WELCOME NORTH MINES LTD. (N.P.L.)
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ARCTIC RED PROJECT

GEOLOGICAL AND GEOCHEMICAL REPORT

ON THE

AB MINERAL CLAIMS

Latitude 64°59'N Longitude 132°17'W

MACKENZIE MINING DISTRICT

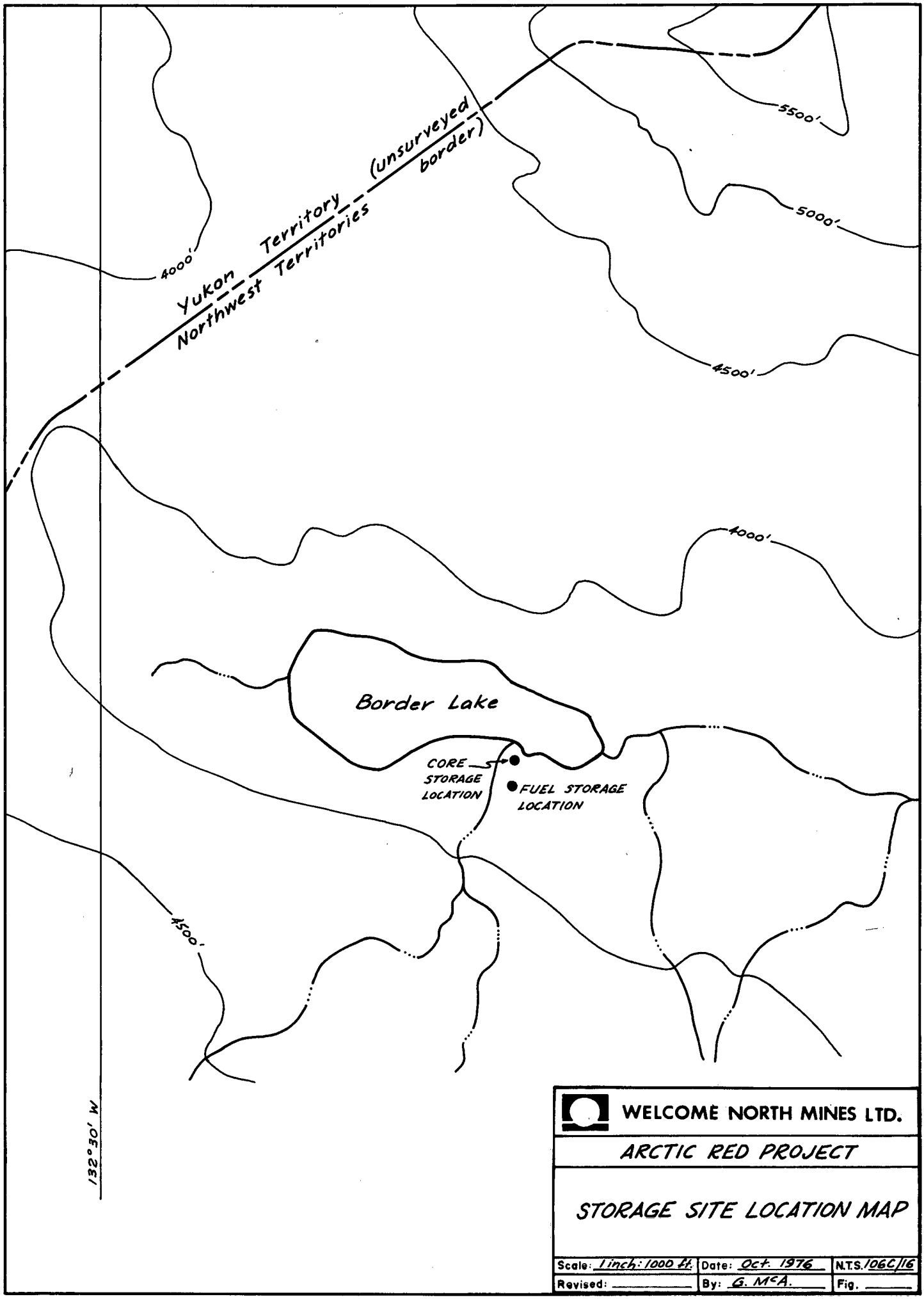
N.T.S. 106C-16

NORTHWEST TERRITORIES
CANADA

by

G.F. McArthur
M.L. McArthur

October 1976

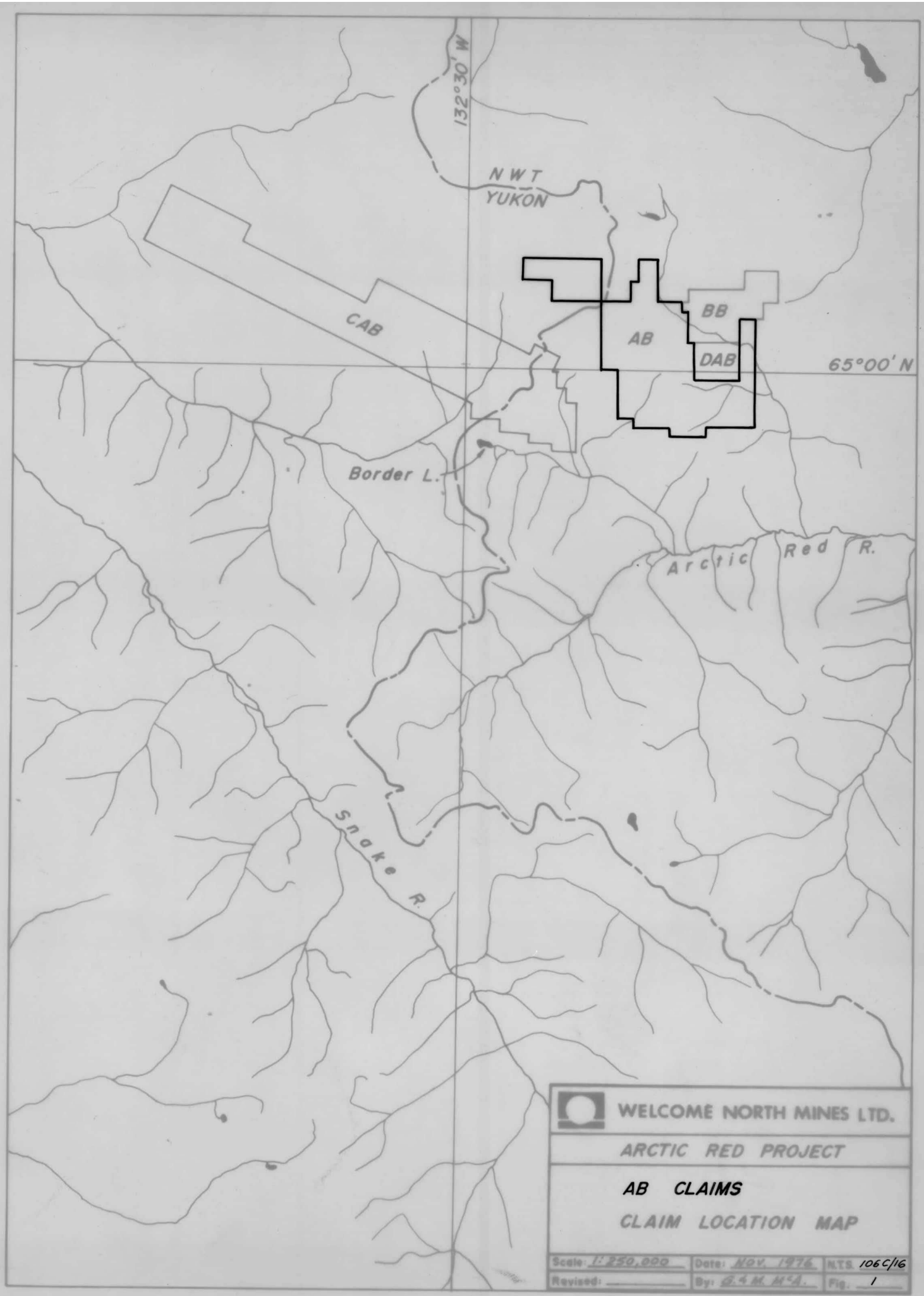


WELCOME NORTH MINES LTD.

ARCTIC RED PROJECT

STORAGE SITE LOCATION MAP

Scale: 1 inch: 1000 ft.	Date: Oct. 1976	N.T.S. 106C/16
Revised:	By: G. McA.	Fig.



WELCOME NORTH MINES LTD.

ARCTIC RED PROJECT

AB CLAIMS

CLAIM LOCATION MAP

Scale: 1:250,000	Date: Nov. 1976	N.T.S. 106C/16
Revised:	By: G.A.M. McA.	Fig. 1

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INTRODUCTION AND SUMMARY

The AB mineral claims were staked in 1974 to cover several occurrences of sphalerite mineralization in the Lower Cambrian Sekwi Formation. At that time initial mapping and sampling was carried out on the Bak and Main mineral zones. In September 1974 three diamond drill holes were drilled to test the Main zone. Diamond drill hole number two (DDH AB-2) intersected one hundred feet of disseminated sphalerite mineralization including a ten-foot section of twelve percent zinc. No additional work was carried out in the 1975 field season.

In 1976 a program of detailed mapping, prospecting and geochemistry was completed on the Main zone. A new mineral occurrence, the AB C-zone, was found, on which detailed mapping, soil geochemistry, prospecting and trenching were completed.

Regional property mapping and soil geochemistry were also part of the 1976 field program.

LOCATION AND ACCESS

The AB Project Area is located in the Mackenzie District of the Northwest Territories at latitude 64°59'N and longitude 137°17'W; 144 miles northeast of Mayo, Yukon Territory (Figure 1).

Access to the property can best be gained by helicopter from Mayo. Topography on the property is such that convenient landing sites are present at or near most locations. Alternately, Border Lake, situated 5 miles southwest of the property at an elevation of 4,000 feet, is suitable for access by fixed-wing aircraft.

The AB Main zone and C-zone both occur at an elevation of 5,000 feet, well above the regional tree line of 4,000 feet. Sidehill slopes range from 18 to 20 degrees while local stream gradients approximate 7 degrees. Talus forms a greater part of the slopes except at the creek margins where small steep gullies form. Gullies in the vicinity which provide best prospecting access remain snowhound until mid-June. Creeks

TABLE 1

CLAIM SUMMARY - DECEMBER, 1976

N.T.S.	CLAIMS		GRANT NUMBERS	RECORDING DATE	DUE DATE	
106C-16, F- 1	AB	1	A56737	July 8/74	July 8/77	NWT
	AB	2- 6	A56738-A56742	July 8/74	July 8/80	NWT
	AB	17	A86141	Aug. 19/74	Aug. 19/77	NWT
	AB	18- 20	A86142-A86144	Aug. 19/74	Aug. 19/80	NWT
	AB	21- 23	A86145-A86147	Aug. 19/74	Aug. 19/77	NWT
	AB	24- 26	A86148-A86150	Aug. 19/74	Aug. 19/80	NWT
	AB	27- 30	A86151-A86154	Aug. 19/74	Aug. 19/77	NWT
	AB	31	A86155	Aug. 19/74	Aug. 19/80	NWT
	AB	32- 34	A86156-A86158	Aug. 19/74	Aug. 19/77	NWT
	AB	35	A86159	Aug. 19/74	Aug. 19/80	NWT
	AB	36- 37	A86160-A86161	Aug. 19/74	Aug. 19/77	NWT
	AB	38- 39	A86162-A86163	Aug. 19/74	Aug. 19/80	NWT
	AB	40- 42	A86164-A86166	Aug. 19/74	Aug. 19/77	NWT
	AB	43- 46	A86167-A86170	Aug. 19/74	Aug. 19/80	NWT
	AB	49- 51	A86173-A86175	Aug. 19/74	Aug. 19/77	NWT
	AB	52- 54	A86176-A86178	Aug. 19/74	Aug. 19/80	NWT
	AB	57- 61	A86181-A86185	Aug. 19/74	Aug. 19/77	NWT
	AB	62- 64	A86186-A86188	Aug. 19/74	Aug. 19/80	NWT
	AB	67	A86191	Aug. 19/74	Aug. 19/77	NWT
	AB	68- 70	A86192-A86194	Aug. 19/74	Aug. 19/80	NWT
	AB	73- 74	A86197-A86198	Aug. 19/74	Aug. 19/77	NWT
	AB	75- 76	A86199-A86200	Aug. 19/74	Aug. 19/80	NWT
	AB	79- 80	A86203-A86204	Aug. 19/74	Aug. 19/77	NWT
	AB	81- 83	A86205-A86207	Aug. 19/74	Aug. 19/80	NWT
	AB	84- 96	A86208-A86220	Aug. 19/74	Aug. 19/77	NWT
	AB	97- 98	A86263-A86264	Aug. 19/74	Aug. 19/77	NWT
	AB	99-100	A65499-A65500	Sept. 4/74	Sept. 4/77	NWT
	AB	101-142	A90601-A90642	Sept. 4/74	Sept. 4/77	NWT
	AB	146-154	A90646-A90654	Sept. 4/74	Sept. 4/77	NWT
	AB	160-166	A90660-A90666	Sept. 4/74	Sept. 4/77	NWT
	AB	172-178	A90672-A90678	Sept. 4/74	Sept. 4/77	NWT
	AB	184-190	A90684-A90690	Sept. 4/74	Sept. 4/77	NWT
	AB	196-202	A90696-A90702	Sept. 4/74	Sept. 4/77	NWT
	AB	226-252	A90726-A90752	Sept. 6/74	Sept. 6/77	NWT
	AB	253	A86403	Dec. 23/74	Dec. 23/80	NWT
	AB	254-255	A86404-A86405	Dec. 23/74	Dec. 23/77	NWT
	AB	256	A86406	Dec. 23/74	Dec. 23/80	NWT
	AB	257-258	A86407-A86408	Dec. 23/74	Dec. 23/77	NWT
	AB	259	A86409	Dec. 23/74	Dec. 23/80	NWT
	AB	260-270	A86410-A86420	Dec. 23/74	Dec. 23/77	NWT
	AB	203-234	Y96275-Y96306	Aug. 22/74	Aug. 22/77	Y

have ample runoff and good silt content. Frost shattering and subsequent weathering produces noticeable rust and hydrozincite staining of mineralized talus blocks. Rock exposure in the area is about 60%, of which 30% is outcrop; however, outcrop on the main AB zone is limited to less than 5%.

CLAIMS

Of the original 290 AB claims, 54 peripheral claims were allowed to lapse in September, 1976 (Plate 1). Table 1 is a list of the remaining 236 AB claims and their current status. Assessment work resulting from the 1976 field season is yet to be filed.

GEOLOGY (Plate 2)

The AB claims are located in a northwest trending belt of faulted lower Paleozoic carbonates, shales and clastics. The Mackenzie Arch lies approximately 25 miles to the northeast.

In general beds strike at 120° and dip 10°-30° toward the southwest. Two major faults trending approximately east-west cut through the map area. These downdrop the Road River Formation and overlying carbonate to the north and thrust in Backbone Ranges Formation to the south (Fig. 3, 4, 5). Between the two regional faults is a third easterly-trending fault which has at least two branches. This central fault causes a small folded horst-like structure south of the C-zone (Fig. 5). Commonly beds are drag folded along these major structures.

STRATIGRAPHY

The oldest rocks in the map area are exposed in a thrust plate along the southern boundary of the claims. This sequence of brightly-weathering sandstone, quartzite and conglomerate is part of the Lower Cambrian Backbone Ranges Formation. The Backbone sediments were deposited in high energy environments of stream channels, beaches, and deltas. Clastic material for this inner detrital belt was derived from erosion of

the Mackenzie Arch. Conglomerates of the Backbone Formation commonly contain clasts of siltstone from the Precambrian Rapitan Formation. The clastic sediments grade both upward and basinward into dolomites and sandy dolomites of the Sekwi Formation which is in part facies equivalent to the Backbone Formation.

The Sekwi Formation in the AB claims area is thought to represent a transition between an inner clastic detrital zone (Backbone Formation) to the north and an outer carbonate platform to the south and west. It is a unique facies, possibly representing a back reef environment (Fritz, 1976 personal communication).

Although a detailed study of stratigraphy has not as yet been completed, mapping to date suggests that the Sekwi Formation can be divided into at least four members. The base of Sekwi is not exposed on the AB claims. The lowest beds are seen in drill core (Plate 4) and are interbedded quartzite, sandy dolomite and dolomite. Overlying this unit is approximately 300 feet of dark-grey bioturbated silty dolomite with interbedded oolitic and oncolitic dolomite. The next member is a cliff-forming, light-grey, medium crystalline dolomite with minor dark-grey fenestral dolomite. The upper 300 feet of Sekwi Formation is orange, thin-bedded, dolomitic quartz siltstone, quartzite and sandy dolomite with occasional beds of oncolitic dolomite. Small archeocyathid mounds and Salterella are found in this member. The uppermost beds of the Sekwi Formation are very fossiliferous and contain brachiopods, archeocyathids and trilobites of the Bonnia-Olenellus Zone (W. Fritz, personal communication).

Unconformably overlying the Sekwi Formation is a sequence of thick-bedded, coarse to fine crystalline, light to dark grey, resistant dolomites of the Cambro-Ordovician Franklin Mountain Formation. These rocks commonly contain orange to white chert and chert breccia with silicified coral fragments. Near the base is a distinctive sandy dolomite which can be used locally as a marker horizon. Perhaps the source of the quartz in this unit is the Mackenzie Arch, uplifted during the Middle Cambrian unconformity.

The section of dolomites in the Franklin Mountain Formation to the north (BB claims) is very thick and perhaps reefal. The Franklin Mountain Formation exposed on the AB could be a fore-reef carbonate shelf facies.

Overlying the Fraklin Mountain Formation is a sequence of platey-weathering, thin-bedded silty limestone, calcareous shale, bituminous shale, and siltstone. The upper part of the formation has abundant black chert nodules which are probably secondary. These rocks are thought to be correlative with the Ordovician to Silurian Road River Formation, and represent marine transgression in Ordovician with some shallowing in the Silurian. The rocks are complexly folded and faulted and appear to unconformably overlie the Franklin Mountain Formation. The base of the Road River Formation is unfortunately poorly exposed due to the recessive weathering character of these rocks.

The youngest rocks mapped consist of thin-bedded platey-weathering grey bioclastic limestones. Fossil debris includes Halysites and Favosites corals, crinoid stems and shell fragments. Chert nodules after fossil debris are common in this section. Fossil evidence suggests that this unit is a deeper water equivalent to the Mount Kindle Formation shelf carbonates of Lower Silurian age.

MINERALIZATION

Sphalerite-galena mineralization on the AB claims occurs in two formations, the Lower Cambrian Sekwi and the overlying Franklin Mountain. In the Franklin Mountain Formation sphalerite and pyrite are common in fractures and vugs with quartz and secondary dolomite (Plate 2, Arctic Red 1974 Report). In general, this type of mineralization is low grade. (Bak Zone: grab, 5% zinc; chip samples, <1% zinc). Both sphalerite and galena are concentrated in the Sekwi Formation. Sulphides occur as massive replacements along laminations and in the matrix as well as in veins and fractures. Low grade mineralization occurs spacially related to faults in several places (Plate 2) but the main concentrations are in the bioturbated dolomites of the Main and C zones. Sphalerite-pyrite mineralization of the "Bak-type" can occur in the resistant sucrosic dolomites within the Sekwi Formation.

Main Showing

Surface mineralization on the AB Main Zone occurs at several horizons in various forms. The upper part of the zone is characterized by disseminated to massive replacements of sphalerite, pyrite, minor galena and barite. This style of mineralization is primarily found in talus, however one small outcrop well to the south of the main float occurrence was found (Plate 3). Underlying is a lower horizon with fracture fillings, breccias and disseminations of honey to dark red-brown sphalerite in a medium crystalline dolomite. Several different beds are mineralized in this style (Plate 3).

In 1974, diamond drill hole AB-2 intersected a one hundred-foot section of disseminated sphalerite in a dark-grey, bioturbated dolomite with oolitic and oncolitic dolomites below. Within this section 10 feet assayed 12% zinc (Plate 4). The host dolomite and occurrence of sphalerite in this horizon is virtually identical to that at the C-zone.

C-Zone

The C-Zone was found in 1976 during the course of mapping and

prospecting on the AB claims. The abundance of associated pyrite gives rise to a vivid residual gossan as well as a rusty-coloured creek, both of which are visible for some distance. Mineralization at the C-Zone also gives a significant geochemical response - 1400 ppm zinc immediately below the showing and several hundred ppm zinc in the main creek.

Mineralization is found in outcrop over approximately 250 stratigraphic feet. Outcropping in the creek is a resistant, grey, bioturbated dolomite which initially assayed 8.5% over five vertical feet and 12.6% over 20 horizontal feet (Plate 5). Overlying this bed is a 50 foot unit of rubbly-weathering, dark-grey bioturbated dolomite with white sphalerite predominantly along laminations but also in cross-cutting fractures. In this rock type (similar to that mineralized in DDH AB-2) the deposition of sulphides appears to have been strongly controlled by the chemistry of the black, silty laminations. The action of burrowing organisms has likely changed the composition of the sediment such that sphalerite has been preferentially precipitated in the more organic rich non-digested sediment.

Above the lower, well-mineralized horizon is a 150-foot section of oosparite which is oncolitic at the base. Honey to brown sphalerite is weakly disseminated throughout and veins of barite, pyrite, sphalerite and quartz are common. Although the veins may give assays as high as 60% zinc (Plate 5), a stockwork does not seem to be well developed. It is the oosparite which is strongly sheared and pyritized making a surface appraisal of this unit difficult.

Overlying the resistant oolitic dolomite is another dark-grey bioturbated horizon with disseminations and fracture fillings of coarse-crystalline red sphalerite crosscut by veinlets of galena. This unit does not outcrop but mineralized float can be traced discontinuously for over 350 feet along strike. Assays from this horizon are as high as 25% combined lead-zinc (grab sample).

Other mineralization found in the area is associated with the overlying resistant vuggy dolomites where minor yellow sphalerite and pyrite

occur in vugs and veinlets. This horizon is not considered to be of significance.

There are many similarities in the style of mineralization as well as the character of the host dolomite between the Main Showing and C-Zone. One problem is the lack of Unit €s3, the cliff-forming dolomite, at the Main Showing. If this unit thins abruptly to the west it is possible that mineralization at both showings is in the same stratigraphic horizon. This is suggested by the fact that both zones lie approximately 700 feet below the basal Franklin Mountain contact.

TRENCHING

In September, 1976 a trenching program was undertaken on the AB C-Zone with the hopes of exposing mineralized outcrop on the upper horizon (T1, T2, T3) and extending known mineralized outcrop on the lower horizon (T4-T10). A table of trench assays can be found on Plate 5.

Results of this program were encouraging. Outcrop exposed suggests the following grades:

A. Overall thickness of lower horizon:

11 ft.	9.75% zinc	51 ft., 4.8% zinc
10 ft.	1.46% zinc	
17 ft.	0.14% zinc	
13 ft.	9.2 % zinc	

B. Strike length of resistant dolomite in lower horizon:

225 ft. av. 12.2% zinc

C. Thickness of upper horizon:

25 ft. av. 4.0% zinc

The trenching also revealed that overburden is approximately up to 10 feet thick on the knoll east of the creek and talus is in excess of 8 feet thick on the west side of the creek. Permafrost was encountered in trench 9 and in talus at a depth of approximately 8 feet which prohibited the exposure of bedrock.

GEOCHEMISTRY

1) Method of Survey

A. Reconnaissance geochemical sampling was conducted on part of the property between the Main Showing and the C-Zone. Geochemistry utilizing a grid with 1000-foot line spacing with 200-foot sample sites was compass and topofil controlled. All samples were obtained with a prospector's grub hoe.

B. Detailed geochemical soil sampling was conducted on the Main Showing using 80-foot line spacing with 50-foot sample sites. Grid-controlled geochemistry was compass and topofil surveyed. All samples were obtained with a prospector's grub hoe.

C. Detailed geochemical soil sampling was conducted over the C-Zone showing utilizing 200-foot line spacing with 100-foot sample sites on the lines. This grid-controlled geochemistry was compass, altimeter and topofil surveyed. All samples were obtained with a prospector's grub hoe.

2) Method of Analysis

Samples obtained were analyzed by Bondar-Clegg & Company Limited of Whitehorse or by Acme Analytical Laboratories of Ross River, Yukon Territory. Samples received were dried, screened to -80 mesh, weighed out to 0.5 grams and digested in hot aqua regia. They were then diluted, clarified for 20 hours and tested for lead and zinc by an atomic absorption spectrophotometer.

Accuracy of the instrument is ideally 1% of the amount of metal present. Individual cathode lamps are used for each element determined and a direct readout in parts per million are given.

3) Treatment of Data

All results of the geochemical soil sampling were treated graphically to determine background, and anomalous values (Sinclair, 1975). Values

plotted on Plates 3, 5, and 6. Values are colour coded on the maps to aid in distinguishing anomalous areas.

4) Interpretation of Geochemical Results

Soil geochemistry on the AB Main Showing has outlined a south-trending coincident lead and zinc anomaly. The anomaly does not appear to be related to surface outcrops of mineralization nor to mineralization intersected in drilling at a depth of approximately 100 feet. The anomalous soil geochemistry is interpreted as the surface expression of a zone of cross-cutting mineralization perhaps related to a sphalerite-bearing outcrop found on the south side of the creek (Plate 3).

Detailed geochemistry at the AB C-Zone has outlined an area of anomalous values coincident with mineralization exposed on surface. Anomalous soil geochemistry suggests that the lower mineralized horizon extends to the west. To the east, overburden probably masks any anomaly from the underlying mineralization.

The regional soil sampling program did not outline any anomalous zones which do not correspond to known surface mineralization. A large central zinc anomaly is associated with the Bak zone. The Franklin Mountain dolomite has been faulted and tilted with the resultant formation of widespread, low-grade fracture-controlled mineralization. The extent of this zone is well delineated by the soil geochemistry. At the eastern extent of the soil grid is a small anomaly which is attributed to a poorly mineralized gossan zone associated with a fault. It is interesting to note that where the regional soil grid crosses the Main Showing, the southward trend of the anomaly on the detailed soil grid is continued (Plates 3, 6).

SUMMARY AND CONCLUSIONS

On the AB property, zinc mineralization is found in both the Cambro-Ordovician Franklin Mountain Formation and the Lower Cambrian

Sekwi Formation. The most significant mineralized areas are the Main Showing and the C-Zone. Both zones have a similar style and grade of mineralization as well as similar types of host dolomite. Although detailed stratigraphy is not completely understood it is possible that both showings are in the same stratigraphic horizon.

Further detailed mapping on the Main Showing suggests that much of the high-grade talus is from a bed which lies above the uppermost horizon tested by drilling in 1974 (Plate 4). Soil geochemistry at the Main Showing outlines a north-south trending anomaly of both lead and zinc which cuts across bedding and does not appear to reflect strata-bound mineralization (Plate 3).

On the C-Zone, a showing found in 1976, high-grade mineralization is found in two horizons (Plate 5). Trenching done in September has presently outlined a lower zone 250 feet long and 50 feet thick. Within this zone is a 5-foot bed which averages 12% zinc. The lowest beds exposed by trenching are mineralized and consequently the base of the zone has not yet been found. The grade of mineralization is quite consistent along the strike and there is no indication that it drops off laterally. The ultimate extent of the lower zone is thus open to speculation.

Trenching in the upper horizon was not as successful as it was in the lower horizon due to thick overburen and talus cover. Outcrop exposed to date indicates that sphalerite mineralization follows bedding while galena mineralization is restricted to cross-cutting fractures. Grades as high as 1.58% lead over 6 vertical feet and 5.76% over 5 vertical feet were obtained.

Mineralization is, in general, spacially related to fault zones. Although fractures do in part control lead-zinc mineralization, the chemistry of the host dolomite plays an important role in localizing sphalerite deposition.

RECOMMENDATIONS

It has become apparent that the three holes drilled on the Main Showing were not adquate to test the extent of mineralization. It is recommended that a trenching program be undertaken to:

a) expose the source of high-grade float (Plate 3; T1, T2, T3),

b) test the high soil geochemistry anomaly (Plate 3; T4, T5),

c) find the extent of known mineralized outcrops (Plate 3; T6, T7, T8).

It is recommended that further diamond drilling be done contingent upon results of the trenching program.

Trenching on the C-Zone has in part delineated a significant zone of sphalerite mineralization. It is recommended that four diamond drill holes, 100 to 200 feet in length be drilled to test the lower mineralized horizon (Plate 5, DDH 1-4). A further two holes (Plate 5, DDH 5, 6) would test the upper horizon and DDH 7 and 8 would test the central zone of sphalerite-barite-pyrite veins. This represents a total of approximately 2,000 feet of diamond drilling.

APPENDIX "A"

PROPOSED AB BUDGET 1977

GEOLOGY	$20,000
GEOCHEMISTRY	2,500
DRILLING	62,500
TRENCHING	4,000
CAMP	25,000
FREIGHT AND TRANSPORTATION	56,000
EXPEDITING	1,400
ADMINISTRATION	10,000
	$181,400

LEGEND

Silurian - Devonian

SDc	Fossiliferous, thin- to thick-bedded limestone; commonly cherty.

Ordovician - Silurian, Road River Fm.

OSRR	Black shale, calcareous shale, and shaley limestone; in part bioclastic limestone; commonly cherty.

Cambrian - Ordovician, Franklin Mtn. Fm.

€Of	Medium-crystalline, vuggy, light-grey dolomite; white chert nodules common.

Lower Cambrian, Sekwi Fm.

€sk	Orange-weathering dolomite, sandy dolomite, siltstone, sandstone, and quartzite; undivided.
€sk 4	Sandy dolomite, quartzite and dolomite; Archeocyathids, Salterella, trilobites and brachiopods.
€sk 3	Medium crystalline, light-grey dolomite.
€sk2	Dark-grey, bioturbated dolomite; oolitic and oncolitic dolomite interbedded.
€sk 1	Lower sandy dolomite, quartzite and dolomite.

Lower Cambrian, Backbone Fm.

€b	Red- to orange-weathering sandstone, siltstone, conglomerate, and quartzite.

Geologic contact

Bedding

Fault

Relative movement along fault

Anticline

Syncline

Mineralization

WELCOME NORTH MINES LTD.

ARCTIC RED PROJECT

AB CLAIMS

GEOLOGIC CROSS-SECTION D-E

Scale: 1 inch : 1000 feet	Date: Oct. 1976	N.T.S. 106C/16
Revised:	By: G. & M. McA	Fig. 4