PATHFINDER RESOURCES LTD. (N.P.L.)

INTERIM GEOLOGICAL REPORT
SANTA MARIA - WAR EAGLE EXPLORATION
Omineca Mining Division, B.C.

W. M. SHARP, P. ENG. DECEMBER 1970

2.

SEE PAGES 3-7

$ 22 - 31

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT

NO. 3485 MAP

TEL: BUS. 987-5322
RES: 987-9520

WILLIAM M. SHARP, P.ENG.
CONSULTING GEOLOGICAL ENGINEER

3485

171 WEST ESPLANADE
NORTH VANCOUVER, B.C.

December 24, 1970

President & Directors,
Pathfinder Resources Ltd. (N.P.L.),
617 - 789 West Pender Street,
Vancouver 1, B.C.

Attention: Mr. G. L. Oates, Pres.

Gentlemen:

With this the undersigned transmits his "INTERIM GEOLOGICAL REPORT, SANTA MARIA - WAR EAGLE EXPLORATION PROGRAM, NORCAN COPPER-SILVER PROSPECT, SMITHERS AREA, OMINECA MINING DIVISION, B.C.".

The report consolidates the results of your Company's 1970 exploration with data accruing from previous investigations during the 1966-68 period.

As a standard procedure, the writer requests that persons making reference to this note of the B.C. Government regulations and general formalities concerning the use of extracts and quotations for news releases.

Respectfully submitted,

W. M. Sharp

W. M. Sharp, P. Eng.

INDEX

Page

SUMMARY: SANTA MARIA - WAR EAGLE

To date, the Santa Maria vein system has been opened and intersected by 12 bulldozer trenches, old hand-trenches, and 14 diamond drill holes. These firmly indicate the continuity of Cu-Ag mineralization and its controlling structures over a N-S strike - length in excess of 2,100 feet - the zone being 'open' beyond the most northerly trench exposures.

The Santa Maria mineralization occurs mainly within the footwall and hanging wall strongly sheared and fractured contacts of a thick, westerly-dipping 'granitic sill' with the local volcanic assemblage. In detail, it occurs within quartz veins and silicified fracture-breccia zones or lodes.

The 'Hanging wall' vein contains successive intervals of potential ore grade mineralization over a presently-delimited strike - length of 1,000 feet to depths of at least 200 feet; copper values range from 1-5% over widths of 1-10 feet.

The Footwall vein exhibits similar continuity - with known strike and dip persistence respectively exceeding 1,100 and 200 feet. The few assays available indicate a general range of 0.1 - 1.5% Cu over 1-30 foot widths, but with known sections of 7½ oz. Ag & 8½% Cu over 2-foot widths.

With the above, and within certain sub-intervals of the zone, as many as four subordinate veins have been delineated by detailed trenching and drilling.

Current compilations of the available data indicate good possibilities for the development of at least two, and possibly more attractive ore situations within the general Hanging wall zone alone.

Considerably more fill-in detail is required before ore reserve calculations are feasible or warranted. However, potential ore grades were estimated from 18 significant trench and drill holes assays relating to the 'Hanging wall' vein. On the basis of a 0.8% Cu cut-off, the weighted average-assay of these was computed as:

> 7.5' @ 1.68 oz./ton Ag; 2.84% Cu or 3.11% total Cu-equivalent, representing gross & net values of about $35. and $26. per ton, respectively.

As only 7 assays grading in excess of 0.5% Cu are available for assessment of the Footwall mineralization, similar grade calculations are of slight value as regards to its probable mineral potential.

The recent Turam electromagnetic survey has indicated the presence of two 'linear conductors' which are essentially parallel to each other, and also to the known Santa Maria vein system. The principal anomaly is continuous over a 1,400 foot strike-length, and has a significant spatial relationship in respect to the Santa Maria vein system.

The geological setting of the War Eagle prospect area, in both its regional and local context, is favourable for the occurrence of porphyry-type copper mineralization. Locally at least one 'granitic' stock, with aplitic, felsitic, and porphyritic phases - some extensively altered and pyritized - is known to intrude members of the Hazelton volcanic group. Extensive and closely coincident copper and mercury anomalies resulting from recent soil-sampling over the drift-covered plateau westward of the stock may relate to a more pervasive, deeper-seated occurrence of mineralization than is suggested by the several minor copper showings in the locality. The attendant possibility, as suggested by the local geology, is that an occurrence of this type could conceivably relate to subjacent, or 'blind' intrusive unit or complex. The writer attaches considerable significance to the fact that the principal mercury anomaly bulges, and over-reaches the coincident copper anomaly, to include the substantially mineralized War Eagle 'vein' and related trenches.

W. M. Sharp

W. M. Sharp, P. Eng.

The following schedules provide for the continuation and completion of exploration recommendations made in the writer's August 18, 1970 report. Revisions have been made in accordance with current interpretations of the local geology, apparent ore controls, and recent exploration results.

RECOMMENDATIONS

Stage 1 - cont'd

A. Repair main access road.

B. Re-establish and extend War Eagle exploration grid.

C. Continue diamond-drill exploration and sampling of the Santa Maria vein system.

D. Provide for local geochemical-geophysical investigations of the Turam anomalies.

E. & F. Provisions for assay, engineering & incidentals.

Stage 2 - cont'd

A. Conduct depth-oriented 7.5 K.W. I.P. surveys of the general War Eagle prospect area - coverage contingent on C - below.

B. Extend Cu-Mo soil sampling, via a westerly extension of War Eagle grid to 8-W.; samples @ 100' intervals.

C. Conduct confirmatory geochem-Hg survey over extended War Eagle grid - by qualified, experienced personnel.

D. Conduct Ronka EM-16 'structure surveys' - coverage contingent on results of A - above.

E. Provide for bulldozer trenching within War Eagle zones.

F. Provide for follow-up drill exploration within War Eagle zones.

G. & H. Provisions for assaying, engineering, & incidentals.

W. M. Sharp

W. M. Sharp, P. Eng.

ESTIMATED COSTS

Stage 1

A.	6 days @ $200.....	$ 1,200.
B.	From 4W - 56E, estim. 10 mi. @ $60.....	$ 600.
C.	Estimate 2300 ft. BQ-size @ $12 per ft.....	$27,600.
D.	1 mile I.P. + 50 soil samples & miscell.....	$ 1,000.
E.	Provision for sampling-assaying on limit of 5 cores + 5 sludges per 100' = 230 @ $7.....	$ 1,600.
F.	Provision: engineering, travel, incidentals, & contingencies @ 20% approx.....	$ 7,500.
	TOTAL, Stage 1 continued	$39,500.

Stage 2

A.	Reconnaissance + detail, 12 mi. @ $800 gross.....	$ 9,600.
B.	Estimate 4-3200 ft. lines for 130 @ $3.30 gross, approx.....	$ 430.
C.	Estimate 250 @ $4 gross.....	$ 1,000.
D.	Estimate 10 mi. @ $100 gross.....	$ 1,000.
E.	Estimate 10 days @ $300 gross.....	$ 3,000.
F.	Allow 3000 ft. @ $12 per ft.....	$36,000.
G.	Provision for sampling-assaying 300 @ $7.....	$ 2,100.
H.	Provision, engineering, travel, incidentals, & contingencies @ 20% approx.....	$10,620.
	TOTAL, Stage 2 revised	$63,750.

Respectfully submitted,

W. M. Sharp

W. M. Sharp, P. Eng.

INTRODUCTION

This report follows upon the writer's preliminary geological-evaluation report of date August 18, 1970 - prior to the commencement of actual exploratory operations by Pathfinder Resources Ltd.

During late August - early September grid preparation and rehabilitation within the Santa Maria and War Eagle claim groups was carried out by Amex Exploration Ltd. crews; soil sampling (Cu-Mo) was done concurrently. Between mid-September and early October Seigel Associates Ltd. ran Turam surveys over the full prepared extent of the Santa Maria grid, and also over a smaller grid covering the War Eagle vein and its inferred north-south extensions.

During his September 24-29 visit the writer carried out compass-tape plan-and-profile surveys of the north half (Turam - positive part) of the Santa Maria grid - with ties to old drill-sites, trenches, vein exposures, and other features. Following this, localized detailed soil-sampling (Cu & Cu-Ag) was done on selected grid-lines over specific E-W intervals as suggested by preliminary interpretations of the Turam data. Field work within the War Eagle Exploration area comprised deep soil sampling (Hg) over the accessible westerly part of the grid, with subordinate compass-tape mapping of relevant geological and physical features.

The current diamond drilling program within the Santa Maria zone commenced on October 10, 1970 and continued until severe winter weather forced its termination on December 7th. A total of 1243 feet were drilled from seven set-ups - the first being on an inferred position of the main Turam conductor at line 13-N, and the balance on known (1966) elements of the Santa Maria vein system - to fill in and augment the rather widely-spaced pattern of earlier drill holes.

The general management and supervision of the 1970 exploration was handled by Mr. G. L. Oates; the writer's principal function comprised the geological engineering direction of the various phases of the program, plus the compilation and correlation of the resulting data.

Grid preparation, geochemical and geophysical surveying, and diamond drilling were done by contract crews. Field engineering functions were handled by engineers provided by Vancouver-based consulting-exploration service companies.

The foregoing field work was carried out from base (tent) camps established on the Santa Maria bench. The camp was entirely serviced, from Smithers and Telkwa, by heavy-duty 4-W.D. pickup trucks.

PART I - SANTA MARIA ZONE

GENERAL

During most of the 1970 field program the resulting data were compiled on the existing 100-scale map set - supplemented by a composite sheet of grid, and base-line sections, and a composite geophysical-geochemical plan on the same scale. During, and subsequent to the latter stages of the drilling program these were superceded by a 40-scale map set - comprising a composite plan - longitudinal vertical projection and set of 15 cross-sections, the foregoing including all available exploration data from section 5-S to 13-N.

GEOLOGICAL FEATURES

Bedrock within the prospect zone is rather generally concealed by a mantle of drift ranging from about 2 feet to probably as much as a 100 feet thick - the deeper accumulations obviously filling the creek channel situating closely west of the Santa Maria mineralized zone. The determination of the bedrock geology depends entirely upon evidence resulting from diamond drilling and trenching; the latter, comprising about 12 bulldozed cross-trenches and local connecting strike-trenches, provides intermittent bedrock exposures over a N-S strike-length of about 2100 feet. Supplementary cross-sectional detail is provided by 14 drill holes over a 1600-foot N-S interval.

Detailed geological correlations indicate that the general section of westerly-dipping andesitic-dacitic-basaltic rocks has been complexly intruded by a composite quartz porphyry/aplite/felsite "sill". Volcanic rocks, adjacent to its east and west contacts are all more-or-less altered - this generally involving additions and/or substitutions of quartz, kaolin, epidote, calcite, chlorite, etc. Locally, sections of bleached and silicified volcanics are indistinguishable from felsic and rhyolitic phases of the intrusive.

In thickness, the Santa Maria sill ranges between 50-250 feet. However, its wider sections normally include major bands or remnants of volcanic rock, but which are usually

less significantly veined or mineralized than the intrusive envelope. Normally, all of the various rock types comprising the general Santa Maria structure are sheared and fractured, with shearing tending to localize at the contacts of different rock types.

Within the explored part of the Santa Maria zone the principal mineralized fracture structures situate at the east and west contact zones of the sill, with generally concordant northerly strikes and westerly dips - the latter averaging about 50 degrees. The main vein-pair, formerly termed the 'Santa Maria' and 'S.H.' veins, are in this report designated as the 'Footwall' and 'Hanging wall' veins. In addition to these, as many as four subordinate veins and/or substantially mineralized fracture zones lie within some strike intervals of the gross structure. Some, particularly in the 4N-6N locality, contain relatively high grade Cu-Ag mineralization. The present evidence suggests that these tend to localize within more complexly fractured and faulted segments of the general structure.

The local Cu-Ag mineralization occurs within quartz veins and variably silicified composite fracture - breccia zones. The ore minerals, in decreasing order of abundance, are chalcopyrite, bornite, and chalcocite; gangue metallics include pyrite and sparser hematite. On the average, silver is present in com-

mercially significant proportions.

The Hanging wall vein contains successive intervals of potential ore-grade mineralization over a gross strike-length of 1000 feet and depth of at least 200 feet. Copper values show a range of 1-5% over widths of 1-10 feet. To date, the total extent of sampling is insufficient for valid tonnage-grade calculations, but is sufficient to indicate that the richer ore sections tend to occur along the Hanging wall structure.

The Footwall vein has been traced, via trench, drill-hole, and tunnel exposures over a gross strike length of 1100 feet - pinching out to the south, but possibly extending an additional few hundreds of feet further north via a more easterly-lying 'split' as exposed in the most northerly trenches (No's 1 and 2). On the basis of the existing situation, involving relatively few unsystematically-spaced trench and drill-hole intercepts, the Footwall vein appears to exhibit relatively more pronounced variations of width and metal content over its known extent. Currently, the best mineralized exposure locates in the trench nearest to section 0-N. The average of two samples taken here by the writer averaged 7.6 oz./ton Ag, 8.6% Cu over a width of 1.85 feet. This vein segment is obviously continuous with, and representative of the material formerly mined in the nearby Santa Maria (Footwall) workings - which resulted in the shipment of 239 tons of sorted ore grading 17% Cu and

9.5 oz./ton Ag. Within other strike and dip intervals the present extent of sampling shows grades ranging from 0.1 - 1.5% copper over widths of 1-30 feet. The associated silver content varies widely - ranging from a small fraction of an ounce to several ounces per unit (1%) of copper.

From their current plots on cross section it is evident that the 1966 drilling provided relatively deep intersections on the Footwall vein with correspondingly shallow tests of the Hanging wall zone - thus precluding valid comparisons of the mineralization within the respective structures at similar horizons or equivalent dip-ranges. The rather limited amount of drilling accomplished prior to the forced termination of the program this year produced some encouraging intersections and necessary fill-in assays, but was too limited in scope for the intended purpose of mathematically proving up at least a modest tonnage of ore within one or more intervals of the Hanging wall zone.

In view of its 1400' N-S extent, and its proximity to the Santa Maria vein system the principal Turam anomaly defined this year must be considered a valid exploration target - in spite of the fact that d.d.h. P-1 did not reveal anything that might relate to it.

DETAILS - 1970 EXPLORATION

1 - Grid Preparation:

This was done by Amex Exploration Services Ltd. to specifications furnished by the writer.

The original Santa Maria base-line was cleared and picketed on 100-foot stations from 17-S to 13-N (shaft @ 00 + 30N) - the base-line bearing approximately N-S (astronom.). E-W cross-lines were established at 200-foot base-line intervals, or at only the odd-numbered stations. These were cleared, flagged, and stationed at approximate 100-foot horizontal intervals between 8E - 8W. Additional flagged lines, for a northerly extention of the Turam survey, were later established to base-line sta. 21-N. The foregoing involved some 20,000 feet of grid-preparation.

2 - Grid Surveys:

These were carried out by the writer, with the requisite assistance, and involved Brunton-tape plan-and profile traversing of the full base-line and cross-lines from 1-S to 21-N. Relevant details, including roads, creek-crossings, trenches, 1966 drill-hole collars, etc., were concurrently tied to the nearest grid stations.

3 - Turam Survey:

The Turam electromagnetic survey was carried out by Seigel Associates Limited. Grid coverage was specified by the writer, and the survey was carried out in accordance with the August 25, 1970 proposal submitted to Mr. Oates.

A Scintrex SE-71 instrument was employed, with a receiving coil separation of 100 feet. Turam, rather than other electromagnetic equipment, was chosen because it is relatively unaffected by a variable topography, provides deep penetration, and is able to detect strong (conductive) fracture structures in addition to its ability to detect more-or-less continuous sulphide deposits. However, the technique appears less definitive with respect to dip determinations than most other electromagnetic methods.

The survey was made over the prepared grid from 17-S to 13-N inclusive, and later extended, via three shorter (1000') lines, to 17-N. The general survey was performed using a 400 c.p.s. frequency. Line 13-N was additionally traversed using 200 and 800 c.p.s. frequencies - with no response resulting from the former, and a response similar to that obtained from the 400 c.p.s. traverse resulting from the latter. The basic 400 c.p.s. traversing totalled about 3 miles; the supplementary traverses involved an additional 2000 feet.

The survey produced parallel 'principal' and 'minor' linear anomalies, trending northerly, and respectively situating at average distances of 400 and 600 feet west of the grid base-line. As noted previously, the writer considers the principal anomaly at least to be a valid exploration target, in spite of the generally negative results accruing from the one preliminary - exploratory drill hole from 13-N, 2W. In this regard the writer thinks that inaccurate positioning of the conductor axis and/or an incorrect dip determination may have resulted in the drill hole completely missing the target.

On the preliminary (map) interpretation "well defined" conductor-axis intersections are shown on lines 1-S, 3-N, 5-N, 7-N, 9-N, and 13-N; with these are "less well defined" intersections on 1-N and 11-N. Intersections south of 1-S are all rated as "least well defined". On line 1-S a situation involving the close coincidence of a "well defined" Turam conductor with a previously designated I.P. anomaly warrants serious consideration - particularly by reason of its down-slope proximity to a small, but pronounced geochemical-Cu anomaly. Pending more detailed geochemical substantiation, one short exploratory hole at least should be drilled from a suitable site in this area.

4 - Diamond Drilling:

This was also done on a contract basis. BQ-size wire-line equipment was employed. Details of holes drilled are as follows:

Hole #	Collared @	Bearing	Incl.°	O'burden'	length'	Core Rec.%
P-1	13+00N,2+00W	West	-60	54	327	91.6
P-2	5+10N,3+00W	East	-45	19	300	76.6
P-3	1+00S,2+00W	East	-45	2	150	71.3
P-4	3+21S,1+75W	East	-45	10	150	75.3
P-6	4+85N,1+65W	East	-45	10	126	65.1
P-8	5+75N,1+75W	East	-45	10	145	78.8
P-7	4+00S,2+50W	East	-45	?	45	(incomplete)

Total, to date - 1243 ft.
Weighted average - - - - 79%

Abbreviated logs of the above holes follow:

P-1:
54-99' Chloritized andesite
99-105' Chloritized andesite with 5% dissem. pyrite
105-115' Chloritized andesite with less dissem. pyrite
115-158' Chloritized andesite and basalt
158-245' Variably altered andesite
245-284' Broken - brecc. alt. andesite, calcite veining
284-311' Mixed firm & soft-alt. andesite; faults @ 30°
311-319' Broken - brecc. alt. andesite; some diorite incl.
319-327' Altered diorite; orange felds.; sp. py. & specul.

Note: Hole drilled to test Turam anomaly - no intersections.

P-2:
19-28' Green chlor. andesite; fract. w calcite & epidote
28-87' Brown basalt; locally soft-alt.
87-106' Green alt. andesite, much broken, minor basalt
106-136' Altered porphyry, occasional quartz veining
136-154' Broken, silic. porphyry; sparse to fair cp.w.py.
154-182' Porphyry & aplite; local sects.w.cp.
182-243' Aplite & porphyry, loc. fract. & alt.; sp. cp.
243-279' Altered tuff, fract., some quartz & cp.
279-300' Aplite & felsite, frequently broken; cp. @ 294-300'

Principal assays (core)	Ag, oz./ton	Cu, %:
162-167'	0.05	0.21
172-179'	0.08	0.22
258.5-264'	0.08	0.42
274-279'	0.13	0.39
294-300'	0.09	0.40

P-3:
2-30' Andesite; fract. w. sp. py. and cp.
30-56' Aplite & felsite; loc. broken w. minor cp.
56-80' Porphyry, var. alt.
80-103' Felsite and rhyolite, loc. cp.
103-150' Aplite and felsite, barren

Principal assays (core):

80-85.5'	0.30 Ag	0.44 Cu

P-4:
10-28' Andesite, scattered cp. in fractures.
28-31' Andesite, Freq. qz. veinlets with cp.
31-60' Aplite, loc. fract.-leached w. limonite.
60-91' Porphyry, loc. fract. & alt.
91-96' Silic. brecc. porphy.; good cp. @ 92.5-93.5'
96-106' Felsite, loc. fract.-alt. w. dissem. py.
106-123' Andesite & felsite, fractured w. sp. sulfides
123-144' Felsite, loc. fract.
144-150' Mainly soft chlor. andesite.

Principal assays (core):

25-31'	0.12 Ag	0.40 Cu
31-36'	0.18	0.17
91.5-96'	0.45	0.80

P-6:
11-46' Felsite; silicif. and mineralized 26-46'
46-62' Porphyry, no min.
62-126' Felsite and aplite; well min. @ 74-85.5'

Principal assays (core):

26-30'	1.40 Ag	5.12 Cu	) 21' @
30-39'	0.12	0.24	) 0.65; 2.44
39-46'	0.98	4.06	)
74-82'	0.65	2.28	
82-85.5'	0.30	0.90	

P-8:
10-60' Aplite & felsite, alt.; scattered cp. in qz. @ 30-40'
60-80' Porphyry, fract. & alt.; 74-80' good to fair cp.
80-103' Felsite w. minor aplite; 80-86' scant cp.
103-110' Tuff w. minor porphyry; barren.
110-135' Porphyry, loc. alt. sections; minor limonite.
135-145' Andesite, loc. fract. & silic.; good cp. @ 134'-137'

Principal assays (core):

74-75'	0.95 Ag	3.25
75-77.5'	0.09	0.57
77.5-80'	0.02	0.15
80-82.5'	0.06	0.34
82.5-86'	0.09	0.23
134.5-136.7'	0.40	2.01
136.7-140.5'	0.08	0.20
140.5-145'	0.04	0.29

Check assays - core N-5 (1966):

72-75'	0.25 oz./ton Ag	0.53% Cu
75-76'	1.00 oz./ton Ag	3.52% Cu
76-78'	3.5 oz./ton Ag	9.65% Cu
78-79'	0.45 oz./ton Ag	0.43% Cu

5 - Assays & Interpretations

Considerable assay data have accumulated as a result of the total trench and diamond-drill exploration accomplished to date. A general appraisal of the gross data suggests that about one-half of it actually relates to principal elements of the vein system; the balance accrues from subsidiary and/or local mineral occurrences of minor economic importance. Within the Hangingwall zone splitting and branching result in the local occurrence of up to three separate veins. This complexity is most evident at 5-S and within the 4N-6N interval.

The bulk of the Footwall mineralization, on the basis of the limited extent to which it has been tested, is generally broadly dispersed within one relatively wide fracture zone. The fact that it includes important intervals of narrower, but much higher grade mineralization is attested to by the pit exposure near Sec. O-N and the recorded grade of ore stoped from the Santa Maria workings over 50 years ago. It is highly probable that similar high grade mineralization occurs elsewhere along strike and down-dip - possibly as 'blind' ore shoots, which would provide no surface evidence of their existence.

All assays derived from the more significant trench exposures and diamond drill intersections of the Hangingwall vein system were computed on 2 bases, with the following results:

(A) On the basis of a 0.8% Cu cut-off, the weighted average assay is:

7.5' @ 1.68 oz./ton Ag.; 2.84% Cu., or
3.11% Cu-equivalent

(B) On the basis of a 1.0% Cu cut-off the result is:

8.16' @ 1.73 oz./ton Ag.; 3.04% Cu., or
3.32% Cu-equivalent.

At $0.56 per lb. Cu., the gross values of the foregoing are respectively $34.82 and $37.18 per ton.

Similar calculations on assay data relating to the Footwall zone, but with the cut-off reduced to 0.5% Cu, give:

6.2' @ 0.55 oz./ton Ag; 1.18% Cu, or
1.22% Cu-equivalent.

Comparison of the above, from the point of view of both width and grade, indicates a considerably higher exploration priority for the Hangingwall vein system.

PART II - WAR EAGLE ZONE

GENERAL

The original 0+00N base-line was re-picketed and employed as the main survey reference line for recent and proposed exploration. The 1966 N-S (traverse) lines were similarly re-established on the 200' E-W spacing, and the grid extended 1400' eastward via 7 additional lines; with this, the grid was re-designated on a coordinate basis.

The results and interpretations of the 1970 geochemical surveys are shown on the revised 200-scale Dwg. 70-3.

GEOLOGY & MINERALIZATION

The claims group is mainly underlain by Hazelton Group andesitic-dacitic lavas and pyroclastics typical of the region. These have been intruded by numerous dykes, sills, and small stocks - the igneous suite comprising granodiorite, granite, quartz feldspar porphyry, aplite, and general 'felsite'. Approximately 80% of the area is drift-covered, with bedrock mainly exposed along the westerly and northerly rims of the plateau, within the valley of War Eagle Creek, and in exploration trenches within the plateau area.

Numerous small occurrences of Cu-Ag mineralization have been discovered, mainly within the northerly and westerly margins of the plateau. The majority of these relate to zones of relatively more intense fracturing or brecciation; however, minor patches of disseminated chalcopyrite can be seen in the northly and westerly trenches - typically with chloritized or jasperized tuffs and breccias. Disseminated pyrite-chalcopyrite also forms a subordinate part of the breccia-type mineralization of the War Eagle 'vein' - currently well exposed on the surface, but so far untested at depth.

Trenching southward of the rim of the cirque has exposed the N-S trending War Eagle structure for about 800 feet. A 200-foot interval of this contains good but patchy fracture and breccia-filling pyrite-chalcopyrite mineralization over

gross widths of 15-30 feet. The writer grab-sampled two trench exposures of better mineralized material:

Location	Ag. oz./ton	Cu. %
11+75N	0.63	1.55
13+35N	1.80	2.35

These compare with the following 1968 sampling:

Location	Apparent Width	Ag. oz./ton	Cu. %
Trench #23:			
Vein	30'	0.58	1.22
Hangingwall Sec.	20'	0.16	0.18
Lamprophyre	20'	trace	1.42
Trench #22:			
Vein	16'	trace	1.42

Trenching to the north and south of the above interval exposes a coincident decrease in fracturing, alteration, silicification, and mineralization.

A conspicuous area of disseminated pyrite mineralization (Fe-gossan) is exposed in the canyon of War Eagle Creek at about 1/2 mile southeast of the War Eagle vein showings. Geologically, it occurs within felsitic phases of the War Eagle stock - a 1500' by 3000' roughly oval-shaped body, elongate in a N.N.W. direction. Earlier sampling of a heavily pyritized exposure indicated a local copper content in the range of 0.04-0.16 percent. Trenching to the northwest and west of this showing, within the flanking volcanics has exposed minor amounts of fracture-filling Fe-Cu sulphides.

I.P. (2.5 KW) surveying in 1966, and locally substantiated in 1968, revealed a broad E-W anomaly traversing the north central part of the stock and adjacent volcanics; both 'highs' directly relate to strongly pyritized sections of the stock. Geochemical surveys, made originally in 1968 and duplicated this year, provide indirect evidence of copper mineralization within interior sections of the stock; however, further geochemical investigation is required for a closer delineation of probable source areas.

In 1968 a deep hole was drilled on a geochemical Cu-'high' situating some 800'-900' southeast of the War Eagle I.P. anomaly, but still within the southerly part of the stock. Most of the intrusives cored were visibly altered and generally impregnated with pyrite, but with negligible amounts of copper mineralization. Independent petrographic examination of a suite of typically altered drill cores has provided indisputable evidence that the alteration and Fe-mineralization are of deep-seated magmatic-hydrothermal origin.

DETAILS - 1970 EXPLORATION

1 - Grid Preparation:

This was also done by Amex Exploration Services Ltd. in conjunction with the Santa Maria assignment. Preparation of the general War Eagle grid included picketing and clearing of a 5600-foot extended base-line and 29 cross-lines @ 200' E-W spacing, reaching 1600' north and south of the base-line. Grid-line pickets were placed at 200-foot (plan) intervals, and marked and flagged (blue). The general War Eagle exploration grid totals about 20 line-miles, covering most of the open plateau and adjacent slopes to the south and east.

A supplementary grid, to accommodate a Turam E.M. survey of the War Eagle vein, was also established. For this the N-S base-line was established on main grid line 18E, and cross-lines located at 200-foot intervals from 4N-24N. These, extending 800 feet to the east and west of the base-line, were picketed for 100-foot stations and flagged (yellow). To facilitate placement of the Turam loop, end-lines 4N and 24N were each extended to 28E. The basic grid, including the base-line and eleven 1600-foot cross-lines, totals 3 3/4 line-miles; with end-line extensions, it totals 4 1/2 miles.

2- Detail Surveys:

Drainage features and some road and trench detail were mapped by Amex personnel in the course of the grid preparation

and soil-sampling assignments. The writer mapped some geological and physical detail on consecutive visits. This, and as much previously-mapped detail as the available time permitted, were tied to the new grids.

3 - Turam Survey:

This was also carried out by crews from Seigel Associates Limited in conjunction with the Santa Maria project and in accordance with plans and contract arrangements made by the writer and Mr. Oates, respectively. Survey procedures were essentially similar to those employed on the Santa Maria project.

No pronounced conductors were indicated, even in the vicinity of the 'vein' showings. Weak conductors were detected on line 16-N, but these apparently do not extend beyond this locality.

The generally negative Turam results may signify that neither the exposed chalcopyrite-pyrite assemblage nor its controlling fracture structures comprise "linear conductors" that are detectable by Turam-E.M. methods. The original 2.5 KW I.P. survey over this area resulted in the delineation of very minor anomalies. Consequently, future depth-oriented I.P. exploration would involve the use of higher-powered equipment and appropriate electrode spacings and separations.

4 - Soil Sampling, Copper-Molybdenum:

The 1970 survey comprises an easterly and southerly extension of the 1966 coverage, and was carried out by the Amex crew. Lines 28E-56E inclusive were sampled at 200-foot intervals - including the easterly plateau and slope areas. The composition of the overburden varies considerably over the grid area, ranging from normal stratified mineral soil (rare) to predominantly gravelly or sandy sections. A deep organic-rich layer is typical of much of the poorly-drained flat, open plateau surface. Consequently, the selection of the sample material was limited to the best available soil at each station. All samples were sent to the North Vancouver Bondar-Clegg laboratory for preparation, and analysis by the atomic absorption method; results were reported in parts-per-million total Cu and Mo.

The 1966 and 1970 data were combined and resolved for interpretation. Three significant copper anomalies are indicated.

One locates in the northwest section of the grid. Its 'squared' dimensions are roughly 1000 by 1500 feet; soil-copper values range generally from 100 to 300 p.p.m. and more locally to 900 p.p.m. 'Background' is in the range of 30-40 p.p.m. It is noteworthy that this anomaly does not include the area of the War Eagle vein showings - possibly due to the presence of a thick, relatively impermeable (clay) cover.

Neverthless, this particular example of a negative geochemical response over a known, substantially mineralized zone illustrates the limitations of the method, and the adviseability of utilizing parallel exploratory techniques.

The other two anomalies comprise a temuously-connected pair, respectively situating within the northerly and southerly halves of the War Eagle Creek stock. Each of these has about one-half the areal extent of the main anomaly to the west. Local soil-copper values show a general range of 100-250 p.p.m. over an average 40-50 p.p.m. background. As has been previously noted, both reflect the presence of a minor copper content within local disseminated pyrite zones. The moderate nature of the local geochemical responses could, in part, be due to the greater thickness and less permeable nature of the overburden within this section of the grid. In the writer's opinion the geochemical response is only fair, but in view of the local geological and geophysical relationships, warrants the application of other depth-oriented surveys.

Geochemical-Mo response was generally negligible. However, a minor anomaly of about 4 X background range overlaps the S.W. corner of the south Cu anomaly in the stock; the Mo anomaly could be conceived as relating to the Cu anomaly through N.E.-trending bedrock fractures.

5 - Soil Sampling, Mercury:

This was restricted, mainly on the basis of time and terrain limitations, to the westerly half of the grid. As the survey was planned as a preliminary reconnaissance, the sampling was done on a 400' x 400' pattern on alternate grid lines. For reasons noted previously, samples were taken from the closest local equivalent of C-zone soil. Samples were sent to Barringer Research Ltd. for preparation and analysis via their specially-developed facilities; results were reported in parts per billion.

The survey is based on the fact that the magmatic-hydrothermal processes relating to base metal mineralization - particularly of the porphyry-type sulphide deposits - also produce geochemically-detectable amounts of mercury which are trapped within the enclosing wall rocks and blanketing overburden.

The survey delineated what appear to be parts of two pronounced mercury anomalies respectively situating north and south of the (0+00N) base line; both are 'open' to the west. The northerly Hg anomaly over-lies the principal copper anomaly and, in addition, extends northeastward to include most of the War Eagle Vein prospect area. Further, it includes major parts of the existing (shallow) I.P. anomalies. The southerly anomaly is smaller than the north anomaly, but in view of its

proximity to it, is probably genetically related. The present geochemical evidence appears sufficiently strong to justify recommendations for deep-ranging I.P. surveys. However, the writer feels that this should be preceded by a confirmatory Hg survey over the whole grid, but employing more refined techniques than were used for the 1970 reconnaissance.

Respectfully submitted,

W. M. Sharp

W. M. Sharp, P. Eng.

CERTIFICATE

I, William M. Sharp, with business and residential addresses in North Vancouver, British Columbia, DO HEREBY CERTIFY THAT:

1. I am a graduate of the University of British Columbia with an M.A.Sc. (1950) degree in Geological Engineering.

2. I am a registered Professional Engineer in the Province of British Columbia.

3. I have practiced my profession for 20 years, including 7 years as a geological consultant.

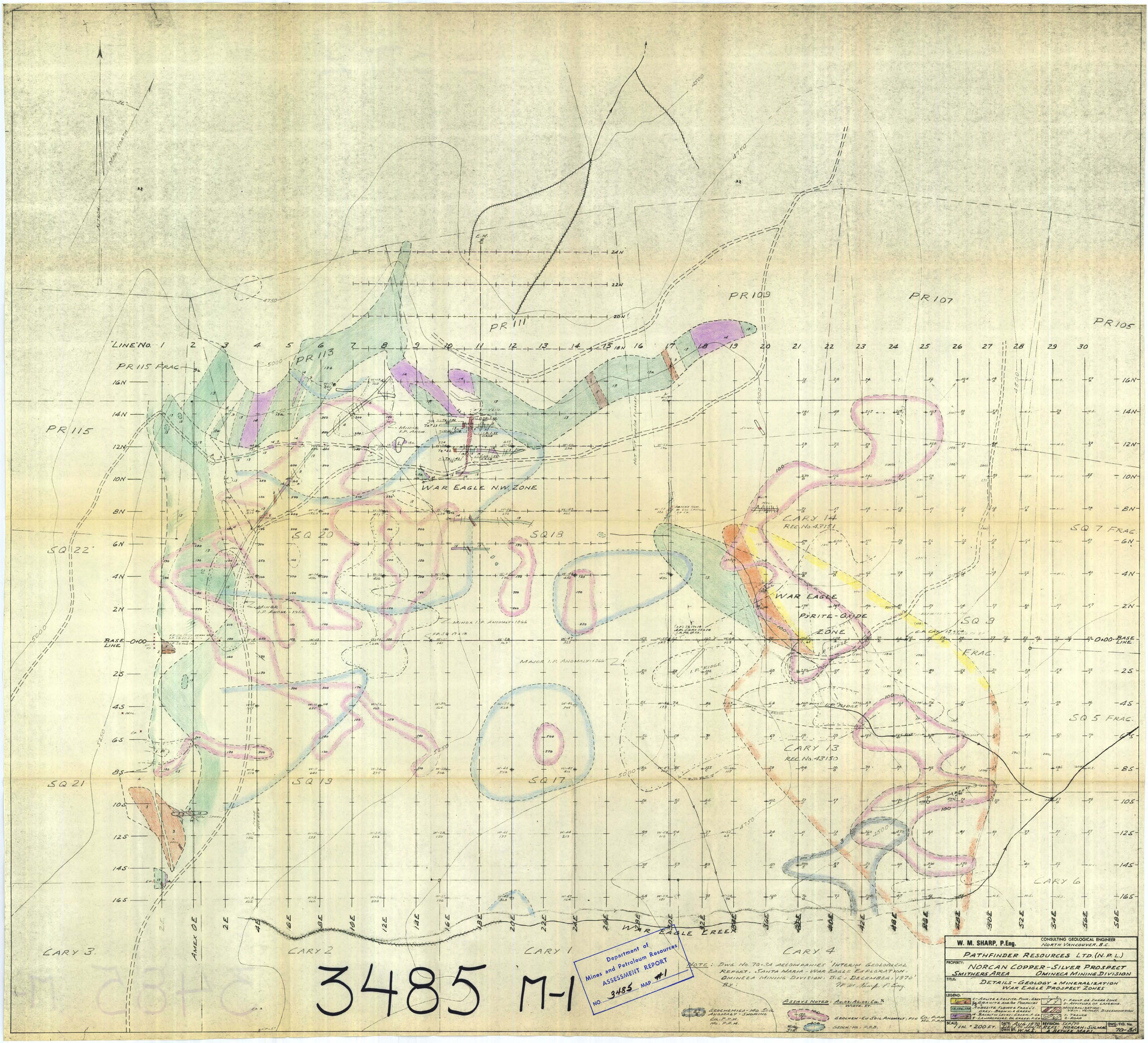
4. I have personally examined the War Eagle and Santa Maria areas of the Norcan property at Howson Basin, Omineca Mining Division, B.C. and all available reference material prior to the preparation of my December 24, 1970 report.

5. I have no direct or indirect interest in the properties of Pathfinder Resources Ltd. (N.P.L.), nor do I expect to acquire any such interest.

W. M. Sharp

W. M. Sharp, P. Eng.

December, 1970
North Vancouver, B.C., Canada


LINE No.
PR 115 FRAC.
PR 115
PR 113
PR 111
PR 109
PR 107
PR 105
SQ 22
SQ 20
SQ 18
SQ 7 FRAC.
SQ 9
SQ 5 FRAC.
SQ 21
SQ 19
SQ 17
WAR EAGLE N.W. ZONE
WAR EAGLE PYRITE-OXIDE ZONE
CARY 14
REC. No. 43151
CARY 13
REC. No. 43150
CARY 6
CARY 3.
CARY 2
CARY 1
CARY 4
BASE LINE
MAJOR I.P. ANOMALY-1966
WAR EAGLE CREEK
NOTE: DWG. No. 70-3A ACCOMPANIES 'INTERIM GEOLOGICAL REPORT, SANTA MARIA - WAR EAGLE EXPLORATION, OMINECA MINING DIVISION, B.C., DECEMBER, 1970'
BY: W. M. Sharp, P. Eng.
ASSAYS NOTED: AU. OZ: AG. OZ: CU. %
WIDTH, FT.
GEOCHEMICAL - MO SOIL ANOMALY - SHOWING CU. P.P.M. MO. P.P.M.
GEOCHEM - CU SOIL ANOMALY, PER CU. P.P.M. MO. P.P.M.
GEOCH. - HG, P.P.B.
W. M. SHARP, P.Eng.
CONSULTING GEOLOGICAL ENGINEER
NORTH VANCOUVER, B.C.
PATHFINDER RESOURCES LTD. (N.P.L.)
PROPERTY: NORCAN COPPER-SILVER PROSPECT
SMITHERS AREA
OMINECA MINING DIVISION
TITLE: DETAILS - GEOLOGY & MINERALIZATION
WAR EAGLE PROSPECT ZONES
LEGEND:
1 - APLITE & FELSITE, PINK, GREY
2, 3 GRANITE AND/OR PORPHYRY
ANDESITE FLOWS & FRAG'L'S, GREY, BROWN, & GREEN
14 - BASALTIC LAVAS: GREEN, F. GR.
5 - LAMPROPHYRE: DK. GREEN, F. GR.
1 - FAULT OR SHEAR ZONE
2 - ATTITUDE OF LAYERING
MINERALIZATION: VEIN, VEINLET, DISSEMINATION
1 - TRENCH
2 - ROAD
SCALE: 1 IN. = 200 FT.
DATE: AUG. 1970 DEC/70 JAN/72
DWN BY: W.M.S.
REVISION: SEP/70
REFS: NORCAN, SULMAC & BETHEX MAPS
DWG/FIG. No. 70-3A
Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3485 MAP #1
3485 M-1