

GEOLOGICAL REPORT.

"Big Bluff" Group, consisting of "Big Bluff" Nos. 1, 2, 3  
and 4 mineral claims (Record Nos. 4083 - 4086 inclusive)  
"Fred" Group, consisting of "Fred" Nos. 1, 2, 3 and 4  
mineral claims (Record Nos. 3858 - 3861 inclusive)  
"Mar" Group, consisting of "Mar" Nos. 1, 2, 3 and 4  
mineral claims (Record Nos. 3866 - 3869 inclusive)  
"Nick" Group, consisting of "Nick" Nos. 5, 6, 7 and 9 Fr.  
mineral claims (Record Nos. 3870, 3871, 3872 and 3874)

and the ungrouped mineral claims "Nick No. 14 Fr."  
and "Nick No. 15 Fr." (Record Nos. 3875 and 3876)

Located 3 miles northwest of Ainsworth, B.C., Slocan M.D.  
49° 116° N.W.

by: W. H. Mathews, P. Eng.

Work performed: May 22 to 30, and June 25 to July 13, 1956.

82 F / 15 W

00138

HIGHLAND-BELL'S "23 CLAIM" and "BIG BLUFF"  
GROUPS, AINSWORTH, B. C.

138

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(Geological Map)

July 1956

W. H. Mathews, P. Eng.

HIGHLAND-BELL'S "23 CLAIM" and "BIG BLUFF" GROUPS,  
AINSWORTH, B. C.

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SUMMARY.

Mapping of the two groups discloses a succession of closely-folded westerly-dipping beds of schist with two intercalated limestone members, the No. 1 (western) and Star (eastern).

Of the types of mineral deposits known in the camp only the high silver, low sulfide ores of the No. 1 mine have a fair chance of occurring in economic amounts on the property. The No. 1 mine, one mile south of the property on the same structural and stratigraphic belt has yielded roughly 2,000,000 ounces of silver from almost 40,000 tons of ore derived from several closely-spaced orebodies on the western contact of the No. 1 limestone. Almost continuous overburden at this horizon on Highland-Bell ground has prevented and will prevent, discovery of other orebodies by surface methods. Geophysical and geochemical exploration can be recommended if, and only if, its costs and effectiveness can be matched against the modest size of the No. 1 type orebodies.

Vein deposits of silver-lead in the Star limestone are considered too small and too sporadic notwithstanding a small surface showing of this type on the southeast boundary of the property.

INTRODUCTION:

The "23 Claim" group ("Fred Nos. 1-4., Mar Nos. 1-4" and "Nick Nos. 1-15" mineral claims and fractional mineral claims) staked on December 16, 1955 lies in the western part of the Ainsworth mining camp in the valleys of Cedar and South Woodbury (Lendrum) creeks. The property is bounded on the southeast by pre-existing Crown-granted claims from the "Ina E. Fraction" on the northeast, to the "Silver Hoard Fraction" on the southwest, but open ground lies to the west and northwest; the "Lee No. 5" mineral claim held by location by Western Mines bounds the property on the northeast. The "Big Bluff" group ("Big Bluff Nos. 1-4") staked July 4, 1956 adjoins the "23 Claim" group on the north and straddles the divide between the south and north forks of Woodbury Creek.

The central part of the "23 Claim" group is readily accessible from Ainsworth by a logging road recently constructed by Kootenay Forest Products Ltd., and being extended in July 1956. A mining road to the "Silver Glance" adit on the south fork of Woodbury Creek gives access to the northern part of the property.

Adequate water for mining development is available in South Woodbury and Cedar creeks, but higher slopes are notably deficient in water except during spring and early summer. Electric power provided by West Kootenay Power and Light, is available at the Florence mine, two miles east of the property. Timber in the central part of the area is held by Kootenay Forest Products under Timber Sale X62315; elsewhere the trees are of poor quality but adequate for mine timbering.

Examination of the property and of the adjacent ground to the south, east, and north occupied 22 days in the field, in May, June, and July, 1956. Geologic information was plotted in the field on a 400 foot to the inch topographic map prepared from B. C. Government air photos by McElhanney-Nelson Air Surveys Ltd. Positions were established by compass re-section, altimeter, topography, and pace and compass traverses. Absolute position is believed to be generally correct within 100 feet. The corners of many surveyed Crown-granted claims aided in the control, and relative position in any one locality is considerably more accurate.

T. Hawes of Ainsworth served as assistant in May; and C. Gilker of Kaslo in June and July. Collaboration with C. Brown of Highland-Bell Ltd. in the survey of the 'Triumph Mines' ground adjoining the "23 Claim" group on the east, was welcomed.

#### GEOLOGY:

##### General Statement.

The property is characterized by a westerly-dipping succession of schists, limestones, quartzites, flanked on the west by irregularly folded greywackes, argillites, cherts and thin bedded argillaceous limestones. No fully satisfactory stratigraphic succession is available from previous geologic work (Schofield, 1920; Rice, 1942), and exposures and structures within the limits of the property are such that none could be established though work on adjacent ground disclosed a partial succession. Small scale repetition of beds by tight folding is common, and evidence of

repetition on a much larger scale is locally available. However, marked changes in the grade of metamorphism, which increases sharply from west to east, makes it difficult, if not impossible to recognize repetition on the basis of the lithology alone, and in view of the tight-folding thickness is an unreliable stratigraphic character. Thus the succession of rocks outlined below may be subject to some change when the stratigraphy and structure of the camp is more fully worked out.

#### Lithologic succession.

The easternmost belt of rocks is a cliff-forming green hornblende schist, 250 to 600 feet in outcrop width, crossing the "Nick No. 15 Fractional" claim. The rock is commonly banded though whether because of original layering or by metamorphic effects remains unknown. Drag folds in the banding suggest overturning in the eastern but not the western side of the belt in which case it may constitute the core of a local anticline. A smaller area of similar green schist in the "Lee No. 5" claim, 700 feet west of the main belt, lies at the axis of a well-defined structural arch.

The adjoining belt on the west, probably stratigraphically above the first, consists of grey, relatively coarse-textured muscovite and muscovite-chlorite schist with minor quartzite. Quartz laminae, possibly a product of metamorphism rather than original sandy layers, are common and exhibit numerous small wrinkles and drag folds. One limestone bed, nowhere known to be more than 15 feet thick, is locally present at the eastern base of the succession.

The third unit consists of a massive to slightly-banded pure limestone having an outcrop width of from 100 to 250 feet, and a

stratigraphic thickness of perhaps half this amount. It can be correlated with the 'Star limestone' of Schofield. This unit has been traced from the "Ayesha" adit on the south to the Bugaboo adit on the north, and it probably corresponds to the limestone on the road 700 feet east of the "Silver Glance" portal, and to the limestone in the northwest corner of the "Lee No. 5" mineral claim.

The fourth belt consists mainly of grey schists and knotted schists, the latter characterized by the metamorphic mineral andalusite or staurolite, or both. Some schists contain 'eyes' of feldspar and quartz. Bedded vein quartz is rare in this unit.

The fifth belt consists of white to grey, medium-fine crystalline limestone, generally massive, but locally banded, generally free from impurities but locally containing minor argillaceous matter, or elsewhere beds with disseminated dolomite. This limestone can be traced northerly from the No. 1 mine through and beyond the "Fred" and "Big Bluff" claims, and can be given the name first applied by Schofield - 'No. 1 limestone.' No subdivisions of this unit could be recognized and used as a means of establishing internal structure, but the eastern contact south of the "Fred" claims exhibits a pattern indicating two major plunging folds. Other such folds may be present within the main mass, and the outcrop width, of up to 2500 feet almost certainly gives an exaggerated impression of the true stratigraphic thickness. Thickness is probably less than 1000 feet. Though the eastern limit of the limestone is well exposed and is marked by a conspicuous east-facing scarp, the western limit is poorly exposed and has been mapped across much of the property at the western limit of limestone outcrops or limestone float.

The westernmost belt consists of a poorly exposed and structurally complex assemblage of greywackes (or tuffs), phyllitic argillites, green schist, argillaceous limestone and cherty beds. Sheared argillites are common on the eastern side of the belt; green schists appear to the west in Cedar Creek valley, and greywackes locally with slaty argillites and cherty beds occur still farther west. Argillaceous limestone occurs on both side of South Woodbury Creek.

#### Bedrock Structure.

Evidence of deformation is widespread; wrinkles and drag folds in all rocks are common; tight folds can locally be demonstrated on a large scale, and are probably common. Individual observations on angles of dip cannot justifiably be extrapolated to depth. Nevertheless the westerly deflection of contacts where these cross valleys indicate that low to moderate westerly dips do extend to depth in all but the westernmost belt of rocks. Changes in dips of schistosity probably reflect warping of axial planes of folds and indicate a second stage of deformation superimposed on an earlier one. Changes in trend of contacts are usually an expression of topography but one bow in the Star limestone between the "Ellen" and "Buckeye" adits, and a corresponding bow in the eastern limit of the No. 1 limestone are independent of topography and mark a broad westerly-trending arch superimposed on westerly-dipping beds. Observations on small folds show that their axes plunge at low angles, generally less than 10 degrees to either north or south; large scale folds such as those affecting the No. 1 limestone both in the area mapped and in the No. 1 mine, plunge northerly. Recumbent folds are noted both on upper Cedar Creek (near the N.E. corner of "Nick No. 12" mineral claim) and at the No. 1 mine. Erect folds are



common in this belt of greywackes on the west side of the property.

#### Superficial deposits.

Glacial beds, both till and poorly-sorted sands and gravels, form a nearly continuous mantle over much of the western part of the property, and on the lower slopes of Cedar and South Woodbury Creek. Well-rounded boulders of porphyritic granite are conspicuous and have evidently been moved east or southeast from the Nelson batholith. Limestone boulders occur only east of the projected line of the west contact of the No. 1 limestone. The drift filling of South Woodbury Creek, now only partly re-excavated, probably exceeds 50 feet on the lower slopes of the valley except where the stream has cut against its former rock wall. The drift mantle on the upper slopes, notably on "Nick Nos. 5 and 6" mineral claims, is generally at least 5 to 25 feet thick.

#### Mineral Deposits.

Only one occurrence of mineralization is known on Highland-Bell ground and this lies at the boundary between this and Triumph ground, on the "Nick No. 14 Fractional" and "Silver Glance" claims (see below). Information on other mineral deposits beyond the limits of the property is necessary for a proper evaluation of its economic possibilities. Mineral deposits adjacent to the Highland-Bell property fall into four types:

1. Bedded fissure veing containing coarse galena with sphalerite and iron sulfides in a quartz gangue, occur in the southern part of the camp and one is currently productive at the Yale (formerly Banker and Albion) mine,  $2\frac{1}{2}$  miles southeast of the Highland-Bell property. Vein widths are commonly

4 to 6 feet, and lengths of between 1/2 and one mile are known. Vein deposits of such dimensions should be detectable if present on Highland-Bell property, but none has been found.

2. Cross-cutting fissure veins: (commonly trending to the northwest quadrant and cutting obliquely across the bedding) containing coarse galena, sphalerite and pyrite in a quartz gangue in the northern part of the camp and have been particularly productive in the Highland and Florence mines. Where such veins cut quartzite or hornblende schist the walls are sharp; where they cut limestone there may be some "replacement ore" extending a few feet into the walls (Schofield). Fracture control of ore deposition remains important. Fault movements are observed on the vein fractures, varying from a few feet to more than 100 feet; horizontal offsets of 100 to 130 feet are observed in both the Highland and Florence mines. In general the faults with greater displacement are both more extensive and more productive (Schofield). Combined normal and strike slip movements may be involved judging from the plunge of million structure on fracture walls.

Several mineralized zones in oblique fractures have been observed in the Star limestone, but with the exception of those on the Bugaboo and Buckeye claims, all were too small to justify mining, and these larger bodies are still too small and too widely-spaced to justify underground exploration for blind orebodies.

The mineralized zone on the boundary between the "Silver Glance" (Triumph Mines) and "Nick No. 14 Fraction" (Highland-Bell Ltd.) is exposed in a road cut across an ill-defined area of about 5 by 5 feet in which can be found veinlets and disseminations of galena and pyrite. Mineralisation

may be localized on the intersection of an oblique fracture and the hangingwall of the limestone.

This intersection extends down dip into "Silver Glimpse" ground and the showing is thus not likely to be of interest insofar as the "23 Claim" group is concerned.

3. Replacement deposits in limestone unrelated to any major fracture are known in one area of the ground held by Western Mines where recent drilling has disclosed a broad zone of disseminated galena and sphalerite in impure "Lower Ainsworth" limestone. Local mineralized joints are present on surface, dipping steeply and striking westerly but constitute only a fraction of the ore. Quartz gangue is not evident, and the limestone though mineralized is not notably altered in other respects. A control by tension fractures in the favourable limestone along the crest of the westerly-trending arch (see structure) is suggested (M. Turner, pers. comm.) as an ore control. Tonnage available was not reported other than that it is expressed in six or more figures.

The axis of the arch passes under Triumph ground between the Buckeye and Ellen showings, and may extend into the Highland-Bell claims, but the favourable Lower Ainsworth limestone is here at such depth (several thousand feet) as to be beyond interest. No comparable replacement deposit is known at higher horizons, and exposures in the eastern part of the No. 1 limestone are sufficiently continuous near the "Let Her Go Gallagher" claim that any would already be discovered.

4. Bedded fractures and/or replacement zones on the west contact of the No. 1 limestone have yielded at the No. 1 mine, 38,683 tons of ore (Rice 1944) containing 1,919,102 oz. of silver (av: 49.6 oz. per ton) and

286,964 lbs. of lead (av: 0.37% Pb.), and at the "Silver Hoard" mine 1,881 tons containing 106,935 oz. of silver (av: 56.8 oz. per ton), and 127,377 lbs. of lead (av: 3.4% Pb).

Development at the adit level of the No. 1 mine (see sketch attached) includes roughly 1150 feet of crosscutting, 900 feet of drifting on the favourable horizon, and 450 feet of drifting on faults, all of this yielding an aggregate length of about 380 feet of stopes ranging from 2½ to 8 feet wide. Though the ore is described as a replacement by Schofield the presence of numerous faults (zones of gouge and crushing) together with much vein quartz, suggests a fracture control on or close to the contact between incompetent argillaceous schists on the west and relatively competent limestone on the east. Flattening of the beds and faults upward and overturning downwards seems to have had little influence on ore deposition. Mullion structure plunges 45 degrees south on a fault followed by the first (main) north drift; structures on the walls of the stopes in the western drifts are determined by rolls in the bedding which plunges about 25 degrees north. Inspection of scattered specimens of ore on the dump confirm Schofield's description (pages 51-52) and demonstrates the low sulfide content. Pyrite, galena, and sphalerite are the principal metallic minerals. Judging from the available analyses and specimens, ore running more than 10% sulfides and 5% pyrite is uncommon.

The Silver Hoard mine was worked by an inclined shaft and is no longer accessible, but a stope broken through to the surface shows well-developed mullion structure on the west wall plunging 50 degrees south. Here, too, a fracture control seems indicated.

The Crown adit driven to intersect the west contact of the No. 1 limestone in an area of almost no outcrop disclosed two faults, one bedded, the other northwesterly-trending and southwesterly-dipping, neither of which exposed orebodies. No work has been done on this adit since it was mapped by Schofield.

The possibility of ore deposits of the No. 1 type offers the best promise of production in the "23 Claim" and "Big Bluff" ground which straddles the same structural and stratigraphic belt as does the No. 1 mine. The rather general deep drift, particularly on the "23 Claim" group, and the evidence of former prospecting in former (cancelled) Crown-granted mineral claims makes it highly improbable that any mineralization worthy of development will be found by surface work. Blind stripping, even close to the limestone-argillite contact is also likely to be fruitless, judging from the excavations already made during logging operations. Water is not available for booming. The cost of geophysical studies and its possible success in locating sulfide-poor orebodies under moderate to deep overburden will be the deciding factor in any further development. Though the chances are fair that at least one orebody of the No. 1 type lies along this contact on Highland-Bell ground, the cost of discovering it is apt to be high.

#### RECOMMENDATIONS:

Further development of the property, if this is considered, should be by geophysical or geochemical methods in the hope of obtaining an orebody of the No. 1 type on the west contact of the No. 1 limestone. The cost and effectiveness of such prospecting must be balanced against the

possible value of another mine comparable to the No. 1 and Silver Hoard.

Mineralization in the Star limestone is too sporadic to justify retention of the "Nick No. 14" claim alone, notwithstanding the showing on the south boundary of this claim.

The limits of the "Nick 15 Fractional" mineral claim are in doubt. The northeast corner (No. 1 post) of the "Lee No. 5" mineral claim (held by Western Mines) which bounds the "Nick No. 15 Fr." on the north has been located, and the No. 2 post, if 1500 ft. to the south as represented, would limit the "Nick 15 Fr." to a strip about 150 ft. wide and 1350 ft. long. Such a claim, by itself, does not appear worth retaining.

Nick Nos. 1, 2, 6, 11 and 13, and Mar. No. 3 claims are apparently devoid of outcrop and lie within the greywacke belt in which there is as yet no record of production in the camp. Mar No. 4 and Nick Nos. 3, 4, 5, 10 and 12 are generally deficient in outcrop and also lie well within the greywacke belt. These have no basis for retention except to cover any down-dip extension of orebodies on the west contact of the No. 1 limestone.

Fred Nos. 1, 2, 3 and 4, Mar Nos. 1 and 2, Big Bluff Nos. 1-4 and Nick Nos. 7-9 now cover the No. 1 limestone the principal economic hope of the property. These should be retained if, and only if, further search for ore is to be conducted. No investigation for ore of the No. 1 type is being carried on elsewhere in the camp at the present time and the retention of the property pending profitable developments on adjacent ground is not justified.

Vancouver, B.C.  
Aug. 1, 1956.



W. H. Mathews. P. Eng.

References:

- Schofield, S.J. (1920) "Geology & Ore Deposits of Ainsworth Mining Camp, B.C."  
GSC Mem. 117.
- Rice, H.M.A. (1944) "Geology & Mineral deposits at Ainsworth, B.C."  
GSC Paper 44-13.

COST OF WORK.

To be applied on the "BIG BLUFF", "FRED", "MAR" and "NICK Groups and the "NICK No. 14 Fr." and "NICK No. 15 Fr." Mineral Claims totalling eighteen full-sized and fractional claims

Located 3 miles northwest of Ainsworth, B. C. in the Slocan Mining Division; 49° 116° N. W.

Period: May 22 to 30, and June 25 to July 13, 1956.

Geological Survey Labour:

W. H. Mathews, P. Eng. (author of Report)	26 days @ \$35.00 per day . . . \$	910.00
C. J. Brown, qualified Geologist assisting	11 days @ \$15.00 per day . . .	165.00
Tommy Hawes, helper during first trip	6 days @ \$12.00 per day . . .	72.00
Gary Gilker, helper during part of second trip	12½ days @ \$10.00 per day . . .	<u>125.00</u>
		\$ 1,272.00

Photogrammetry:

400-scale contoured topographical map of the "TWENTY-THREE CLAIMS GROUP", Ainsworth, B.C. CONSTRUCTED FROM Air photographs for detailed geological mapping purposes . . . . .	\$	582.00
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Total Cost of work to be applied . . . . . \$ 1,854.00

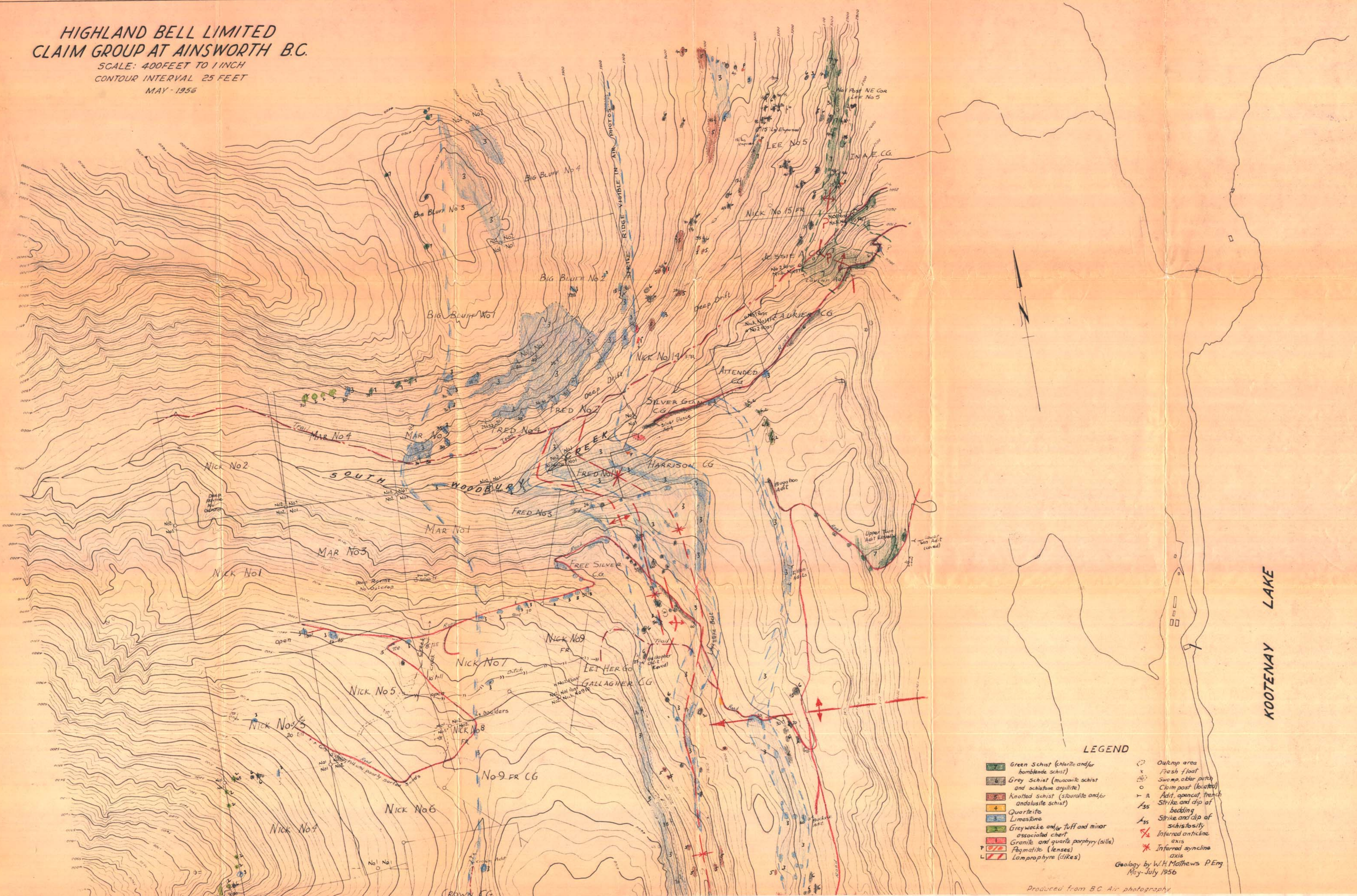
Cost Statement certified by:

  
 W. H. Mathews, P. Eng.



# HIGHLAND BELL LIMITED CLAIM GROUP AT AINSWORTH B.C.

SCALE: 400 FEET TO 1 INCH  
CONTOUR INTERVAL 25 FEET  
MAY - 1956



**LEGEND**

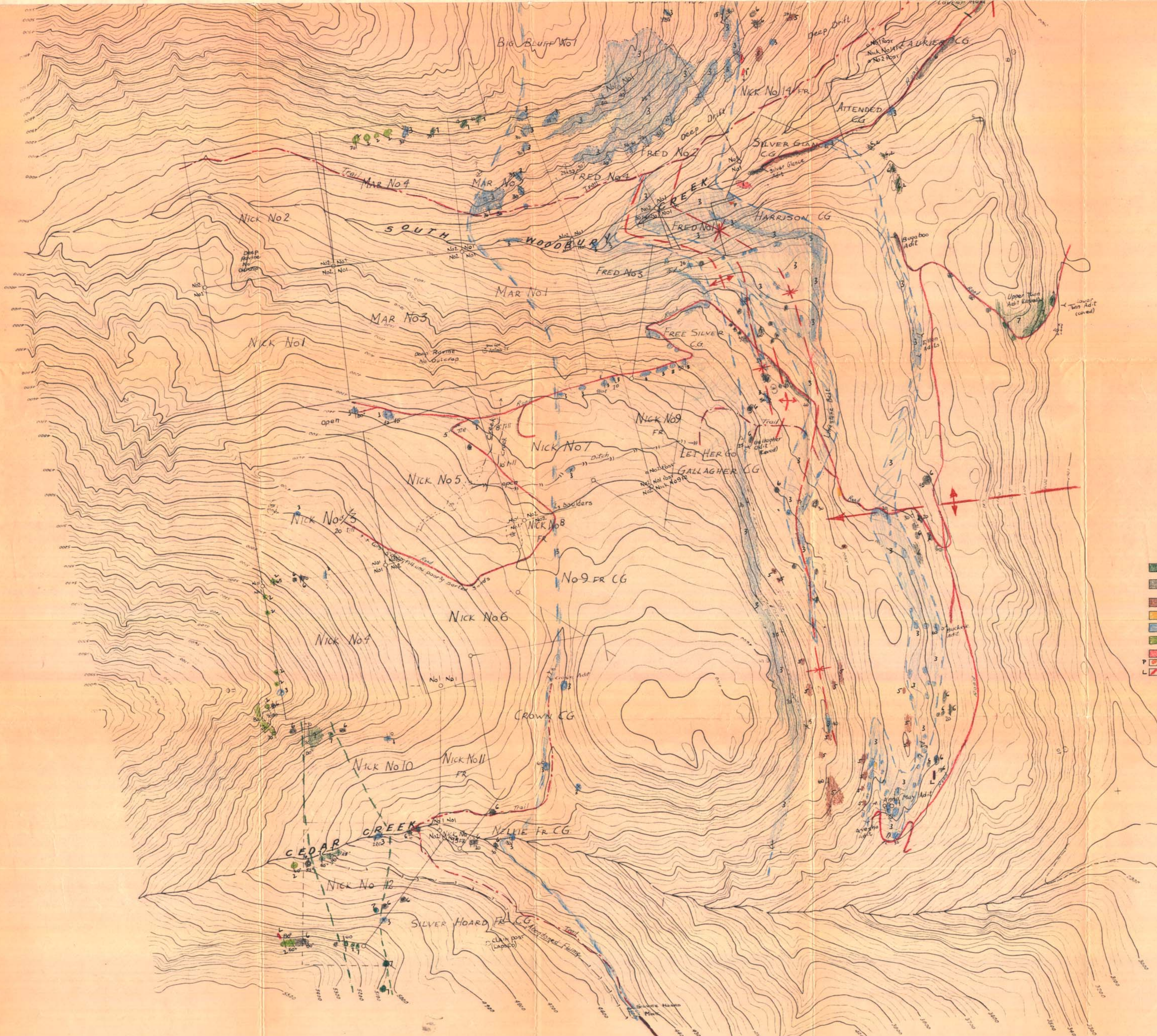
	Green schist (chlorite and/or hornblende schist)		Outcrop area
	Grey schist (muscovite schist and schistose argillite)		Fresh float
	Knotted schist (staurolite and/or andalusite schist)		Swamp, oblar patch
	Quartzite		Claim post (located)
	Limestone		Adit, open cut, trench
	Greywacke and/or tuff and minor associated chert		Strike and dip of bedding
	Granite and quartz porphyry (sills)		Strike and dip of schistosity
	Pegmatite (lenses)		Inferred anticline axis
	Lamprophyre (dikes)		Inferred syncline axis

Geology by W.H. Mathews P.Eng.  
May-July 1956

Produced from BC Air photography

KOOTENAY LAKE





**LEGEND**

Green Schist (chlorite and/or hornblende schist)	Outcrop area
Grey Schist (muscovite schist and schistose argillite)	Fresh float
Knotted schist (staurolite and/or andalusite schist)	Swamp, obar patch
Quartzite	Claim post (located)
Limestone	Adit, open cut, trench
Greywacke and/or tuff and minor associated chert	Strike and dip of bedding
Granite and quartz porphyry (sills)	Strike and dip of schistosity
Pegmatite (lenses)	Inferred anticline axis
Lamprophyre (dikes)	Inferred syncline axis

Geology by W.H. Matthews P.Eng  
May-July 1956

Produced from BC Air photography  
 Caution: Control from existing plans  
 Topography is based on Kootenay Lake elevation 1750 feet and is relative only  
 Relative accuracies - Open ground 20 feet  
 Timbered area 40 feet

KOOTENAY LAKE

Department of  
 Mines and Petroleum Resources  
 ASSESSMENT REPORT  
 NO. 138 MAP #1

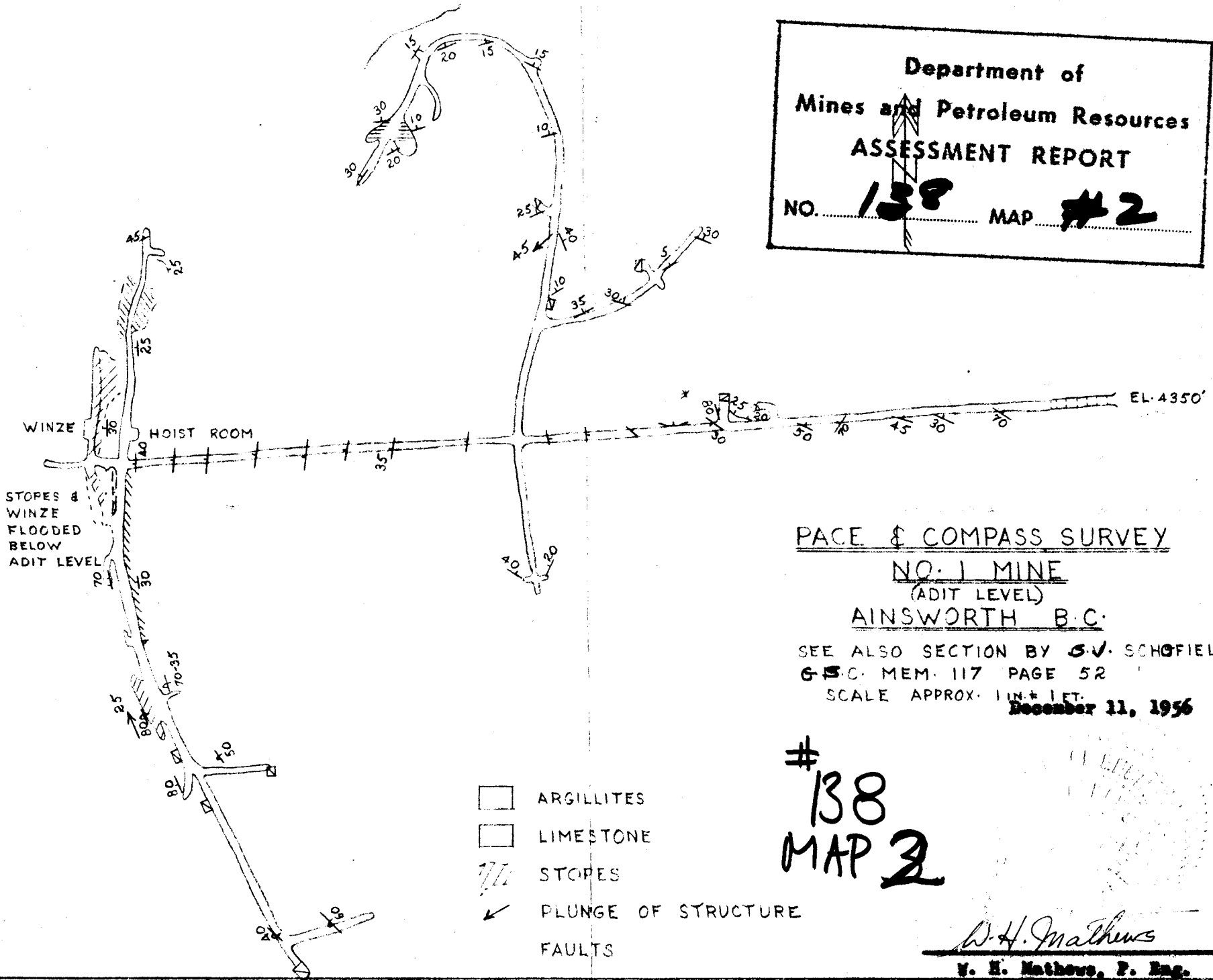


*W.H. Matthews* Dec. 1956  
 McElhannay, Nelson Air Surveys Ltd  
 1240 West Pender St.  
 Vancouver, British Columbia



Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT

NO. **138** MAP **#2**



PACE & COMPASS SURVEY

NO. 1 MINE  
(ADIT LEVEL)

AINS WORTH B.C.

SEE ALSO SECTION BY S.V. SCHOFIELD  
G.S.C. MEM. 117 PAGE 52

SCALE APPROX. 1 IN. = 1 FT.

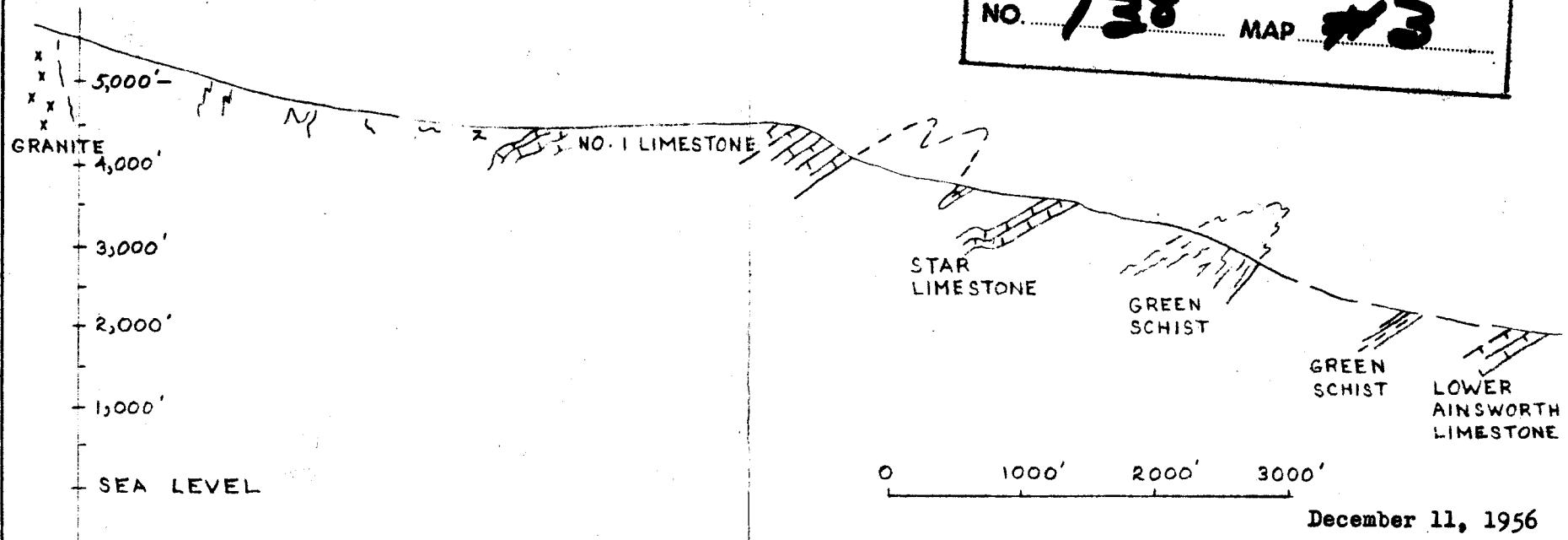
December 11, 1956

#  
**138**  
**MAP 2**

- ARGILLITES
- LIMESTONE
- STOPS
- ↙ PLUNGE OF STRUCTURE
- FAULTS

*W.H. Mathews*  
W. H. Mathews, P. Eng.

Department of  
 Mines and Petroleum Resources  
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 NO. **138** MAP **#3**



December 11, 1956

DIAGRAMMATIC CROSS SECTION  
AINSWORTH CAMP  
 BETWEEN CEDAR & SOUTH WOODBURY  
 CREEK

#138 Map 3

*W. H. Mathews*  
 W. H. Mathews, P. Eng.