LINE CREEK 78(1)A

IR SHELL-LINE CREEK
(HORSE SHOE ROAD)
78(1)A.
GEOLOGICAL
REPORT
1978

419

GEOLOGICAL REPORT

WORK DONE FROM MAY 15, 1978 TO OCT. 30, 1978

LINE CREEK COAL PROJECT

KOOTENAY LAND DISTRICT, B.C.

B.C. COAL LICENCES

NOS. 293 TO 298 INCLUSIVE AND 291

HELD BY SHELL CANADA RESOURCES LIMITED

OPERATED BY CROWS NEST RESOURCES LIMITED

NTS 82G/15

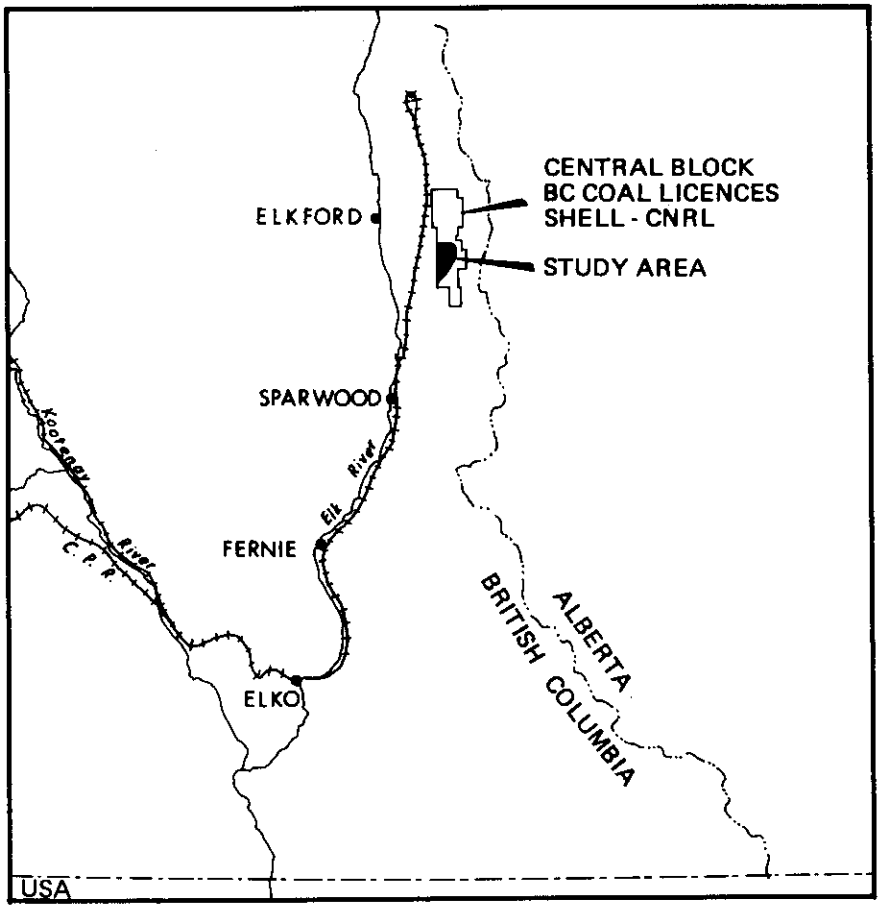
LAT. 49° 57' N, LONG. 114° 46' W

BY
TED HANNAH & TOM COLE
1979-04-30

Crows Nest Resources Limited

SHELL CENTRE, CALGARY, ALBERTA, CANADA

LINE CREEK COAL PROJECT



GEOLOGY

1978 EXPLORATION AND SUMMARY OF PREVIOUS WORK

MARCH 1979

COPY #3

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FOR ANALYSIS DATA, REFER TO CONFIDENTIAL COAL ANALYSIS FILE.

LIST OF APPENDICES

SUMMARY

The Line Creek Ridge coal property includes:

- an open pit area on the south where exploration is completed for final mine planning, and
- a northern part with large underground potential which has been little explored.

The property is located in the Crows Nest Pass area of the Rocky Mountains in southeastern British Columbia about 1150 kilometres east of Vancouver and 25 kilometres northeast of Sparwood at approximately latitude 49° 57'N and longitude 114° 46'W. It covers 750 hectares of B. C. coal licences which are held by Shell Canada Resources Ltd. and operated by Crows Nest Resources Ltd. (CNRL). It is the most intensively studied portion of the Shell-CNRL Central Block licences where exploration has indicated several other areas which may be suitable for coal development, both surface and underground.

The planned mine site is 9.5 kilometres from CNRL's proposed coal preparation plant and the nearest railway point (Canadian Pacific).

Up to 550 metres of coal-bearing Kootenay Formation of Upper Jurassic - Lower Cretaceous age are preserved in a dip-slope situation on Line Creek Ridge near the south end of the Upper Elk Coalfield. These strata include coal of up to 55 metres aggregate thickness in 7 seams thicker than 2.8 metres. Coal from equivalent horizons is being mined at the Kaiser Resources and Fording Coal operations to the south and north respectively.

The north-plunging Fording Syncline is the main structural element in the vicinity of Line Creek Ridge. The Ridge is largely underlain by the west limb of the Fording Syncline, the consistent dip and curvature of which is locally disturbed by small magnitude folds and thrust faults. At lower

elevations the eastern slope of the Ridge overlies the axis of the Syncline as well as the west-dipping east limb and the Fording Thrust Zone. Drag-folding along this major thrust zone has resulted in local thickening of coal seams and inter-seam strata. Dips flatten out towards the synclinal axis both on the south and north end of Line Creek Ridge. Bedding attitudes on the east-dipping west limb range from 10^{o} - 45^{o} in the pit area and up to vertical and overturned north of the pit area.

Exploration was concentrated on the surface mineable area on the south portion of Line Creek Ridge. The work included geological field mapping, 16,320 metres drilling in 82 holes, 1314 metres drivage in 12 adits, and 8 test pits. Road cuts also exposed the coal seams at numerous places.

This work delineated the following coal reserves in the pit area:

	METALLURGICAL	THERMAL	TOTAL
In-Situ Coal ($\times 10^3$ Tonnes)	30804	10579	41383
Run-Of-Mine Coal ($\times 10^3$ Tonnes)	27982	9579	37471
Product (Clean) Coal ($\times 10^3$ Tonnes)	19917	8789	28706
Total Waste ($\times 10^3$ Bank Cubic Metres)	-	-	150162

- Run-of-Mine coal reserves have an average overburden ratio of 4.01 bank cubic metres of total waste per tonne of ROM coal.
- Ninety percent of the reserves are in the four lower seams (seams #8, #9, #10B, and #10A - aggregate thickness approximately 26 m).

- The product metallurgical coal has about 9.5% ash, low sulphur (0.5%) and low to medium volatile content (19.5 - 22.5%, dry basis).

- The run-of-mine thermal coal has a Free Swelling Index of 3.5 or lower, and a Heat Value of 6400 KCal/Kg at 23% raw ash (or 7600 KCal/KG when washed to 12% ash).

The proposed open pit is a maximum 1300 metres wide and maximum 1650 metres long along the strike of the strata. Based on geotechnical surveys, tests and studies done by Golder Associates, the tentative pit perimeters are as follows:

- on the south and west a natural footwall on top of the Kootenay Formation Moose Mountain Member; a massive to thick bedded sandstone immediately underlying the lower most #10A coal seam. It is proposed that the weathered zone be benched to 37° and the non-weathered sandstone be bolted and meshed at its natural bedding angle.

- a highwall on the north, nearly perpendicular to the strike of strata and other structures, with a 41.5° angle on the weathered zone and a 48.5° angle on the non-weathered wall.

- an east wall with an overall slope angle of 38.5°.

OBJECTIVES

The intent of the Line Creek Ridge Geological Report is to compile, analyze and synthesize all geological information from the 1978 exploration program and all previous programs. The presentation of geological information is in a form readily useable by the CNRL engineering staff for their final mine planning. The available geological data is provided as back-up data and proofs for marketing purposes.

The Line Creek Ridge Property is considered to be as described in the Joint Venture Agreement with Mitsui dated August 29, 1978 (Figure 2).

LOCATION

Crows Nest Resources Ltd. is the operator on 7,547 ha of land, currently under Crown Coal License to Shell Canada Resources Ltd. in the Line Creek area of the Upper Elk Coal Field. Of this total, in excess of 4,452 ha are underlain by the Kootenay Formation coal-bearing sequence.

The Line Creek Ridge Project area is centered at latitude 49° 57'N and longitude 114° 46'W, 25 km northeast of Sparwood, British Columbia in the Upper Elk Coal Field. It is within 9.5 km of the Canadian Pacific Railroad line in the Elk Valley. (Figures 1 & 2) The licenses lie about midway between two major operating metallurgical coking coal properties, the Kaiser Resources Harmer Ridge 16 km to the south and the Fording River Coal's open pit operations to the north.

Vehicular access into the area is via an all-weather, gravel base road presently used by CNI logging operations in the area.

The Central Block area consists of several explored units, the principal ones being Line Creek Ridge, Horseshoe Ridge, and Ewin Pass. This report covers primarily the southern portion of Line Creek Ridge, in which the major exploration effort has been concentrated.

Topographically, the Line Creek Ridge area is of rugged relief, with elevation differentials of up to 780 m from the narrow ridge crest to the valley floor. Average surface gradients range from 40% on the eastern side to 60% on the west flank of the ridge. One major

drainage, Line Creek, drains the bulk of the reserve area from the east flank; a smaller stream receives drainage from the steep west slopes and flows into Line Creek, which, in turn, is tributary to the Fording River some 9.5 km west.

EXPLORATION

WORK DONE PRIOR TO 1978

- Aerial Photographs & Photogrammetric Mapping
  - 1968 - aerial photos 1: 36000 (1"=3000')
    - aerial photos - YC-1587, 1:24000 (1"=2000') used to construct 1:2400 (1"=200') topographic maps with 10 ft. contour interval
  - 1970 - aerial photos - YC-1827, 1:24000 (1"=2000')
    - YC-1845, color transparencies 1:12000 (1"=1000')

- Geological field mapping was carried out by CNI from July 1968 to 1973. Mapping was done on air photo enlargements and later transferred onto topographic maps.

- 55 reverse-circulation rotary holes were drilled by CNI with truck-mounted rigs between June 21, 1969 and September 27, 1970. All holes were vertical and most were logged geophysically. A total of 11,613.2 m were drilled. Chip samples from the coal seams were washed to 1.45 SG. and tested for FSI and proximate analyses, except DH-1 to DH-6 inclusive which were analysed on a raw coal basis.

- 11 coal-cored rotary holes were drilled by Consolidation Coal between October and November, 1973, near to 10 previously drilled rotary holes. Core recovery ranged from 69 - 100% in 589 m of total drilling.

- 13 adits were driven in seven seams between July 16, 1968 and January 7, 1971 with a total drivage of 1314 m. Bulk samples were taken from 18 crosscuts. Seven of the adits reached unoxidized coal.

- 8 test pits were dug into 4 seams for bulk sampling:
  - March 1/68 - February 28/69 - 6 pits
  - March 1/69 - February 28/70 - #9 pit started
  - October 30/70 - #9 Pit completed
  - December /71 - February /72 - #10 pit

- Geotechnical work done by Golder Assoc. in 1976 included field mapping of all major outcrops to measure orientation and nature of rock discontinuities. These data were studied using computerized stereographic plotting programs. Block samples were collected from adits #5, #7 and outcrops for shear and strength tests.

- References:

CNI Toronado Mtn. Project - Vol. 1 - 1971

CNI Report of Work Done March 1/69 - February 28/70

CNI Report of Work Done March 1/70 - February 28/71

Boyd - Line Creek Feasibility Study - 1975

Mitsui - Geological Study of Line Creek Project - 1977

Golder Assoc. - Stage I Geotechnical Assessment - Sept. /76

1978 PROGRAM

- Geodetic ground control (Appendix E) and location survey (Appendix F) were done by Shell Can. Res. Ltd. Survey Department. Photogrammetric mapping was done by North West Survey Corp. (Appendix E) as follows:
  - 1978 - aerial photos - NW 55678 1:40,000 (high level)
    - NW 61778 1:20,000 (low level)
    - low level photos were used in construction of 1:2000 photogrammetric maps with a 2 m contour interval.
  - all new drill hole locations were surveyed.
- Some infill geological field mapping was done during the 1978 drilling program.
- 16 continuous-core holes were drilled between June and September, 1978 using two diamond drill rigs of Tonto Drilling. Eleven holes were angled at between 50^{o} and 80^{o} from horizontal. All holes were logged geophysically by BPB Instruments Ltd. with Gamma-Ray Log, Neutron-Neutron Log, two Density Logs (Bed-Resolution and Long-Spaced) and Caliper Log. The coal seam core recovery averaged 80% in 4117.99 m total drilling. Coal seam core samples were sent to the CNRL Lab in Fernie for analyses.
- The 1978 geotechnical program obtained samples and data from geotechnical core logging (summary, detailed, orientated). Packer tests were performed on selected holes to measure relative formation heads and permeability values. Sealed prezometers and standpipes were installed in several holes.

GEOLOGY

REGIONAL STRATIGRAPHY

The Kootenay Formation of Upper Jurassic - Lower Cretaceous age is the coal-bearing sequence of south-eastern B. C. It is a thick sequence of clastic sediments representing delta progradation over marine shales, siltstones and sandstones of the Jurassic Fernie Formation.

Deposition was initiated by an epeirogenic uplift of the source area in early phases of the Columbian Orogeny in Late Jurassic time. The Kootenay section thickens from east to west; the source of sediments being southwest and the shoreline on the east and northeast. Its thickness within the Upper Elk Coal Field ranges up to 1100 m.

The Kootenay Fm. can be subdivided into three main units. A basal, cliff-forming "Moose Mountain Member" is composed predominently of sandstones with minor siltstones and shales. It is a prograding sequence of delta front sheet sands, barrier bars and tidal channel deposits.

The middle, "Coal-bearing Member" is generally in sharp contact with the underlying Moose Mountain (sandstone-coal, or sandstone - bioturbated silty shale). It consists of alternating beds of sandstone, shale, siltstone and coal representing prograding delta plain environments. The Coal-bearing Member is 245 m - 860 m thick, including 6 m to 61 m of coal in the south contained within 2 to 8 seams, and up to 90 m of coal in 23 seams on the north.

The upper portion of the Kootenay Fm., the "Elk Member", consists of alternating sandstone, siltstone, shale and conglomerates

with minor lenticular coal beds. It represents progradation of the alluvial plain over the delta plain coal-forming environments.

The upper contact of the Kootenay is an erosional surface. It is overlain by the Cretaceous Blairmore Group, beginning with rejuvenated piedmont-plain deposits of the Cadomin Formation (Cadomin Conglomerate).

REGIONAL STRUCTURE

The Coal-Bearing Kootenay Formation occurances in the front ranges of south-eastern B. C. are preserved in north-south trending synclines referred to as the East Kootenay Coalfields (Figure 3). High structural relief of Paleozoic rocks surrounding the Coalfields fades out in relatively incompetent rocks of the Fernie and Kootenay Formations. The structure within the synclines is complicated to varying degrees by thrust faults and their associated folds, and also by normal faults. This structural complexity increases towards the thinner, east side of the Coalfields where they have been thrust against underlying Paleozoics.

The East Kootenay Coalfields can be subdivided into three coal-bearing areas. From south to north they are the Flathead Coalfield, the Fernie Coalfield and the Upper Elk Coalfield. Since they are all part of the same depositional complex, the subdivision is based on erosional boundaries and structural boundaries.

UPPER ELK COALFIELD

The Upper Elk Coalfield is an elongate basin composed of two major synclines (Greenhills and Fording) separated by an anticline

and the northern extension of the Erickson normal fault. The eastern, Fording syncline, can be traced northward from Alexander Creek to the Kananaskis Lakes. On its south end, it is symmetric with moderate to steep dips on both limbs. To the north it becomes more asymmetric with a west dipping axial plane, vertical strata on the west limb and moderately dipping strata on the east limb.

On the west side of the Erickson Fault, the Greenhills syncline has been downthrown approximately 900 m. It can be traced northerly up to Elk River valley from Fording Mountain to where it is cut off by the Elk River Thrust. The Greenhills Syncline is slightly asymmetric with a west dipping axial plane.

Only erosional remnants of the Kootenay Formation are preserved in the south of the Fording Syncline. A 10^{o} north plunge on the syncline preserves an increasing thickness of Kootenay section to the north. Faulting and folding has caused some repetitions of the section and thickening of the coal seams.

Stratigraphy - Line Creek Ridge

On Line Creek Ridge the Jurassic - Cretaceous, Coal-bearing Kootenay Formation and underlying Jurassic Fernie Formation are preserved in the Fording Syncline.

Fernie Formation

The marine Fernie Formation is a recessive unit which generally is only exposed in road cuts or drill core. It can be divided into two units: (Figure 4)

- The lower unit consists of a dark gray to black, slightly silty and calcareous marine shale with minor sandstone lenses and burrowed zones throughout. Core hole LC-113 encountered 49 m of this unit.
- The upper unit, commonly referred to as the "Passage Beds", consists of interbedded sandstone, shale and siltstone. Sandstone are massive to cross-bedded. Burrowed zones are common throughout the section. This unit represents a transition zone between underlying marine shales and overlying delta-front sandstones of the Moose Mountain Member (Kootenay Formation). The upper and lower boundaries of the Passage Beds are gradational and therefore difficult to map. Core hole LC-113 penetrated 31 m of this unit.

Kootenay Formation

The thickness of Kootenay Formation preserved on Line Creek Ridge ranges from 60 m at the south end to a maximum of about 55 m on the north end. The basal Moose Mountain Member and middle Coal-bearing

Member are best exposed along the west side. The Elk Member is not preserved on Line Creek Ridge. (Figures 4, 5, 6)

- The basal Moose Mountain Member, a cliff-forming unit about 60 m thick, is composed mainly of sandstone with minor conglomerate, shale and coal.
    - Sandstones are generally fine to medium grained, often coarsening down-section to pebbly sandstone or conglomerate. The bedding ranges from large scale to medium scale cross-beds.
    - The pebble-size conglomerates are thin and lensy with gradational upper contacts and sharp, erosional lower contacts.
    - Shales are generally dark gray to black, slightly calcareous, lensy and thin. Two noteable exceptions occur persistently at 12 m and 16 m below the top of the Moose Mountain Member. Their thickness ranges from 0.2 m to 1.0 m and lithology varies from carbonaceous shale to bright coal. These beds appear as two slightly recessive layers in the Moose Mountain Member, especially noticeable along the west side of the Ridge. In core hole LC-109 the upper coaly bed is missing, probably cut out by a fault zone. A similar feature can be seen in the Moose Mountain outcrop west of LC-109 where the section above the upper coaly bed is repeated by a thrust fault.
    - The lower contact of the Moose Mountain Member is transitional into Passage Beds (Fernie Formation) while the upper contact is generally sharp below the #10A seam of the Coal-bearing Member.

- The middle Coal - bearing Member is an interbedded sequence of shale, siltstones, sandstone and coal with a maximum thickness on Line Creek Ridge of 490 m.
    - Shales range from carbonaceous to silty and dark gray to black in color. Thin laminae of siltstone or sandstone and coaly stringers or wisps are common throughout the section. Hardness in core samples ranges from soft to strong (S1 - R3 - Golder Assoc. - Table 2) depending on the carbonaceous or silty content of the rock. Shales are almost never exposed in natural outcrop. In road cuts (constructed between 1968 and 1971) the carbonaceous shales are almost completely sloughed over where as the silty shales are often still partially exposed.
    - Siltstones are interbedded with shales and sandstones or occur as the transition from one to the other. Core samples are very strong (R4). Natural exposures are generally restricted to the crest of the Ridge. Road-cut occurances are often still well exposed.
    - Sandstones are fine to medium grained and tend to become coarser down section. Laminar bedding, cross-bedding and soft-sediment deformation are seen throughout. The lower 75 m of the Coal-bearing Member (below #8 seam) have a higher proportion of thick, persistant sandstone units, some of which are easily correlated in drill holes throughout the Ridge. Petrographic analysis of the cliff-forming quartzite between #8 & #9 seams (G. Wilson, 1976) is as follows:

Quart & Chert	-	73%
Cement - Silica	-	20%
Matrix	-	7%
Accessory Minerals	-	Trace
		100%

Core samples of this sandstone are very strong to extremely strong (R4 - R5). Above #8 seam, sandstones in the Coal-bearing Member are less common, thinner and more variable. Their upper and lower contacts tend to be gradational, compared with the relatively sharp sandstone contacts below #8 seam. Core samples are strong to very strong (R3 - R4).

- Coal on Line Creek Ridge occurs in 11 seams with a net thickness of approximately 58 m in 78 m of gross aggregate coal section. Seams are numbered from the top #1, #2, #3, #4, #5, #6, #7, #8, #9, #10B, #10A, with 45% of the coal thickness occuring in the lower four seams. The main mineable seams are:

  - #4, two coal seams separated by a shale parting which thickens to the east. The lower seam becomes very shaly and difficult to correlate towards west side of Ridge. Average thickness is 8.7 m/15.0 m.
  - #6, two coal seams separated by a shale parting which ranges in thickness from zero to 13.0 m. The area of thick parting has a NE-SW trend through DH-5, LC-110, and DH-78. Average thickness is 4.6 m/6.6 m.

STRUCTURE - LINE CREEK RIDGE

At Line Creek Ridge, limbs of the Fording Syncline are symmetrical about a near-vertical axial plane which trends NNW with a plunge of 10^{o} North. Bedding dips on the west limb range from 5^{o} - 10^{o} near the syncline axis, up to vertical and overturned in some northwestern outcrops. Bedding dips on the east limb are also in the 5^{o} range near the axis and range up to about 40^{o}W to the east. This limb is complicated by faults and drag fold associated with Fording Thrust Zone. (Figures 9 a-f, 10 a-v).

- West Limb - Footwall of Pit

  On the south end of the Ridge, west limb dips range from 10^{o} near the syncline axis up to 30^{o} to 40^{o}E at western outcrops. Northwest, dips become steeper, averaging 45^{o}E. Localized folds and faults have complicated the otherwise simple east dip.

  - Fault zones were seen in the core from LC-100, -101, -102, -104, -105, -109 & -114. Movement is generally restricted to minor thickening of inter-seam sections. Minor faulting was also seen in the Moose Mountain Member on the south nose of the Ridge and in outcrops west of core hole LC-109, where approximately 10 m of Moose Mountain has been repeated by thrusting. These faults are interpreted to be low-angle bedding-plane thrusts which may die-out into shear zones in coal seams or rolls on the west limb. Individual faults are difficult to trace between control points but their trend is parallel or sub-parallel to the main Fording Thrust Zone.

- #7, maintains a regular thickness throughout the Ridge of about 5.2 m/6.3 m.
- #8, is the thickest seam, averaging 11.6 m/12.8 m. Its stratigraphic and geophysical characteristics are very consistent. Thickness variations (DH-14, 63, 73) are probably due to structural disturbance (faulting and/or drag folding).
- #9, over south half of the Ridge maintains a regular thickness averaging 5.6 m. Northwards, a split in the lower part of section thickens and the lower seam becomes thin. Overall average thickness is 5.4 m/6.8 m.
- #10B, maintains a regular thickness (average 4.5 m) except where faulted (DH-60, DH-44, LC-106). Its upper contact is interbedded carbonaceous shale and and shaly coal and is therefore not as sharp as the basal contact.
- #10A, maintains a regular thickness (average 2.8 m) except where faulted (DH-48). Its basal contact is often sandy coal or coaly sandstone.

• Coal quality for work prior to 1978 is summarized on Table 3 (Mitsui, 1977). Refer also to FSI/Ash data on Figure 7 and Figure 8 a-i.

The consistent nature of stratigraphy from #8 seam down to the Moose Mountain Member indicated an inter-deltaic coastal marsh or lower deltaic-plain interdistributary depositional environment. More variable stratigraphy above #8 seam indicates deposition in flood-basin swamps (Gibson, 1977).

- Minor "rolls" in the footwall structure are best illustrated on the coal seams structure maps. As previously indicated they are probably a form of drag-fold associated with the bedding-plane thrusts. "Rolls have been delineated in three areas around:
  - LC-109, LC-107, DH-8
  - LC-103, DH-3, DH-4
  - LC-104, LC-111, DH-2

  The amplitude of these folds is in the order of 6 - 10 m and they each affect an area of about 4 - 5 hectares.

- Fording Thrust Zone - East-wall of Pit

  Fording Thrust Zone is a steeply west-dipping thrust zone, comprised of numerous individual thrust planes, which trends subparallel to Fording Syncline axis. Total displacement of the strata is at least 120 m. Portions of the zone can be seen in drill holes DH-22, -24, -44, LC-112, -115 in the form of repetition of section and/or thickening of coal seams by faulting. Associated with the main fault zone are areas of minor faulting:
  - DH-60, -61, -35 - steeply dipping thrust and normal fault
    - maximum displacement of about 8 - 10 m
  - DH-22, -44, -48 - south-west-dipping thrust fault trending NW-SE
    - maximum displacement about 6 - 8 m

- Drag-Folding - East-wall of Pit

  A drag-fold associated with the Fording Thrust Zone can be seen in Test Pit #9, drill-holes DH-63, -14 and outcrops around these holes. Test Pit #9 exposes a faulted anticline with a vertical

axial plane which trends parallel to the main Fording Syncline. This fold has an amplitude in the order of 30 m and breadth of approximately 65 m. Outcrop evidence indicates that strata from seam #9 up to seam #6 have been affected by this structure.

- Proposed Highwall of Pit

The proposed highwall, which forms the north limit of the pit area, runs roughly east-west in the vicinity of DH-1 & DH-5, perpendicular to the main north-south structural trends of Line Creek Ridge. Aside from the previously mentioned bedding-plane thrusts, the main features of the highwall are a west-dipping normal fault zone and a number of west-dipping thrust faults.

- Normal fault trends NW-SE and is downthrown on the west side approximately 60 m. Evidence for this fault is seen in LC-112 where #8 seam and about 50 m of the section above #8 are missing.
- Thrust faults, which probably trend NW-SE, are seen in DH-78, -16, LC-106, -112. They are interpreted to be splays off of the main Fording Thrust Zone. In drill holes these thrusts are evidenced by repetition of section and thickening of coal seams:
  - DH-78 - #8 seam and 75 m of section above #8 repeated
  - DH-16 - section between #6 & #7 seam repeated
  - LC-106 - #9 seam and 40 m of section above #9 repeated
    - #10 seam over-thickened
  - LC-112 - portions of #7 seam repeated twice

Data control on thrusts is limited to these three drill holes. A suggested southern limit for this faulting is the area north of DH-1; the northern extent is unknown due to lack of control.

- West Limb - North of Pit Area

North of the proposed pit area, structure of the west limb of the Fording Syncline is similar to that described within the pit. The bedding attitudes are slightly steeper than to the south, averaging 50° - 60°E. on the west half of the limb. Some sections have been thickened by bedding-plane thrusts similar to those seen in the pit area. Evidence for these is seen in DH-70, 73, 23 and 10. The most noteable structural element is seen in outcrops on the west side of Line Creek Ridge, north and northwest of Test Pit #6. Strata from the Moose Mountain Member up to the section between seams #8 and #7 have been folded into a recumbent syncline. The lower or east-dipping limb is continuous with the west limb of the Fording Syncline. Bedding attitudes on the upper or west-dipping limb range from vertical to 55°W (overturned bedding).

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PROFESSIONAL VERIFICATION OF REPORT

Entitled: Line Creek Coal Project
Kootenay Land District, B.C., 1978
B.C. Coal Licenses
Nos. 293 to 298 Inclusive and 291

Mr. Ted Hannah planned and carried out the 1978 geological field program on Line Creek B.C. Coal Licenses held by Shell Canada Resources Ltd. and operated by Crows Nest Resources Ltd. He also prepared this report. Mr. Frank Martonhegyi supervised the activity of this program under the general direction of the undersigned.

Ted Hannah, B.Sc., graduated in Geology from the University of New Brunswick in 1973. Mr. Hannah is a member, as a Professional Geologist, of the Association of Professional Engineers, Geologists, and Geophysicists of Alberta. His experience in Western Canadian coal exploration since 1974 includes positions with:

- Shell Canada Resources Ltd., Calgary, Alberta
- Crows Nest Resources Ltd., Calgary, Alberta

Frank Martonhegyi, M.E., graduated in Mining Geological Engineering from the University of the Heavy Industry, Hungary, in 1962; and received post-graduate training at the University of Saskatchewan, Saskatoon, in 1969-1971. His experience in Western Canadian coal exploration since 1971 includes positions with:

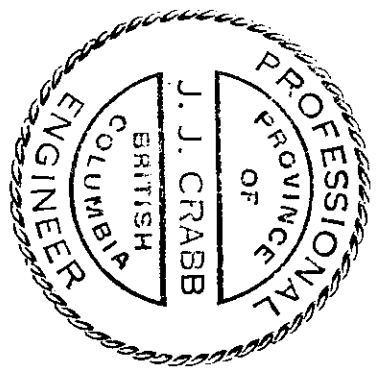
- CanPac Minerals Ltd., Calgary, Alberta
- Shell Canada Resources Ltd., Calgary, Alberta
- Crows Nest Resources Ltd., Calgary, Alberta

His prior work experience includes underground coal mining geology, geotechnical engineering and geochemistry in Hungary, Austria and Canada.

He currently holds the position of Staff Geologist for Crows Nest Resources Ltd., supervising coal exploration in British Columbia.

I consider both the aforementioned geologists to be well qualified to undertake the responsibilities they were assigned on this project. I am satisfied that the attached report dated April 30, 1979 has been competently prepared and justly represents the information obtained from this project.

J. J. Crabb, P. Eng.



April 30, 1979

Table 2

HARDNESS CODE FOR CORE SAMPLES*

Golder Associates Hardness Code	Geological Society of London Term	Field Estimation of Hardness
R5	Extremely strong	Requires many blows of geological hammer to break.
R4	Very strong	Requires a few blows of geological hammer to break.
R3	Strong	Breaks under single blow of geological hammer.
R2	Moderately strong	0.5 cm indentations with sharp end of geological pick.
	Moderately weak	Too weak to cut by hand into triaxial specimen.
R1	Weak	Crumbles under firm blows of geological pick.
S5	Very weak (rock)	May be broken in the hand with difficulty.
S4	Very stiff (soil)	Indented by fingernail.
S3	Stiff	Cannot be moulded in fingers.
S2	Firm	Moulded with strong pressure of fingers.
S1	Soft	Easily moulded with fingers.

* From Golder Associates "Geotechnical Core Logging"

Proximate Analysis* Table 3

Adit Samples

Seam	Adit	I.M.	Ash	V.M.(d.a.f.)	F.C.	T.S.	P. in coal	Raw coal Ash
By Steel Mills (average)								
No.8	7	1.3	9.7	20.0 (22.5)	69.0	0.39	0.042	-
No.9	4	1.2	8.9	19.6 (22.0)	70.3	0.35	0.037	-
No.10B	5	1.0	9.7	20.1 (22.5)	69.2	0.47	0.020	-
No.10A	12	0.9	10.4	20.3 (22.9)	68.4	0.54	0.016	-
By Mitsui Mining								
Upper No.6	15	2.4	9.6	20.7 (23.5)	68.3	0.54	-	11.1
Lower No.6	15	1.4	9.4	22.8 (25.6)	66.4	0.56	-	13.1
Upper No.7	16	2.0	9.4	21.1 (24.0)	67.5	0.50	-	26.0
Lower No.7	16	1.4	9.4	22.9 (25.7)	66.3	0.53	-	27.5
No.8	7	1.6	9.6	20.3 (22.9)	68.5	0.35	0.045	17.2
No.9	4	1.5	9.4	19.7 (22.1)	69.4	0.33	0.027	16.5
No.10B	5	1.3	9.6	20.1 (22.6)	69.0	0.43	0.029	17.5
No.10A	12	1.1	9.6	20.2 (22.6)	69.1	0.49	0.039	19.2

Drill Hole Samples

Seam	Non-Core Drill					Core Drill
	Number of Holes	Clean Coal* I.M.	Ash	V.M.(d.a.f.)	F.C.	Raw Coal** Ash
No.4	5	1.1	7.3	27.2 (29.8)	64.4	-
No.6	7	1.2	7.7	25.1 (27.5)	66.0	-
No.7	10	1.1	7.8	25.2 (27.6)	65.9	-
No.8	29	1.1	7.9	22.2 (24.4)	68.8	17.3
No.9	25	1.1	8.1	22.3 (24.5)	68.5	15.7
No.10B	26	1.2	9.1	22.1 (24.7)	67.6	17.4
No.10A	22	0.9	11.0	21.8 (24.5)	66.3	19.0

* Clean Coal - Float fraction of s.g. 1.45 of non-core drill chip samples.

** Raw coal - Core samples of L.C. drill holes.

Seam	Number of Holes
No.8	5
No.9	2
No.10B	2
No.10A	1

* From Mitsui - Geological Study of Line Creek Project - 1977.

REFERENCE

THESE REPORTS COVER IN ONE UNIT ALL B.C. COAL LICENCES IN SOUTH-EASTERN BRITISH COLUMBIA

HELD BY SHELL CANADA RESOURCES LIMITED
OPERATED BY CROWS NEST RESOURCES LIMITED

TWO SETS WERE FILED WITH

ADMINISTRATOR FOR COAL
MINISTRY OF ENERGY, MINES & PETROLEUM RESOURCES
GOVERNMENT OF BRITISH COLUMBIA
VICTORIA, B.C.

ON APRIL 30, 1979, TO WHOM FURTHER COPIES WILL BE SUPPLIED AT REQUEST.

CROWS NEST RESOURCES LIMITED

REPORTS ON GEODETIC SURVEY

WORK DONE FROM JUNE 27, 1978 TO JANUARY 31, 1979

SURVEY CONTROL FOR CROWS NEST RESOURCES LIMITED

FERNIE - SPARWOOD, BRITISH COLUMBIA

PHOTOGRAMMETRIC MAPPING PROJECT (1978)

FERNIE - SPARWOOD AREA - S.E. BRITISH COLUMBIA

COVERING ALL COAL LAND IN S.E. BRITISH COLUMBIA

HELD BY SHELL CANADA RESOURCES LIMITED

OPERATED BY CROWS NEST RESOURCES LIMITED

MORRISSEY FREEHOLD

B.C. COAL LICENCES

264 TO 313 INCL., 365 TO 373 INCL., 408, 412 TO 414 INCL.

490 TO 495 INCL., 588 TO 601, 1299 - 1302 INCL., 4080 TO 4089 INCL., 4090, 4092

KOOTENAY LAND DISTRICT, B.C.

NTS 82G AND 82J

LAT. 49° 05; TO 50° 10' N, LONG. 114° 30' TO 115° 10' W

BY
SHELL CANADA RESOURCES LIMITED - SURVEYING DEPARTMENT
GENERAL SURVEY CONTRACTOR

NORTHWEST SURVEY CORPORATION (YUKON) LIMITED
SUBCONTRACTOR ON PHOTOGRAMMETRIC MAPPING

1979-04-26

T A B L E O F C O N T E N T

GROUP "CA"

DEPARTMENT OF MINES AND PETROLEUM RESOURCES

Coal Act (Sec. 23)

APPLICATION TO GROUP LICENCES

Licensee(s) SHELL CANADA RESOURCES LIMITED

Land district KOOTENAY

Location S.W. ELKFORD, B.C.

Date of application JANUARY 31, 1979

I/We, the undersigned licensee(s)* of the following coal licences, desire to group them according to the provisions of the *Coal Act:*

I/We, desire to consolidate the licences to obtain a uniform anniversary date: Yes [X] No [ ]

Licence Number	HA.	AC.	Anniversary Date	Signature of Licensee
281	130	320	January 31	
282	130	320	"	
283	260	640	"	
286	260	640	"	
287	130	320	"	
288	130	320	"	
289	260	640	"	ASSISTANT SECRETARY
291	133	328	"	
293	260	640	"	
294	260	640	"	
1299	130	320	"	
1300	130	320	"	
1301	130	320	"	
1302	130	320	"	
TOTAL 14 Lics	2473	6088		

* May be signed by a person authorized to sign on behalf of the licensee.

FOR DEPARTMENTAL USE ONLY

All Licences were issued in 1975

Approved uniform date

Recording Fee: $5 for each licence in the group.

2M-675-8195

(NEW, PRELIMINARILY CALLED "CA

DEPARTMENT OF MINES AND PETROLEUM RESOURCES

Coal Act (Sec. 19)

APPLICATION TO EXTEND TERM OF LICENCE

1. I, Gordon A. Schuartz (Name) agent for Shell Canada Resources Limited (Name)

P. O. Box 100 (Address)
Calgary, Alberta T2P 2H5

P. O. Box 100 (Address)
Calgary, Alberta T2P 2H5

Valid FMC No. 171 929

hereby apply to the Minister to extend the term of Coal Licences No(s). 281,282,283,286,287,288,289, 291,293,294,1299,1300,1301,1302; 14 licences covering approximately 6088 acres = 2473 hectares for a further period of one year.

2. I have performed, or caused to be performed, during the period February 1, 1978 to January 30, 19 79, work to the value of at least $ $771,417 on the location of coal licences as follows:

CATEGORY OF WORK	Licence No(s).	Apportioned Cost
Geological mapping	all 14 licences above	$ 65,530
Surveys: Geophysical	None	NIL
Geochemical	None	NIL
Other - Geodetic	all 14 licences above	$ 56,691
Road construction	294	$ 44,540
Surface work	281,282,287,288,289,290 1299,1300,1301,1302	$ 33,970
Underground work	None	NIL
Drilling	294	$348,912
Logging, sampling, and testing	294	$180,355
Reclamation	294	$ 919
Other work (specify) Geotechnical	294	$ 60,500

3. I wish to apply $ 165,826 of this value of work on Coal Licence(s) *281,282,283,286, 287,288,289,291,293,294,1299,1300,1301,1302; application filed concurrently to group these fourteen licences into one group.

N.A. 4. I wish to pay cash in lieu of work in the amount of $ _____ on Coal Licence(s) No(s). _____

N.A. 5. I wish to apply $ _____ of this value of work to claim a refund of cash in lieu of work in the amount of $ _____ which was paid to extend the term of Coal Licence(s) No(s). _____ from _____ to _____, 19____. Mining Receipt No. _____ for prior payment of cash in lieu of work *is attached* for adjustment.

6. The work performed on the location(s) is detailed in the attached report entitled Geodetic Ground Control Survey and Photogrammetric Mapping - Central Block, Kootanay Land District, B.C.; Coal Project final report - Line Cr. Ridge, Kootanay Land District, B.C. - Exploration and Geological Evaluation; coal progress report - North Central Block, Kootanay Land District, B.C. - Exploration and Geological Evaluation; All three reports are in progress and will be submitted within 90 days.

1979-01-31 (Date)

G. A. Schuartz (Signature and position) LANDMAN

*Applications or group licences may be filed to apportion assessment on a maximum of 10 licences.

(FORMS TO BE SUBMITTED IN DUPLICATE)

FOR DEPARTMENTAL USE ONLY

Value of work reported $ _____ Value of work applied on licences $ _____

Value of work approved $ _____ Value of credit remaining $ _____

Work performed. Yes [X] No [ ]

The program of operations detailed hereunder was carried out during the period from February 1, 1978 to January 30, 19 79. Total costs are $ 771,417, an average of $ 126.71 per acre. or $313.10 per hectar

GEOLOGICAL MAPPING Yes [X] No [ ] Cost $ 65,530

	Area (Acres)	Scale	Time
Reconnaissance	6482 Ac = 2623 Ha	1:16,000	240 man-days
Detail: Surface	640 Ac = 259 Ha	1: 2,000	80 man-days
Underground	NIL		
Other (specify)	measuring stratigraphic sections 2990 m.	1: 500	48 man-days

GEOPHYSICAL OR GEOCHEMICAL SURVEYS Yes [ ] No [X] Cost $ NIL

Method _____ Line miles _____

OTHER SURVEYS Yes [X] No [ ] Cost $ 56,691

Grid _____ Topographic Geodectic ground control and location survey photogrammetric mapping

ROAD CONSTRUCTION Yes [X] No [ ] Cost $ 44,540

Length: On Licences 19.2 kilometres Access (off licences) 12.8 kilometres upgrading & maintenance

SURFACE WORK Yes [X] No [ ] Cost $ 13,970

	Length	Licence Number(s)
Trenching	by hand 505 m.	282,287,288,289
Seam tracing	by hand 6000 m.	282, 287, 288, 290
Crosscutting	-	
Other	by hand tracing marker bed 5000 m.	281, 1299, 1300, 1301, 1302

UNDERGROUND WORK Yes [ ] No [X] Cost $ NIL

Test adits: Number _____ Average length _____ Total footage _____

Other workings: Area _____ Total footage _____

DRILLING Yes [X] No [ ] Cost $ 348,912

	Hole Size	Number of Holes	Total Footage
Core: Diamond [X] Wireline [ ]	HQ	11	10,505 ft.=3,183 m.
Rotary: Conventional [ ]			
Reverse circulation [ ]			
Other			

Contractor Tonto Drilling Where core stored CNRL Lab, Fernie, B.C.

LOGGING, SAMPLING, AND TESTING (check) Yes [X] No [ ] Cost $ 180,355

Lithology: Drill samples [ ] Core samples [X] Bulk samples [ ]

Logs: Gamma-Neutron [X] Density [X] Other [X]

Testing: Prox. analysis [X] FSI [X] Washability [X]

Carbonization [ ] Petrographic [ ] Plasticity [ ] Other [ ]

OTHER WORK (specify details) Geotechnical installations, tests, survey Cost $ 60,500

REPORTS:

Reclamation work (Permit No. 54) Detail of work* Seeding and fertilizing drill sites and side roads

Report will be submitted by March 31, 1979 Cost $ 919

OPERATIONS:

Work was supervised by Ted Hannah Position Geologist

Is this person a registered or licensed Professional Engineer in British Columbia? Yes [ ] No [X]

NOTE—Where the licensee intends to perform, during the extended term of his licence, work not set out in the plan of operations filed under section 15 (2) (c), a supplemental plan of operations is to be attached.

* If reclamation work reported in separate report give details of report identification.

VALUATION OF WORK: COST STATEMENT
(Sec. 27, B.C. Reg. 436/75)

ON-PROPERTY COSTS: For period from February 1, 1978 to January 30, 1979

1. OPERATOR'S FEES, SALARIES, AND WAGES:

	Average Number of Employees	Average Rate	Average Number of Days	Amount
Professional and technical	5	$125/man-day	149	$ 93,125
Machine operators and support	NIL			
Miners	NONE			
Other	NIL			

Total operator's costs $ 93,125

2. CONTRACTORS AND CONSULTANTS:

Name	Service	Contract Amount
SCRL - Survey Dept.	Geodetic ground control survey	$ 46,716
(including Subcontractor	Photogrammetric mapping	
~~Northwest Survey)~~	~~Geodetic location survey~~	
Tonto Drilling	Diamond Drilling	$238,500
Drain Brothers Construction	Bulldozer etc. work	$ 41,200
~~Ackles Trucking~~	~~Water Supply (truck)~~	~~$ 48,600~~
ANC Geol. Consultants	Geol. Consultant	$ 13,900
B&R Drilling	Drilling Supervisor	$ 4,500
Jamieson Geol. Consultants	Bulldozer Supervisor	~~$ 2,000~~

TOTAL CONTRACTOR AND CONSULTANT COSTS $395,416

N.A. 3. EQUIPMENT AND INSTRUMENTS USED:

	Owned:	
	Rented:	Amount

Total equipment and instrument rentals $ NIL

4. FIELD CAMP COSTS:

		Amount
Food	1322 man-days; $16 per man-day	$ 21,152
Accommodation	1320 man-days; $18 per man-day	$ 23,760
Fuel		$ 6,350
Other	Miscellaneous(Communication,Power Plant,Trailer,etc)	$ 7,250

Total field camp costs $ 58,512

5. SAMPLING, ANALYSIS, AND TESTING:

Service	Performed by	Amount
Wireline Logging	BPB Industries	$ 30,900
Geotechnical installations,tests	Golder Associates	$ 60,500
Analyses	CNI Lab	$ 15,470

Totals, samplings, analysis, and testing $ 106,870

6. SUPPLIES AND MATERIALS COSTS:

	Amount
Process supplies	
Operating and maintenance supplies	22,100
Office and technical supplies	7,900
Other supplies and materials	

Total, supplies and materials $ 30,000

7. TRANSPORTATION COSTS (Ground transportation details):

Vehicles	Owner	Rental Rate	Amount
four 4x4 truck	Minchuk leasing	$1200/month*	$ 14,600
three trucks	Kiki Trucking	$25/hour,330 hours	$ 8,250

* including repairs

Air support details:

Aircraft Type	Owner	Charter
Helicoptor 206 B	Kenting	$375/hour 42.5 hours $17,475

Total transportation costs $ 40,325

8. RECLAMATION WORK:

Interior Reforestation Co. Ltd. $ 919

9. TRAVEL EXPENDITURES (operator's costs only):

Number of Personnel	Number of Trips	Amount
expenditures in addition to field/camp cost are included as overhead in the $125 per man-day allocation		

Total travel expenditures $ N.A.

Total costs $ 725,167

(Secs. 28 and 29, B.C. Reg. 436/75)

OFF-PROPERTY COSTS: Period from _____ to _____, 19____

	Amount
(a) Logistics and field support	$
(b) Technical and feasibility studies	
(c) Preparation of reports 370 man-days; $125 per man-day	46,259
(d) Supplies and services	
(e) Mobilization and demobilization of equipment	
(f) Travelling expenses (Itemize)	

Supporting Cost Statements Attached

Total $ 46,250

Amount

Total supporting costs $ _____

SUMMARY

On-property costs	$ 725,167
Off-property costs	$ 46,250
Total costs	$ 771,417

Statement of costs verified by Accounting Devision, Finance & Administration, SCRL

1979-01-30
(Date)

(Signature and position)
Analyst, Administration & Planning
CNRL

234-673-8196

GROUP "CA"

DEPARTMENT OF MINES AND PETROLEUM RESOURCES

Coal Act (Sec. 23)

APPLICATION TO GROUP LICENCES

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Land district KOOTENAY

Location S.W. ELKFORD, B.C.

Date of application JANUARY 31, 1979

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294	260	640	"	
1299	130	320	"	
1300	130	320	"	
1301	130	320	"	
1302	130	320	"	
TOTAL 14 Lics	2473	6088		

* May be signed by a person authorized to sign on behalf of the licensee.

FOR DEPARTMENTAL USE ONLY

All Licences were issued in 1975

Approved uniform date

Recording Fee: $5 for each licence in the group.

2M-675-8195

(NEW, PRELIMINARILY CALLED "CA

DEPARTMENT OF MINES AND PETROLEUM RESOURCES

Coal Act (Sec. 19)

APPLICATION TO EXTEND TERM OF LICENCE

1. I, Gordon A. Schwartz (Name) agent for Shell Canada Resources Limited (Name)

P. O. Box 100 (Address)
Calgary, Alberta T2P 2H5

P. O. Box 100 (Address)
Calgary, Alberta T2P 2H5

Valid FMC No. 171 929

hereby apply to the Minister to extend the term of Coal Licences No(s). 281,282,283,286,287,288,289, 291,293,294,1299,1300,1301,1302; 14 licences covering approximately 6088 acres = 2473 hectares for a further period of one year.

2. I have performed, or caused to be performed, during the period February 1, 1978 to January 30, 19 79, work to the value of at least $ $771,417 on the location of coal licences as follows:

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Surveys: Geophysical	None	NIL
Geochemical	None	NIL
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Reclamation	294	$ 919
Other work (specify) Geotechnical	294	$ 60,500

3. I wish to apply $ 165,826 of this value of work on Coal Licence(s) *281,282,283,286, 287,288,289,291,293,294,1299,1300,1301,1302; application filed concurrently to group these fourteen licences into one group.

N.A. 4. I wish to pay cash in lieu of work in the amount of $ on Coal Licence(s) No(s)

N.A. 5. I wish to apply $ of this value of work to claim a refund of cash in lieu of work in the amount of $ which was paid to extend the term of Coal Licence(s) No(s) from to , 19 . Mining Receipt No. for prior payment of cash in lieu of work *is attached* for adjustment.

6. The work performed on the location(s) is detailed in the attached report entitled Geodetic Ground Control Survey and Photogrammetric Mapping - Central Block, Kootanay Land District, B.C.; Coal Project final report - Line Cr. Ridge, Kootenay Land District, B.C. - Exploration and Geological Evaluation; coal progress report - North Central Block, Kootanay Land District, B.C. - Exploration and Geological Evaluation; All three reports are in progress and will be submitted within 90 days.

1979-01-31 (Date)

G. O. Schwartz (Signature and position)
LANDMAN

* Applications to group licences may be filed to apportion costs on a maximum of 10 licences.

(FORMS TO BE SUBMITTED IN DUPLICATE)

FOR DEPARTMENTAL USE ONLY

Value of work reported $ Value of work applied on licences $

Value of work approved $ Value of credit remaining $

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The program of operations detailed hereunder was carried out during the period from February 1, 1978 to January 30, 19 79 Total costs are $ 771,417, an average of $ 126.71 per acre. or $313.10 per hectar

GEOLOGICAL MAPPING Yes [X] No [ ] Cost $ 65,530

	Area (Acres)	Scale	Time
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Detail: Surface	640 Ac = 259 Ha	1: 2,000	80 man-days
Underground	NIL		
Other (specify)	measuring stratigraphic sections 2990 m.	1: 500	48 man-days

GEOPHYSICAL OR GEOCHEMICAL SURVEYS Yes [ ] No [X] Cost $ NIL

Method _____ Line miles _____

OTHER SURVEYS Yes [X] No [ ] Cost $ 56,691

Grid _____ Topographic Geodectic ground control and location survey photogrammetric mapping

ROAD CONSTRUCTION Yes [X] No [ ] Cost $ 44,540

Length: On Licences 19.2 kilometres Access (off licences) 12.8 kilometres upgrading & maintenance

SURFACE WORK Yes [X] No [ ] Cost $ 13,970

	Length	Licence Number(s)
Trenching	by hand 505 m.	282,287,288,289
Seam tracing	by hand 6000 m.	282, 287, 288, 290
Crosscutting	-	
Other	by hand tracing marker bed 5000 m.	281, 1299, 1300, 1301, 1302

UNDERGROUND WORK Yes [ ] No [X] Cost $ NIL

Test adits: Number _____ Average length _____ Total footage _____

Other workings: Area _____ Total footage _____

DRILLING Yes [X] No [ ] Cost $ 348,912

	Hole Size	Number of Holes	Total Footage
Core: Diamond [X] Wireline [ ]	HQ	11	10,505 ft.-3,183 m.
Rotary: Conventional [ ]			
Reverse circulation [ ]			
Other			

Contractor Tonto Drilling Where core stored CNRL Lab, Fernie, B.C.

LOGGING, SAMPLING, AND TESTING (check) Yes [X] No [ ] Cost $ 180,355

Lithology: Drill samples [ ] Core samples [X] Bulk samples [ ]

Logs: Gamma-Neutron [X] Density [X] Other [X]

Testing: Prox. analysis [X] FSI [X] Washability [X]

Carbonization [ ] Petrographic [ ] Plasticity [ ] Other [ ]

OTHER WORK (specify details) Geotechnical installations, tests, survey Cost $ 60,500

REPORTS:

Reclamation work (Permit No. 54) Detail of work* Seeding and fertilizing drill sites and side roads

Report will be submitted by March 31, 1979 Cost $ 919

OPERATIONS:

Work was supervised by Ted Hannah Position Geologist

Is this person a registered or licensed Professional Engineer in British Columbia? Yes [ ] No [X]

NOTE—Where the licensee intends to perform, during the extended term of his licence, work not set out in the plan of operations filed under section 15 (2) (c), a supplemental plan of operations is to be attached.

* If reclamation work reported in separate report give details of report identification.

VALUATION OF WORK: COST STATEMENT
(Sec. 27, B.C. Reg. 436/75)

ON-PROPERTY COSTS: For period from February 1, 1978 to January 30, 1979

1. OPERATOR'S FEES, SALARIES, AND WAGES:

	Average Number of Employees	Average Rate	Average Number of Days	Amount
Professional and technical	5	$125/man-day	149	$ 93,125
Machine operators and support	NIL			
Miners	NONE			
Other	NIL			

Total operator's costs $ 93,125

2. CONTRACTORS AND CONSULTANTS:

Name	Service	Contract Amount
SCRL - Survey Dept.	Geodetic ground control survey	$ 46,716
(including Subcontractor	Photogrammetric mapping	
~~Northwest Survey)~~	~~Geodetic location survey~~	
Tonto Drilling	Diamond Drilling	$238,500
Drain Brothers Construction	Bulldozer etc. work	$ 41,200
~~Ackles Trucking~~	~~Water Supply (truck)~~	~~$ 48,600~~
ANC Geol. Consultants	Geol. Consultant	$ 13,900
B&K Drilling	Drilling Supervisor	$ 4,500
Jamieson Geol. Consultants	Bulldozer Supervisor	~~$ 2,000~~

TOTAL CONTRACTOR AND CONSULTANT COSTS $395,416

N.A. 3. EQUIPMENT AND INSTRUMENTS USED:

	Owned:	Amount
	Rented:	

Total equipment and instrument rentals $ NIL

4. FIELD CAMP COSTS:

		Amount
Food	1322 man-days; $16 per man-day	$ 21,152
Accommodation	1320 man-days; $18 per man-day	$ 23,760
Fuel		$ 6,350
Other	Miscellaneous(Communication,Power Plant,Trailer,etc)	$ 7,250

Total field camp costs $ 58,512

5. SAMPLING, ANALYSIS, AND TESTING:

Service	Performed by	Amount
Wireline Logging	BPB Industries	$ 30,900
Geotechnical installations,tests	Golder Associates	$ 60,500
Analyses	CNI Lab	$ 15,470

Totals, samplings, analysis, and testing $ 106,870

6. SUPPLIES AND MATERIALS COSTS:

	Amount
Process supplies	
Operating and maintenance supplies	22,100
Office and technical supplies	7,900
Other supplies and materials	

Total, supplies and materials $ 30,000

7. TRANSPORTATION COSTS (Ground transportation details):

Vehicles	Owner	Rental Rate	Amount
four 4x4 truck	Minchuk leasing	$1200/month*	$ 14,600
three trucks	Kiki Trucking	$25/hour,330 hours	$ 8,250

* including repairs

Air support details:

Aircraft Type	Owner	Charter
Helicoptor 206 B	Kenting	$375/hour 42.5 hours $17,475

Total transportation costs $ 40,325

8. RECLAMATION WORK:

Interior Reforestation Co. Ltd. $ 919

9. TRAVEL EXPENDITURES (operator's costs only):

Number of Personnel	Number of Trips	Amount
expenditures in addition to field/camp cost are included as overhead in the $125 per man-day allocation		

Total travel expenditures $ N.A.

Total costs $ 725,167

(Secs. 28 and 29, B.C. Reg. 436/75)

OFF-PROPERTY COSTS: Period from _____ to _____, 19__

	Amount
(a) Logistics and field support	$
(b) Technical and feasibility studies	
(c) Preparation of reports 370 man-days; $125 per man-day	46,250
(d) Supplies and services	
(e) Mobilization and demobilization of equipment	
(f) Travelling expenses (Itemize)	

Total $ 46,250

Supporting Cost Statements Attached

	Amount

Total supporting costs $

SUMMARY

On-property costs	$ 725,167
Off-property costs	$ 46,250
Total costs	$ 771,417

Statement of costs verified by Accounting Devision, Finance & Administration, SCRL

1979-01-30
(Date)

(Signature and position)
Analyst, Administration & Planning
CNRL

234-673-8196

INTER-OFFICE CORRESPONDENCE

Date APRIL 24, 1979

To CROWSNEST RESOURCES LIMITED (CNRL)

From SHELL CANADA RESOURCES LIMITED
SURVEYING SECTION

Subject LOCATION SURVEY
LINE CREEK - SPARWOOD AREA, S.E. BRITISH COLUMBIA
DRILL HOLES:

LC 100	LC 105	LC 110	LC 115
LC 101	LC 106	LC 111	
LC 102	LC 107	LC 112	
LC 103	LC 108	LC 113	
LC 104	LC 109	LC 114	

Two CNI Stations (T6 & T7) on Horseshoe Ridge (STA SCRL 103 & 104 respectively) were found and occupied by Doppler Satellite as part of the photomapping and control network. They were tied by Doppler Satellite to Geodetic Control Station 'Northwest' with 2nd order accuracy.

Station 104 was positioned by closed traverse between stations Northwest and Tornado and held fixed as the datum for the surveying of the above drill locations. Conventional survey methods using 1" theodolite and electronic distance measuring equipment were used to obtain co-ordinates and elevations for these drill locations.

Calculations were done in the U.T.M. system with distances and bearings converted to plane and results were reported to CNRL in tabular form for plotting, a copy of which is enclosed.

The total cost of the work was $44,118.

D.C. Poulsom

BKbp

Attachment:

LINE CREEK DRILL HOLES
REFERENCED TO 117° WEST LONG ZONE 11

DRILL HOLE	NORTHING	EASTINGS	ELEVATION
100	5533533.6	659735.7	1915.6
101	5534465.9	659395.4	2030.6
102	5533405.4	660001.8	1836.0
103	5534049.1	659893.8	1792.3
104	5533519.4	659888.5	1848.4
105	5533811.6	659670.2	1883.9
106	5534649.7	660000.9	1867.7
107	5533972.1	659696.7	1859.7
108	5533758.2	660199.5	1688.5
109	5533925.3	659551.1	1944.0
110	5534405.9	659671.4	1916.1
111	5533655.6	659807.5	1862.5
112	5534509.9	660269.8	1734.2
113	5533560.2	659614.7	1976.7
114	5534275.0	659788.0	1866.7
115	5533998.2	660398.3	1634.2
STA-104(Traverse)	5532740.96	662007.42	2020.8
STA-104(Doppler)	5532740.96	662007.42	2020.8

CROWS NEST RESOURCES LIMITED - EXPLORATION
SHELL CANADA RESOURCES LIMITED - SURVEYING

GROUND CONTROL SURVEY AND PHOTOGRAMMETRIC MAPPING
SOUTHEASTERN BRITISH COLUMBIA

DISTRIBUTION OF AFE Z4670: UNDIVIDED COSTS
TO PROJECTS AND GROUPS OF LICENCES
ON THE BASIS OF HOLDING ACREAGES

*HOLDINGS/PROJECTS	AFE	ACREAGE	%	$ COSTS
NORTH BLOCK=GROUP "NA"	4853A	7,840	8.0	29,440
CENTRAL BLOCK NORTH	4851J	10,264	10.5	38,640
HORESESHOE RIDGE	4851E	6,532	6.7	24,656
LINE CREEK J.V.	4851D	1,854	1.9	6,992
(Central Block Total)		(18,650)	(19.4)	(71,392)
(Group "CA")		(6,088)	(6.2)	(22,816)
(Group "CB")		(8,082)	(8.6)	(31,648)
(Group "CS")		(4,480)	(4.6)	(16,928)
CROWN MOUNTAIN TOTAL	4851Z	6,317	6.5	23,920
(Group #31)		(3,117)	(3.2)	(11,776)
(Group #32)		(3,200)	(3.3)	(12,144)
CORBIN=GROUP #6	4851Q	1,760	1.8	6,629
(Coal Mountain)		(640)	(0.7)	(2,578)
(Tent Mountain)		(1,120)	(1.1)	(4,051)
MORRISSEY FREEHOLD	4851U	43,200	44.1	162,288
LODGEPOLE=GROUP #104	4851S	3,345	3.4	12,512
LILLYBURT	4851R	6,122	6.3	23,184
HARVEY CREEK TOTAL	4851T	7,307	7.5	27,600
(Group #105 Renewal)		2,992	(3.1)	11,408
(Remainder)		4,315	(4.4)	16,192
CABIN CREEK=Group #106	4851V	3,200	3.3	12,144
TOTAL	Z4670	97,741	100.0	368,000
		= 39,556ha		$3.77/acre
				$9.30/ha

*All B.C. Coal Licences except Morrissey Freehold

1979-01-31

F. Martonhegyi
Exploration

D. Poulsom
Surveying

H. Hofer
Finance Analyst

J. J. Crabb
Manager - Exploration

114° 45'

50°00'

CL 278 (L 6749)
CL 277 (L 6748)
CL 1299
CL 279 (L 6750)
CL 280 (L 6751)
CL 281 (L 6752)
CL 1302
CL 284 (L 6754)
CL 283 (L 6753)
CL 282 (L 6753)
CL 1301
CL 285 (L 6756)
CL 286 (L 6757)
CL 287 (L 6758)
CL 1300
CL 304 (L 6789)
CL 289 (L 6760)
CL 288 (L 6759)
CL 290 (L 6761)
CL 291 (L 6762)
CL 293 (L 6766)
CL 368
CL 294 (L 6767)
CL 295 (L 6768)
CL 373
CL 297 (L 6771)
CL 296 (L 6770)
CL 369 (L 6769)
CL 298 (L 6772)
CL 299 (L 6773)
CL 301 (L 6776)
CL 300 (L 6775)
CL 302 (L 6777)
CL 303 (L 6778)
CL 307

CENTRAL BLOCK NORTH PROJECT

GROUP "CA"

CENTRAL BLOCK SHELL-CNRL

LINE CREEK RIDGE PROJECT CNRL-MITSUI JV.

HORSESHOE RIDGE PROJECT

GROUP "CB"

TEEPEE MTN. PROJECT

GROUP "CS"

FRONT RANGES

PROVINCIAL

Gas Pipeline (underground)

C.P.

Elk River

Fording River

Line Creek

Tornado Creek

North Fork Pass

Tornado Pass

Kootenay Land District

Mount Lyne 8500

Mount Erris

Mount Salter 9337

Harriet Lake

Grave Lake

Sheep Mountain

Crows Nest Resources Limited

EXPLORATION

LAND MAP
PROJECT AND GROUP
SUBDIVISIONS
CENTRAL BLOCK
SOUTHEASTERN B.C.

NTS 82G/15
82J/2

KOOTENAY LAND DISTRICT

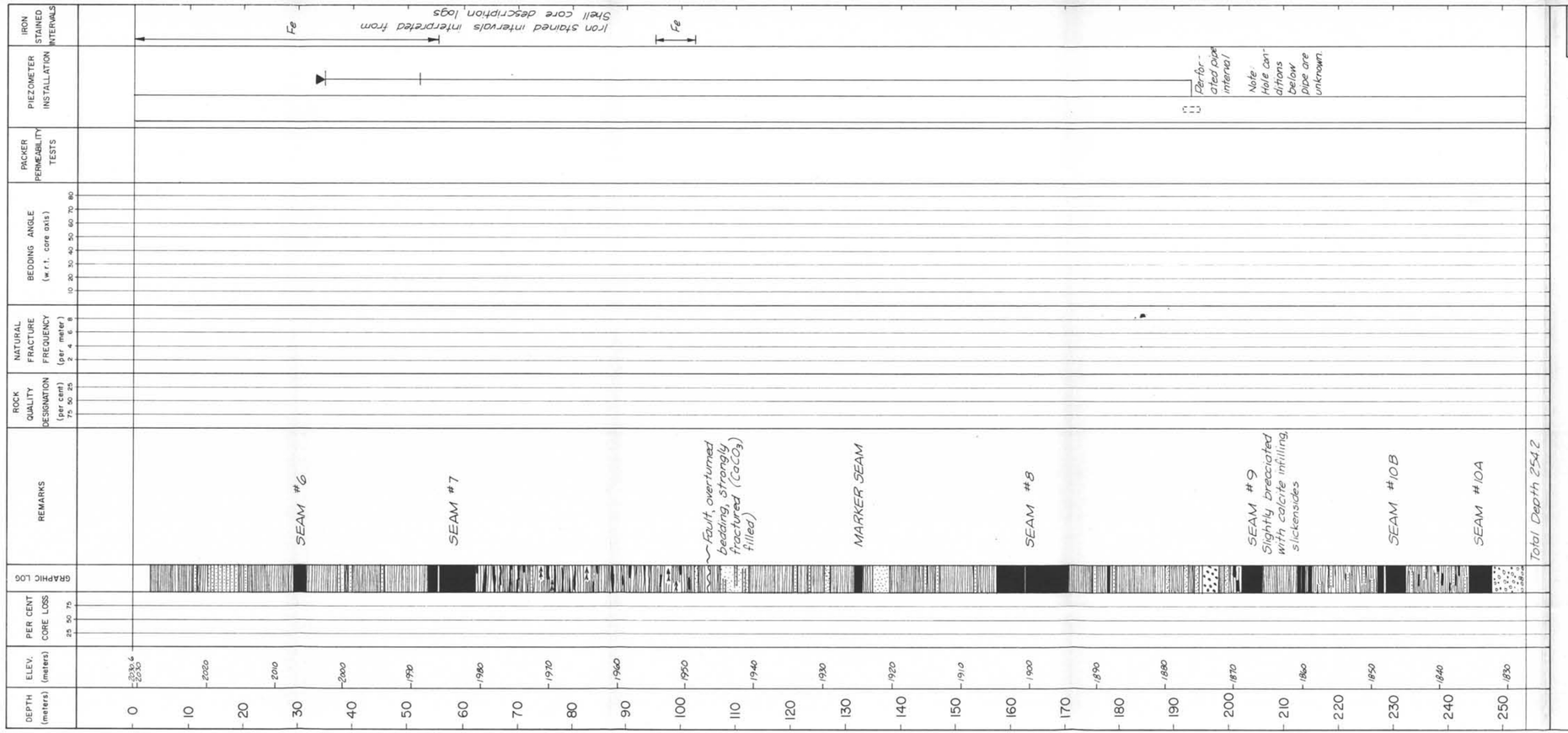
AUTHOR F. Martonhegyi	SCALE 1:50,000	ENCLOSURE No.
DATE	REVISED	DRAWING No.
To Accompany		

419

PR. SHELL - LINE C. (HORSESHOE RIDGE) 78(2)A

COMPOSITE GEOTECHNICAL LOG FOR DRILLHOLE LC - 101

Figure II-1



KEY TO GRAPHIC LOG

- CONGLOMERATE other than coarse
- SANDSTONE coarse grain
- SANDSTONE medium grain
- SANDSTONE fine grain
- SILTSTONE
- SHALE COALY SHALE
- CARBONACEOUS SHALE
- COAL
- COAL FRAGMENTS
- PLANT DEBRIS

KEY TO PIEZOMETER INSTALLATION

- Seal - cement / bentonite grout
- Seal - bentonite balls
- Pea Gravel
- Sand
- Perforated pipe interval

Range of measured water head levels from July 20, 1978 to Oct. 27, 1978

Drillhole interval over which head measured

NOTES

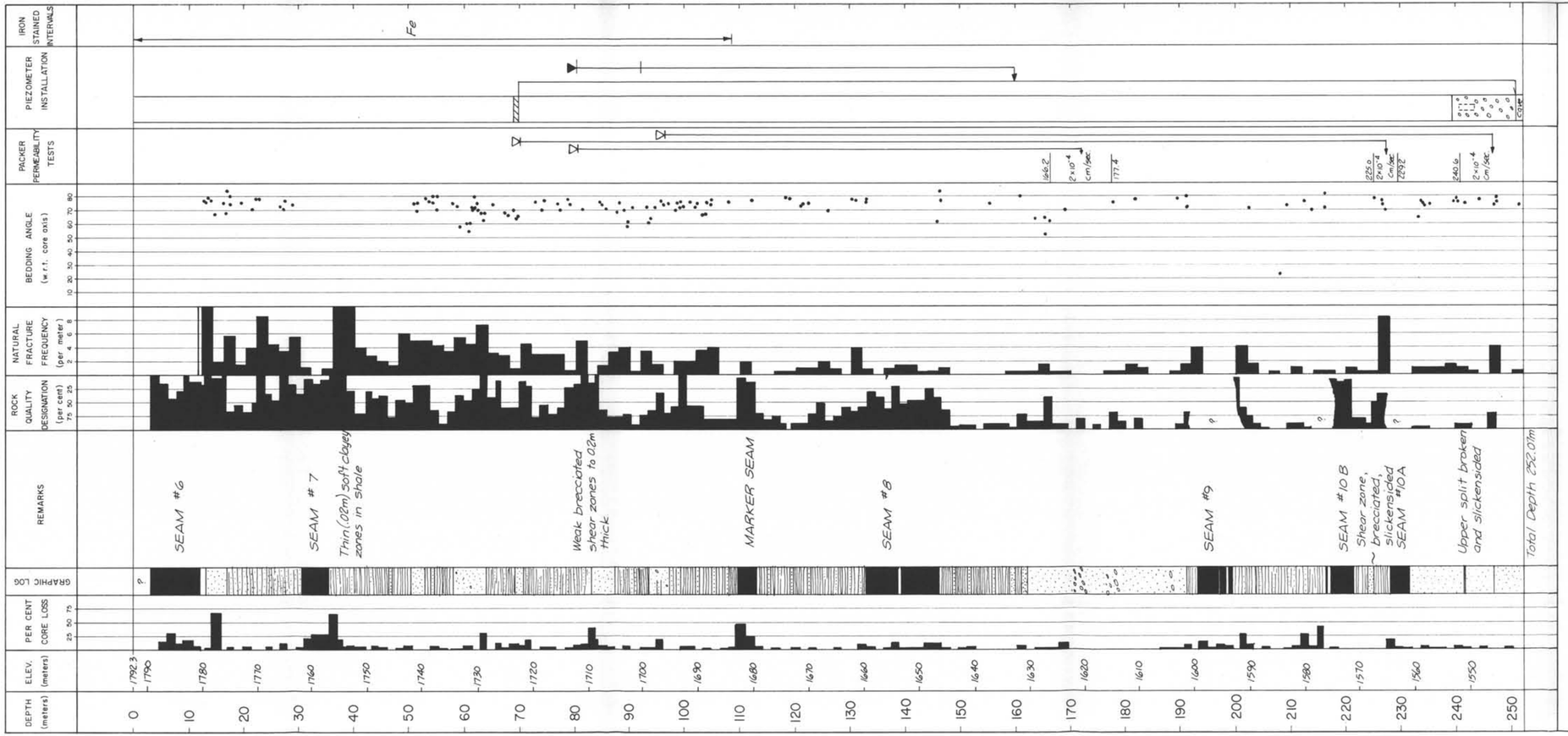
Elevation scale computed for an average hole inclination of -53° from horizontal.

Scale 1:500

Golder Associates

782-1303-D

Pa-SHELL-LINE @ (HORSESHOE R.) 78(2)A.



COMPOSITE GEOTECHNICAL LOG FOR DRILLHOLE LC - 103

Figure II-2

KEY TO GRAPHIC LOG

- CONGLOMERATE other than coarse
- SANDSTONE coarse grain
- SANDSTONE medium grain
- SANDSTONE fine grain
- SILTSTONE
- SHALE COALY SHALE
- CARBONACEOUS SHALE
- COAL
- COAL FRAGMENTS
- PLANT DEBRIS

KEY TO PIEZOMETER INSTALLATION

- Seal - cement / bentonite grout
- Seal - bentonite balls
- Pea Gravel
- Sand
- Perforated pipe interval
- Range of measured water head levels from July 18/78 to Nov. 29/78.
- Drillhole interval over which head measured

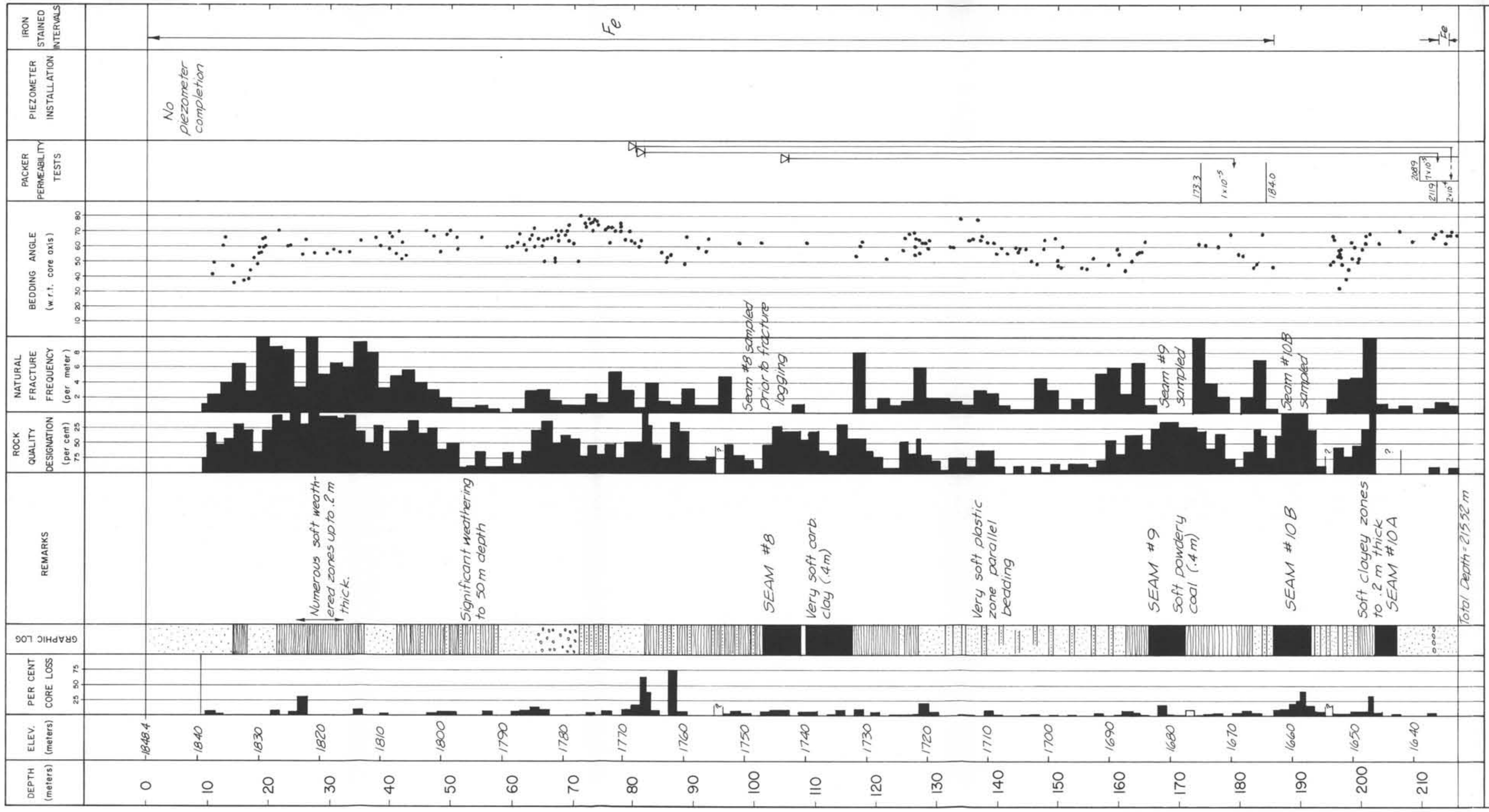
NOTES

Scale 1:500

Golder Associates

782-1303-D

Oil - Shell - Line C. (Horseshoe R.) 78(2)A



COMPOSITE GEOTECHNICAL LOG FOR DRILLHOLE LC - 104

Figure II-3

KEY TO GRAPHIC LOG

- CONGLOMERATE other than coarse
- SANDSTONE coarse grain
- SANDSTONE medium grain
- SANDSTONE fine grain
- SILTSTONE
- SHALE COALY SHALE
- CARBONACEOUS SHALE
- COAL
- COAL FRAGMENTS
- PLANT DEBRIS

KEY TO PIEZOMETER INSTALLATION

- Seal - cement / bentonite grout
- Seal - bentonite balls
- Pea Gravel
- Sand
- Perforated pipe interval
- Range of measured water head levels from N/A to N/A
- Drillhole interval over which head measured

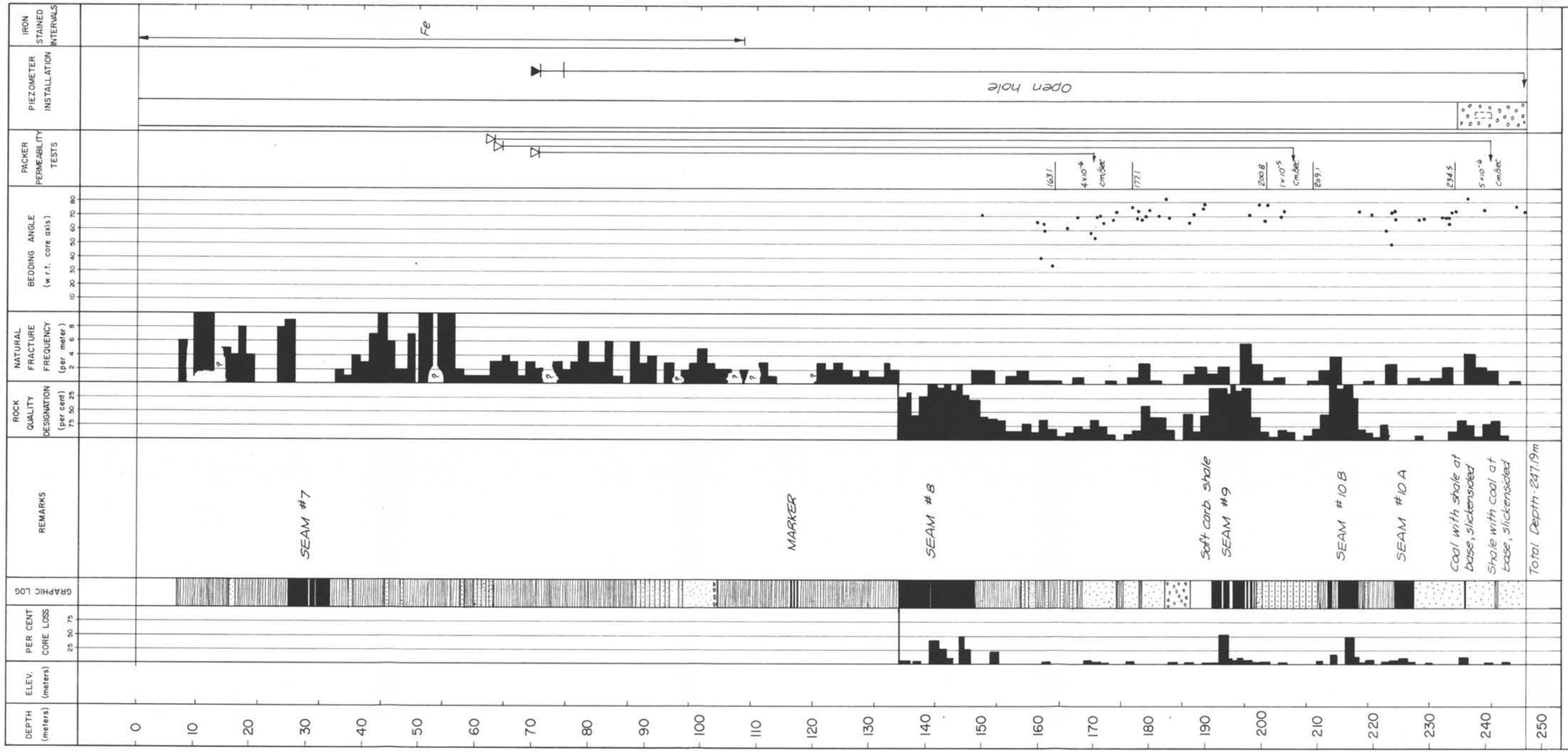
NOTES

Scale 1:500

Golder Associates

782-1303-D

Re- SHELL-LINE C. (HORSESHOE R.) 78(2)A.



COMPOSITE GEOTECHNICAL LOG FOR DRILLHOLE LC - 107

Figure II-4

KEY TO GRAPHIC LOG

- CONGLOMERATE other than coarse
- SANDSTONE coarse grain
- SANDSTONE medium grain
- SANDSTONE fine grain
- SILTSTONE
- SHALE COALY SHALE
- CARBONACEOUS SHALE
- COAL
- COAL FRAGMENTS
- PLANT DEBRIS

KEY TO PIEZOMETER INSTALLATION

- Seal - cement / bentonite grout
- Seal - bentonite balls
- Pea Gravel
- Sand
- Perforated pipe interval
- Range of measured water head levels from July 28/78 to Nov. 28/78.
- Drillhole interval over which head measured

NOTES

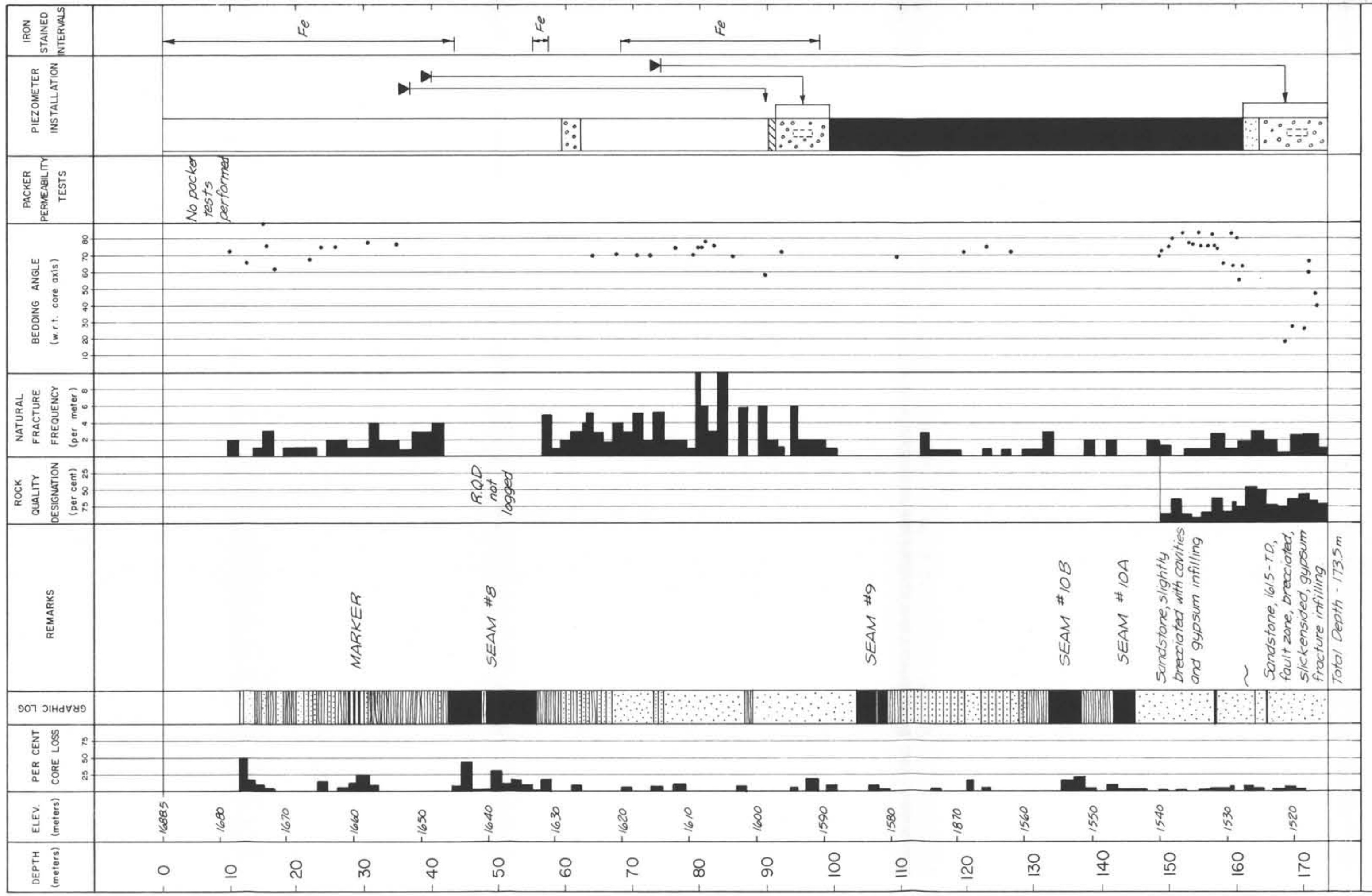
The upper two Packer tests were performed with bentonitic drilling fluid in the hole. The measured permeability values from these tests will be less than actual but indicated piezometric heads should be unaffected.

Scale 1:500

Golder Associates

782-1303-D

PR-SHELL-LINE C (HORSESHOE R) 78(2)A



COMPOSITE GEOTECHNICAL LOG FOR DRILLHOLE LC - 108

Figure II - 5

KEY TO GRAPHIC LOG

- CONGLOMERATE other than coarse
- SANDSTONE coarse grain
- SANDSTONE medium grain
- SANDSTONE fine grain
- SILTSTONE
- SHALE COALY SHALE
- CARBONACEOUS SHALE
- COAL
- COAL FRAGMENTS
- PLANT DEBRIS

KEY TO PIEZOMETER INSTALLATION

- Seal - cement / bentonite grout
- Seal - bentonite balls
- Pea Gravel
- Sand
- Perforated pipe interval

Range of measured water head levels from Aug 22, 1978 to Oct 27, 1978

Drillhole interval over which head measured

NOTES

Scale 1:500

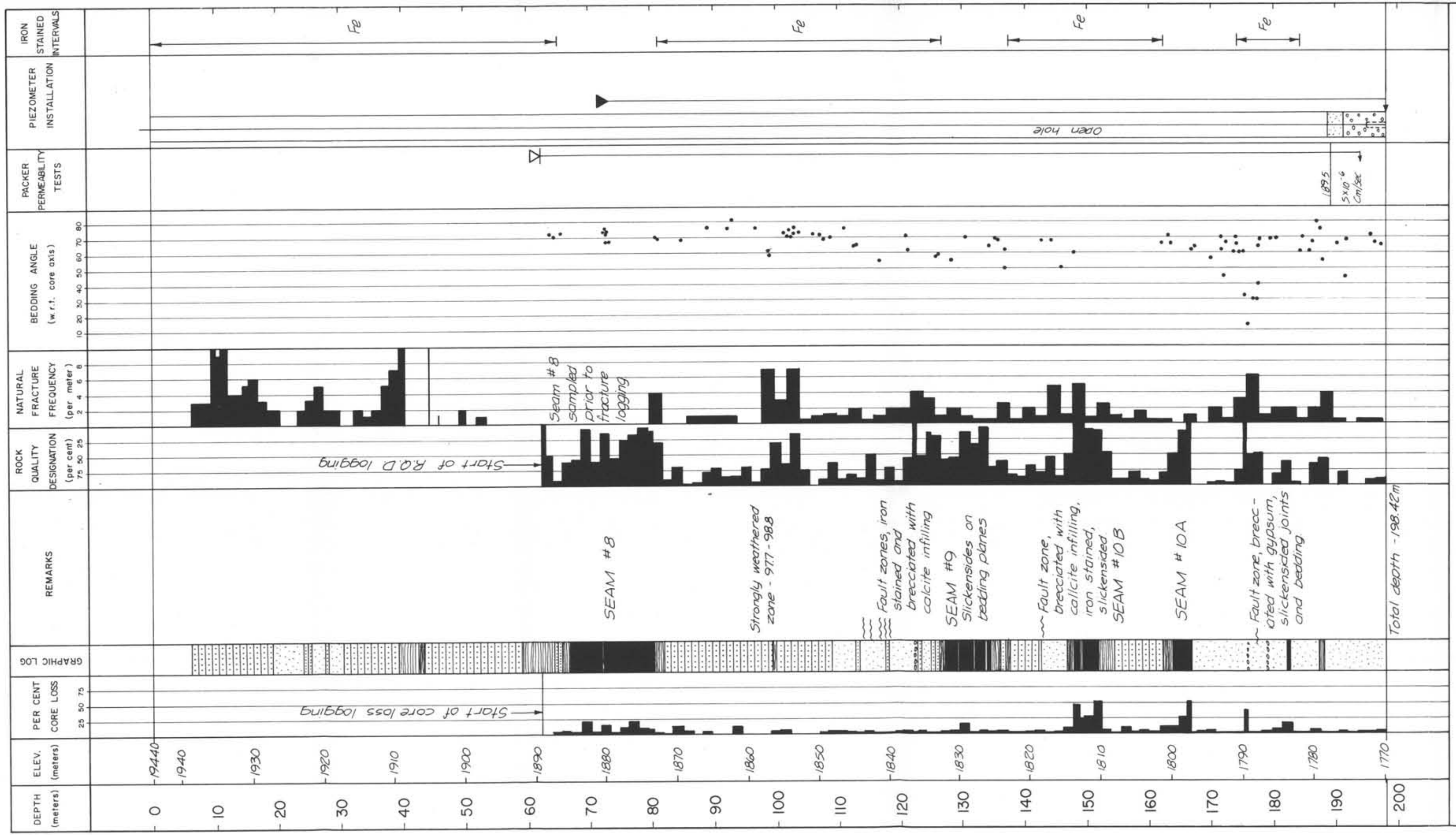
Golder Associates

782-1303-D

Pit - Shell - Line C (Horseshoe R.) 78(2)A

COMPOSITE GEOTECHNICAL LOG FOR DRILLHOLE LC - 109

Figure II - 6



KEY TO GRAPHIC LOG

- CONGLOMERATE other than coarse
- SANDSTONE coarse grain
- SANDSTONE medium grain
- SANDSTONE fine grain
- SILTSTONE
- SHALE COALY SHALE
- CARBONACEOUS SHALE
- COAL
- COAL FRAGMENTS
- PLANT DEBRIS

KEY TO PIEZOMETER INSTALLATION

- Seal - cement / bentonite grout
- Seal - bentonite balls
- Pea Gravel
- Sand
- Perforated pipe interval
- Range of measured water head levels from Aug. '78 to Sept. '78
- Drillhole interval over which head measured

NOTES

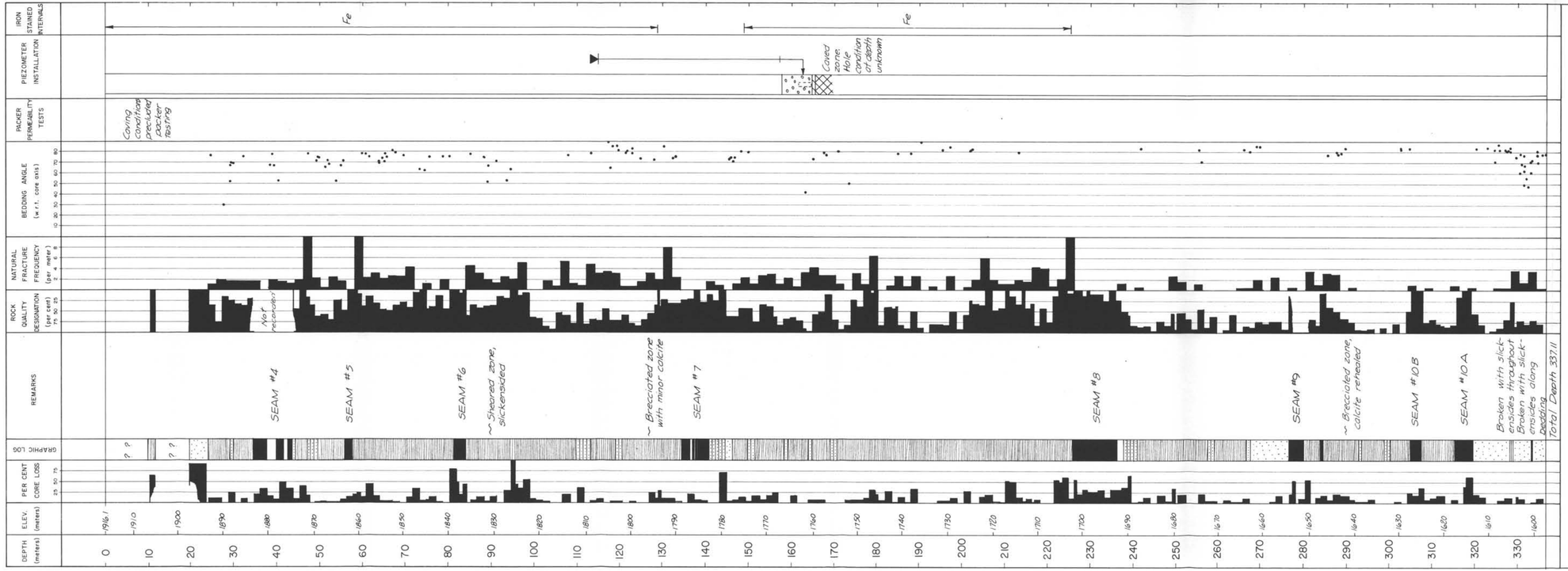
1. Elevation scale computed for an average hole inclination of -62° from horizontal.
2. Sufficient cement/bentonite grout was pumped through the drill rods to form at least a 100 m seal above the lower piezometer. The fact that this grout was totally absorbed by the formation indicates a permeable unit may be present, possibly the faulted zone from 175.5 to 178.1 m in the Basal Sandstone.

Scale 1:500

Golder Associates

782-1303-D

MR. SHELL - LINE 2. (HARLESHAW R.) 78(2)A.



COMPOSITE GEOTECHNICAL LOG
FOR DRILLHOLE L.C - 110

Figure II-7

KEY TO GRAPHIC LOG

- CONGLOMERATE other than coarse
- SANDSTONE coarse grain
- SANDSTONE medium grain
- SANDSTONE fine grain
- SILTSTONE
- SHALE
- COALY SHALE
- CARBONACEOUS SHALE
- COAL
- COAL FRAGMENTS
- PLANT DEBRIS

KEY TO PIEZOMETER INSTALLATION

- Seal - cement / bentonite grout
- Seal - bentonite balls
- Pea Gravel
- Sand
- Perforated pipe interval
- Range of measured water head levels from Aug. 22/78 to Oct. 22/78.
- Drillhole interval over which head measured

NOTES

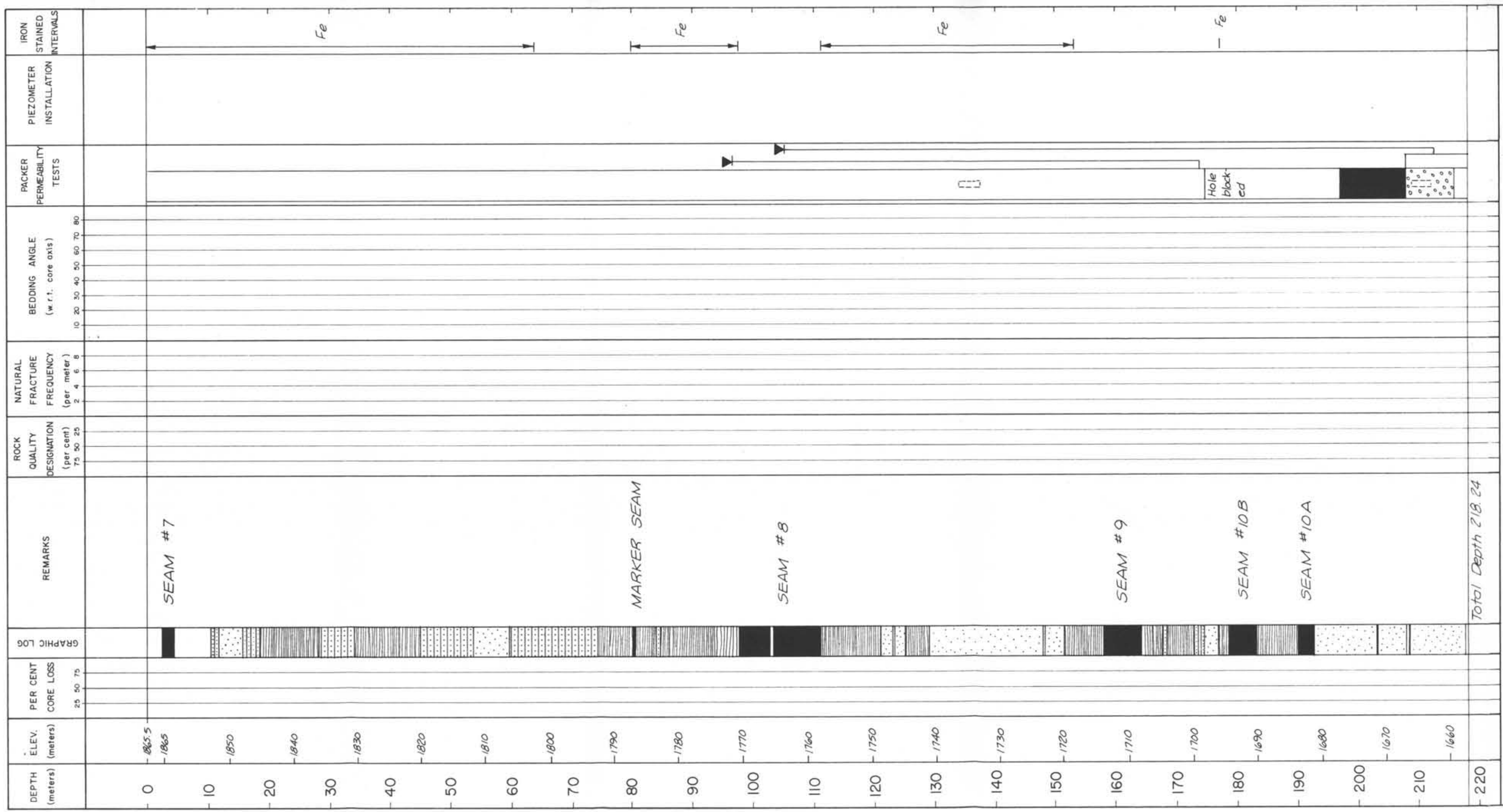
Elevation scale calculated for an average hole inclination - 70° from horizontal.

Scale 1:500

Golder Associates

782-1303-0

PR. SHELL - LINE 2 (HORSESHOE R.) 71(2)A.



COMPOSITE GEOTECHNICAL LOG FOR DRILLHOLE L.C. - III

Figure II-8

KEY TO GRAPHIC LOG

- CONGLOMERATE other than coarse
- SANDSTONE coarse grain
- SANDSTONE medium grain
- SANDSTONE fine grain
- SILTSTONE
- SHALE COALY SHALE
- CARBONACEOUS SHALE
- COAL
- COAL FRAGMENTS
- PLANT DEBRIS

KEY TO PIEZOMETER INSTALLATION

- Seal - cement / bentonite grout
- Seal - bentonite balls
- Pea Gravel
- Sand
- Perforated pipe interval
- Range of measured water head levels from _____ to _____
- Drillhole interval over which head measured

NOTES

Scale 1:500

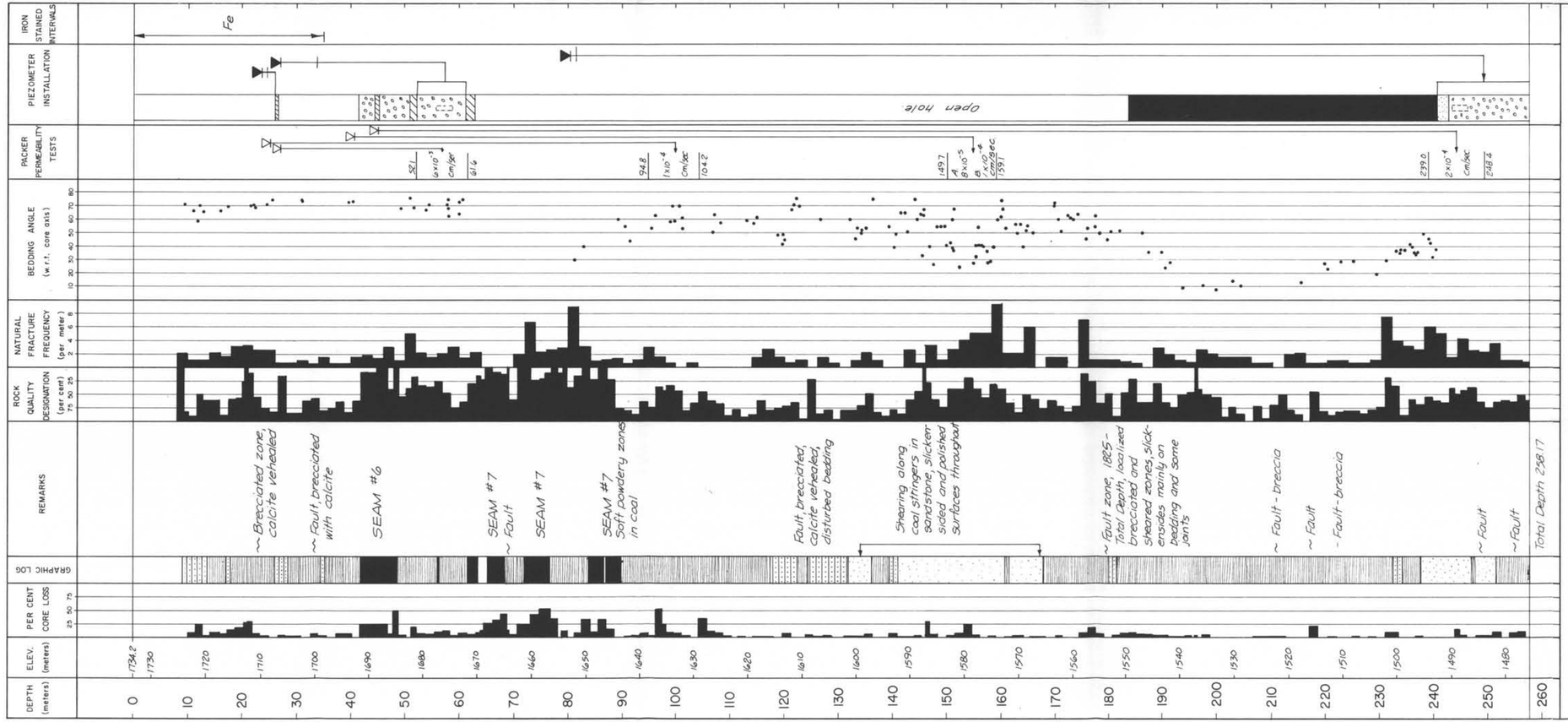
Golder Associates

782-1303-D

PR - SHELL - LINE 6 (HORSESHOE R.) 7012)A.

COMPOSITE GEOTECHNICAL LOG FOR DRILLHOLE LC - 112

Figure II - 9



KEY TO GRAPHIC LOG

- CONGLOMERATE other than coarse
- SANDSTONE coarse grain
- SANDSTONE medium grain
- SANDSTONE fine grain
- SILTSTONE
- SHALE COALY SHALE
- CARBONACEOUS SHALE
- COAL
- COAL FRAGMENTS
- PLANT DEBRIS

KEY TO PIEZOMETER INSTALLATION

- Seal - cement / bentonite grout
- Seal - bentonite balls
- Pea Gravel
- Sand
- Perforated pipe interval
- Range of measured water head levels from Sept. 5/78 to Nov. 28/78.
- Drillhole interval over which head measured

NOTES

Scale 1:500

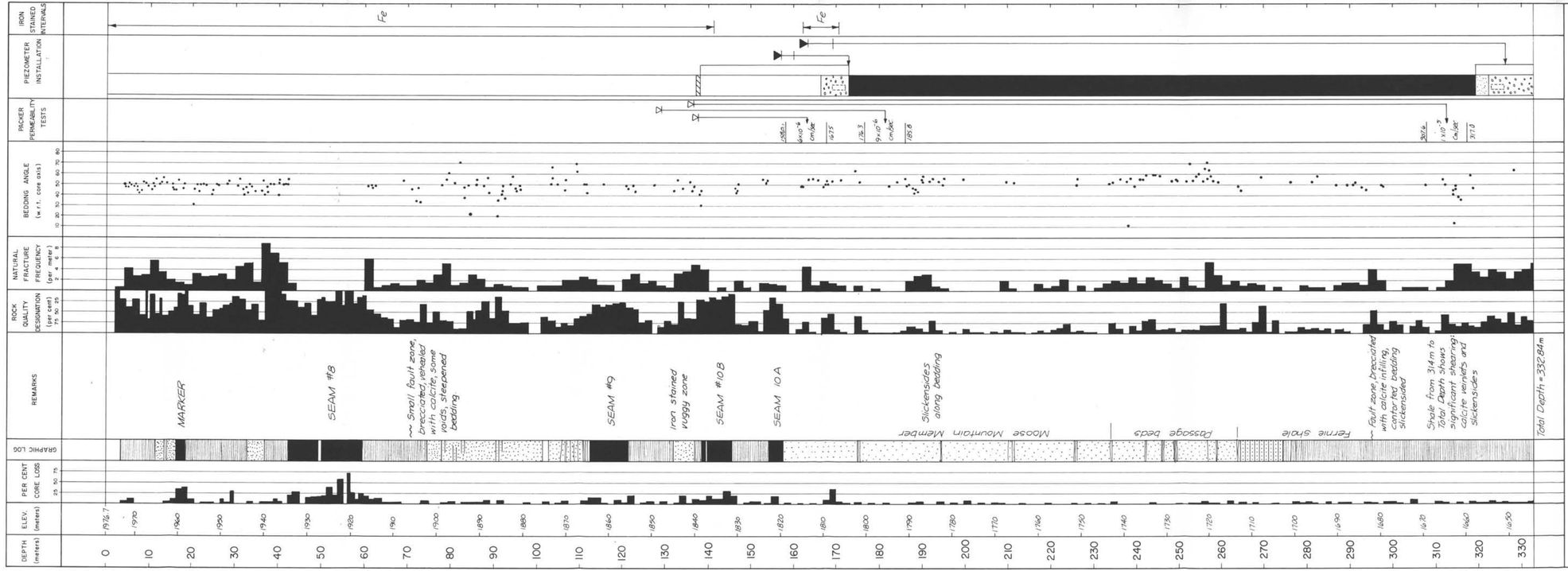
Golder Associates

782-1303-D

PR. SHELL - LINE C. (HORSESHOE R.) 78 C/1 A

COMPOSITE GEOTECHNICAL LOG FOR DRILLHOLE LC - 113

Figure II - 10



KEY TO GRAPHIC LOG

- CONGLOMERATE other than coarse
- SANDSTONE coarse grain
- SANDSTONE medium grain
- SANDSTONE fine grain
- SILTSTONE
- SHALE COALY SHALE
- CARBONACEOUS SHALE
- COAL
- COAL FRAGMENTS
- PLANT DEBRIS

KEY TO PIEZOMETER INSTALLATION

- Seal - cement / bentonite grout
- Seal - bentonite balls
- Pea Gravel
- Sand
- Perforated pipe interval
- Range of measured water head levels from Sept. 5/78 to Oct. 27/78.
- Drillhole interval over which head measured

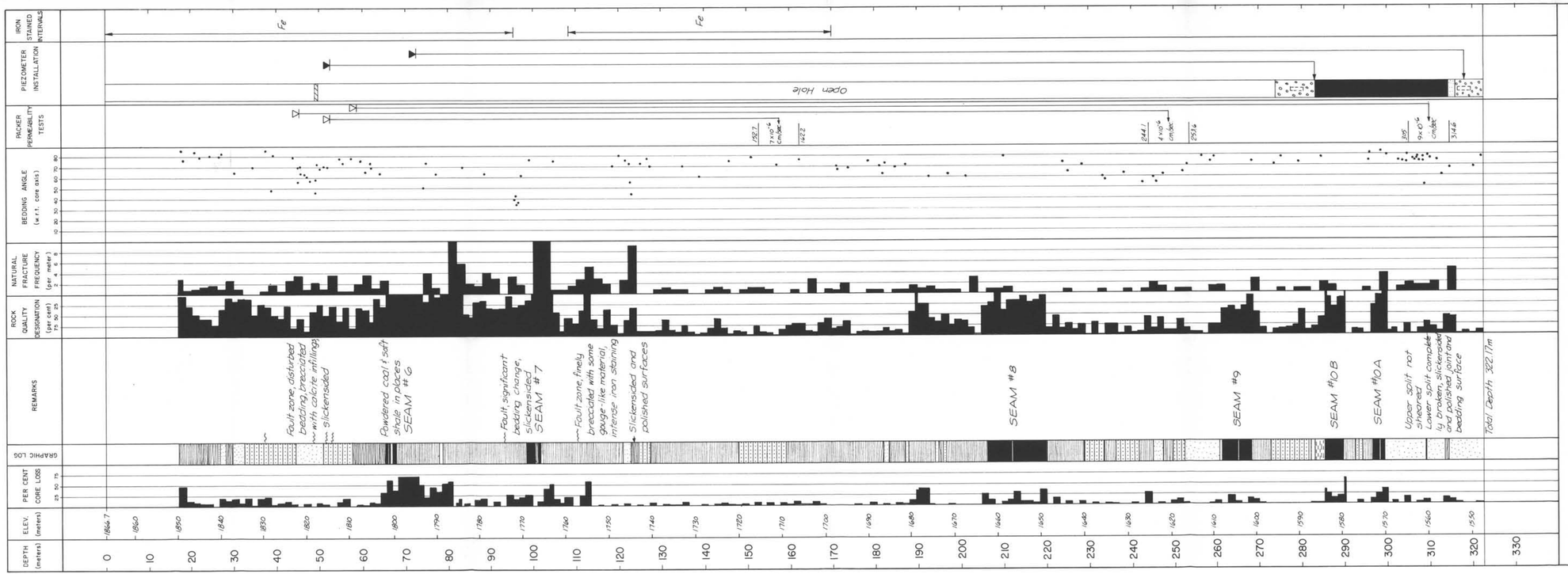
NOTES

Scale 1:500

Golder Associates

782-1303-D

RE: SHELL - LINE C. (HORSESHOE (E) 72 (2) A



COMPOSITE GEOTECHNICAL LOG
FOR DRILLHOLE LC - 114

Figure II-11

KEY TO GRAPHIC LOG

- CONGLOMERATE other than coarse
- SANDSTONE coarse grain
- SANDSTONE medium grain
- SANDSTONE fine grain
- SILTSTONE
- SHALE COALY SHALE
- CARBONACEOUS SHALE
- COAL
- COAL FRAGMENTS
- PLANT DEBRIS

KEY TO PIEZOMETER INSTALLATION

- Seal - cement / bentonite grout
- Seal - bentonite balls
- Pea Gravel
- Sand
- Perforated pipe interval
- Range of measured water head levels from Sept. 20/78 to Oct. 27/78.
- Drillhole interval over which head measured

NOTES

Elevation scale computed for an average hole inclination of -81° from horizontal.

Scale 1:500

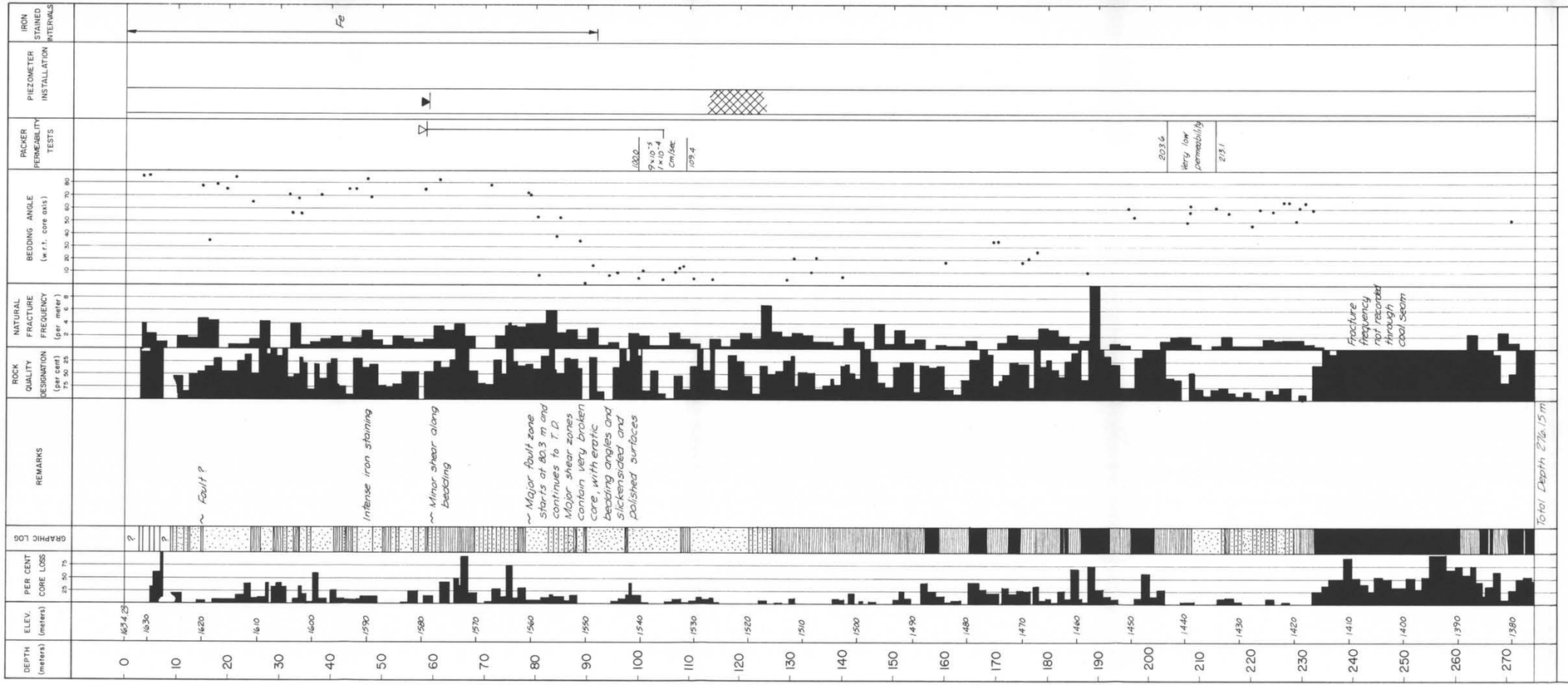
Golder Associates

782-1303-D

PR - SHELL - LINE 6 (HORSESHOE #2) 78(2)4

COMPOSITE GEOTECHNICAL LOG FOR DRILLHOLE LC - 115

Figure II - 12



KEY TO GRAPHIC LOG

- CONGLOMERATE other than coarse
- SANDSTONE coarse grain
- SANDSTONE medium grain
- SANDSTONE fine grain
- SILTSTONE
- SHALE
- COALY SHALE
- CARBONACEOUS SHALE
- COAL
- COAL FRAGMENTS
- PLANT DEBRIS

KEY TO PIEZOMETER INSTALLATION

- Seal - cement / bentonite grout
- Seal - bentonite balls
- Pea Gravel
- Sand
- Perforated pipe interval
- Range of measured water head levels from Sept 23, 1978 to N/A
- Drillhole interval over which head measured

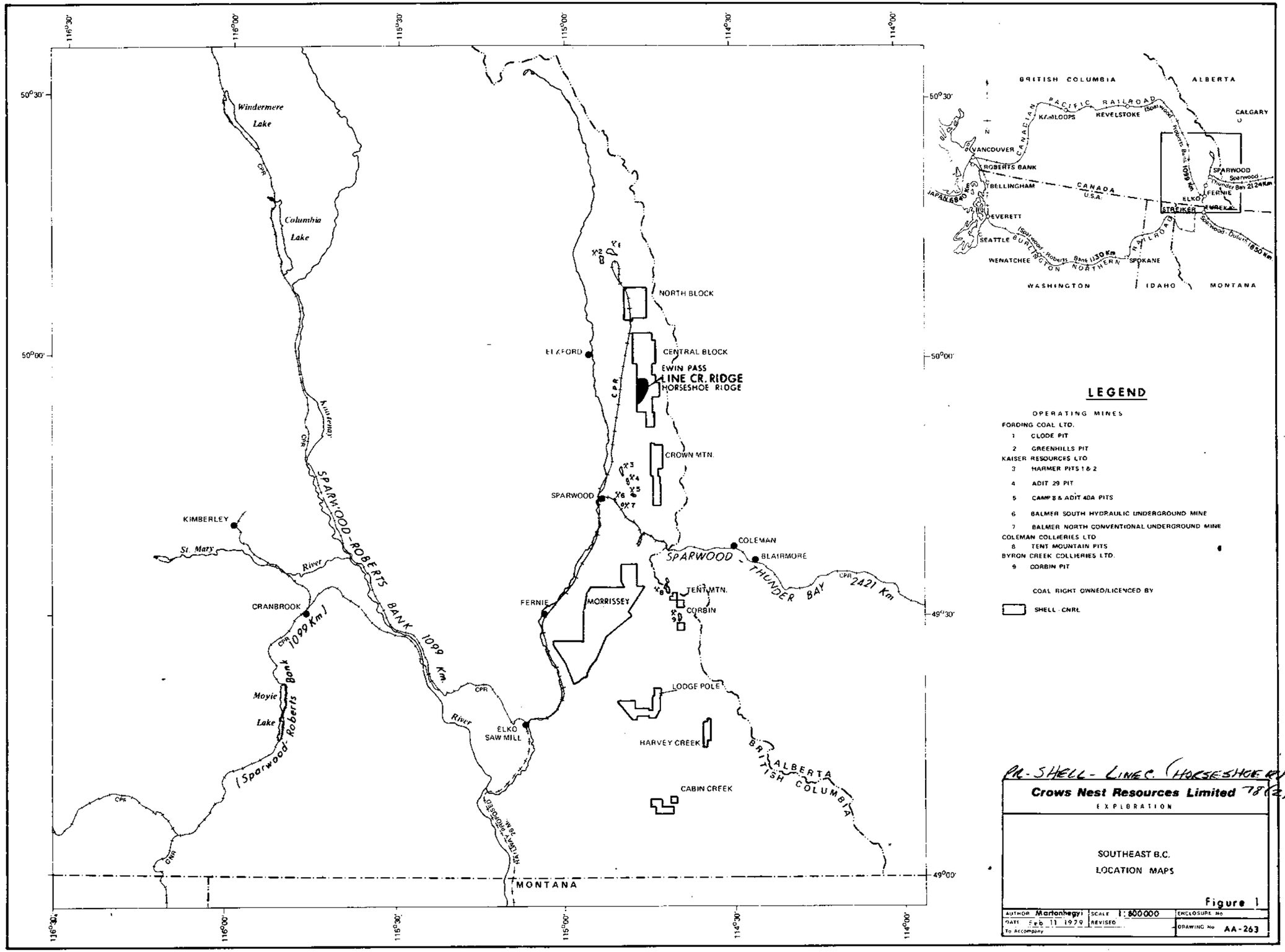
NOTES

1. Elevation scale computed for an average hole inclination of -70° from horizontal.
2. Caving hole conditions precluded more extensive packer testing or piezometer installation.

Scale 1:500

Golder Associates

782-1303-D



LEGEND

OPERATING MINES

FORDING COAL LTD.
1 CLODE PIT
2 GREENHILLS PIT

KAISER RESOURCES LTD
3 HARMER PITS 1 & 2
4 ADIT 29 PIT
5 CAMP 8 & ADIT 40A PITS
6 BALMER SOUTH HYDRAULIC UNDERGROUND MINE
7 BALMER NORTH CONVENTIONAL UNDERGROUND MINE

COLEMAN COLLIERIES LTD
8 TENT MOUNTAIN PITS

BYRON CREEK COLLIERIES LTD.
9 CORBIN PIT

COAL RIGHT OWNED/LICENCED BY

SHELL - CNRL

PR - SHELL - LINE C. (HORSESHOE)

Crows Nest Resources Limited 78(2)A

EXPLORATION

SOUTHEAST B.C.
LOCATION MAPS

Figure 1

AUTHOR Martonhegyi	SCALE 1:800000	ENCLOSURE No
DATE Feb 11 1979	REVISED	
To Accompany		DRAWING No AA-263

PR-SHELL-LINE C. (HORSESHOE R.) 78/23A

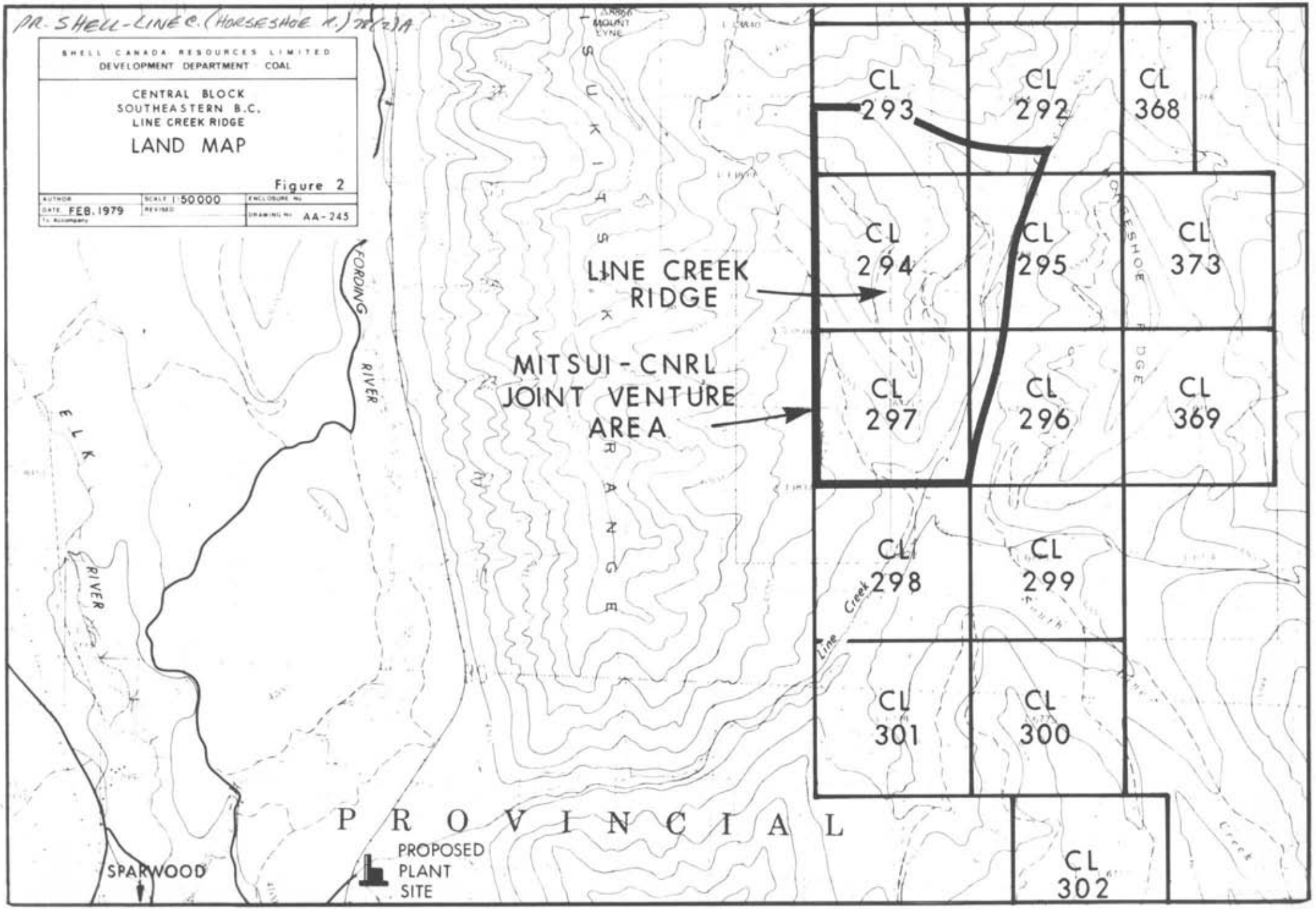
SHELL CANADA RESOURCES LIMITED
DEVELOPMENT DEPARTMENT COAL

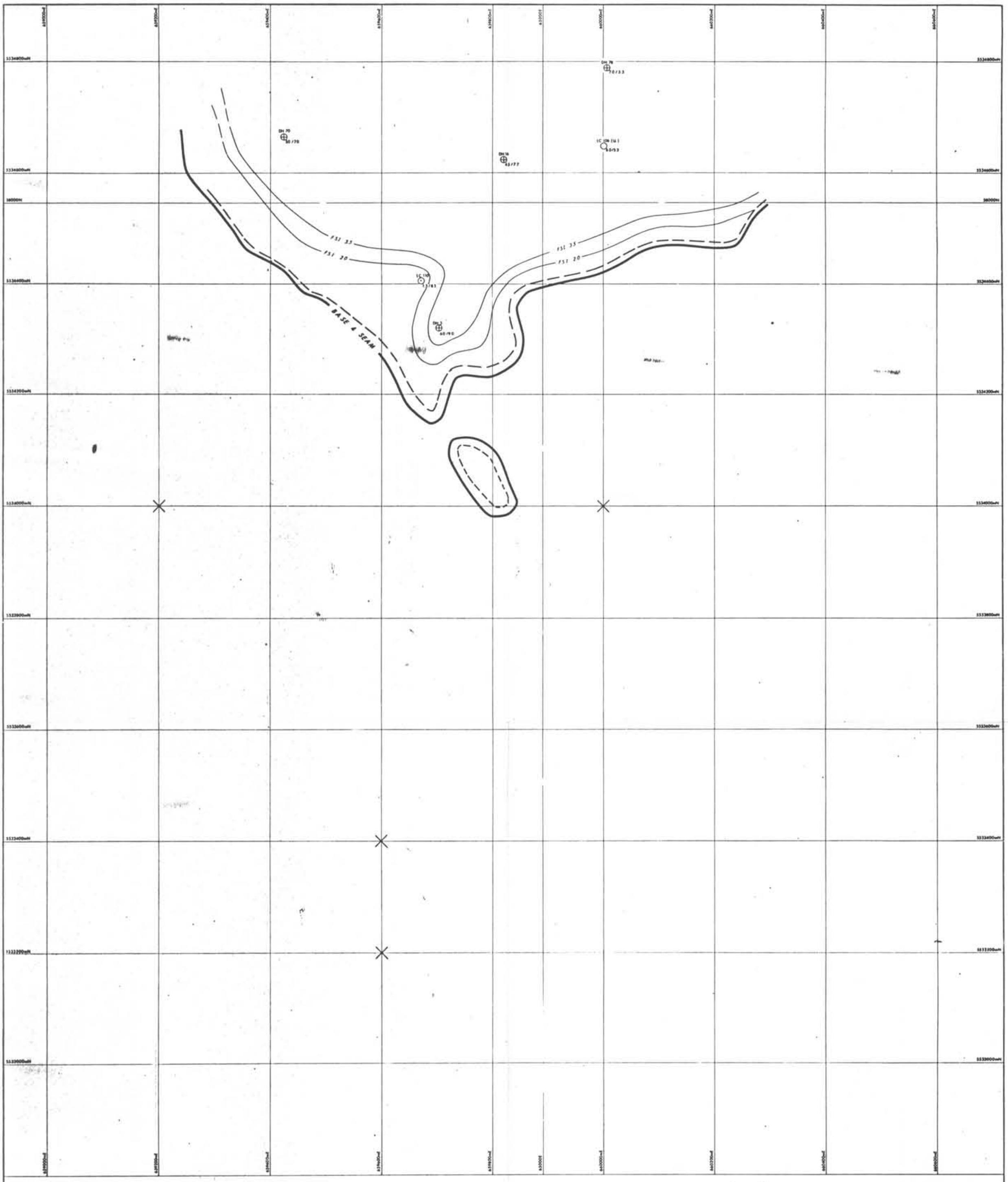
CENTRAL BLOCK
SOUTHEASTERN B.C.
LINE CREEK RIDGE

LAND MAP

Figure 2

AUTHOR	SCALE 1:50000	ENCLOSURE No.
DATE FEB. 1979	REVISED	DRAWING No. AA-245
To Accompany		





419

78(2)A.

PR-SHELL-LINE C. (HORSESHOE R.)

LEGEND

- ROTARY HOLE
- CORE HOLE
- ADIT ENTRANCE
- ADIT SAMPLE POINT
- 2.0/62 F.S.I. / ASH

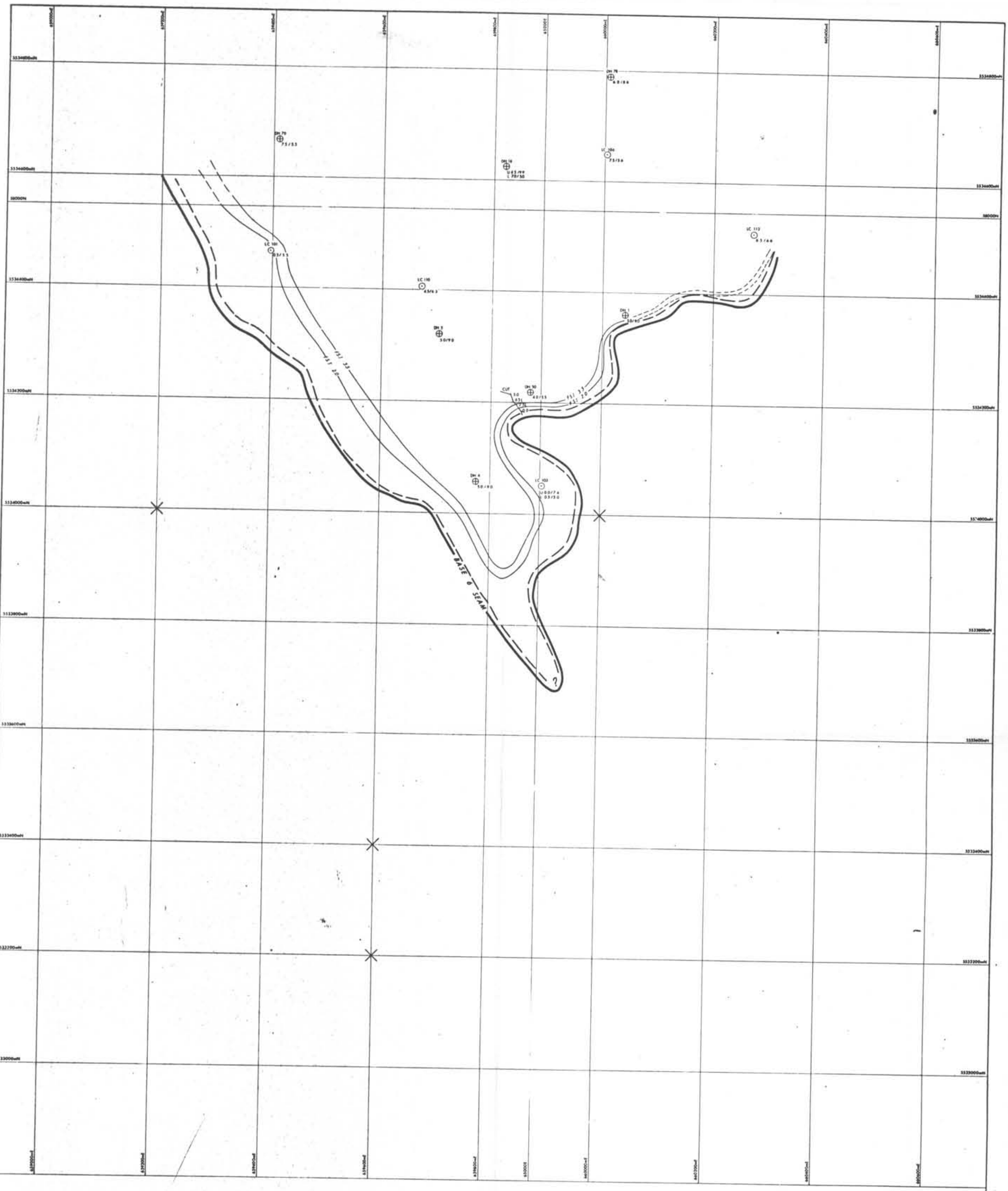
Crows Nest Resources Limited
EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

ISO - F.S.I. MAP
4 SEAM

Figure 8a

AUTHOR T.HANNAM & T.COLE	SCALE 1:5000	ENCLOSURE No.
DATE DEC 1978	REVISED	DRAWING No. HH-19
To Accompany		



LEGEND

- ⊕ ROTARY HOLE
- ⊙ CORE HOLE
- ADIT ENTRANCE
- × ADIT SAMPLE POINT
- F.S.I. / AEH

419

T6(2)A

PR-SHELL-LINES (HORSESHOE 12)

Crows Nest Resources Limited

EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

ISO - F.S.I. MAP
6 SEAM

Figure 8b

AUTHOR T HANNAH & T COLE	SCALE 1:5000	ENCLOSURE No
DATE DEC. 1978	REVISED	DRAWING No: HH - 19a
To Accompany		

DH 79
8.3/7.6
DH 70
7.5/6.6
LC 106
7.5/9.1
DH 16
7.0/6.7
LC 101
7.0/6.7
LC 112
5.5/9.0
LC 110
6.0/9.2
DH 14
DH 1
5.0/9.0
DH 5
5.0/9.0
LC 114
3.3/8.8
DH 19
DH 50
6.0/7.5
FSI 3.5
FSI 3.0
DH 8
5.5/7.7
DH 4
5.0/9.0
LC 103
5.0/9.7
LC 107
7.0/10.3
CUT
DH 3
5.5/9.0
BASE 7 SEAM
LC 111
7.0/8.3

LEGEND

- ROTARY HOLE
- CORE HOLE
- ADIT ENTRANCE
- ADIT SAMPLE POINT

3.3/9.2 F.S.I. / ASH

419

72(2)A.

MR. SHELL - LINE C. (HORSESHOE R.)

Crows Nest Resources Limited

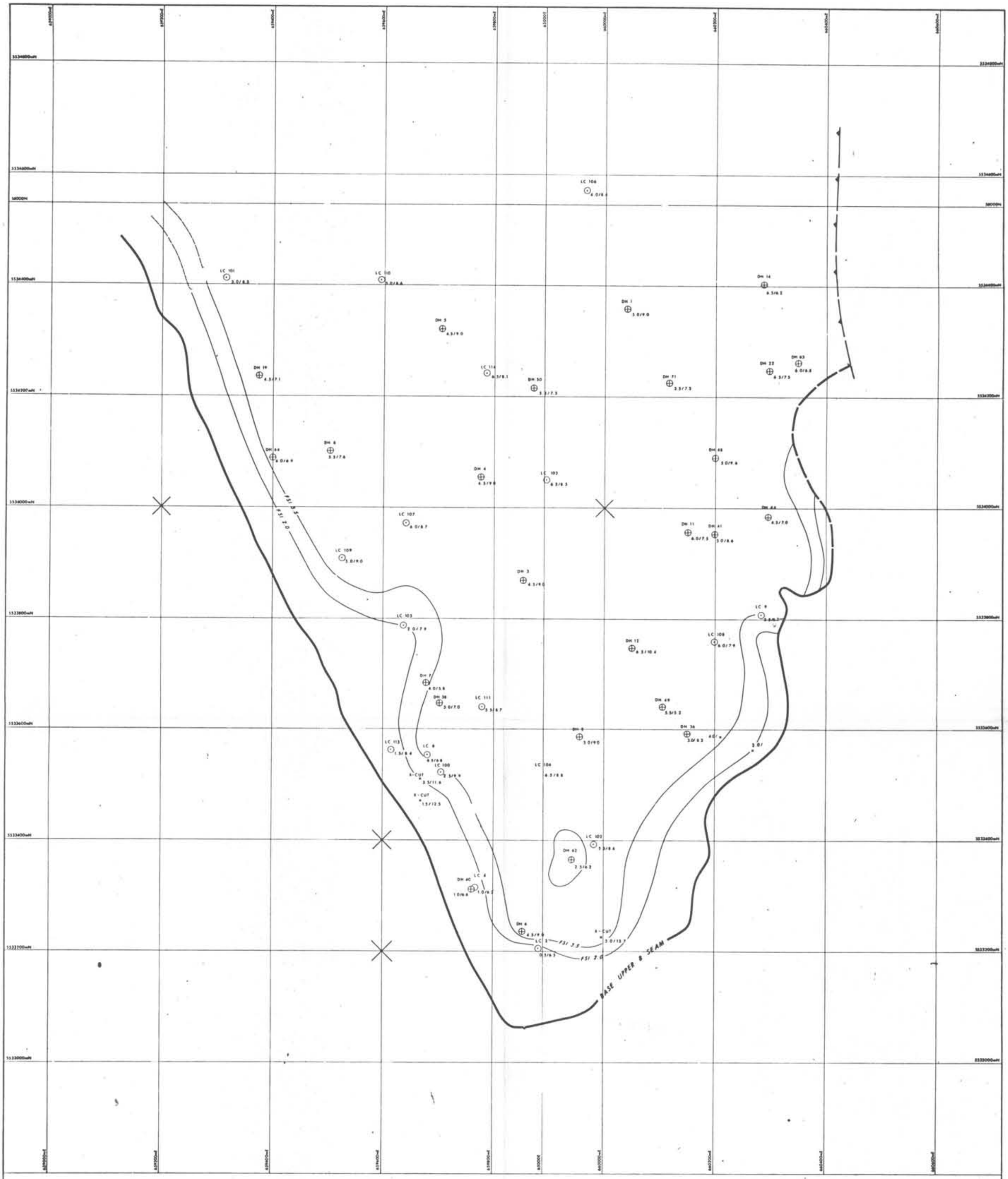
EXPLORATION

LINE CREEK AREA
SOUTHEASTERN B.C.

ISO - F.S.I. MAP
7 SEAM

Figure 8c

AUTHOR T. HANNAH & T. COLE	SCALE 1:5000	ENCLOSURE No.
DATE DEC 1978	REVISED	DRAWING No. HH - 19b
To Accompany		



LEGEND

- ⊕ ROTARY HOLE - COMPOSITE DATA
- ⊙ CORE HOLE
- —< ADIT ENTRANCE
- x ADIT SAMPLE POINT
- 3.5/6.3 F.S.I. / ASH

Crows Nest Resources Limited
EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

ISO - FSI MAP
8 UPPER SEAM

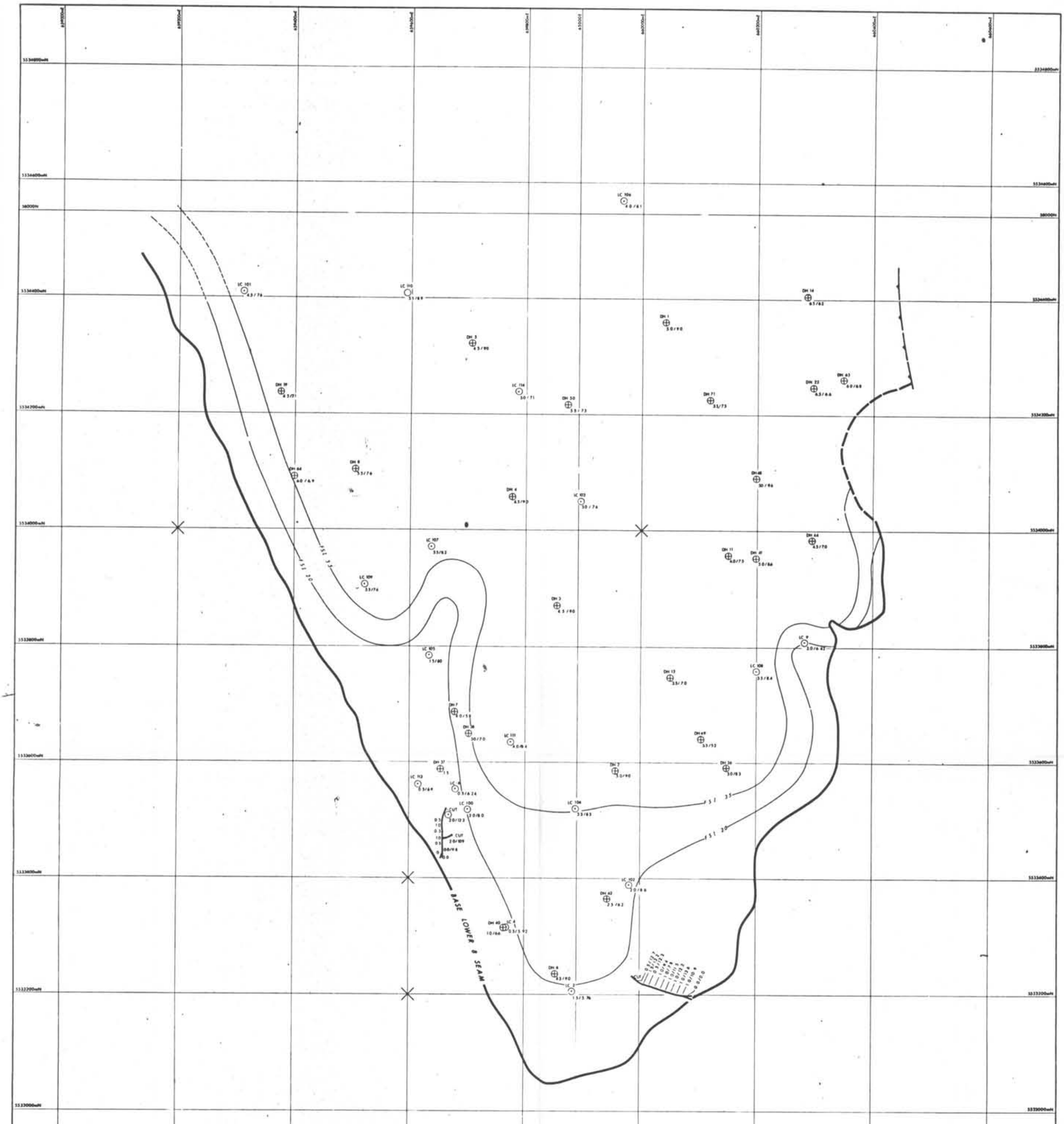
Figure 8d

AUTHOR T.HANNAH & T.COLE	SCALE 1:5000	ENCLOSURE No.
DATE DEC. 1978	REVISED	DRAWING No. HH-19 c
To Accompany		

419

78(2)A.
PR-SHELL-LINE C. (HORSESHOE R.)

"NEW GRID" TO BE USED FOR PLOTTING



419

78(2)A

PR-SHELL-LINEC (HORSESHOE R.)

Crows Nest Resources Limited

EXPLORATION

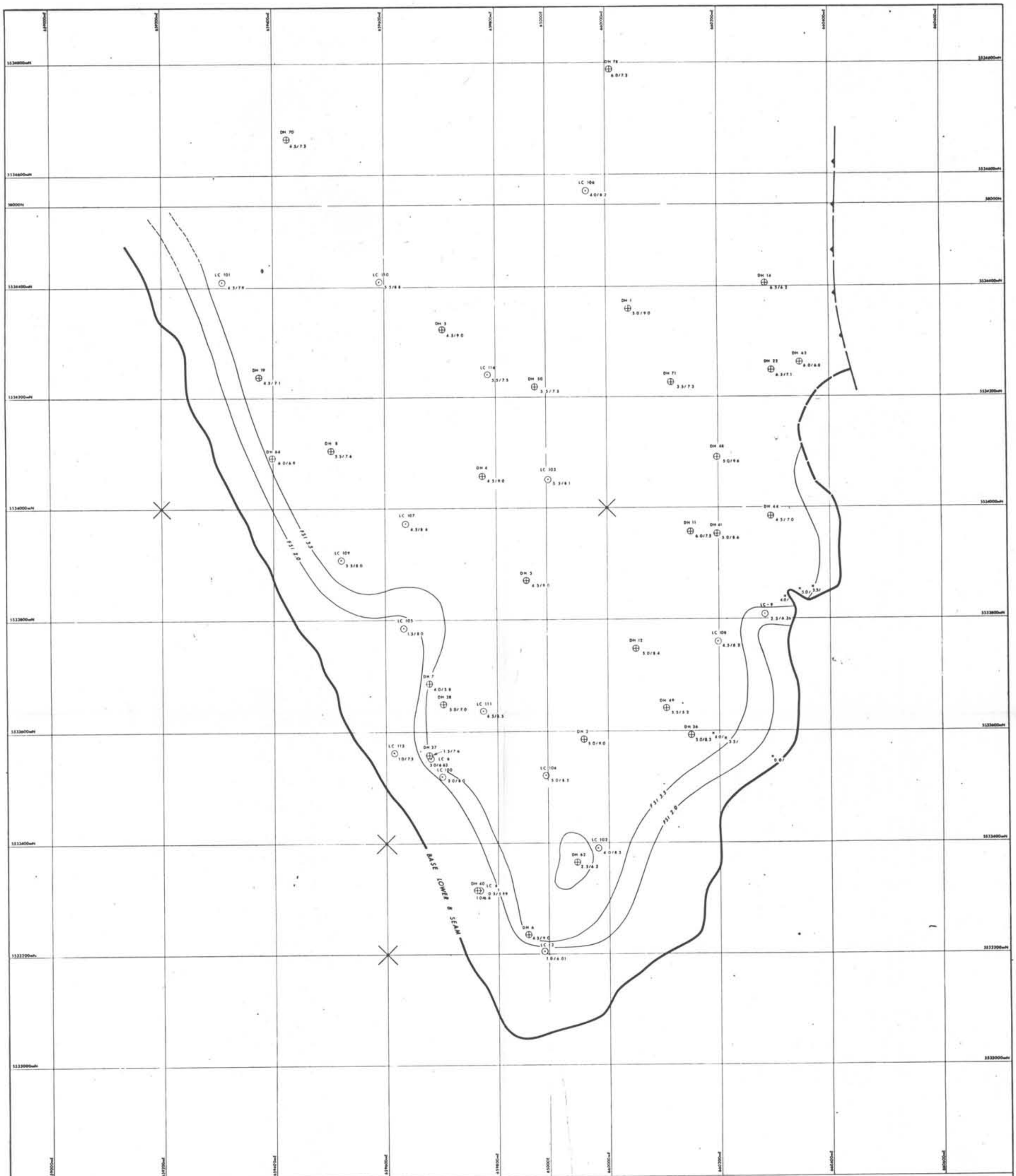
LINE CREEK RIDGE
SOUTHEASTERN B.C.

ISO - F.S.I. MAP
B LOWER SEAM

Figure 8e

AUTHOR T. HANNAH & T. COLE	SCALE 1:5000	ENCLOSURE No.
DATE DEC. 1978	REVISED	DRAWING No. HH-19d
To Accompany		

NEW G.R.'S TO BE DATA FOR FUTURE



LEGEND

- ⊕ ROTARY HOLE
- ⊙ CORE HOLE
- ADIT ENTRANCE
- x ADIT SAMPLE POINT
- 2.5/6.2 F.S.I. / ASH

Crows Nest Resources Limited
EXPLORATION

LINE CREEK POOL
SOUTHEASTERN B.C.

ISO-F.S.I. COMPOSITE
8 SEAM

Figure 81

AUTHOR T.HANNAH&T.COLE	SCALE 1:5000	ENCLOSURE No
DATE DEC. 1972	REVISED	DRAWING No HH-19e
To Accompany		

419

71(2)A.

PR-SHELL-LINE C. (HORSESHOE)

'NEW GRID' TO BE USED FOR FUTURE

BASE 9 SEAM

LEGEND

- ⊕ ROTARY HOLE
- ⊙ CORE HOLE
- ADIT ENTRANCE
- × ADIT SAMPLE POINT
- 2.5/63 F.S.I. / ASH

419

PR-SHELL-LINE C. (HORSESHOE K.) 78(2)A.

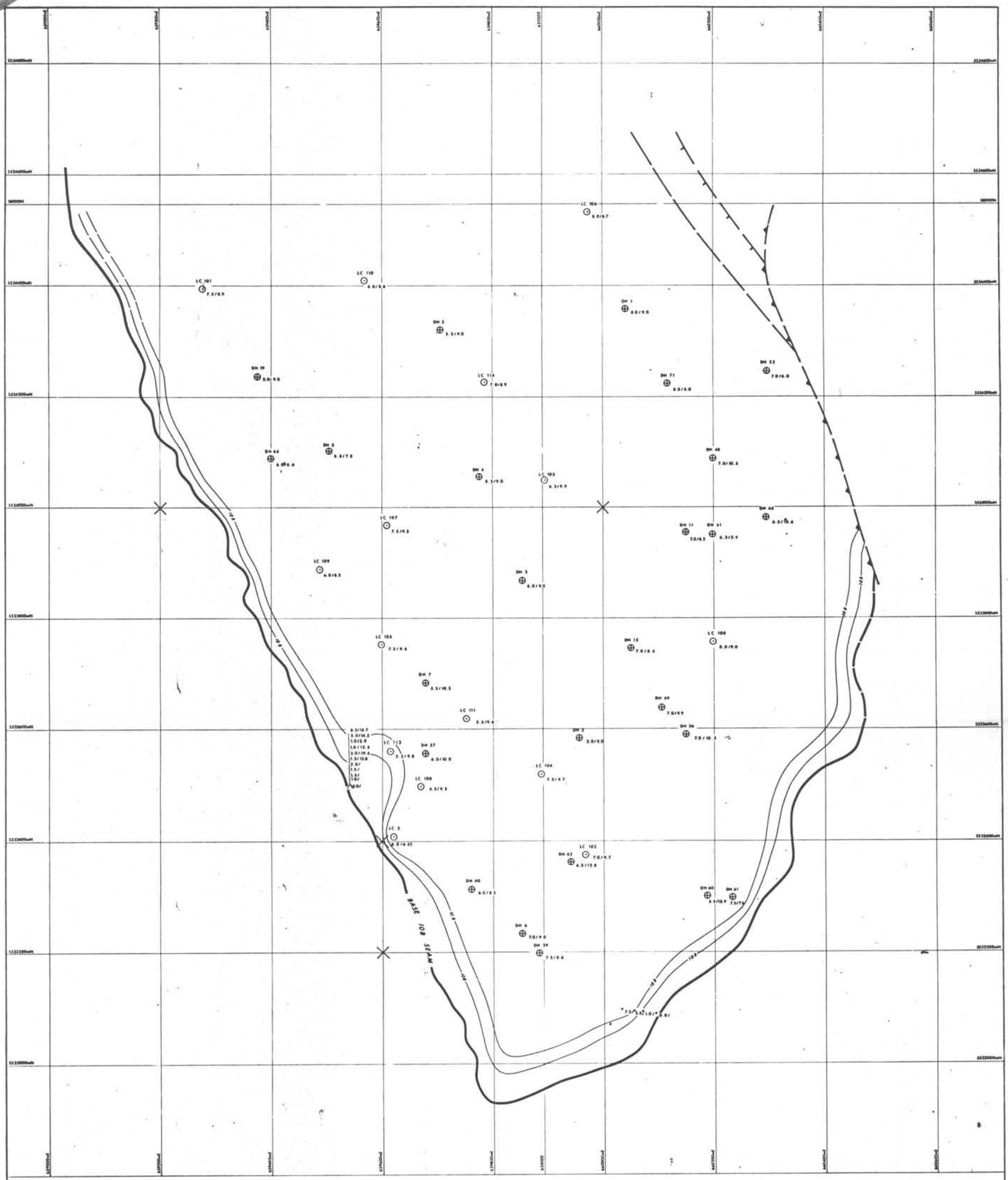
Crows Nest Resources Limited
EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

ISO - F.S.I. MAP
9 SEAM

Figure 8g

AUTHOR T.HANNIGAN & T.COLE	SCALE 1:5000	ENCLOSURE No.
DATE DEC 1978	REVISED	DRAWING No. HH-19f
To Accompany		



LEGEND

- ⊕ ROTARY HOLE
- ⊙ CORE HOLE
- ADIT ENTRANCE
- ADIT SAMPLE POINT
- 2.5/6.2 F.S.I. / ASH

419

78(2)A

PR - SHELL - LINE C. (HORSESHOE)

Crowe Nest Resources Limited

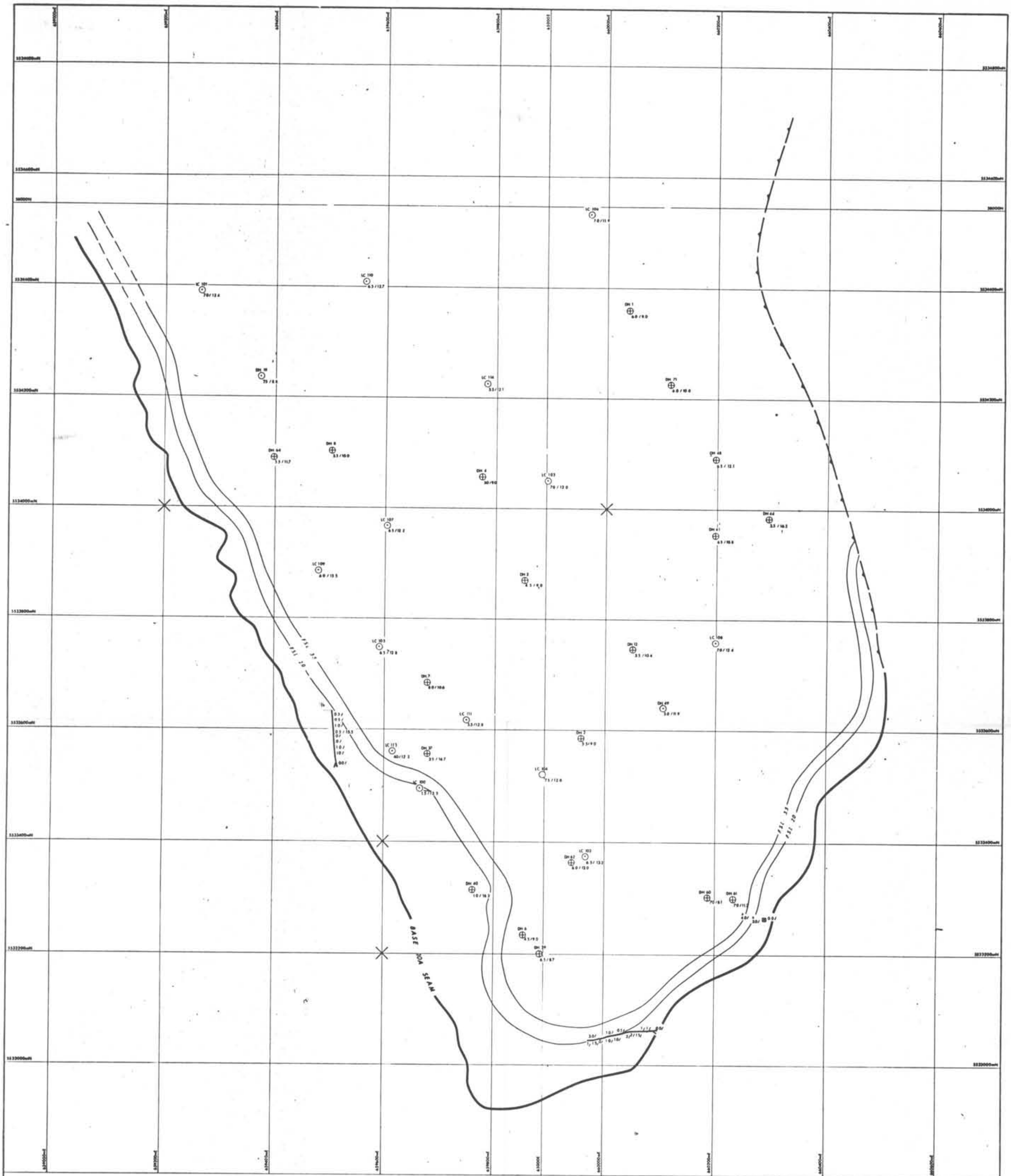
EXPLORATION

LINE CREEK AREA
SOUTHEASTERN B.C.

ISO - F.S.I. MAP
10B SEAM

Figure 8h

AUTHOR T. HANNAM & T. COLE	SCALE 1:5000	ENCLOSURE No.
DATE DEC. 1978	REVISED	DRAWING No. HH-19g
To Accompany		



419

TS (2) A

PR - SHELL-LINE C (HORSESHOE 2)

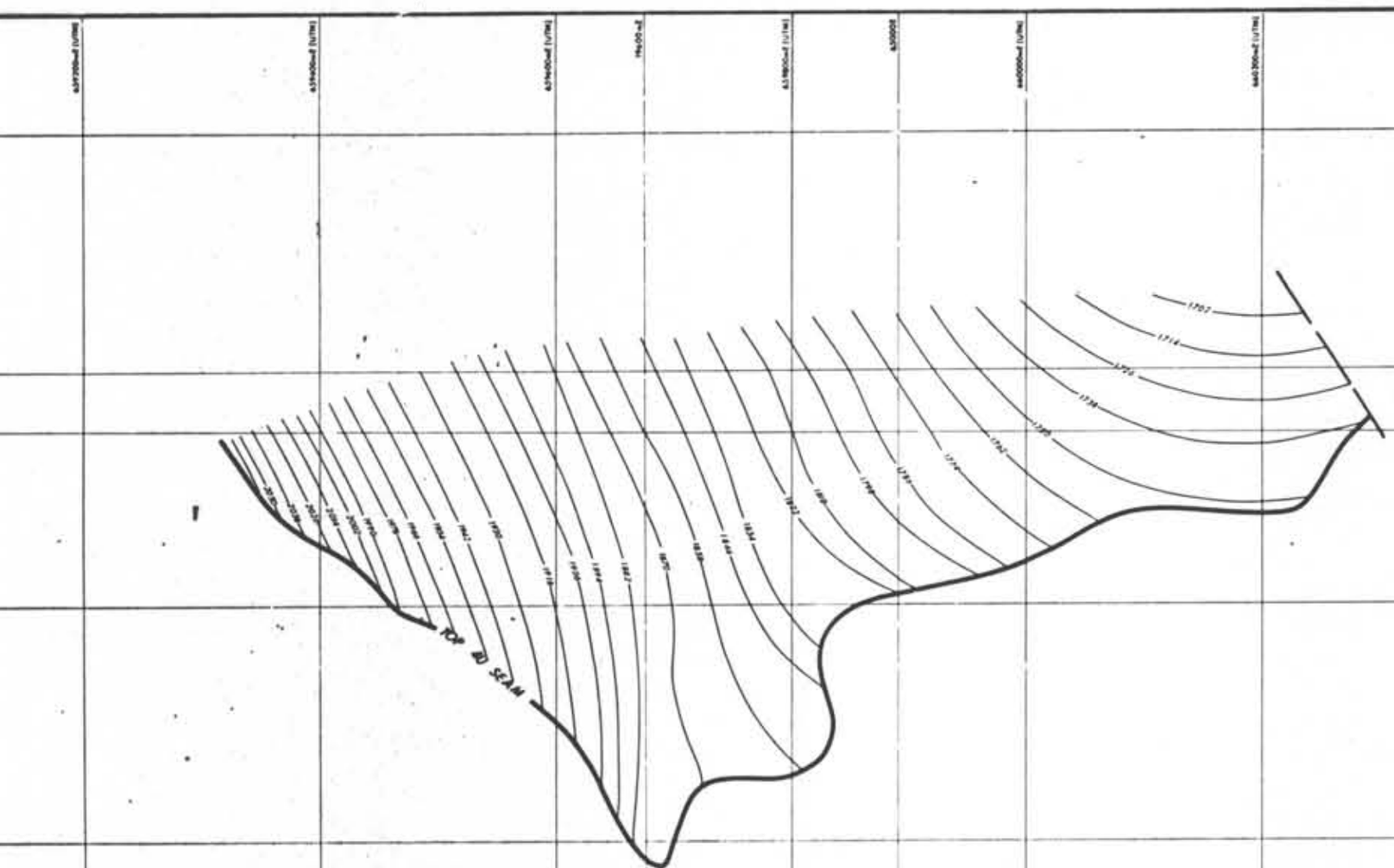
Crows Nest Resources Limited
EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

150 - F.S.I. MAP
10A SEAM

Figure 8i

AUTHOR T.HANNAH & T.COLE	SCALE 1:5000	ENCLOSURE No.
DATE DEC. 1978	REVISED	DRAWING No. HH - 19h
To Accompany		

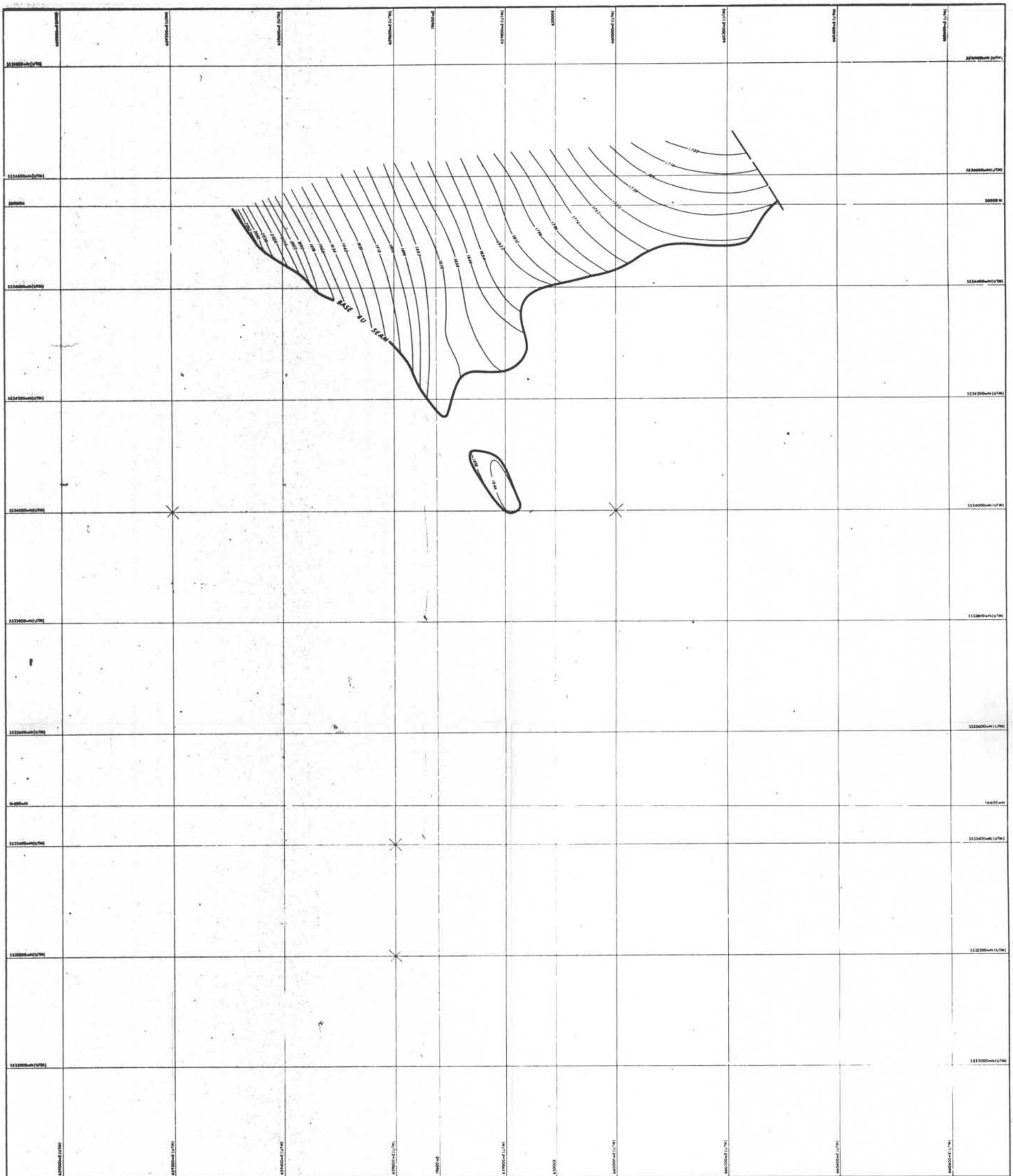


419

78(2)A.

PR-SHELL - LINE C. (HORSESHOE R.)

Crows Nest Resources Limited		
EXPLORATION		
LINE CREEK RANGE SOUTHEASTERN B.C.		
STRUCTURE CONTOUR MAP TOP 4 UPPER SEAM		
CONTOUR INT. 12m		Figure 10a
AUTHOR	SCALE 1:5000	ENCLOSURE No.
DATE NOV 1978	REVISED	DRAWING No. HI - 19
To Accompany		



419

10(2)A

PR-SHELL-LINE C. (HORSESHOE R.)

Crows Nest Resources Limited

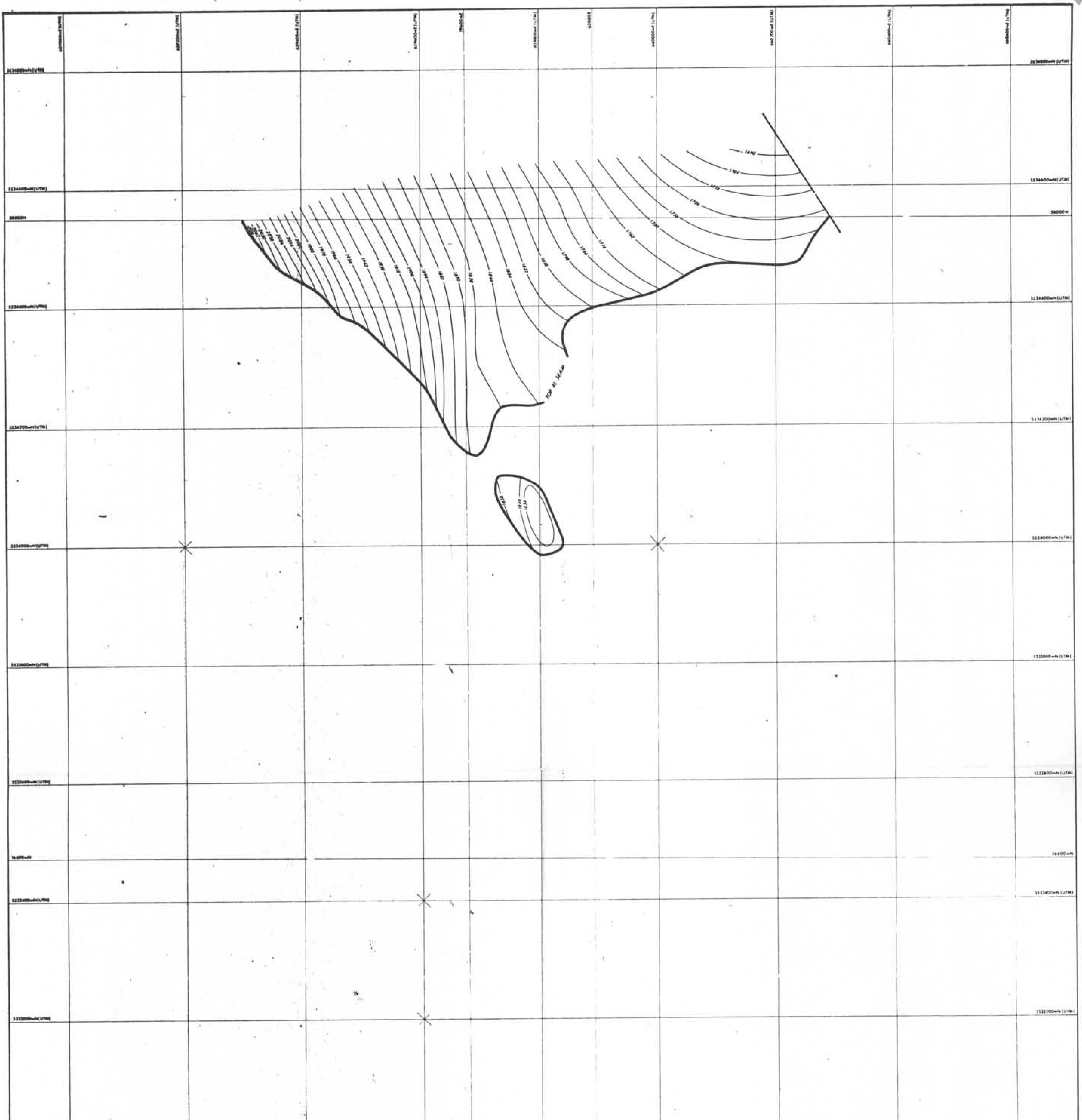
EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
BASE 4 UPPER SEAM

CONTOUR INT. 12m — Figure 10b

AUTHOR	SCALE 1:5000	ENCLOSURE No.
DATE Nov 1978	REVISED	DRAWING No. H1-19a
To Accompany		



419

Crows Nest Resources Limited
EXPLORATION

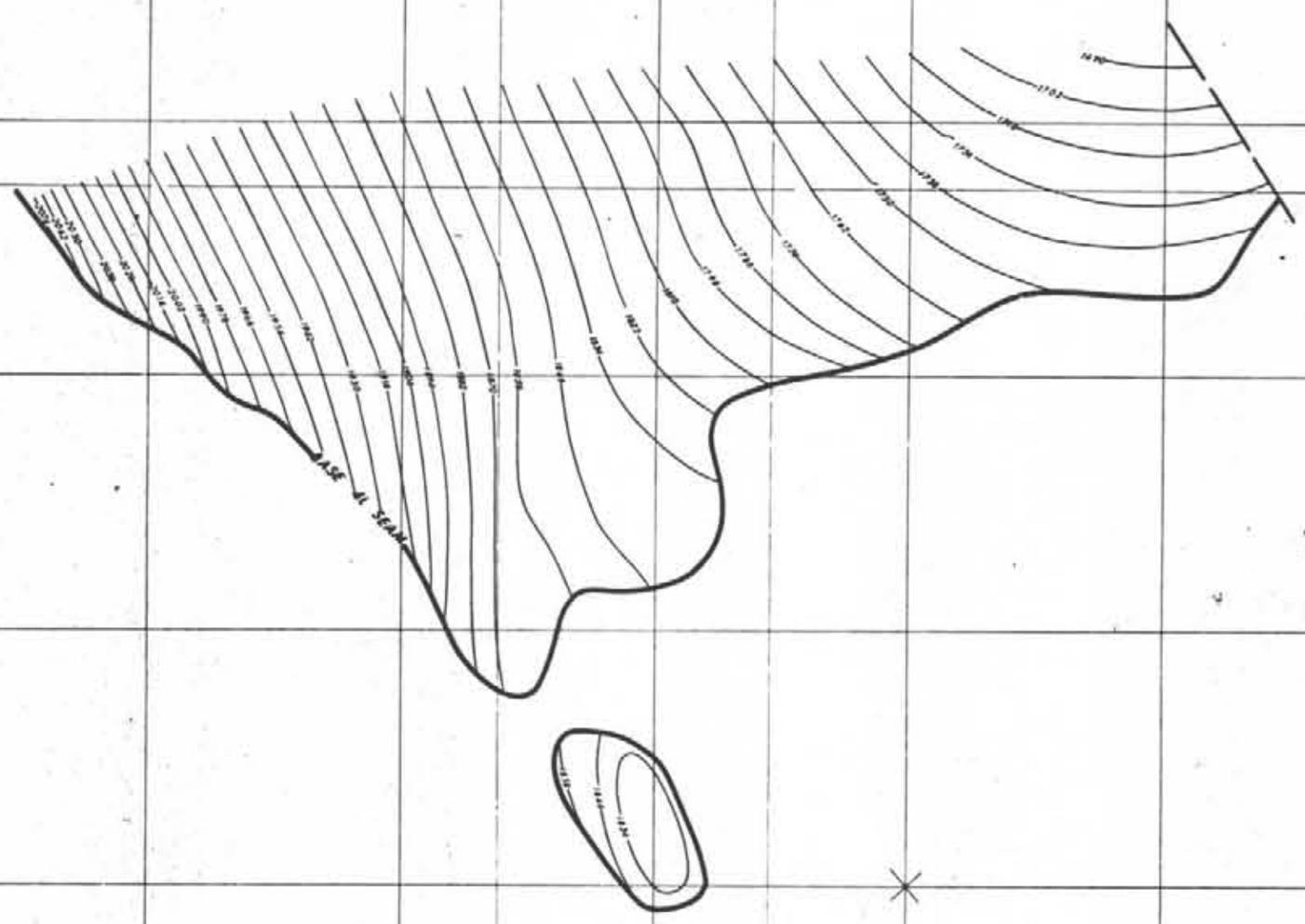
LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
TOP 4 LOWER SEAM

CONTOUR INT. 12m — Figure 10c

AUTHOR	SCALE 1:5000	ENCLOSURE No
DATE NOV 1978	REVISED	DRAWING No H1-19b
To Accompany		

78(2)A.
PR-SHELL-LINE C. (HORSESHOE R.)



419

78(2)A.

PR. SHELL - CINEC. (HORSESHOE)

Crows Nest Resources Limited

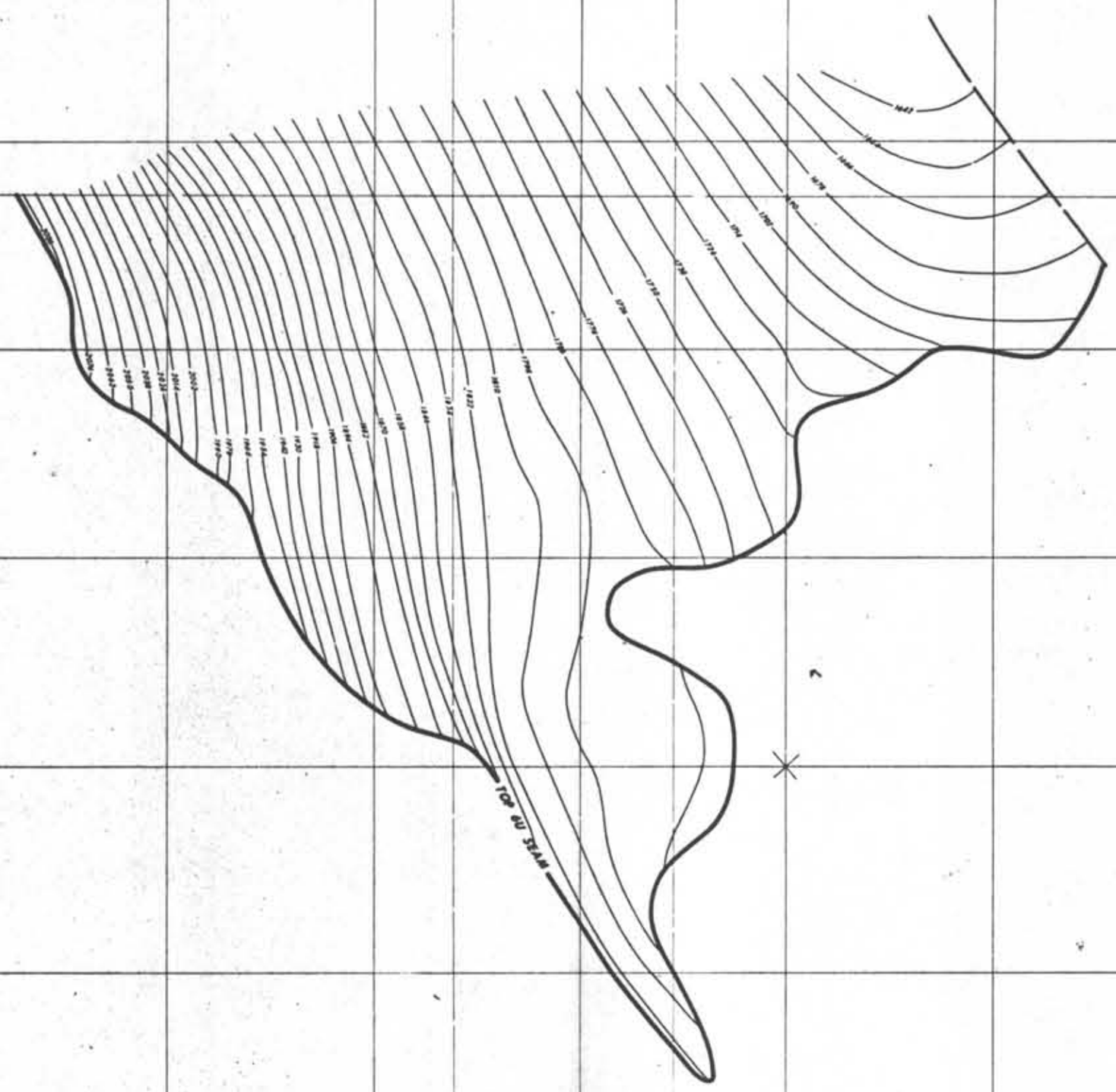
EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
BASE 4 LOWER SEAM

CONTOUR INT. 12m — Figure 10d

AUTHOR:	SCALE 1:5000	ENCLOSURE No.:
DATE: NOV 1978	REVISED:	DRAWING No. H1 - 19c



419

78(2)A.
Pr-Shell-Line C. (Horseshoe R.).

Crows Nest Resources Limited
EXPLORATION

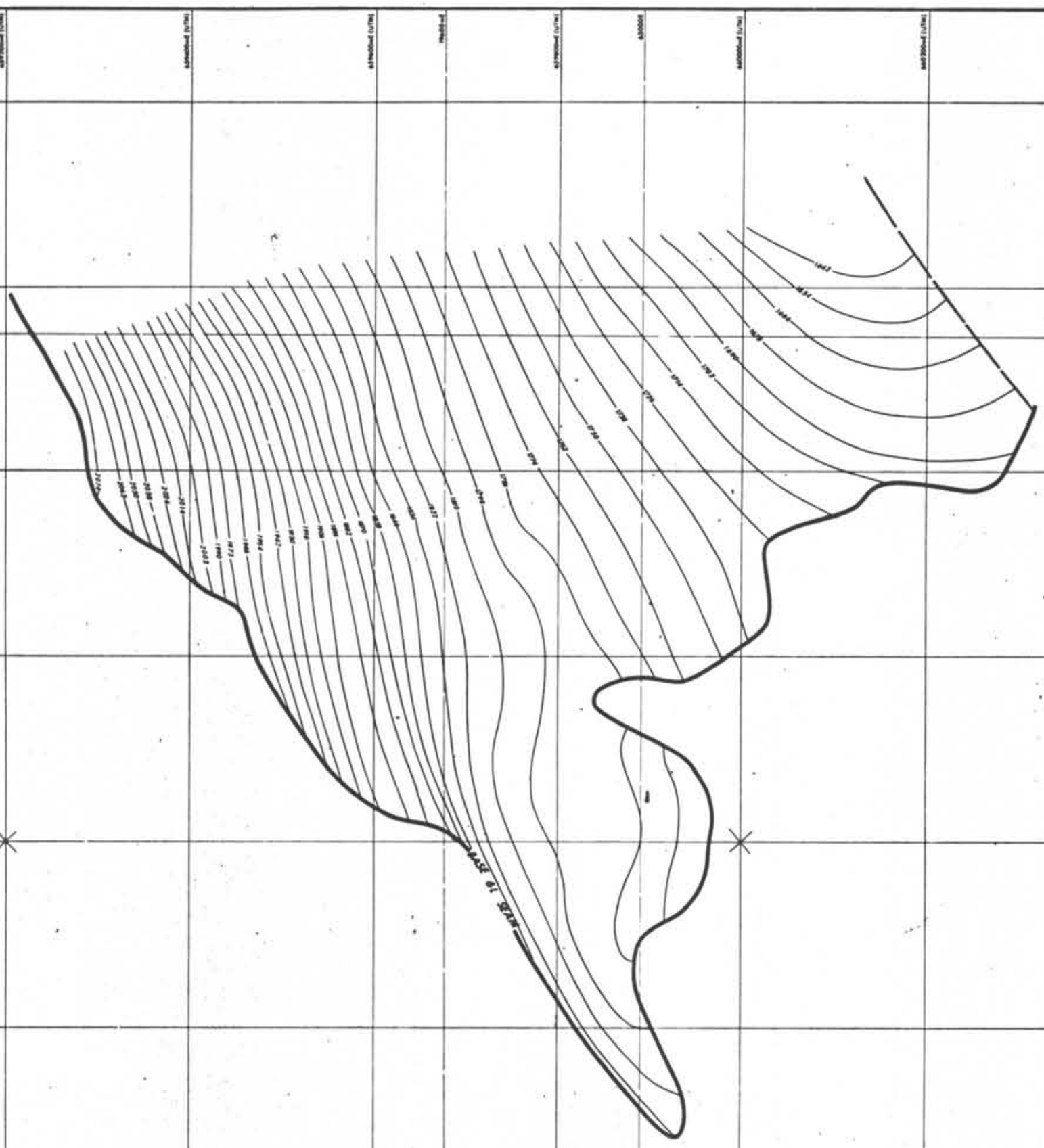
LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
TOP 6 UPPER SEAM

CONTOUR INT. 12m

Figure 10e

AUTHOR	SCALE 1:5000	ENCLOSURE No.
DATE: NOV 1978	REVISED:	DRAWING No. HI-19d
To Accompany		



419

78(2)A.

PR-SHELL-LINE C. (HORSESHOE R.)

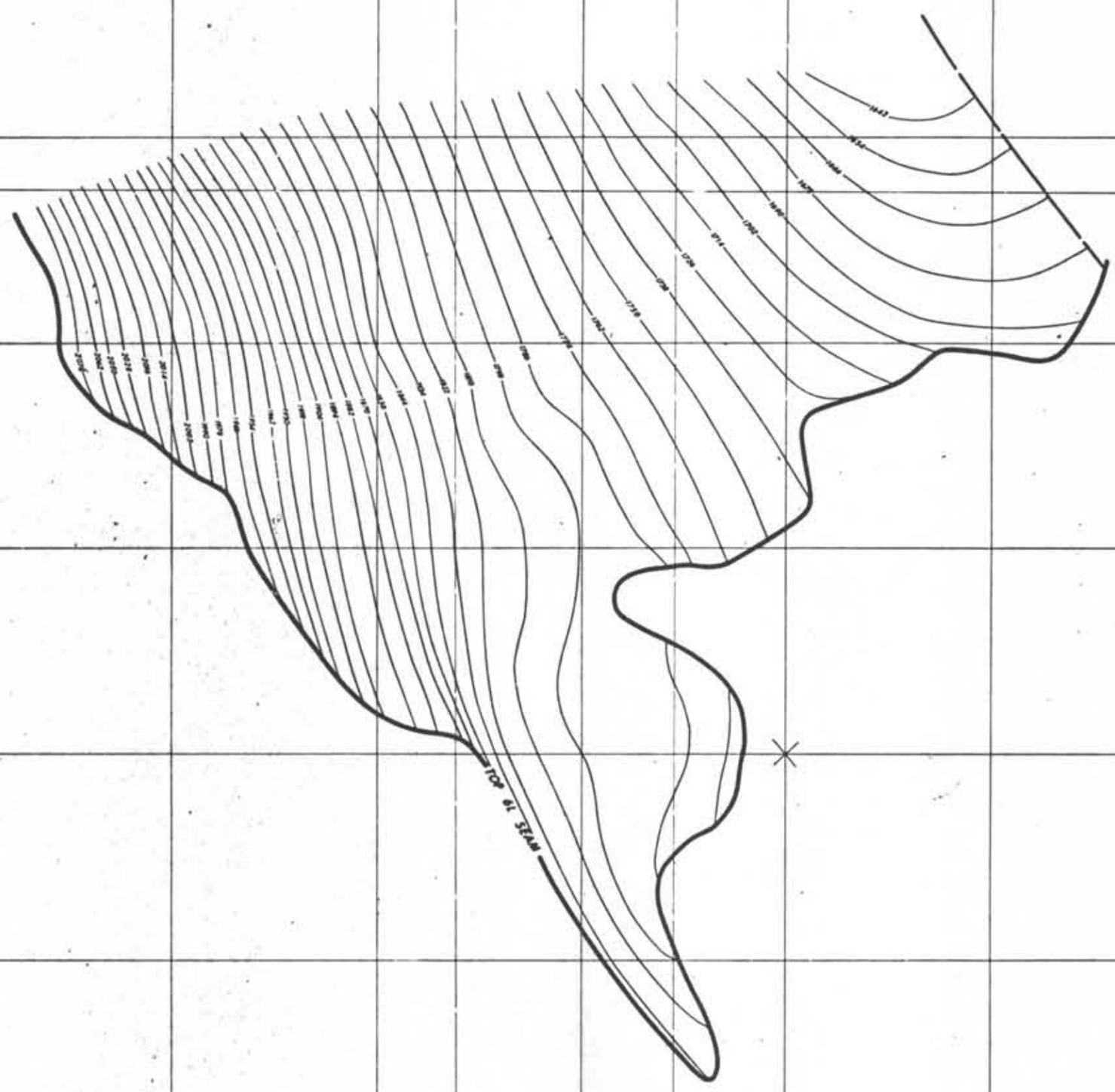
Crows Nest Resources Limited
EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
BASE 6 LOWER SEAM

CONTOUR INT. 12m — Figure 101

AUTHOR:	SCALE 1:5000	ENCLOSURE No.:
DATE: NOV. 1978	REVISED:	DRAWING No. H1 - 19e
To Accompany		



419

78(2)A

PR-SHELL-LINE C. (HORSESHOE R.)

Crows Nest Resources Limited

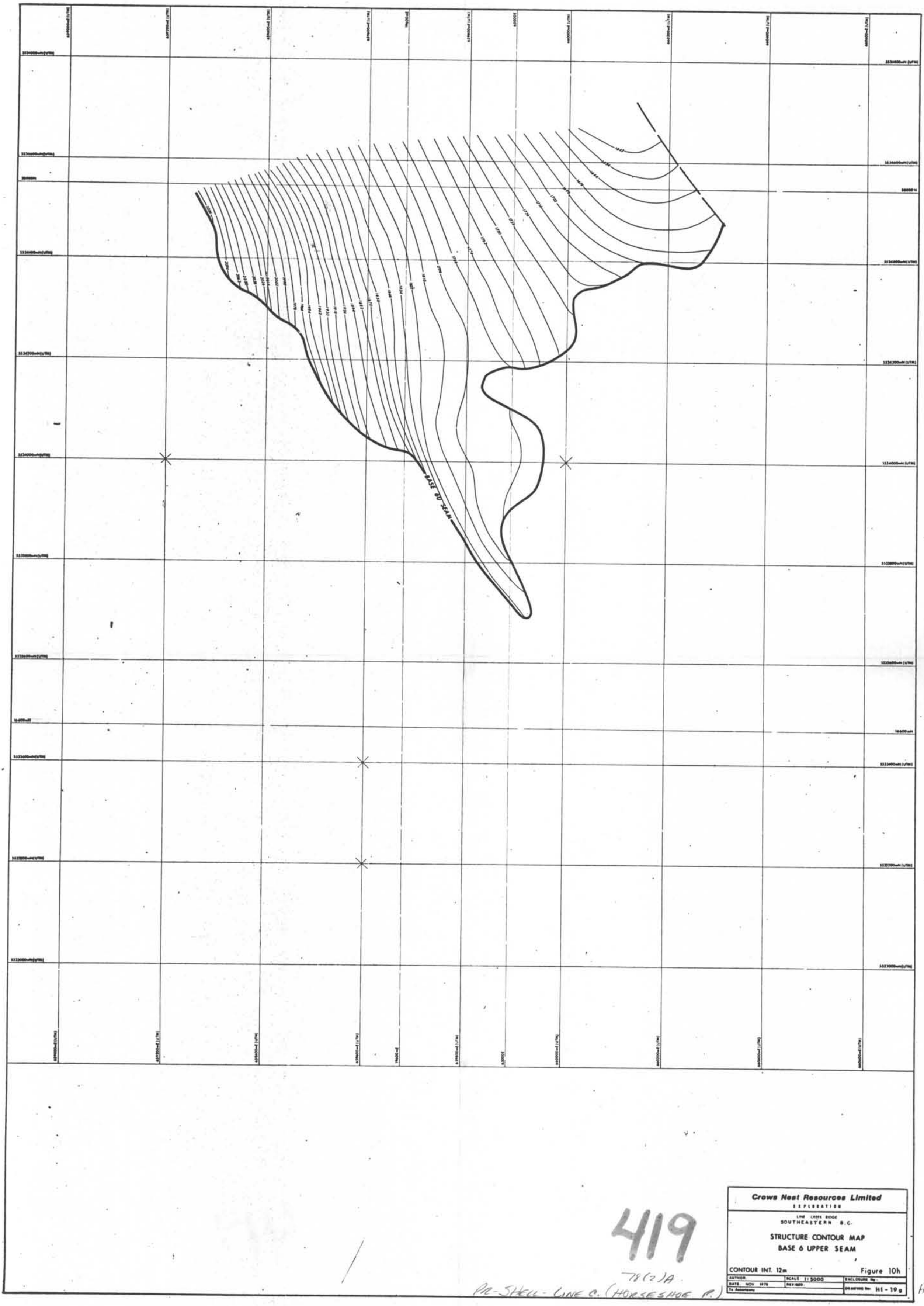
EXPLORATIONS

LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
TOP 6 LOWER SEAM

CONTOUR INT. 12m — Figure 10g

AUTHOR: | SCALE 1:5000 | ENCLOSURE No.:
DATE: NOV 1970 | REVISED: | DRAWING No. H1-19f
To Accompany



419

78(2)A

Re-SHELL - LINE C. (HORSESHOE R.)

Crows Nest Resources Limited

EXPLORATION

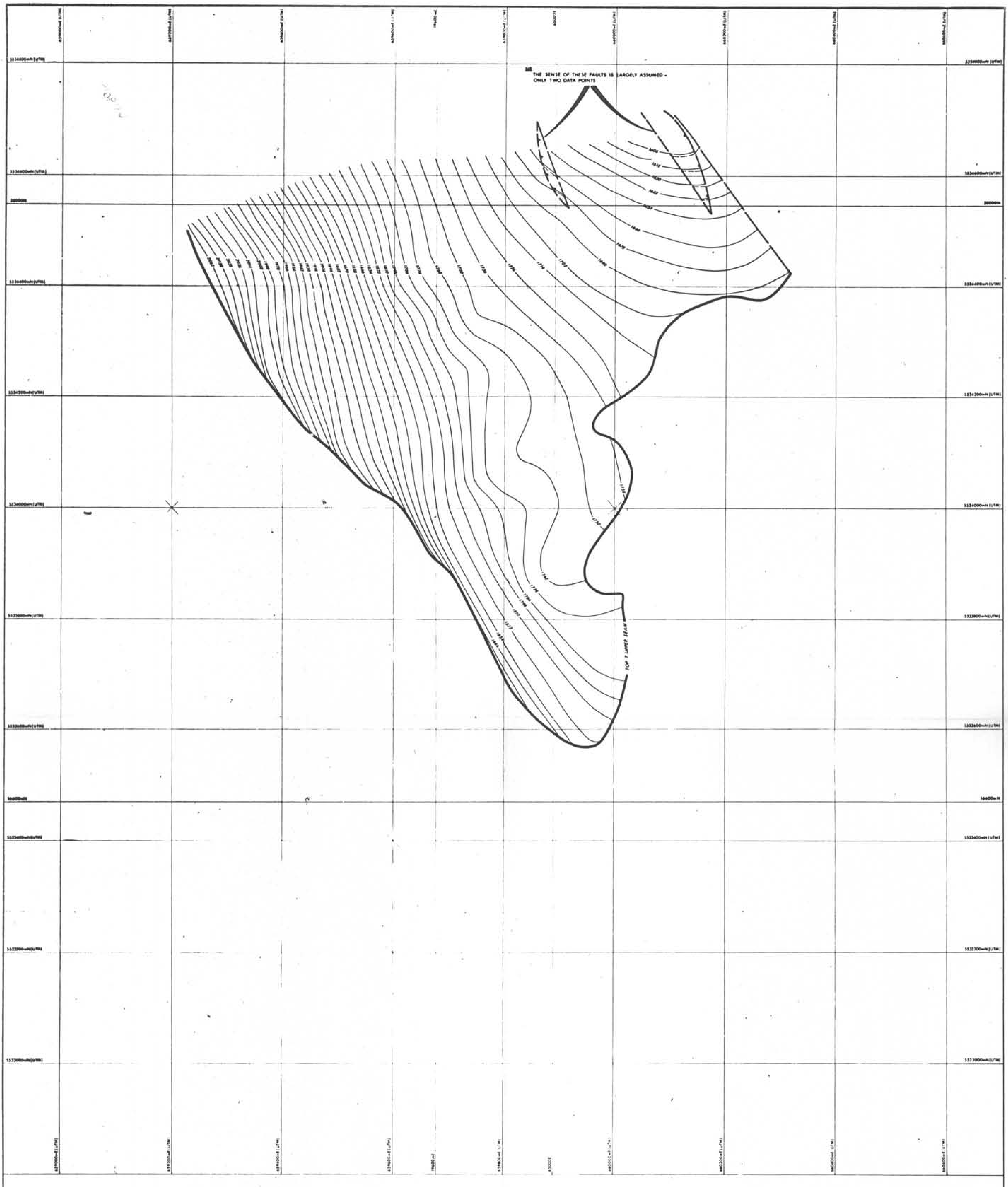
LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
BASE 6 UPPER SEAM

CONTOUR INT. 12m — Figure 10h

AUTHOR	SCALE 1:5000	ENCLOSURE No.:
DATE NOV 1978	REVISED:	DRAWING No. H1 - 19 g
To Accompany		

H



419

Crowe Nest Resources Limited
EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
TOP 7 UPPER SEAM

CONTOUR INT 12m — Figure 10i

AUTHOR	SCALE 1:5000	ENCLOSURE No.
DATE NOV 1978	REVISED	DRAWING No. H1-19h
To Accompany		

78(2)A
PR-SHELL-LINE C. (HORSESHOE R.)

NB THE SENSE OF THESE FAULTS IS LARGELY ASSUMED — ONLY TWO DATA POINTS.

BASE 7 UPPER SEAM

419

78(2)A.

PR-SHELL-LINE C. (HORSESHOE R.)

Crows Nest Resources Limited

EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
BASE 7 UPPER SEAM

CONTOUR INT. 12 m — Figure 10j

AUTHOR	SCALE 1:3000	ENCLOSURE No.
DATE NOV 1979	REVISED	DRAWING No. H1-19 i
To Accompany		

419

78(2)A.

PR-SHELL-LINEC (HORSESHOE R.)

Crows Nest Resources Limited

EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
TOP 7 LOWER SEAM

CONTOUR INT. 12m — Figure 10k

AUTHOR	SCALE 1:5000	ENCLOSURE No.
DATE NOV 1978	REVISED	DRAWING No. HI-191
To Accompany		

THE SENSE OF THESE FAULTS IS LARGELY ASSUMED - ONLY TWO DATA POINTS

419

78(2)A

Re-SHELL-LINE C. (HORSESHOE R.)

Crows Nest Resources Limited

EXPLORATION

LYNX CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
BASE 7 LOWER SEAM

CONTOUR INT. 12m

Figure 101

AUTHOR	SCALE 1:5000	ENCLOSURE No.
DATE NOV 1978	REVISED	DRAWING No. HJ - 19
To Accompany		

LEAD EDGE

NS
THE SENSE OF THIS FAULT IS LARGELY ASSUMED – ONLY TWO DATA POINTS

NS
STRUCTURE IN THIS AREA HAS BEEN OVER-SIMPLIFIED

NORMAL FAULT

THRUST FAULT

TOP UPPER 8 SEAM

419

Crows Nest Resources Limited
EXPLORATION

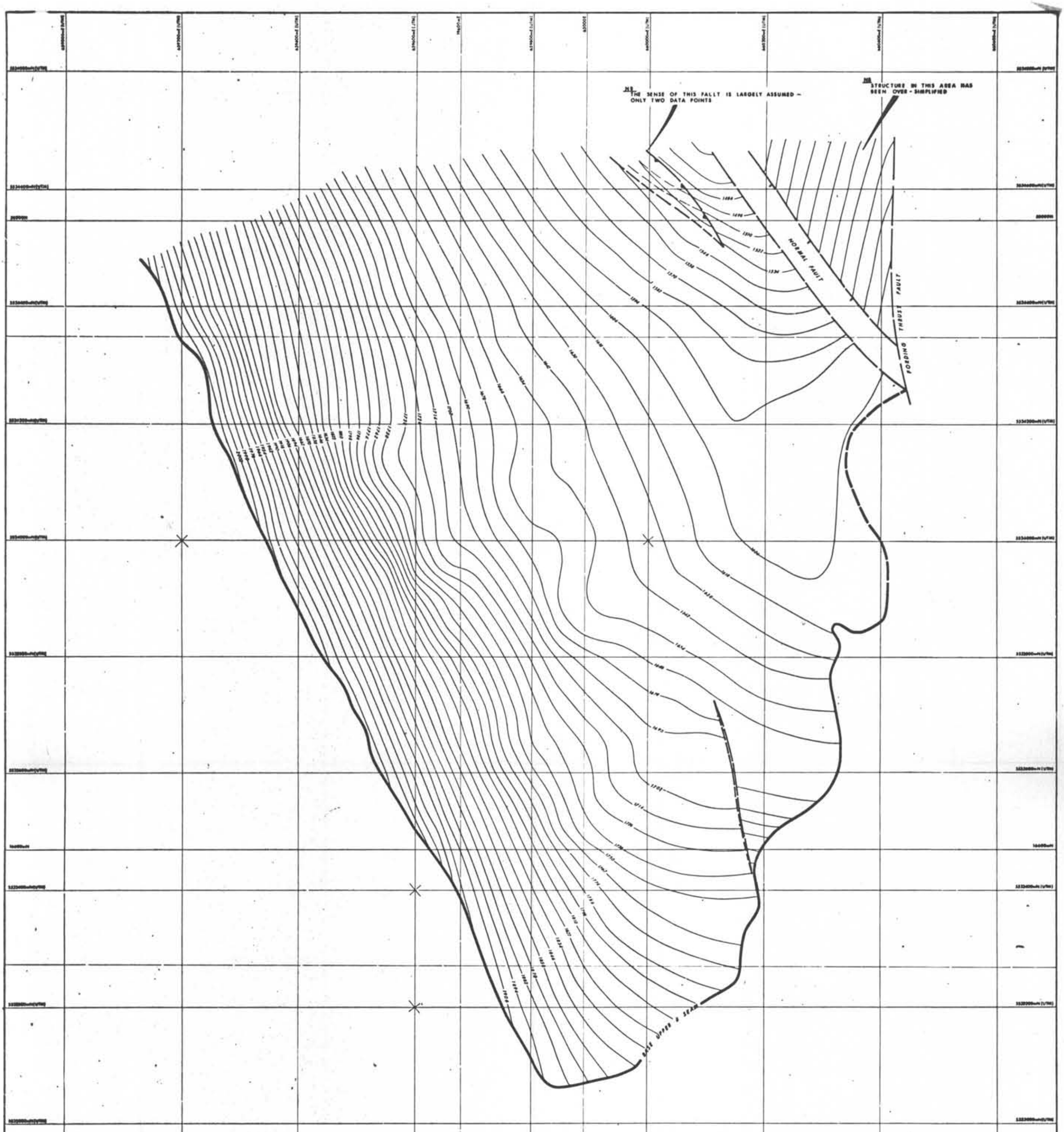
LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
TOP UPPER 8 SEAM

CONTOUR INT. 12m — Figure 10m

AUTHOR: TOSE & THOMSON | SCALE: 1:5000 | ENCLOSURE No.:
DATE: NOV 1978 | REVISED: | DRAWING No. HJ - 19a
To accompany

78(2)A.
PR - SHELL - LINE C. (HORSESHOE R.)



419

78(2)A.

RE-SHELL-LINE C. (HORSESHOE R.)

Crows Nest Resources Limited
EXPLORATION

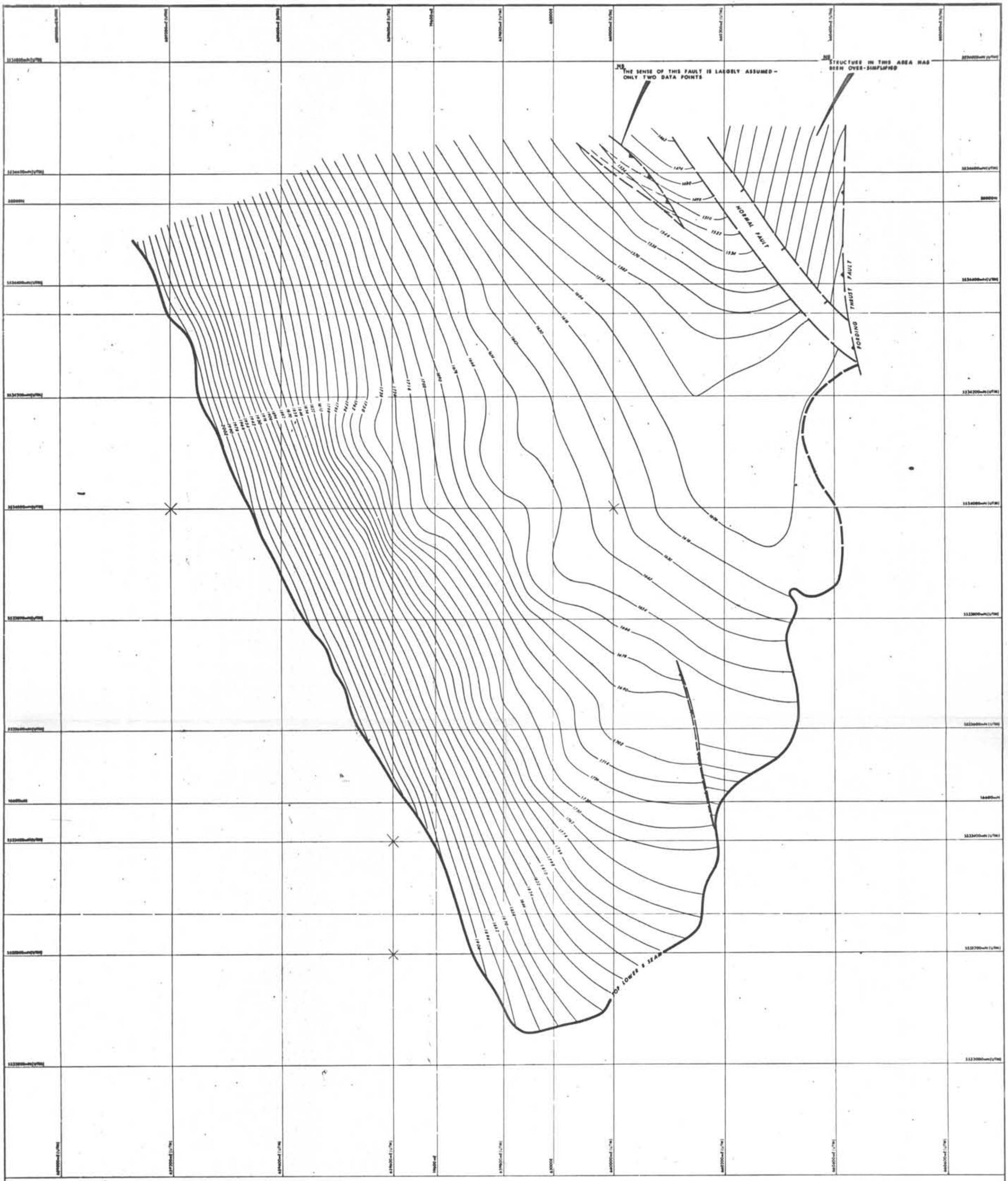
LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
BASE UPPER B SEAM

CONTOUR INT. 12m — Figure 10n

AUTHOR: T. COLE & T. HADDAD | SCALE 1:5000 | ENCLOSURE No.:
DATE: NOV 1978 | REVISED: | DRAWING No.: HJ-19b
For Assessment

LEAD EDGE



419

78(2)A.

PR- SHELL-LINE C. (HORSESHOE R.)

Crows Nest Resources Limited

EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
TOP LOWER B SEAM

CONTOUR INT. 12 m. Figure 10o

AUTHOR T.COLE & T.THOMPSON	SCALE 1:5000	ENCLOSURE No. -
DATE NOV 1978	REVISED:	DRAWING No. HJ-19c

LEAN RIDGE

NB THE SENSE OF THIS FAULT IS LARGELY ASSUMED — ONLY TWO DATA POINTS

NB STRUCTURE IN THIS AREA HAS BEEN OVER - SIMPLIFIED

NORMAL FAULT

THRUST FAULT

419

Crows Nest Resources Limited

EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
BASE LOWER B SEAM

CONTOUR INT. 12m

Figure 10p

AUTHOR T.CLAY & T.WILLIAMS | SCALE 1:5000 | ENCLOSURE No.:
DATE: NOV 1976 | REVISED: | DRAWING No. HJ - 19d

78/21A.
PR-SHELL-LINE C. (HORSESHOE R.).

LEM RIDGE

NB THE SENSE OF THESE FAULTS IS LARGELY ASSUMED – ONLY TWO DATA POINTS

NB THE STRUCTURE IN THIS AREA HAS BEEN OVER-SIMPLIFIED

NORMAL FAULT

THRUST FAULT

TOP 9 SEAM

419

Crows Nest Resources Limited
EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
TOP 9 SEAM

CONTOUR INT. 12m — Figure 10a

AUTHOR T COLE & T HANNAH | SCALE 1:5000 | ENCLOSURE No.
DATE: NOV 1979 | REVISED:
To Accompany | DRAWING No. HJ-19a

78(2)A.
PR-SHELL-LINE C. (HORSESHOE R.)

LEAD EDGE

NB
THE SENSE OF THESE FAULTS IS LARGELY ASSUMED — ONLY TWO DATA POINTS

NB
STRUCTURE IN THIS AREA HAS BEEN BEEN OVER SIMPLIFIED

NORMAL FAULT

THRUST FAULT

BASE 9 SEAM

419

Crows Nest Resources Limited
EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
BASE 9 SEAM

Figure 10r

AUTHOR TODD & TAMMEMAGI	SCALE 1:5000	ENCLOSURE No. :
DATE: NOV 1978	REVISED:	DRAWING No. HJ-191
To Accompany		

78(2)A
PR-SHELL-LINE C. (HORSESHOE R.)

LEAD EDGE

?18
THE SENSE OF THESE FAULTS IS LARGELY ASSUMED - ONLY TWO DATA POINTS.

?18
STRUCTURE IN THIS AREA HAS BEEN OVER-SIMPLIFIED.

NORMAL FAULT

ROOSING THRUST FAULT

419

Crows Nest Resources Limited
EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
TOP 10B, SEAM

CONTOUR INT. 12m — Figure 10s

AUTHOR T COSE & T HANSUM	SCALE 1:5000	ENCLOSURE No.
DATE NOV 1978	REVISED	DRAWING No. HJ-19g
To Accompany		

78(2)A.
RE-SHELL-LINE C. (HORSESHOE R.)

LEAD RIDGE

NB
THE SENSE OF THESE FAULTS IS LARGELY ASSUMED — ONLY TWO DATA POINTS

NB
STRUCTURE IN THIS AREA HAS BEEN OVER - SIMPLIFIED

NORMAL FAULT

FOOTING THRUST FAULT

BASE 10B SEAM

419

Crows Nest Resources Limited
EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
BASE 10B, SEAM

CONTOUR INT. 12m — Figure 10

AUTHOR: TCOLE & THANBAM | SCALE: 1:5000 | ENCLOSURE No.:
DATE: NOV 1978 | REVISED: | DRAWING No. HJ-19h
By: Company

78(2)A.
PR-SHELL-LINE CO. (HARGESHAIE R.)

NB.
THE SENSE OF THESE FAULTS IS LARGELY ASSUMED - ONLY TWO DATA POINTS

NB.
STRUCTURE IN THIS AREA HAS BEEN OVER - SIMPLIFIED.

NORMAL FAULT

THRUST FAULT

TOP 10A SEAM

419

78(2)A.

P2-SHELL LINE C. (HORSESHOE C.)

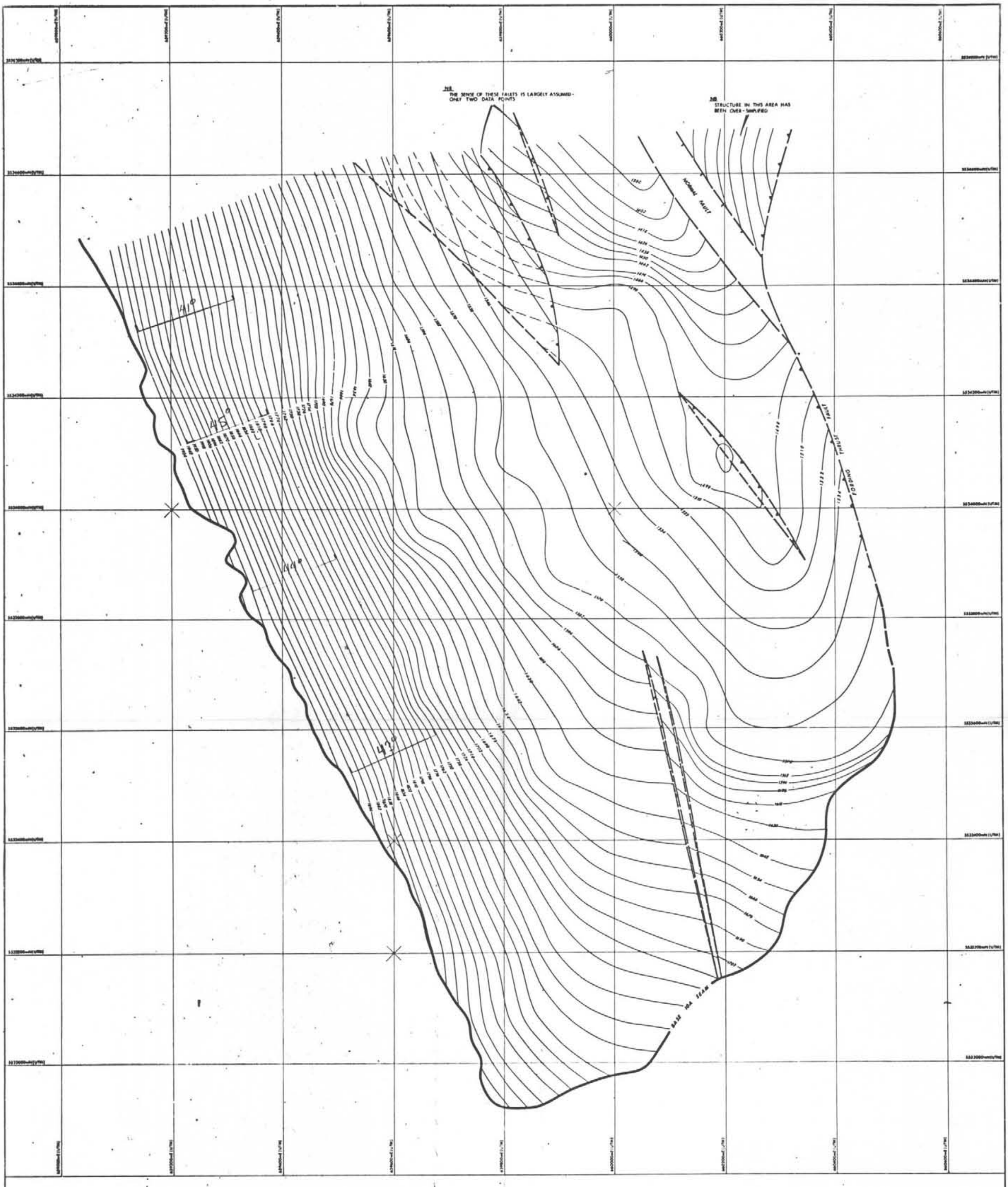
Crows Nest Resources Limited
EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
TOP 10A, SEAM

CONTOUR INT. 12m — Figure 10u

AUTHOR T.COLE & T.HARRISON	SCALE 1:5000	ENCLOSURE No. -
DATE NOV 1978	REVISED:	DRAWING No. HJ-191
For Accompany		



419

Crows Nest Resources Limited
EXPLORATION

LINE CREEK RIDGE
SOUTHEASTERN B.C.

STRUCTURE CONTOUR MAP
BASE 10A, SEAM

CONTOUR INT. 12m Figure 10v

AUTHOR TODD & TINSMAN | SCALE 1:5000 | ENCL. DRAWING No.
DATE NOV 1978 | REVISED
TO ACCOMPANY | DRAWING No. HJ-19j

8(2)A
PR-SHELL-LINE C. (HORSESHOE R.)

STRATIGRAPHIC SECTION

DESIGNATION

PART ____ OF ____

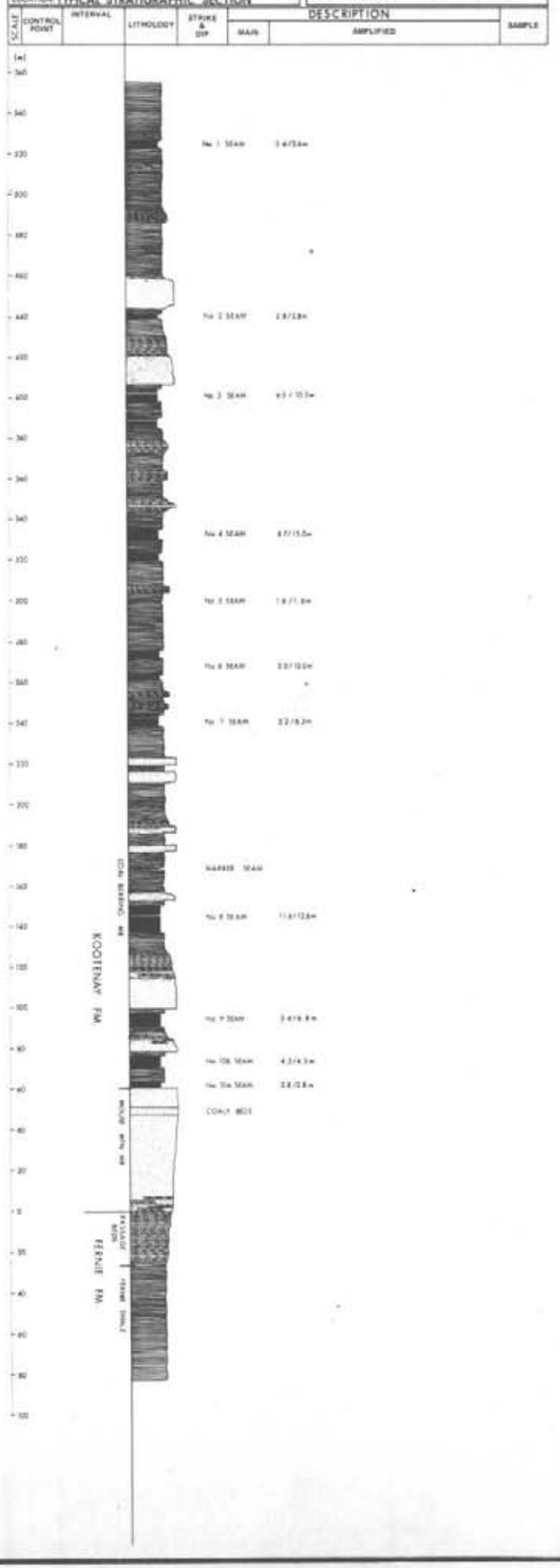
PROJECT: LINE CREEK RIDGE

AUTHOR: T.W.H. DATE: SEPT / JAN

AREA: SOUTHEASTERN B.C.

SOURCE OF DATA: LC-113, LC-103, DH-78

LOCATION: TYPICAL STRATIGRAPHIC SECTION



78(2)A

PR-SHELL-LINE C. (HARGREAVES)

Crows Nest Resources Limited

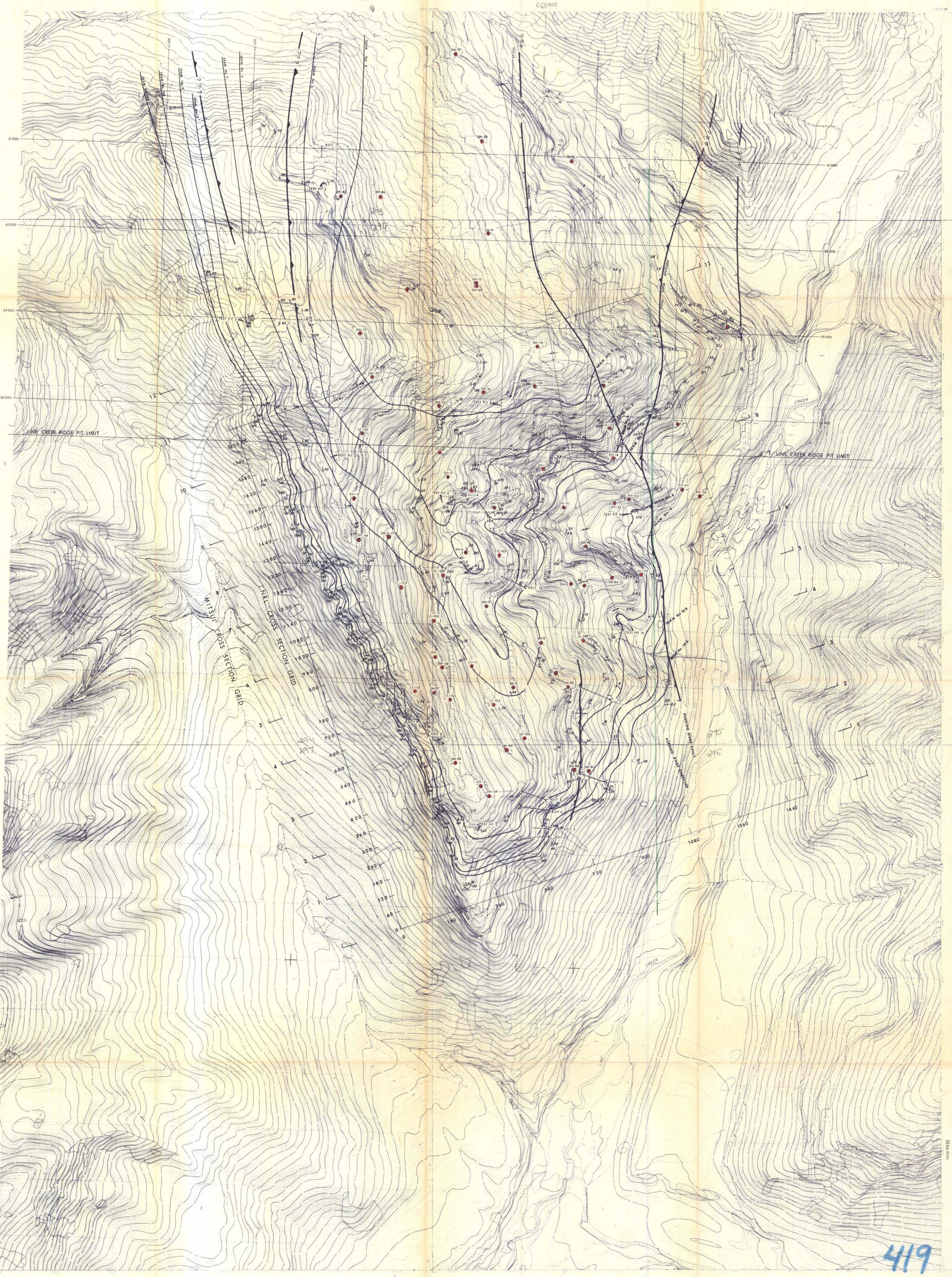
EXPLORATION

SOUTHEASTERN B.C.
LINE CREEK RIDGE

TYPICAL STRATIGRAPHIC SECTION

Figure 4

AUTHOR: Hannah	SCALE: 1 : 5000	ENCLOSURE No.
DATE: March/79	REVISED	DRAWING No. HJ - 18
To Accompany		



LEGEND

DRILL HOLE No. DH-12 ⊕ ROTARY DRILL HOLE

⊙ CORE HOLE

⊙ ANGLE HOLE

ADIT No. ADIT-7 ADIT

Crows Nest Resources Limited

SOUTHEASTERN B. C.
LINE CREEK PROJECT

GEOLOGICAL MAP
LINE CREEK PROJECT

Figure 5

AUTHOR: HANNAH & COLE	SCALE: 1:5000	ENCLOSURE No:
DATE: FEB. 8, 1979	REVISED:	DRAWING No: HH-17
To Accompany		

419

PD-SHELL · LINE C. (HORSESHOE R.) 78(2)A

USE FOR DEPOSIT ONLY

LAND CLASSIFICATION FOR COAL EXPLORATION
AND DEVELOPMENT
IN THE EASTERN SLOPES OF ALBERTA

CATEGORY 1
CATEGORY 2
CATEGORY 3
CATEGORY 4

YES

EAST KOOTNEY COAL FIELDS

UPPER ELK COALFIELD

FERNIE COAL FIELD

FLATHEAD COAL FIELD

KANANASKIS CF-72

TURNER VALLEY CF-75

GREEN HILLS SYNCLINE

FORDING RIVER SYNCLINE

OLD MAN RIVER CF-51

SAVANNA CREEK CF-54

ERICKSON FAULT

FORDING THRUST FAULT

McCONNELL CREEK FAULT

LIVINGSTONE THRUST

DAISY CREEK CF-46

COLEMAN CF-45

BLAIRMORE CF-41

BELLEVUE CF-40

TENT MOUNTAIN CF-56

BEAVER MINES CF-70

LEWIS THRUST

FIFTH MERIDIAN

29 28 27 26 25 24 23 W4

419

PR-SHELL-LINE C. (HORSESHOE R.) 78(2)A

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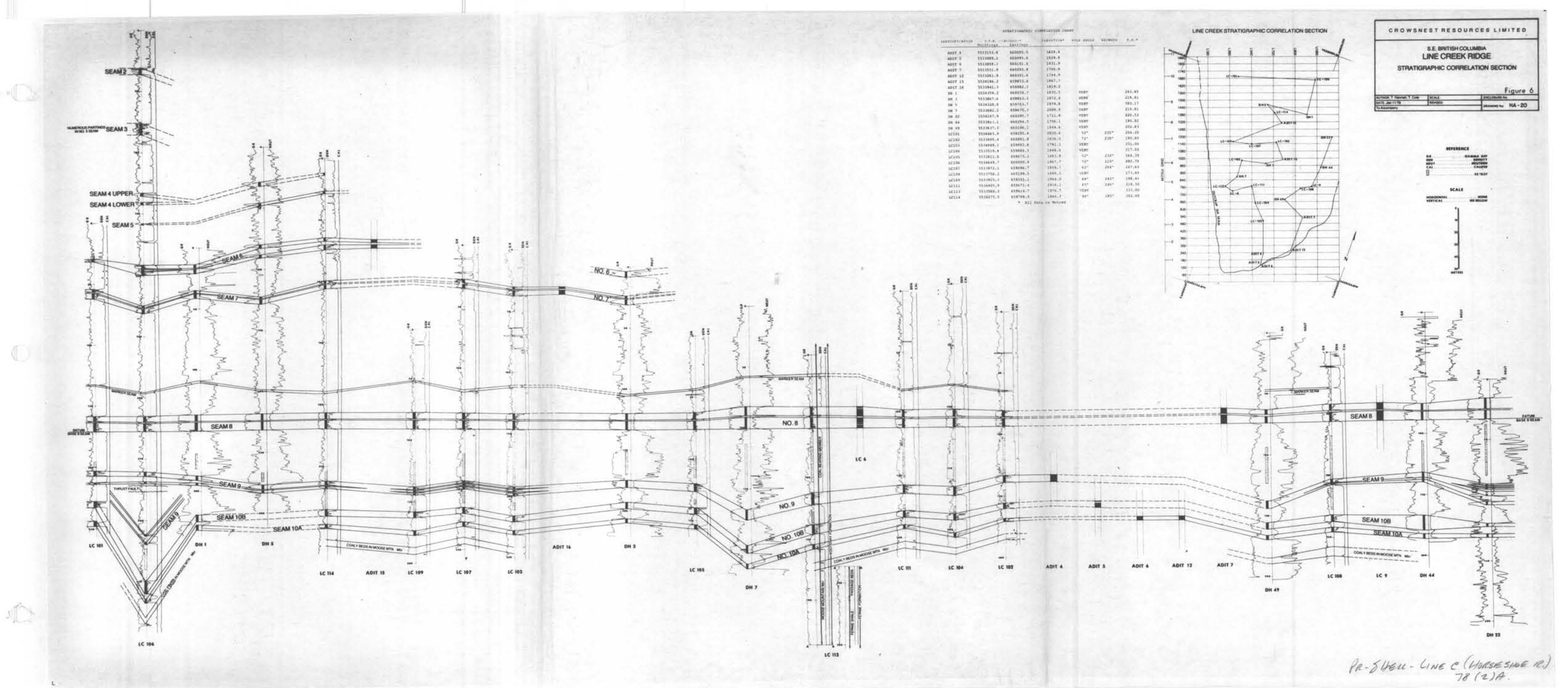
EXPLORATION

LINE CREEK RIDGE
B.C.

REGIONAL GEOLOGY
MAP

Figure 3

AUTHOR HANNAH & COLE	SCALE: 1 500,000	ENCLOSURE No.
DATE FEB. 1979	REVISED	DRAWING No. HA-19A
To Accompany		



PR-SHELL - LINE C (HORSESHOE RD)
78(2)A.

R. SHELL-LINE @ (HORSESHOE R.) 7E(2)A

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EXPLORATION

SOUTHEASTERN B.C.
LINE CREEK RIDGE

COAL SEAM INFORMATION MAP

Figure 7

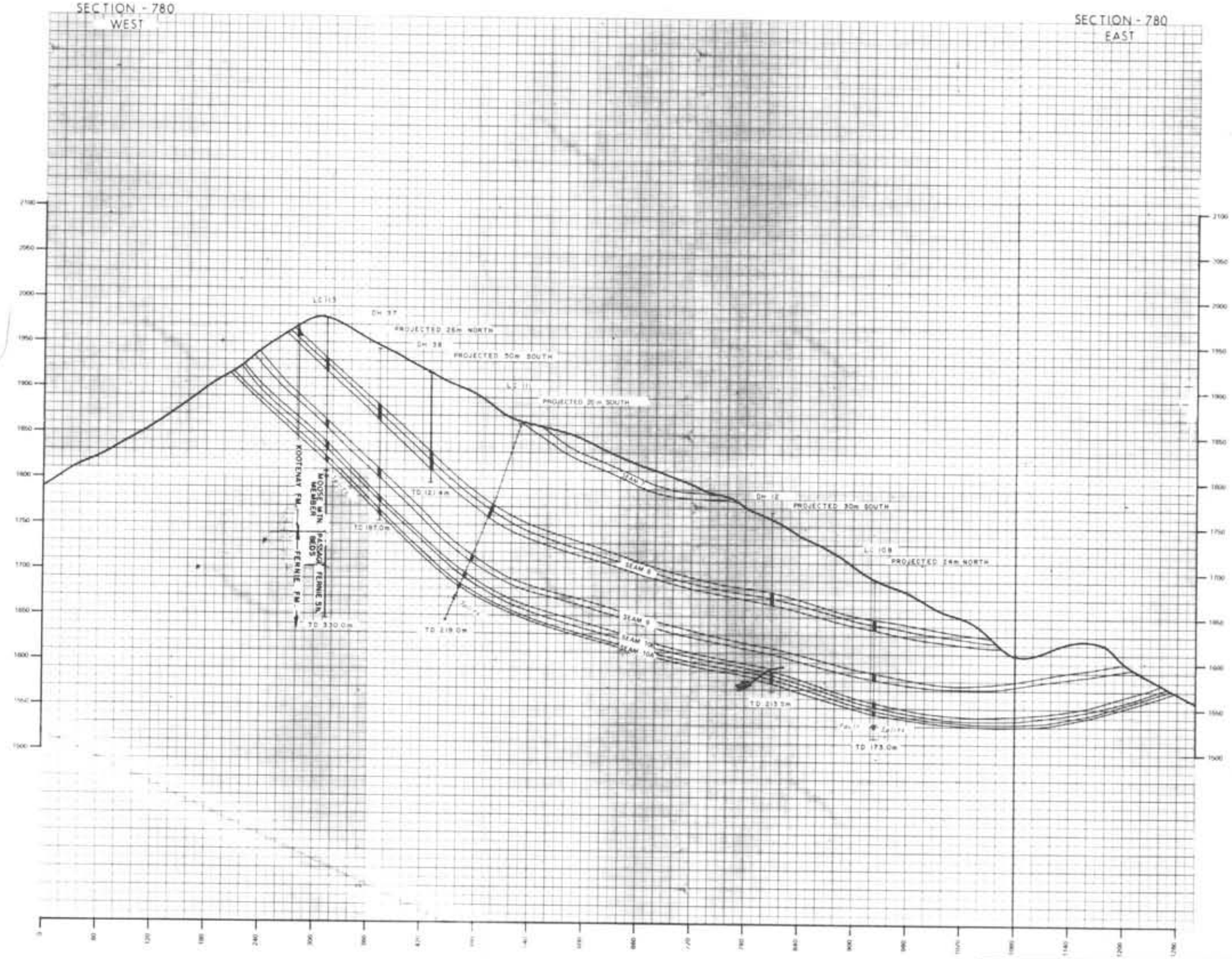
AUTHOR Hannah/Cole	SCALE 1:5000	ENCLOSURE No.
DATE	REVISED	DRAWING No. HH-17C
To Accompany		

419

P/C

SECTION - 780
WEST

SECTION - 780
EAST



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78(2)A

PR-SHELL-LINE C. (HORSESHOE R.)

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SOUTHEASTERN B.C.
LINE CREEK RIDGE

CROSS SECTION 780

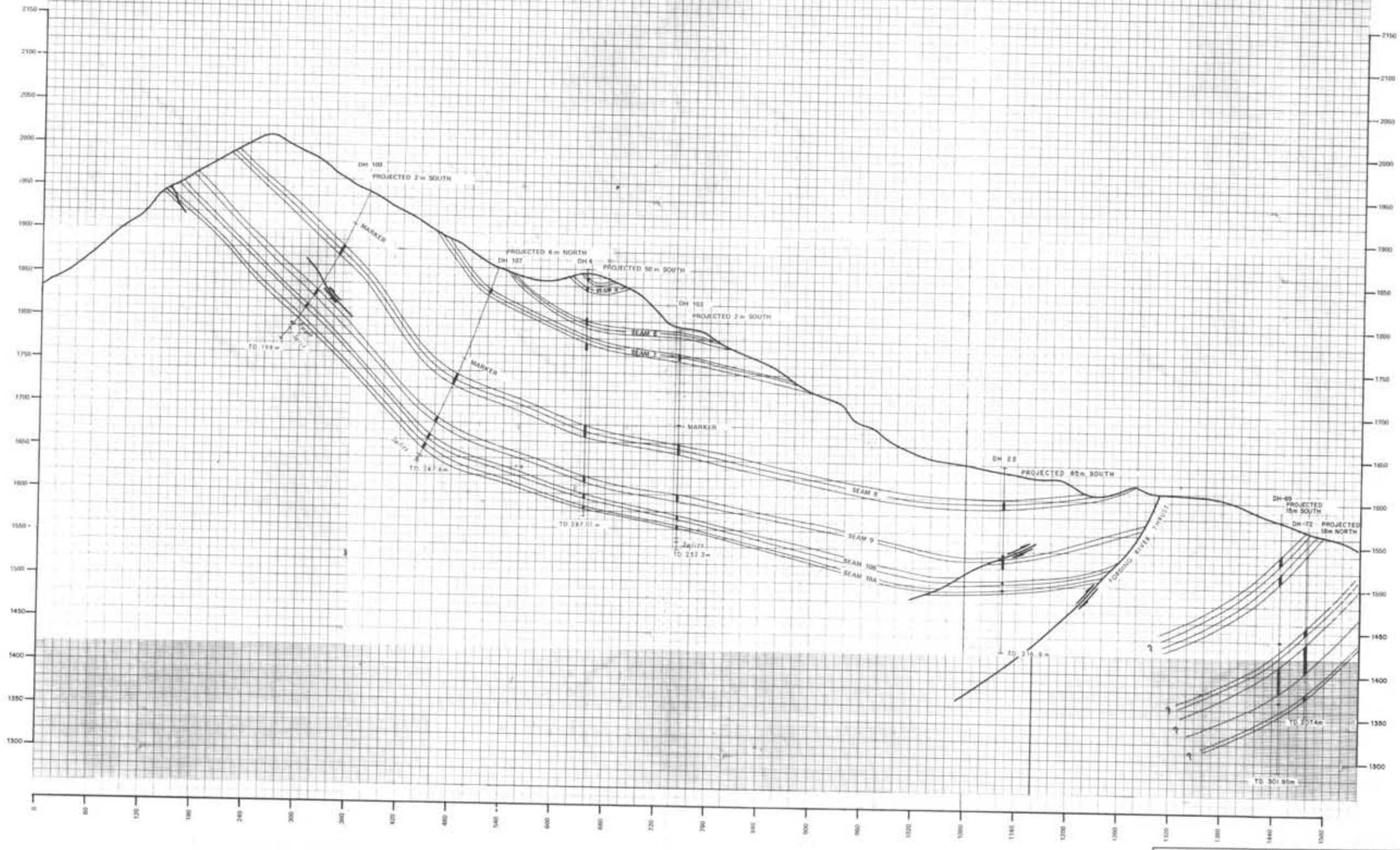
Figure 9A

ENCLOSURE No.

DRAWING No. HI-15H

SECTION - 1140
WEST

SECTION - 1140
EAST



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73(2)A

PR-SHELL-LINE C. (HORSESHOE R.)

Crows Nest Resources Limited
EXPLORATION

SOUTHEASTERN B.C.
LINE CREEK RIDGE

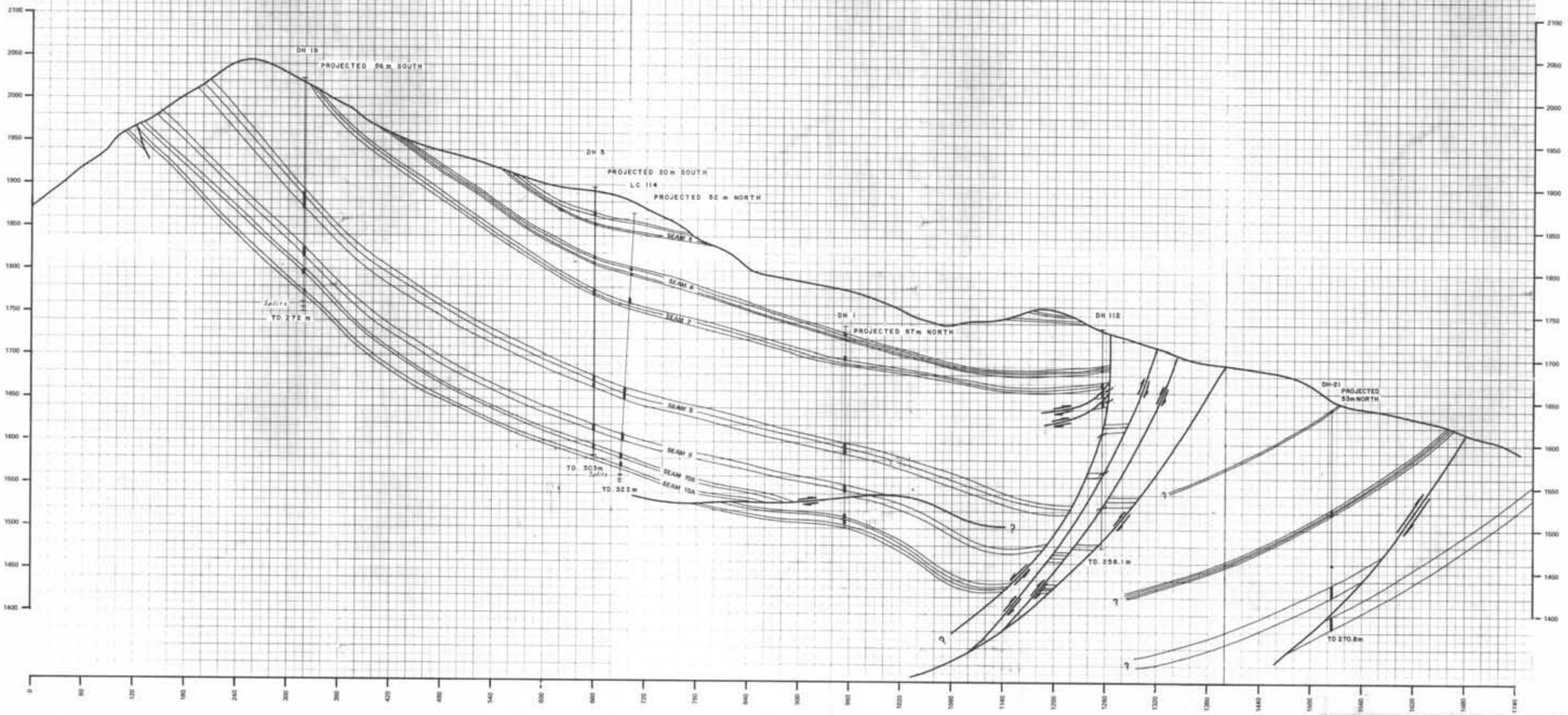
CROSS SECTION 1140

Figure 9B

AUTHOR Hannah B Cole	SCALE	ENCLOSURE No.
DATE JAN. 1979	REVISED	DRAWING No. HI-15G
In Accompany		

SECTION - 1440
WEST

SECTION - 1440
EAST



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78(2)A

PR-SHELL-LINE C. (HORSESHOE R.)

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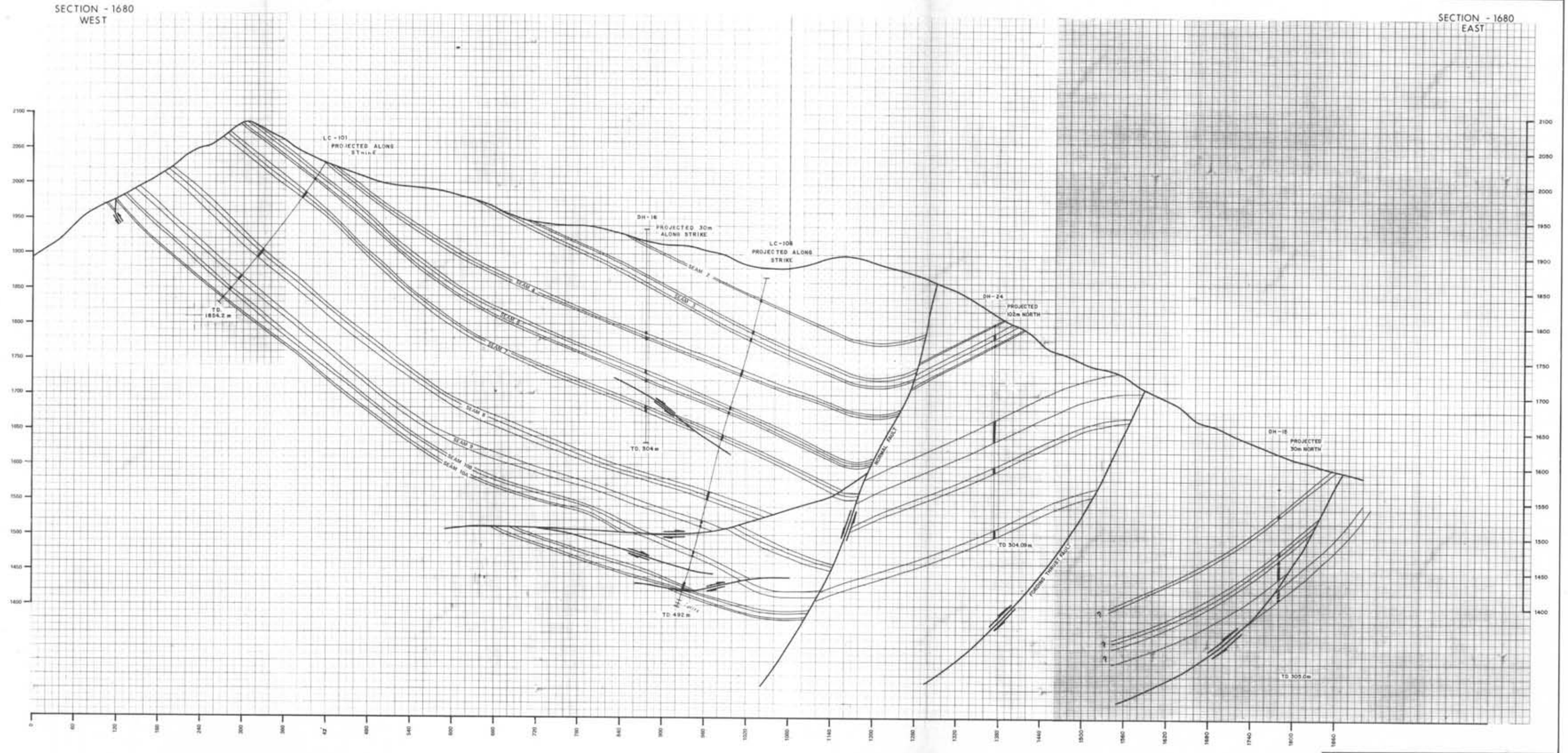
EXPLORATION

SOUTHEASTERN B.C.
LINE CREEK RIDGE

CROSS SECTION 1440

Figure 9C

AUTHOR Hannah & Cole	SCALE	ENCLOSURE No.
DATE Jan 1979	REVISED:	DRAWING No. HI-151
To Accompany		



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78(2)A

PR. SHELL - LINE C. (HORSESHOE R.)

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EXPLORATION

SOUTHEASTERN B.C.
LINE CREEK RIDGE

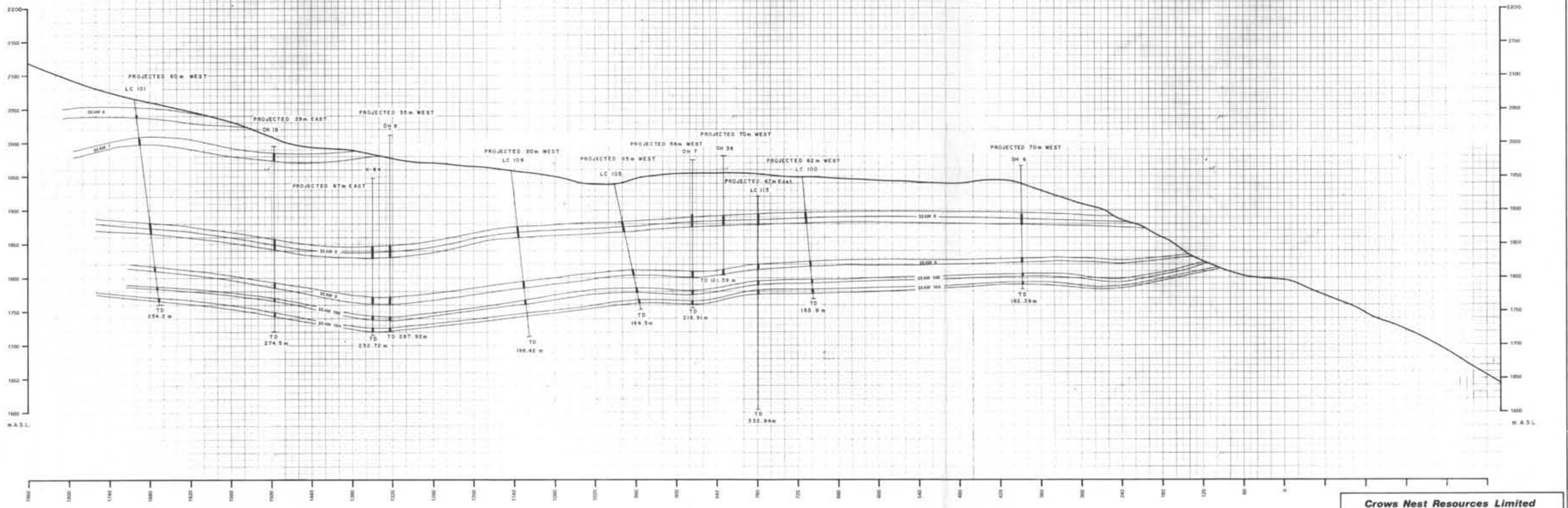
CROSS SECTION 1680

Figure 9D

AUTHOR Hannah & Cole	SCALE:	ENCLOSURE No:
DATE Jan. 1979	REVISED:	DRAWING No: HI-15F
To Accompany		

SECTION L360
NORTH

SECTION L360
SOUTH



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78(2)A

PR-SHELL - LINE @ (HORSESHOE R.)

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SOUTHEASTERN B.C.
LINE CREEK RIDGE

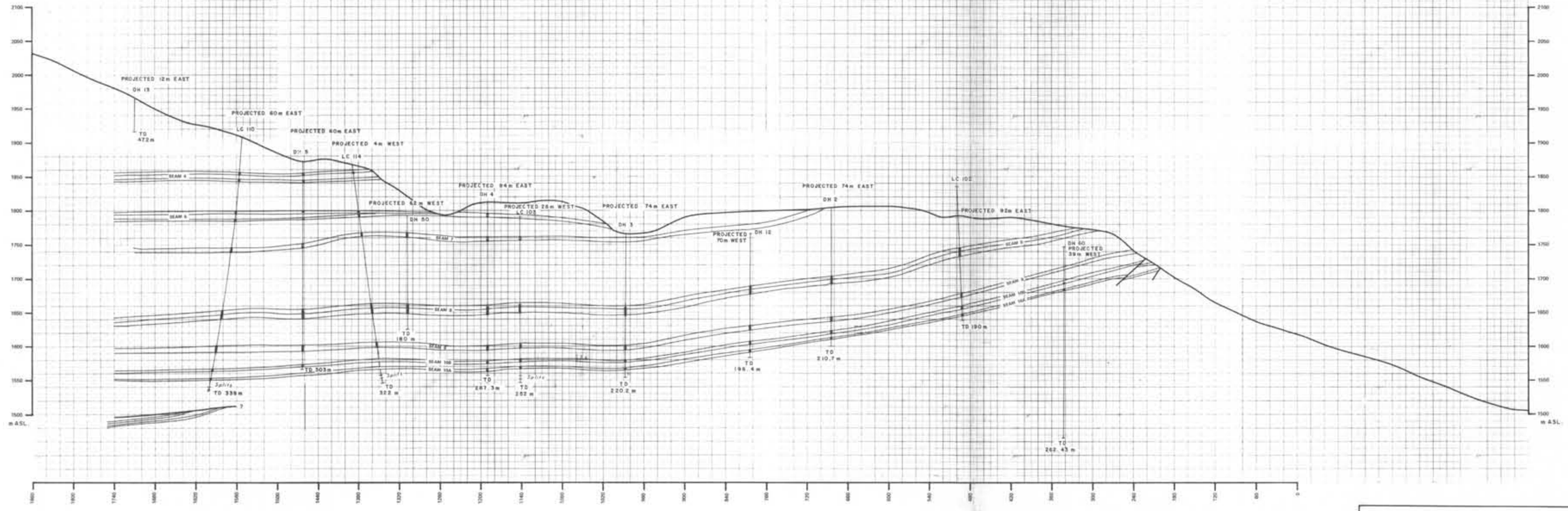
LONGITUDINAL SECTION L360

Figure 9E

AUTHOR Hannah & Cole | SCALE: | ENCLOSURE No.:
DATE Jan. 1979 | REVISED: | DRAWING No. HI-15K
To Accompany

SECTION L720
NORTH

SECTION L720
SOUTH



Crows Nest Resources Limited
EXPLORATION

SOUTHEASTERN B.C.
LINE CREEK RIDGE

LONGITUDINAL SECTION L720

Figure 9F

AUTHOR Hannah & Cole	SCALE:	ENCLOSURE No:
DATE Jan. 1979	REVISED:	DRAWING No: HI-15J
To Accompany		

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71(2)A.

PR-Shelf - Line C. (Horseshoe R.)