenic anomaly in this area. Detailed prospecting in the area of soil anomalies may be successful in locating cassiterite mineralization, and is strongly recommended. Panned concentrate sampling along creeks draining the Ram and Wolf Groups is also suggested, as our existing sampling in this area is probably inadequate.

Petrographic studies are now under way on a number of samples from the Mahtin Group, which should result in a fuller understanding of the intrusive rocks on this property. Depending on results to be collected during 1981, we should be in a position to suggest, or possibly deter, the siting of several short drill holes on the existing geochemical anomalies. The creeks draining the Mahtin Group contain exceptionally high quantities of cassiterite, and a good deal of work remains before these anomalies are adequately explained.

STATEMENT OF QUALIFICATIONS

Work on the Mahtin Group during 1980 was carried out under the direction of A. Woodsend of Vancouver, British Columbia.

Mr. Woodsend is Field Manager-North for CCH RESOURCES LIMITED. He holds a B.Sc.(Hons.) degree in geology from Southampton University, England and has practiced his profession continuously for a period of ten years in a variety of countries and geological environments.

The majority of geological work during this period was conducted by the author, Brian Paul, a geologist with Billiton Canada Limited, Toronto, Ontario and presently seconded to the Cortin Joint Venture.

Capable assistance was provided in the field by T. Boyd and A. Lee of Vancouver, B.C. and P. Plishka of Oshawa, Ontario.

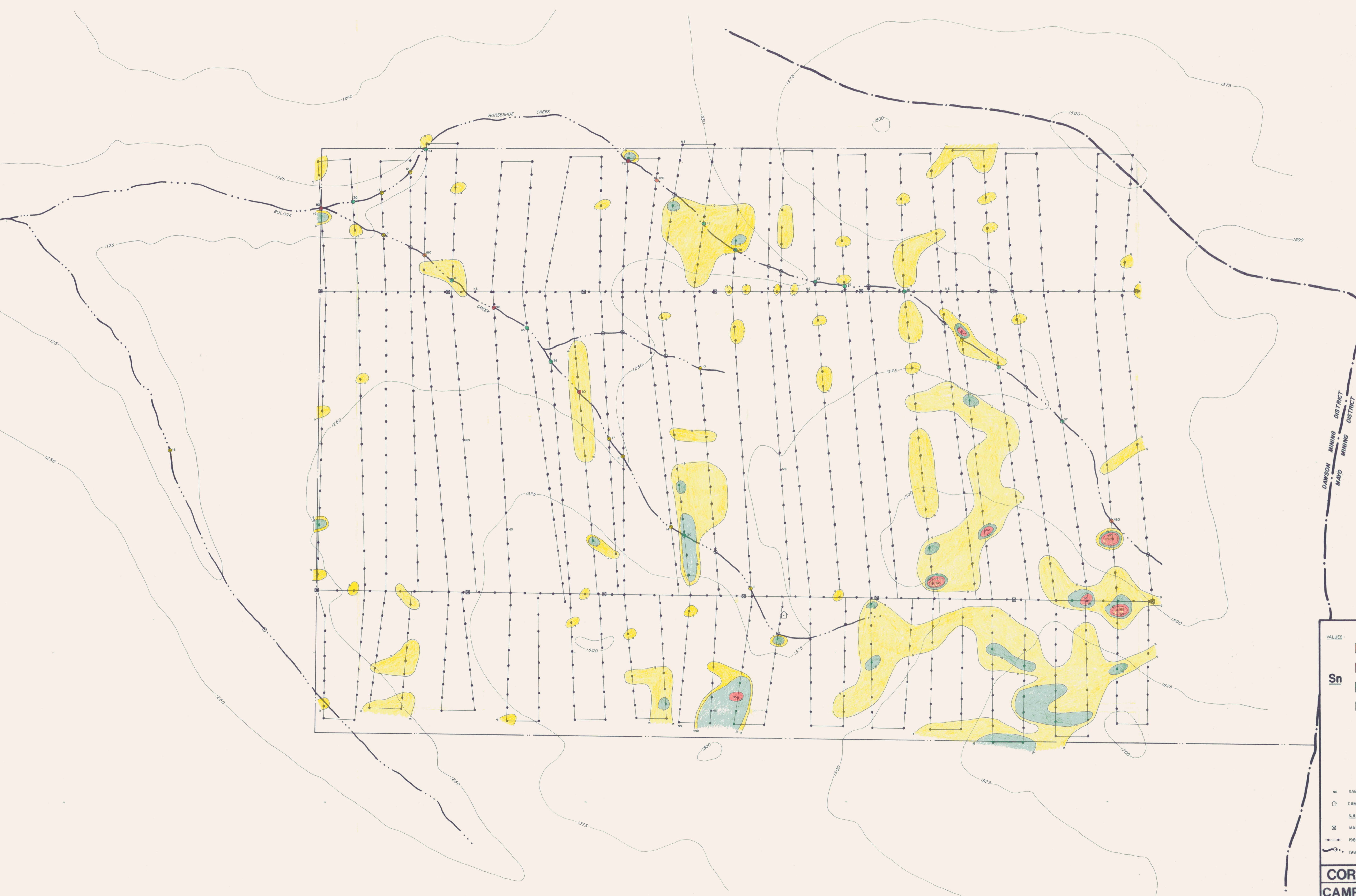
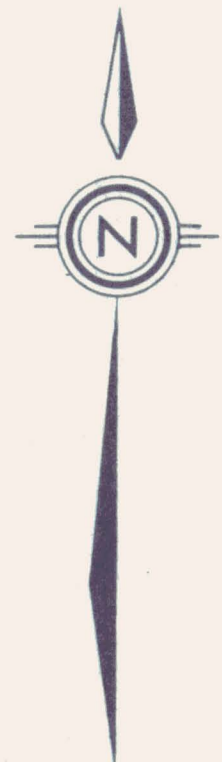
STATEMENT OF EXPENDITURES

1143 Soils analyzed for Sn/W/Cu/Zn/Ag/As @ \$13.55	\$15,487.00
80 Assistant Days @ \$50.00/day	4,000.00
20 Geologist days @ \$60.00/day	1,200.00
14 Helicopter hours @ \$440.00/hour (casual rate)	<u>6,160.00</u>
	\$26,847.00

Work was carried out during the period June 2 to June 21,
1980.

Vancouver, B. C.
April 7, 1981.

Brian Paul
Brian Paul
Geologist-Cortin J.V.



VALUES:

Sn

[Red]	> 90 ppm
[Orange]	> 40 ppm
[Green]	> 19 ppm
[Yellow]	> 9 ppm

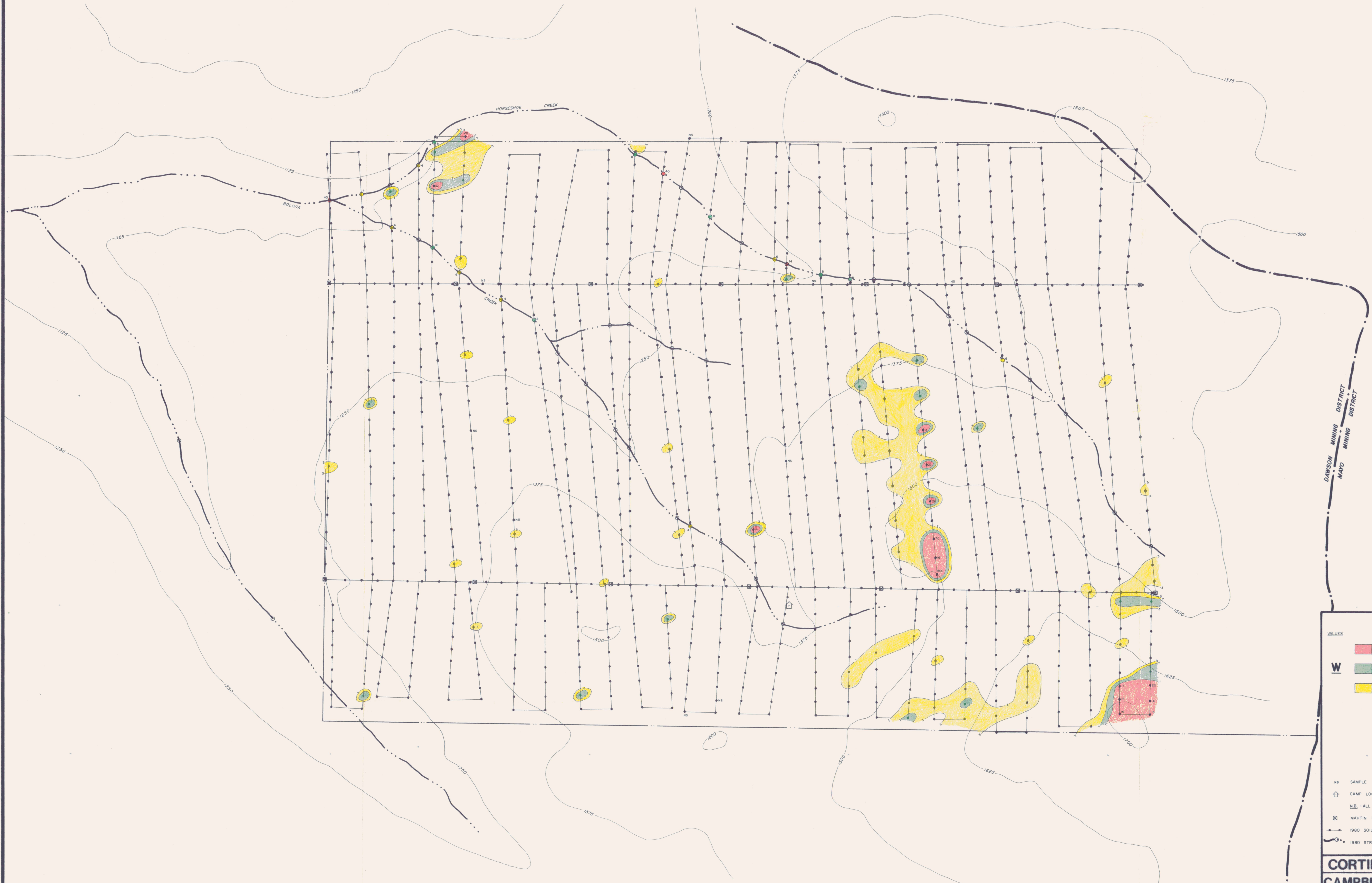
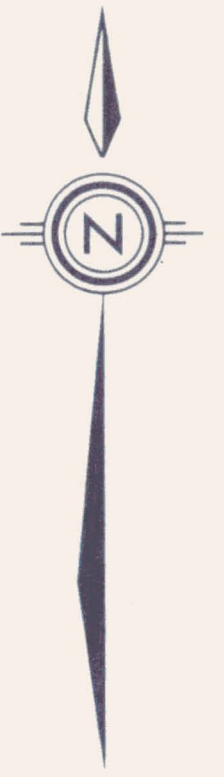
ns SAMPLE NOT TAKEN
⊙ CAMP LOCATION
N.B. - ALL ELEVATIONS IN METRES.
⊠ MAHTIN CLAIM POSTS
⊙ 1980 SOIL SAMPLES
⊙ 1980 STREAM SEDIMENT SAMPLES

LEGEND

CORTIN JOINT VENTURE
CAMPBELL RESOURCES INC.
115-P-15
MAHTIN GROUP

DETAILED SOIL GRID — Sn

SCALE 1:5000 DRAWN BY DFN DATE JAN. 14, 1981 PLAN NO. 713-2
FIELD YEAR 1980 REVISED DATE



DANFON MINING DISTRICT
MAITO MINING DISTRICT

LEGEND

VALUES:

- >11 ppm
- >7 ppm
- >3 ppm

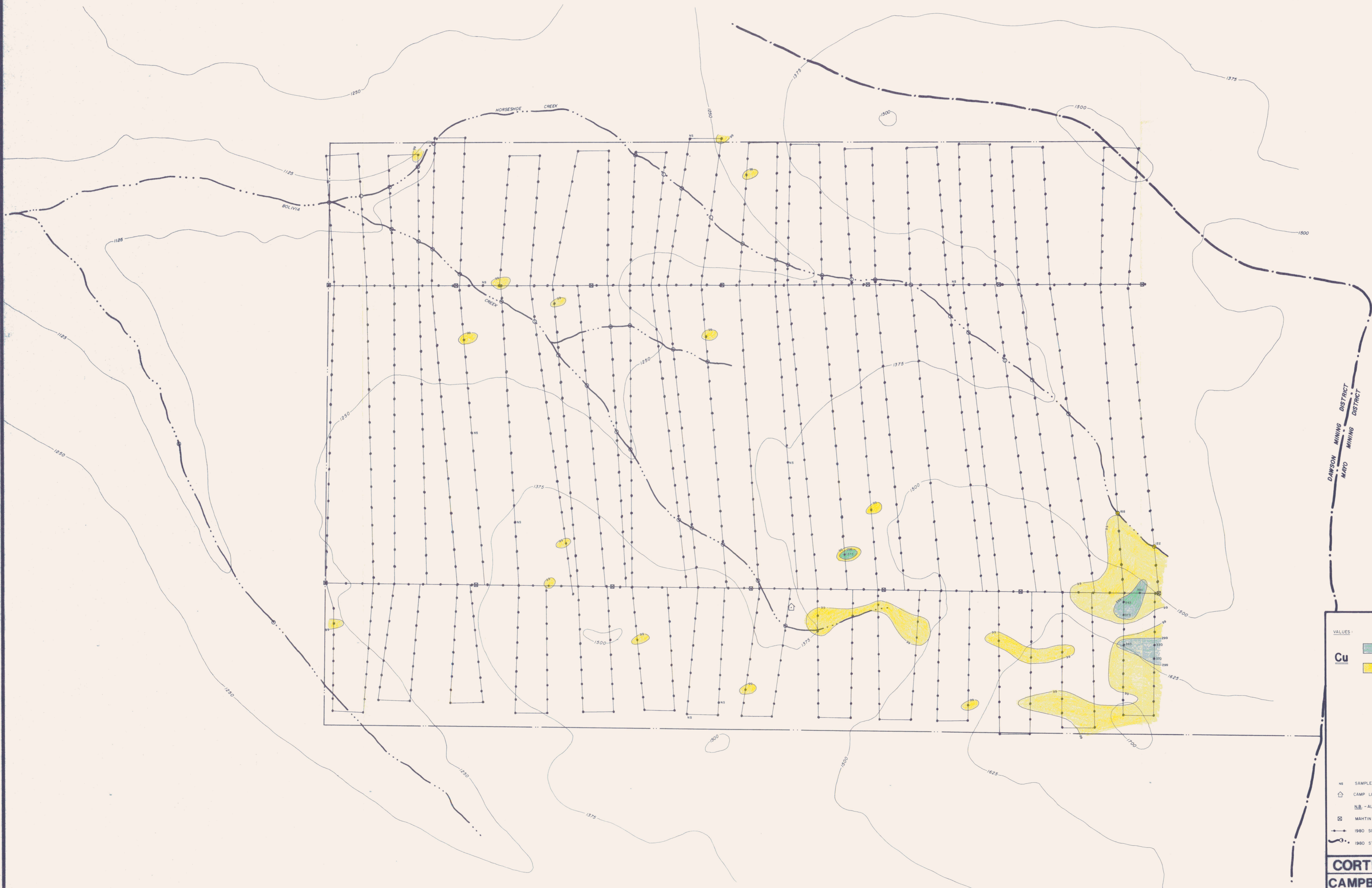
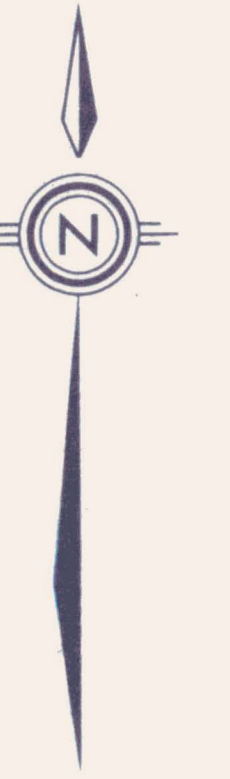
W

- SAMPLE NOT TAKEN
- CAMP LOCATION
- N.B. - ALL ELEVATIONS IN METRES.
- MAHTIN CLAIM POSTS
- 1980 SOIL SAMPLES
- 1980 STREAM SEDIMENT SAMPLES

CORTIN JOINT VENTURE
CAMPBELL RESOURCES INC.
115-P-15
MAHTIN GROUP

DETAILED SOIL GRID - W

SCALE 1:5000	DRAWN BY DFN	DATE JAN 13, 1991	PLAN NO.
FIELD YEAR 1980	REVISED BY	DATE	713-3



LEGEND

VALUES

Cu

- >200 ppm
- >99 ppm

ns SAMPLE NOT TAKEN

Ⓜ CAMP LOCATION

N.B. - ALL ELEVATIONS IN METRES.

⊠ MAHTIN CLAIM POSTS

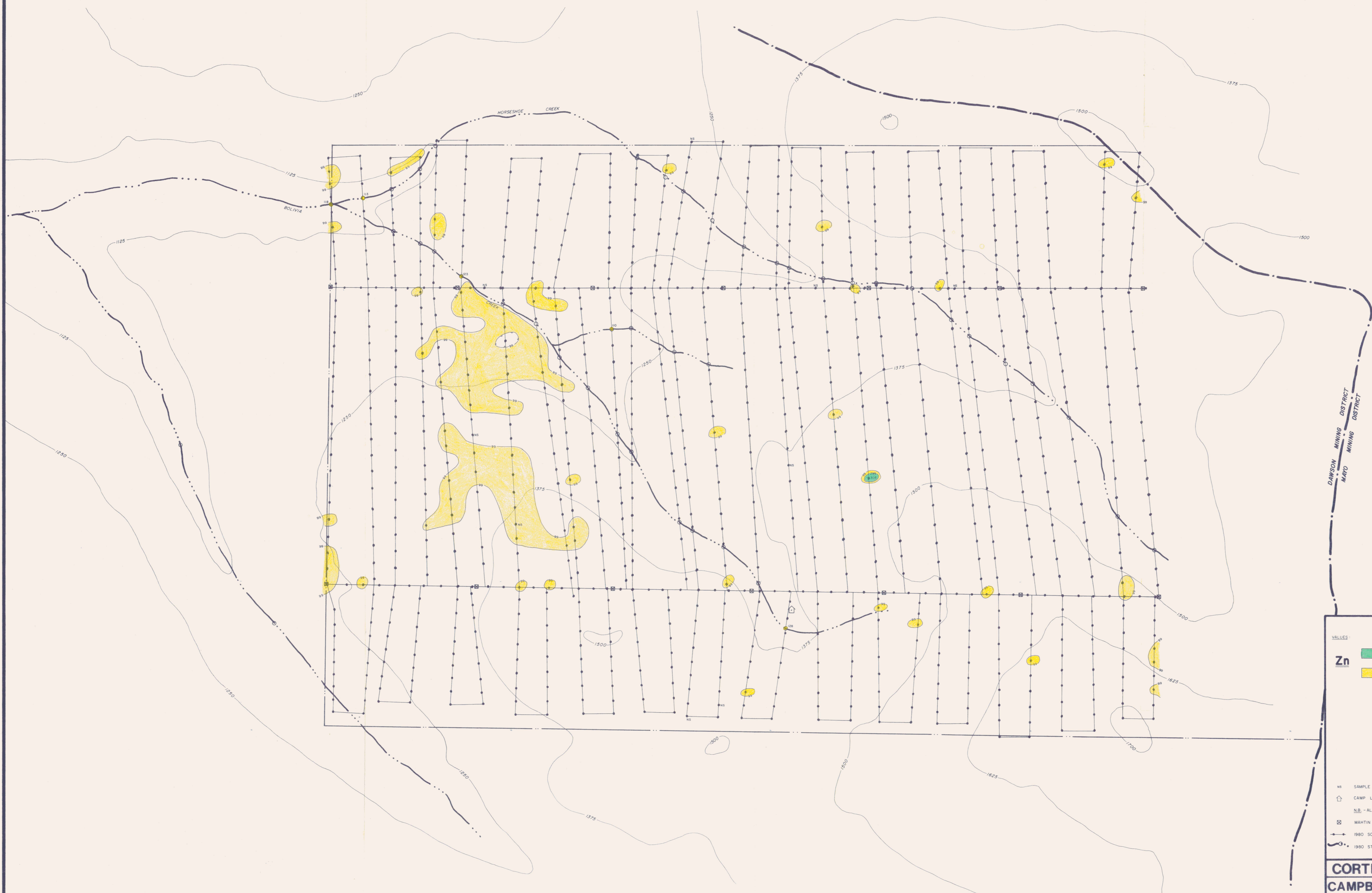
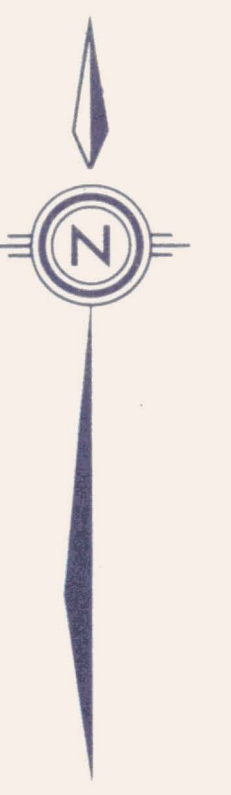
⊠ 1980 SOIL SAMPLES

⊠ 1980 STREAM SEDIMENT SAMPLES

CORTIN JOINT VENTURE
CAMPBELL RESOURCES INC.
IIS-P-15
MAHTIN GROUP

DETAILED SOIL GRID - Cu

SCALE 1:5000 DRAWN BY DFN DATE JAN 13, 1981 PLAN NO. 713-4
FIELD YEAR 1980 REVISION BY DATE



LEGEND

Zn

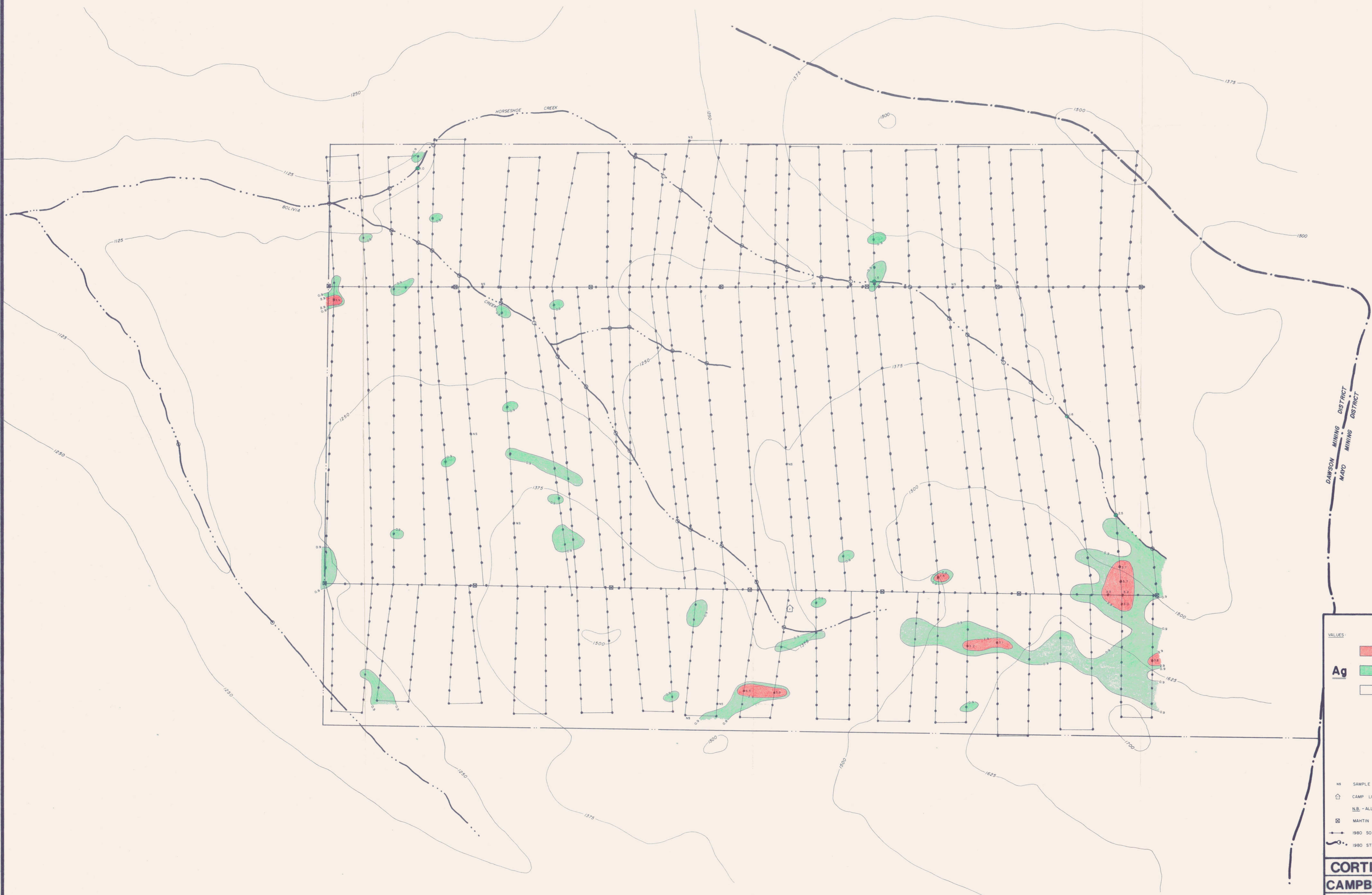
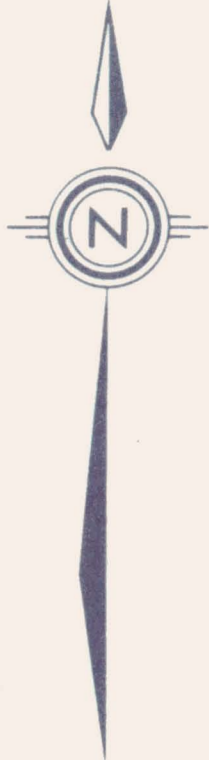
- > 299 ppm (Green)
- > 99 ppm (Yellow)

NS - SAMPLE NOT TAKEN
CAMP LOCATION
N.B. - ALL ELEVATIONS IN METRES.
MAHTIN CLAIM POSTS
1980 SOIL SAMPLES
1980 STREAM SEDIMENT SAMPLES

CORTIN JOINT VENTURE
CAMPBELL RESOURCES INC.
I15-P-15
MAHTIN GROUP

DETAILED SOIL GRID - Zn

SCALE 1:5000	DRAWN BY DFN	DATE JAN 14, 1980	PLAN NO.
FIELD YEAR 1980	REVISOR BY	DATE	713-5



LEGEND

VALUES

- >2.9 ppm
- >0.9 ppm
- >0.4 ppm (NOT PLOTTED)

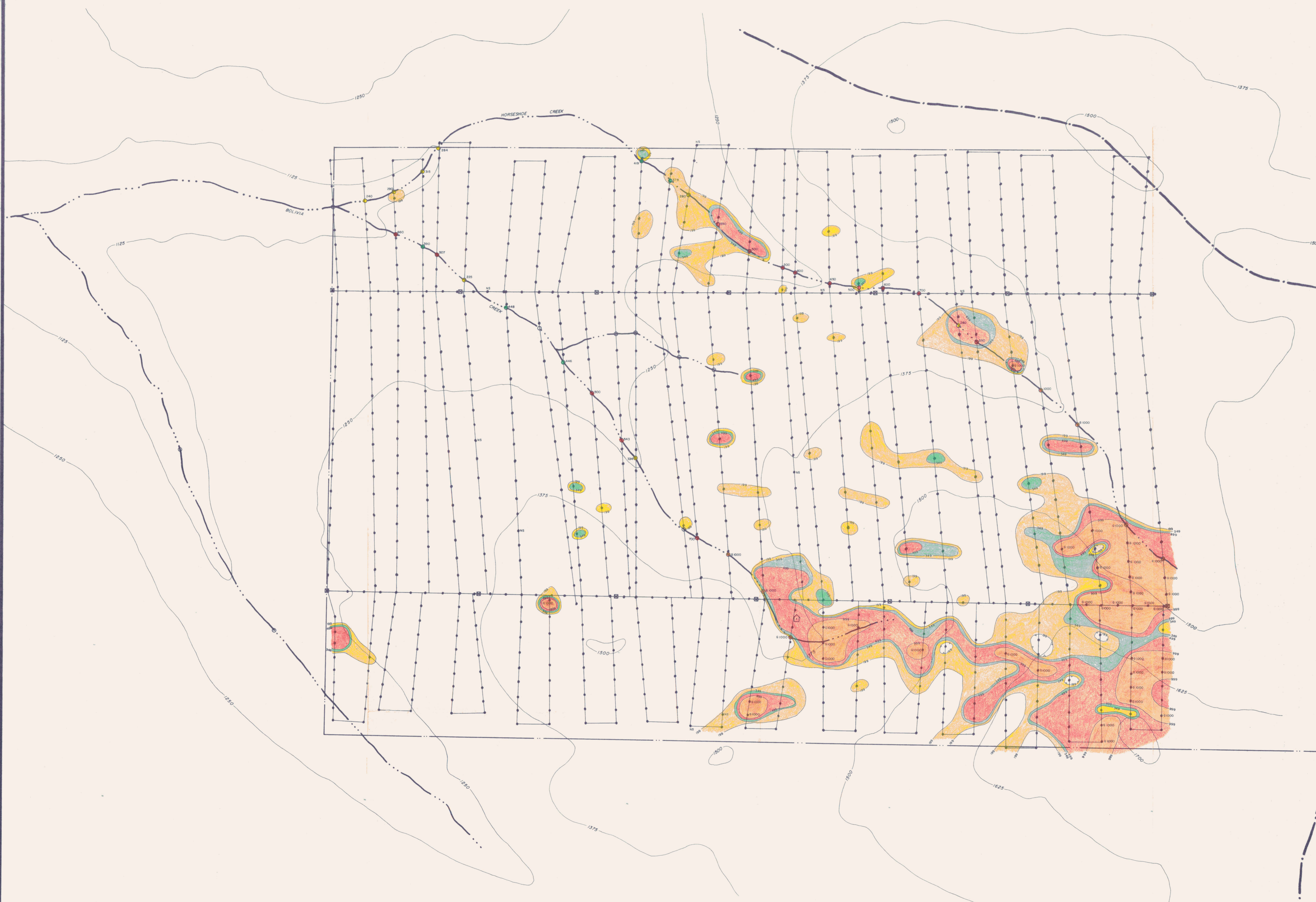
Ag

- SAMPLE NOT TAKEN
- CAMP LOCATION
- ALL ELEVATIONS IN METRES.
- MAHTIN CLAIM POSTS
- 1980 SOIL SAMPLES
- 1980 STREAM SEDIMENT SAMPLES

CORTIN JOINT VENTURE
CAMPBELL RESOURCES INC.
115-P-15
MAHTIN GROUP

DETAILED SOIL GRID — Ag

SCALE 1:5000	DRAWN BY DFN	DATE JAN. 13, 1991	PLAN NO.
FIELD YEAR 1980	REVISED BY	DATE	713-6



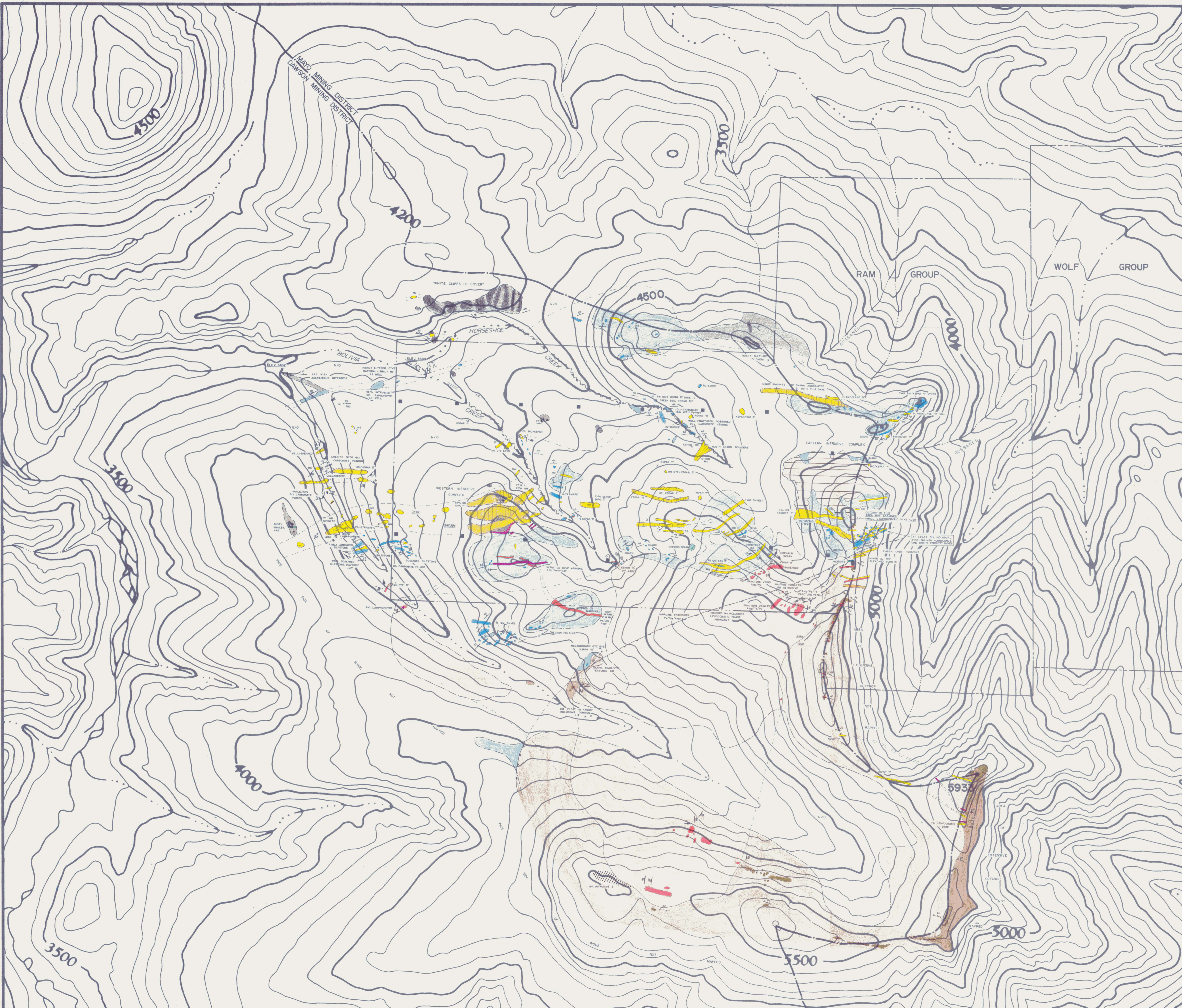
LEGEND	
VALUES:	
As	> 999 ppm
	> 499 ppm
	> 349 ppm
	> 199 ppm

- NS SAMPLE NOT TAKEN
- CAMP LOCATION
- N.B. - ALL ELEVATIONS IN METRES.
- MAHTIN CLAIM POSTS
- 1990 SOIL SAMPLES
- 1990 STREAM SEDIMENT SAMPLES

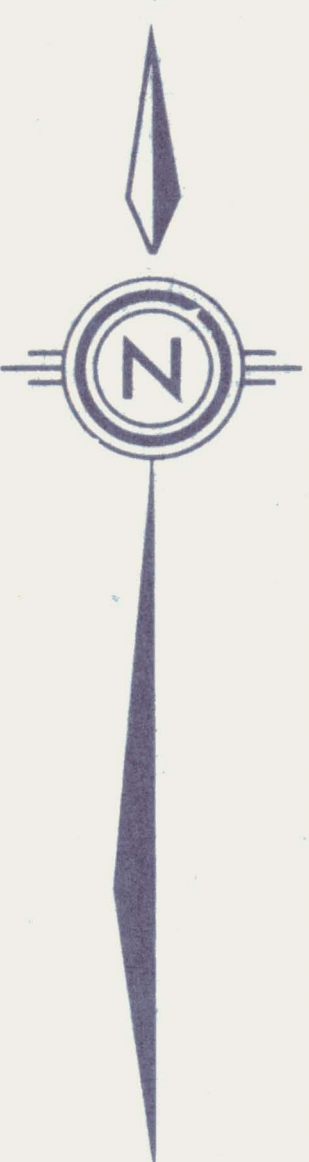
CORTIN JOINT VENTURE
CAMPBELL RESOURCES INC.
IIS-P-15
MAHTIN GROUP

DETAILED SOIL GRID - As

SCALE: 1:5000	DRAWN BY: DFN	DATE: JAN 16, 1991	PLAN NO.
FIELD YEAR: 1990	REVISED BY:	DATE:	713-7



LEGEND



- ABBREVIATIONS**
- Δ BRECCIA
 - FG FINE GRAINED
 - MG MEDIUM GRAINED
 - BW BUFF WEATHERING
 - IT PORPHYRY
 - QV QUARTZ VEIN
 - QM QUARTZ MONZONITE
 - HB HORNBLENDE

GEOLOGY

- CRETACEOUS**
- BIOTITE LAMPROPHIRE
 - "ROTTEN" QUARTZ-SERICITE PORPHYRY
 - UNDIFFERENTIATED DYKE ROCKS
 - WHITE QUARTZ-EYE/K-FELDSPAR PORPHYRY-MONZONITE
 - PORPHYRYIC HORNBLENDE SYENITE
 - BUFF WEATHERING SYENITE-GRANITIC TEXTURE
 - MEDIUM GRAINED BIOTITE/K-FELDSPAR SYENITE
 - BIOTITE/K-FELDSPAR PORPHYRY; MAINLY SYENITIC, A FEW MONZONITES
 - FINE-GRAINED, DARK GREY MONZONITE
 - QUARTZ-EYE/BIOTITE/K-FELDSPAR PORPHYRY; MONZONITIC TO QUARTZ MONZONITIC
 - MIGMATITIC HORNBLENDE-BIOTITE QUARTZ MONZONITE
 - BIOTITE QUARTZ MONZONITE/ADAMELLITE
- JURASSIC AND/OR CRETACEOUS**
- DIBASE/GABBRO
 - BIOTITE PYROXENITE
- ORDOVICIAN, POSSIBLY OLDER**
- TYPE "B" SHALE, SLATE, ARGILLITE, QUARTZITE AND GRITTY CALCARENITE
 - TYPE "A" FINELY LAMINATED SLTSTONE, ARGILLACEOUS SILTSTONE, LIMESTONE AND CHERT
- PRECAMBRIAN AND/OR CAMBRIAN**
- YUKON GROUP; BUFF-, BROWN-, AND RUSTY-WEATHERING GRITTY QUARTZITE AND QUARTZ-MICA SCHIST, ANDESITE

SYMBOLS

- AREA OF OUTCROP
- AREA OF SCREE COVER
- N/O NO EXPOSURE
- x ISOLATED BOULDERS
- CONTACT-OBSERVED
- - - CONTACT-ASSUMED
- TREND OF CONTACT, INCLINED
- BEDDING/LAMINATION, INCLINED
- SCHISTOSITY, INCLINED
- JOINTS, PROMINENT FRACTURING-INCLINED, VERTICAL
- FOLD AXES, DIRECTION OF PLUNGE
- FAULT
- THRUST FAULT, DIRECTION OF DIP
- SKARN
- TRENCH
- CLAM POSTS-MANTIN; OTHER
- TRIANGULATION POINT
- ⊕ CAMP LOCATION
- ⊕ HELICOPTER PAD

CORTIN JOINT VENTURE
CAMPBELL RESOURCES INC.
 115-P-15
 MAHTIN GROUP
GEOLOGY 090808

SCALE 1:110,000 DRAWN BY DFN DATE APRIL 15, 1981 PLAN NO. 713-9
 FIELD YEAR '79, '80 REVISOR DATE