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TELKWA

COAL CREEK TELKWA PROJECT

1970 FIELD WORK

KAISER RESOURCES

G.P. GORMLIEY

1st Oct, 1970

GEOLOGICAL BRANCH
ASSESSMENT REPORT

00 223

~~TK-1~~
TK - COAL CREEK 7000A

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KAISER RESOURCES LTD.
COAL CREEK - TELKWA PROJECT
1970 FIELD WORK REPORT

62

Prepared by: G.P. Gormley, B.Sc.
October 1, 1970

Under the direction of
Alan A. Johnson, B.Sc.

Supervised by
J. E. Morris, P. Eng.

ABSTRACT

Field work on the Coal Creek coal deposit consisted of geological mapping at a scale of 1" to 1000' for the total coal licence area and follow-up detail mapping of the main seam exposures at a scale of 1" to 100'.

The completed 1" to 1000' mapping outlined the southern end of a lacustrine basin of Jurassic age. Rapid, non-cyclic deposition took place on an unstable plane of a volcanic flow surface causing slump faults along the basins eastern edge. A major lineal fault was found to cut off the sediments approximately 1 mile north of the main seam exposures.

The mapping sharply reduced the area of the property which was thought to be underlain by sedimentary units which could have contained potential for coal measures. Trenching and geological mapping in the vicinity of the main seams indicated that the seams were not consistent along strike. The average dip of 24° in this area also precludes the possibility of locating significant strippable reserves.

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KAISER RESOURCES	
TELKWA PROJECT	
COAL CREEK — ZYMOETZ RIVER AREA	
LOCATION MAP	
SCALE: 1 in = 150 mi	NTS
DRAWN: G GORMLEY/mg	REVISED:
DATE: Sept. 1970	PLATE: TKW-70-01a

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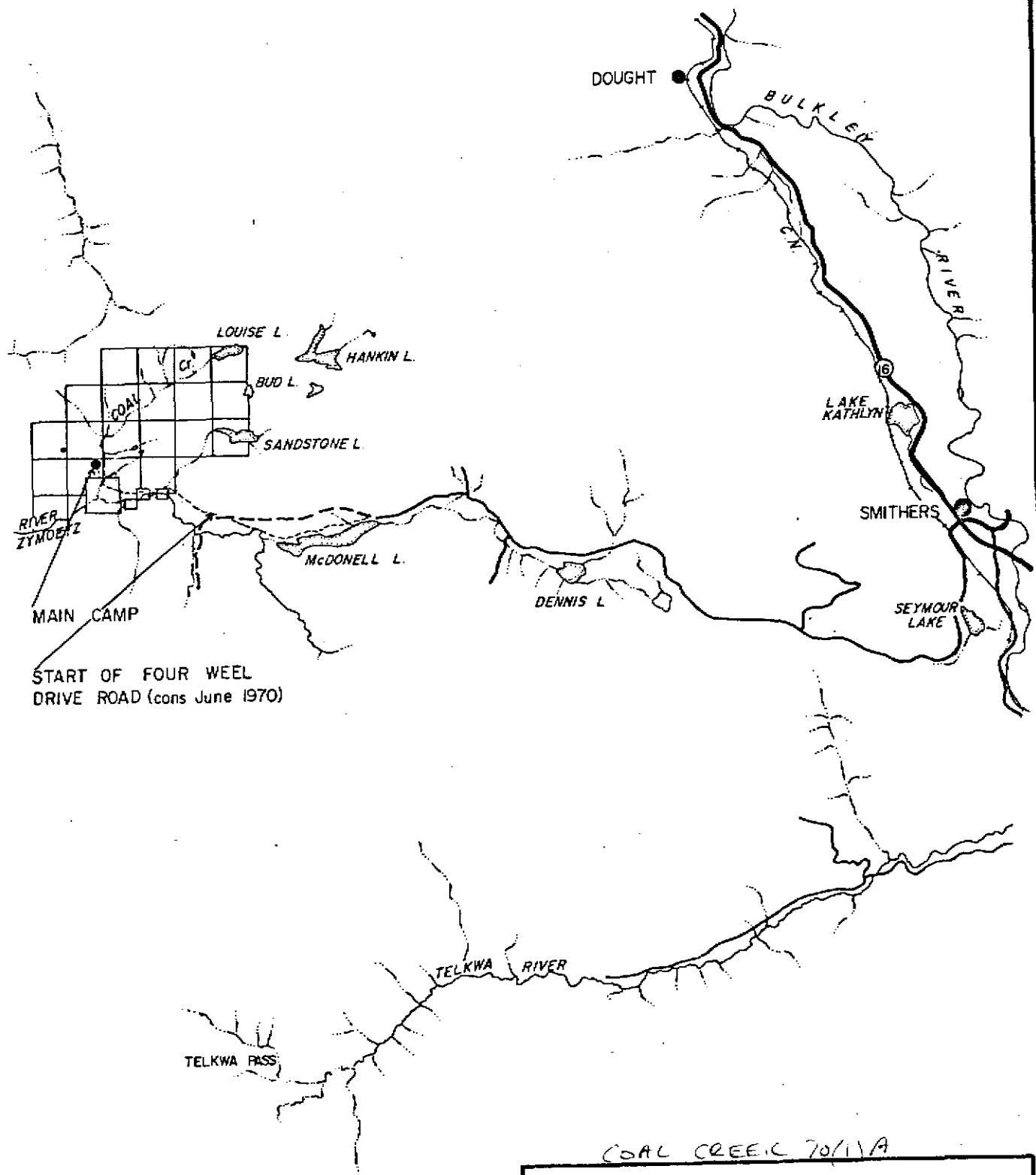
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INTRODUCTION

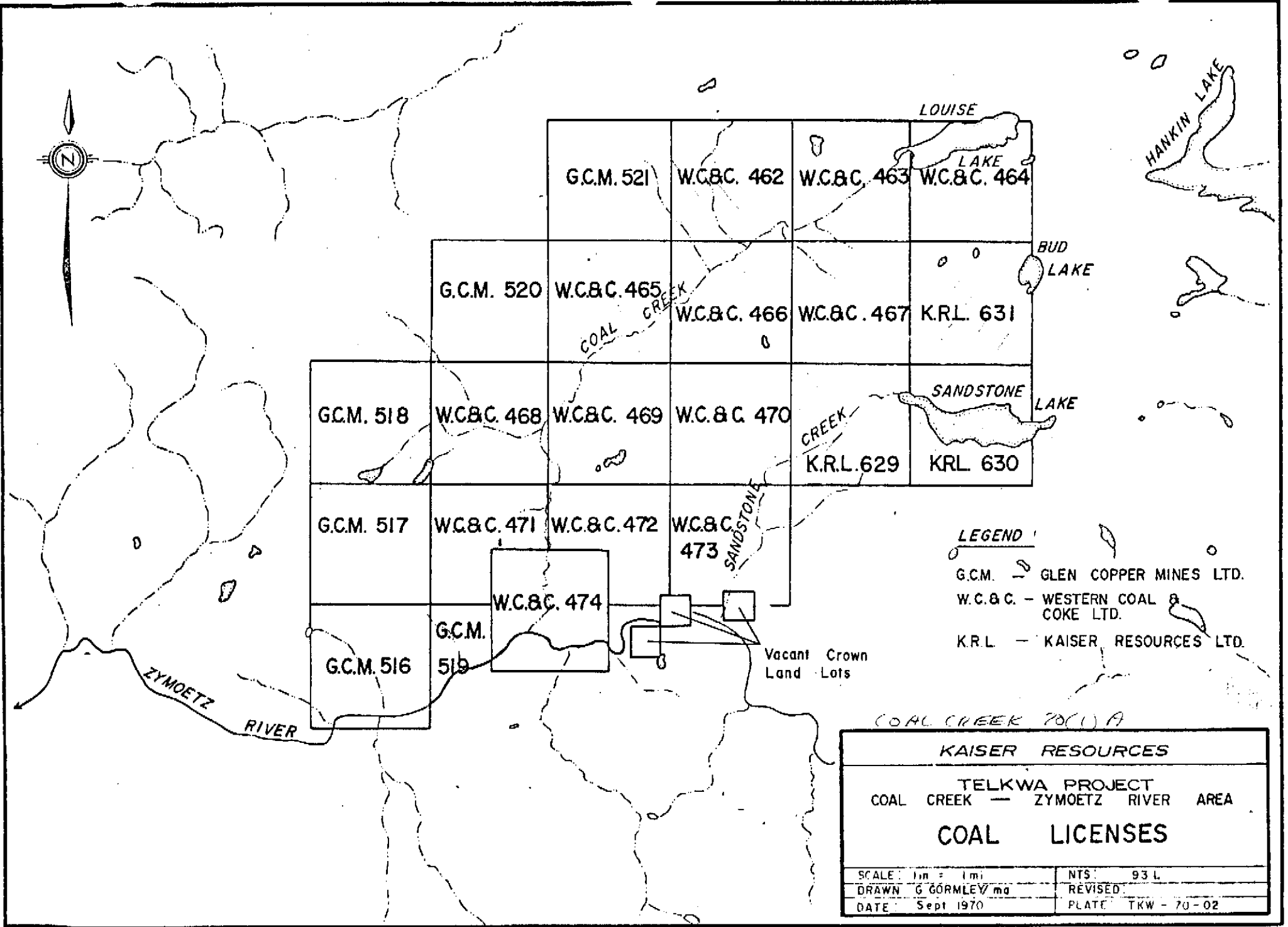
LOCATION AND ACCESS

The property is located in the Range 5 District of the eastern flank of the Coast Intrusive Complex. Surveyed coal licences extend from approximately $127^{\circ} 39'$ to $127^{\circ} 48'$ N.W. Longitude and from $54^{\circ} 47'$ to $54^{\circ} 52'$ N. Latitude (see plate TKW-70-01a). Access consists of a 2- and 4-wheel drive road, a total distance of 31 miles approximately due West of Smithers, B. C.. Rail distance from Terrace to the port of Prince Rupert is approximately 94 miles. 4-wheel drive access to the main exposures and camp was completed in June by repairing latter portions of the Smithers - McDonell Lake Road and by the construction of 4 miles of new road down the north bank of the Copper River and up the west bank of Coal Creek (see plate TKW-70-01b). It is expected that some cat work would be required to make the road passible next spring due to runoff and bank slumps.



COAL CREEK 70/11A

KAISER RESOURCES	
TELKWA PROJECT	
COAL CREEK — ZYMOETZ RIVER AREA	
LOCATION & ACCESS	
SCALE: 1 in. = 250,000'	NTS: 93 L
DRAWN: G. GORMLEY/mg	REVISED:
DATE: Sept. 1970	PLATE TKW - 70-01b



LEGEND

G.C.M. - GLEN COPPER MINES LTD.
 W.C.&C. - WESTERN COAL & COKE LTD.
 K.R.L. - KAISER RESOURCES LTD.

COAL CREEK 70(1) A

KAISER RESOURCES	
TELKWA PROJECT	
COAL CREEK — ZYMOETZ RIVER AREA	
COAL LICENSES	
SCALE: 1in = 1mi	NTS: 93 L
DRAWN: G GORMLEY mg	REVISED:
DATE: Sept 1970	PLATE: TKW - 70-02

LICENCE NUMBERS AND STATUS

All licences comprising the Coal Creek property were surveyed during early exploration and development work from 1910 to 1923. Since none of the original licence posts were found, the position of one post just north of the main seam exposures was calculated by chain and compass using information obtained from a previous detail map (Garde, 1923) of the main workings. All boundaries from this post were assumed to trend North South and East West and to be 1 mile in each direction. Positions of the licences as recorded on Government Land Office Maps are shown in plate TKW-70-02. The following list gives the ownership and status of the claims.

Land Lot. No.	Coal Lic. No.	Acreage	Ownership	Expiry Date
5580	462	640	*W.C. & C.	May 7, 1971
5579	463	640	" " "	" " "
5866	464	639	" " "	" " "
5570	465	640	" " "	" " "
5571	466	640	" " "	" " "
5572	467	640	" " "	" " "
5561	468	640	" " "	" " "
5560	469	640	" " "	" " "
5559	470	640	" " "	" " "
5554	471	480	" " "	" " "
5555	472	483	" " "	" " "
5556	473	611	" " "	" " "
2277	474	640	" " "	" " "

cont'd

LICENCE NUMBERS AND STATUS cont'd

Land Lot No.	Coal Lic. No.	Acreage	Ownership	Expiry Date
5863	629	637	*K.R.L.	Aug. 8, 1971
5864	630	635	"	" " "
5865	631	640	"	" " "
5540	516	640	*G.C.M.	Oct. 24, 1970
5553	517	640	"	" " "
5562	518	640	"	" " "
5539	519	173	"	" " "
5562	520	640	"	" " "
5581	521	640	"	" " "

*W.C. & C. - Western Coal & Coke Ltd.

K.R.L. - Kaiser Resources Ltd.

G.C.M. - Glen Copper Mines Ltd.

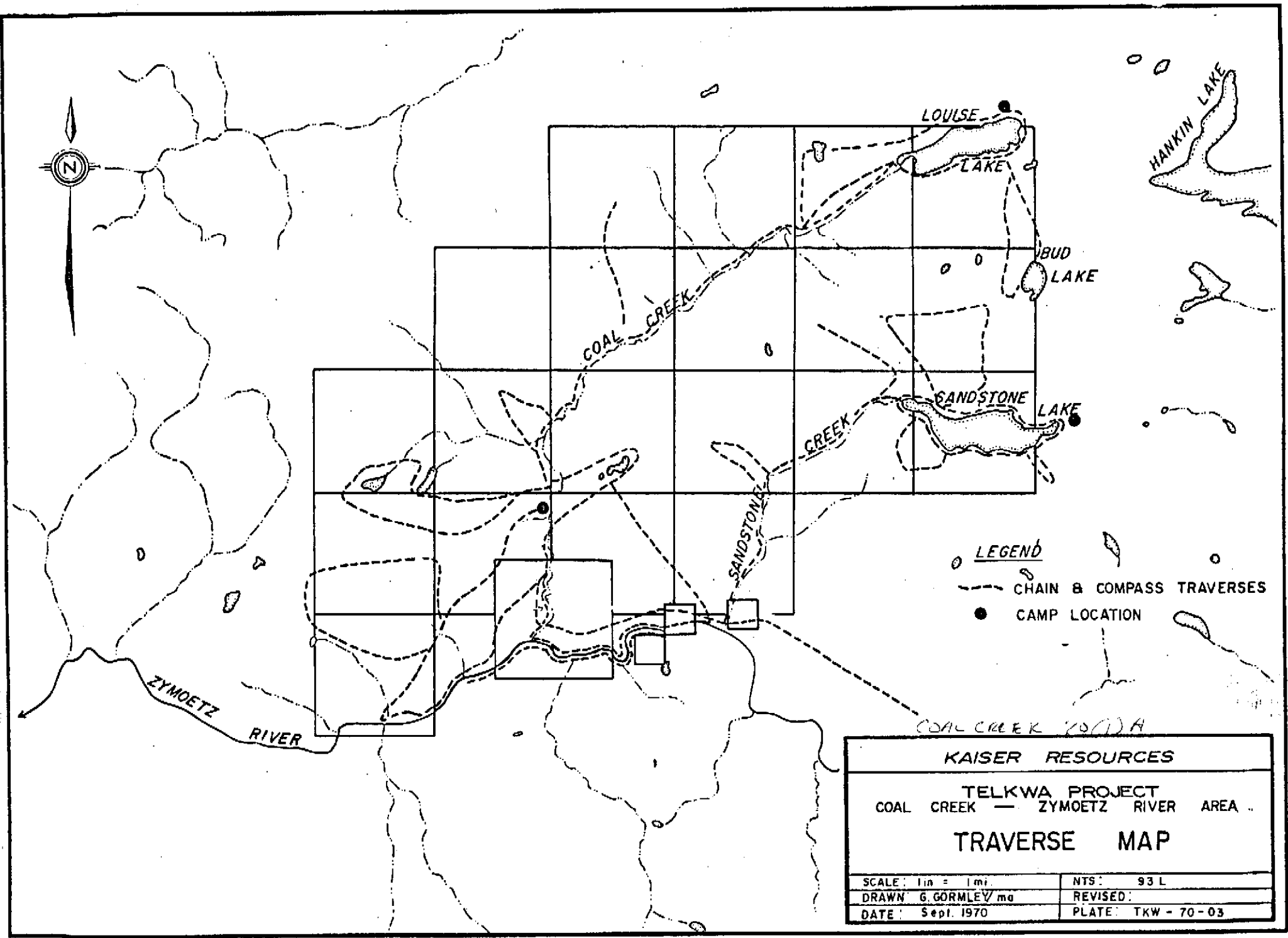
PURPOSE OF INVESTIGATION

This project was undertaken to investigate the extent of the sedimentary coal bearing unit and to establish both stratigraphic and structural relationships of the surrounding rock types. From completed geological mapping and from surface trenching and stripping, widths and continuity of coal seams were to make possible a preliminary economic appraisal of the property.

SEQUENCE AND METHOD OF INVESTIGATION

Prior to actual field work on the property, a mosaic of government air photographs was prepared in order to locate probable faults, lineations and areas in which traverses would most likely encounter outcrop. Aerial photography at a scale of 1" = 2000' and the subsequent provision of topographic maps was contracted to McElhanney Surveying and Engineering Ltd. of Vancouver. Once access was established to the main camp, chain and compass mapping traverses were initiated. Mylar overlays on air photographs were used to pin point outcrop locations and rock samples have been coded and bagged from each outcrop investigated. The majority of the mapping traverses originated from the main camp (Plate TKW-70-03) but two helicopter flycamps on Sandstone and Louise Lakes were required to complete regional mapping. The regional map was prepared by transferring individual traverse information onto 1" = 400' air photo blow ups and finally transferring and condensing all information to a 1" to 1000" topographic map. Trenching and stripping of the main seams was then begun to check their continuity and also to determine stratigraphy and structure. This work was initiated with 2 D-7E caterpillars but it was later found that due to the amount and "hard pan" nature of the

cont'd



LEGEND

- - - CHAIN & COMPASS TRAVERSES
- CAMP LOCATION

KAISER RESOURCES	
TELKWA PROJECT COAL CREEK — ZYMOETZ RIVER AREA	
TRAVERSE MAP	
SCALE: 1 in = 1 mi.	NTS: 93 L
DRAWN: G. GORMLEY/mg	REVISED:
DATE: Sept. 1970	PLATE: TKW - 70-03

SEQUENCE AND METHOD OF INVESTIGATION cont'd

overburden at depth a D-8 caterpillar equipped with a ripper was much more economical. A gas operated hand drill was used in some of the trenches to test overburden depth and also to establish the underlying rock type as stripping to surface would have been both time consuming and costly. All work and geological information found in the main seam vicinity was mapped by chain and compass at a scale of 1" to 100' (see plate TKW-70-05a and TKW-70-05b.)

ACKNOWLEDGEMENTS

Mr. Willard Thompson - (Consultant - Western Coal & Coke Ltd.)

- for furnishing a collection of old reports on the deposit and supplying drill logs of a 3 hole diamond drill program carried out in 1968.

Mr. Glen Huck - (Glen Copper Mines Ltd.)

- for locating positions of early diamond drill holes and indicating locations of old workings.

Dr. R. V. Best - (Paleontology Professor - U.B.C.)

- for assistance in fossil classification and views on depositional environment.

Greg Cave and Neil Osborne - (Geology and Zoology Students)

- for field assistance in mapping and sampling

GEOGRAPHY AND GEOMORPHOLOGY

Elevations on the property vary from approximately 2,500 feet at the Copper River to 4,900 feet at the top of a prominent volcanic ridge trending north east at the extreme northern boundary of the property. Relief was found to be pronounced only in areas of volcanic or igneous activity. Areas believed to be underlain by sedimentary stratum were characterized by deranged swampy drainage and up to 16 feet of glacial and alluvial overburden. It is estimated that only 25% of the coal licence area had surface exposure with outcrops of the two sedimentary units being restricted almost entirely to the banks of Sandstone and Coal Creeks at points south of a major fault. (See plate TKW-70-06).

Exposures of volcanic rock were highly weathered and rotted and due to their massive nature yielded little structural information. Climate and vegetation in the area was affected greatly by erratic humid influxes of coastal air up the Copper River valley from Terrace. Approximately 70% of the area had been burnt over by two previous forest fires and the remaining ground was heavily wooded and covered with thick coastal type bush.

STRATIGRAPHY AND PETROGRAPHY

STRATIGRAPHY

Six units including overburden were separable on the property. Due to the absence of contact exposures it was difficult to establish any reliable calculations of unit thicknesses but a reasonable chronologic succession was inferred from completed mapping and is listed as follows:

Lithologies	Age	Origin
1. Overburden: Sand Gravel Volcanic Clay Till	Pleistocene to Recent	Glacial; Drift & Alluvium
2. Quartz Monzonite	Upper Cretaceous (Early Tertiary)	Intrusive
3. Mixed Flow a) White, Yellow Rhyolite b) Black, Green Basalt	Tertiary	Minor Extrusive Flows
4. Sustut Group Sandstone, conglomerate mudstone and minor coal	Upper Cretaceous - Eocene	Non Cyclic, Turbid Marine??Deposition
5. Tuffaceous Greenstone Sediments	Middle - Lower Jurassic	Tuffaceous Flow
6. a) Biotitic Rhyolite b) Red and Purple Andesite	Lower - ???Middle Jurassic	Massive extrusive Flow

*Ref. Carter, N.C. & Kirkham, R.V., 1969, B. C. Dept. of Mines & Petroleum Resources, Map 69 - 1

LITHOLOGIC AND PETROGRAPHIC DESCRIPTIONS

1) Overburden

Overburden was found to depths of 12' to 16' to the east and west of the main seam exposures on Coal Creek. Medium clastic grained sand of arkosic composition graded into well rounded gravel and occasionally into a hard impervious till with a green or red volcanic clay matrix.

2) Quartz Monzonite.

Five separate intrusive bodies having the approximate composition of quartz monzonite were found on the property. These bodies were found as dome shaped plugs, dykes and one major faulted stock. The rock has a blue grey aphanitic appearance with degree of weathering and distance from intrusive core causing both physical and chemical variance. The approximate composition of a representative sample is:

Grey quartz	70 - 80%
Plagioclase feldspar	5 - 10%
K (Potassium) feldspar	5 - 10%
Ferro Magnesian Mafics and Pyrite	5%

The best exposures of this intrusive were found at Louise Lake near the North East corner of the coal licence area. Rock in this vicinity is characterized by kaolinization of K feldspar porphyry and also by

cont'd

LITHOLOGIC AND PETROGRAPHIC DESCRIPTIONS cont'd

a uniform pattern of quartz stringers and associated minute shear planes. Pyrite was disseminated through all the quartz monzonite in this area and minor molybdenite was found in one outcrop. Canadian Superior Explorations Ltd. were in the process of doing follow-up geochemistry on one remaining I.P. anomaly after a 13 hole diamond drill program last winter failed to establish any ore zones below the pyrite "halo". The intrusive has been found cutting both sedimentary and volcanic rocks with evident metamorphism and displacement of the major volcanic unit but little displacement of the sedimentary Sustut unit. This latter fact was illustrated in the vicinity of the felsite dyke on Coal Creek. (See plate TKW-70-06). From the texture and composition of the rock it is suspected to have been the result of a very rapid intrusion of residual material of a near surface batholith.

3) Mixed Flow Unit

White, Yellow Rhyolite and
Black, Green Basalt

Outcrops of the above rock unit were found sporadically to the west of the main exposures on Coal Creek. Fault displacements made a few of the outcrops very prominent but in general they were highly

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LITHOLOGIC AND PETROGRAPHIC DESCRIPTIONS cont'd

weathered and indistinct due to a moss or swamp cover. A consistent fine to medium grained texture and yellow to white color was exhibited in all rhyolite samples taken. All rocks west of the main coal exposures were previously mapped as sandstone of the Sustut unit (Chettleburgh, F.B. 1923). Hydrous iron oxide in the form of goethite (HFeO_2) was found in varying percentages as both fine grained disseminations and large spherical blebs. The oxides occasionally showed slight flow characteristics but these were of a very small and erratic nature. Stratigraphic placement of this unit above the coal bearing Sustut group was inferred from the positions and logs of early drill holes number 2 and 3 (see plate TKW-70-04). These holes encountered slightly dipping sedimentary sequences and number 2 bottomed in volcanic rock resembling map unit 6b, no rocks were encountered bearing any resemblance to the mixed flow unit. It is suggested that this unit was a minor extrusive which flowed into the sedimentary basin to the west of the drill holes and was later faulted and eroded.

4) Sustut Group

The Sustut group contains all coal seams on the property and on a regional scale forms a small sedimentary pocket in the surrounding Hazelton volcanics. Lithologic changes in the unit are

cont'd

LITHOLOGIC AND PETROGRAPHIC DESCRIPTIONS cont'd

very rapid and inconsistent in regard to correlation from drill hole to drill hole. Members consisting of coal seams, medium grained arkosic sandstone, grey carbonaceous mudstone and chert-pebble conglomerate were far thicker and consistent in nature near the old diamond drill holes which is again suggestive of the sedimentary basin bottoming in this area. Coal measures and sedimentary members were non-continuous near the main coal exposures and it is also noted that the main coal seam occurs much closer to the basement volcanic in this area than at the basin bottom.

Members:

Mudstone - Medium to dark grey mudstone in this unit was very porous and of a consistent "mud" grain size. Carbonaceous leaf and twig imprints and the occasional coal stringer were found along bedding surfaces throughout this member. (Fresh water environment)

Chert-Pebble Conglomerate - The conglomerate ranged from pebble to occasional cobble grain size and was generally found to have a quartz or chert rich matrix with iron oxide cement. Basic constituents of the conglomerate were red and green chert and slightly rounded volcanic

cont'd

LITHOLOGIC AND PETROGRAPHIC DESCRIPTIONS cont'd

pebbles and cobbles. Coal partings up to 1/8" in length were occasionally found in the conglomerate matrix suggesting that a rapid and short distance erosional process of a previous coal bearing sedimentary sequence was taking place.

Sandstone - Sandstone was of a consistent arkosic composition and contained no coal, vegetation or fossil remnants. Ripple marks were found in the sandstone at two locations near the main seam exposures. This feature is probably indicative of the edge of the depositional basin where it bordered with the basement volcanics.

Coal

The six original "discovery" seams were located and correlated on both banks of Coal Creek in the vicinity of the main camp. (See plate TKW-70-05b). There were no other areas where new coal was correlated or of an economic thickness. Seam exposures were not found to be continuous along strike to the North East as trenching yielded the underlying volcanic contact and a few small, disturbed seams in the overlying sediments. Due to narrow widths and wide stratigraphic thicknesses between seams,

attention was focussed only on the #1 and #2 seam which had measured clean coal thicknesses of 10.2' and 3.5' in seam aggregate of 17.2' and 7.2' respectively. A detailed analysis of the coal was carried out on the coal from the 1968 drilling program (Fuels Research Centre Divisional Report FRC 69-18-PREP) and yielded results placing the coal in the border range of high volatile A and high volatile B bituminous coal. (ASTM rating). Thermal quality was in the 14,500 - 15,000 range. 6" x 6" full width channel samples were taken on seams 1 and 2 from locations marked on plate TKW-70-05a and were shipped to the Kaiser lab in Fernie, B. C., for proximate analysis.

Results

Sample	Moist Percent	Volume Content Percent	Fixed Carbon Percent	Ash Percent	FSI
No. 1 Seam Clean Coal	6.4	46.7	20.1	26.8	NC
No. 1 Seam Coal and Mud	5.4	39.1	9.5	46.0	NC <i>Substrate</i>
No. 2 Seam Clean Coal	3.4	35.0	56.6	5.0	1
No. 2 Seam Coal and Mud	3.2	33.4	48.4	15.0	1

Moisture Content Bases on Air Dried Basis

NC: Non Coking

The above sampling was done only to establish a first estimate of grade as it is realized that surficial oxidation greatly affects coal quality. The coal sampled was very hard and shiny where clean and had parting in a range of 1/8" - 1/4". Parting surfaces were often coated with mud and had pyrite spherulites in a pitchy matrix. This latter occurrence was noted as the probable cause for the Fuels branch statement that pyrite could not economically be removed by conventional means.

5) Tuffaceous Greenstone Sediments

This rock has a distinctly clastic texture consisting of altered and fresh angular feldspar, rounded hematite, angular fragments of glass and intergranular chlorite. There appears to be very little quartz present. All feldspar have chlorite rims and some are sericitized. The rock is probably a tuff of rhyolitic or dacitic composition, grain size, alteration and the abundance of fossil zones suggest that it has been rapidly deposited in a marine environment. The following is a list of fossils which were studied from hand specimens of the unit:

cont'd

<u>PHYLLUM</u>	<u>GENUS</u>	<u>SPECIES</u>	<u>AGE</u>
Cephalopoda	Belemnnoidea	Belemnopsis	M. Jurassic
Cephalopoda	Belemnnoidea	Nannobelus	L. Jurassic
Cephalopoda	Gastropoda	Loxonema	Ord. - Miss.
Pelecypoda	Dysodonta	Anomia	Jurassic - Rec.

The above classification to species is not definite due to insufficient preservation but from the general study it was agreed that the assemblage was of Jurassic age.

6. a) Biotitic Rhyolite.

b) Red and Purple Andesite

The biotite rhyolite was a very distinct rock type having large well formed biotite phenocrysts in a creamy rhyolitic ground mass. It was found beyond the eastern property boundary north of Bunny Lake (see plate TKW-70-06) but very strong air photo trends suggest its presence as far south as Sandstone Lake. Due to linear borders and the absence of flow orientation, it is believed this unit was a rapidly injected volcanic dyke. The main red and purple andesite unit formed most of the relief through the central and eastern portions of the property. Surface exposures yielded little detailed information but it was evident the

cont'd

flow was plunging southwest and dipping northwest in directions which generally corresponded with the attitude of the deposition of Sustut sediments.

STRUCTURAL GEOLOGY

Regional

(See Plate TKW-70-06)

Intrusive Structure

It is believed that the felsite dyke on Coal Creek and the dome shaped plugs near the eastern property boundary were the result of subsurface channelling from the main quartz monzonite body located North of Louise Lake.

Faulting

There was no indication of intrusive origin on the fault system of the property. One prominent linear fault cuts the intrusive and thus is considered to be pre-Cretaceous in origin. A series of tensional linear faults extend from this main fault at various angles. The above fault system would be the result of a large scale surface disturbance and not any form of surface imbalance. There is a zone in the central portion of the property where rotational faults cut the andesite (Unit 6b) and which generally are found to occur near sedimentary contacts. These faults were probably the result of a very steep flow dip to the north west combined with basement movement

cont'd

which caused breakage and subsequent movement down dip along the plane of sedimentary deposition. One prominent slump fault plunging down dip to the north west was found along the creek draining Lynx Lake.

Sedimentary Structure

Structural information from the coal bearing sediments is restricted to Coal and Sandstone Creeks. An average based on 30 undisturbed sedimentary locations yielded an attitude of N 28° E/ 24° NW. Attitudes near or on slump faults however varied with fault direction. The average attitude is suggestive of the eastern portion of a lacustrine basin. The basin is terminated approximately 1 mile due north of the main showings by the upthrust of a lineal fault running diagonally through the property and to the east by the underlying andesite unit. The possibility for coal exposures on the western flank of the basin was not investigated beyond the western property boundary but it is certain that no exposures of the sediments occurred within the boundary. There is a possibility for coal measures on the bottom and western flanks of the basin below the overlying flow but surface indications show faulting and main seam exposures show inconsistencies in thickness throughout the coal measured (see plate TKW-70-04).

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Detailed Structure

(See Plate TKW-70-05 a, b)

Slump faults were indicated by drag folds and shearing in the coal seams. The faults were produced by unstable oversteepening of sedimentary deposition on the steeply dipping volcanic surface. From ripple mark structure and the attitudes of the oversteepening it is found that current direction was approximately 340. Although correlation of the 6 main seams was possible on both banks of Coal Creek it was found that thicknesses varied significantly and no reliable correlation of the seams could be made in the sediments encountered by the early drilling. Splitting and "pinching out" of some of the seams is thought to be the reason for thickness inconsistency.

GEOLOGIC HISTORY

After detailed study of the structural and lithologic features of the area, the following geological history is proposed:

1. An andesite flow plunging southwest and dipping northwest formed a basement structure.
2. Under a marine environment, fossils were abundant in embayments along the Sandstone Lake drainage and eastward to McDonnell Lake.
3. Rapid deposition of tuffaceous ash trapped fossils in the marine environment.
4. There was erosion of the tuff and volcanic flow from the non-marine environment in the vicinity of Coal Creek and westward.
5. The marine environment recessed followed by the deposition of Sustut sediments in a fresh water basin which trapped plant material.
6. The mixed rhyolite, basalt unit (3 a & b) flowed into the lacustrine basin to overlie the Sustut formation (Unit 4).

cont'd

7. Erosion and drainage: The drainage pattern along the sedimentary volcanic contacts established the present locations of Coal and Sandstone Creeks.
8. Intrusion of quartz monzonite with uplift was the possible cause for rotational faults in the andesite and also for additional slump faults along Sustut basement contact.
9. Regional faulting along the major fault trending north east resulted in numerous small faults in the sedimentary basin to the south east and in possible slump faults along the Sustut/basement contact.
10. Glaciation caused smeared and crushed contacts with the concomitant formation of a hard pan layer and deposited alluvium on both banks of the Copper River valley.

POTENTIAL RESERVES

A report dated July 7, 1969 by J. M. Black, P. Eng. acting on behalf of Western Coal and Coke Ltd., listed the following under reserves:

<u>Indicated</u>	<u>Length</u>	<u>Slope Length</u>	<u>Thickness</u>	
Lower Seam	940'	x 725'	x 8'	= 218,000 tons
		25 cu. ft./ton		
Upper Seam	940'	x 525	x 6'	= 130,000 tons
		25		
			Gross	<u>348,000 tons</u>

Deduct about 10% for possible washouts, faults, etc.: 38,000 tons

Indicated net tonnage 310,000 tons

Possible

Possible tonnage is $\frac{2000 \times 2200 \times 8}{25} = 1,400,000$ tons

From this is subtracted the indicated tonnage in the lower seam 218,000 tons

Therefore the net possible reserve is 1,182,000 tons

Total indicated and possible is 1,492,000 tons

Potential

Only a minor part of the area believed to be underlain by sediments has been explored. The potential reserves are large."

con'td

POTENTIAL RESERVES cont'd

Geological mapping has reduced the potential coal bearing area to a maximum of 2 square miles. Using an 8 foot average seam thickness a possible reserve of 35 million tons could be calculated for this area. However, various features of the coal make mineable reserves of this magnitude very improbable. The following is a list of these indications:

1. Dip

The dip of the bedding is consistently in the order of 24° both in the area of the coal outcrops and in the potential area to the north east. A slope of this magnitude precludes the possibility of underground mining in this area. There is virtually no area which would be amenable to strip mining as indicated by the following table which gives the stripping ratios versus length of seam extracted for a dip of 24° (assuming the pit wall slope is also 24°).

<u>Length of Seam Mined</u>	<u>Stripping Ratio</u>
100	4.70
200	9.40
300	14.12
400	18.82
500	23.53
700	32.90
1000	47.07

cont'd

POTENTIAL RESERVES cont'd

The pit wall slope could be greater than 24° and in fact the slope would vary with pit size and support strength of the bedrock. In any case, even if the pit walls were to approach 90° the stripping ratios given above would only be reduced by 1/2. Assuming a cut off stripping ratio of 10:1 which might be viable for very high grade coking coal it can be seen that the seams would only be mined along a 200 foot distance which would undoubtedly remain in the highly oxidized and thus poor quality zone.

There does not appear to be any potential for underground mining since there is no indication that the coal seams on the property are sufficiently continuous or uniform over distances which would justify this type of operation.

2. Slump faults and linear displacements break up the sedimentary coal area in various locations.

3. Splitting and thinning of the coal seams is found along strike in a southwesterly and westerly direction.

4. A high sulphur content has been found in near surface samples and is non-extractable by conventional methods. (ref. Fuel Research Centre Divisional Report - FRC 69/18 - Prep.)

RESPECTFULLY SUBMITTED

by:


G. P. Gormley, BSc.

October 1, 1970

BUDGET EXPENDITURE

The following is a list of minimum expenditures incurred by Kaiser Resources on the Telkwa Prospect up to November 9, 1970.

Explanation	Service or Requirements	Supplier	Cost
Roads - Contracted Work	Caterpillar Road Construction	J. Pidherney Constr. Ltd.	4000.00
Trenching - Contracted Work	Caterpillar Trenching	J. Pidherney Constr. Ltd.	8300.00
Surveying - Contracted Work	Aerial Photo- graphy and Topo- graphic Maps	McElhaney Surveying & Engineering	4155.60
Miscellaneous	22 Coal Licences Renewal	B.C. Gov't.	550.00
	Fees	B.C. Gov't.	5949.50
	Legal Easement	L.W. Perry & Assoc.	32.50
			<u>6532.00</u>
Transportation (Vehicles)	Truck(1/2 Ton Power Wagon) Rental	Brentwood Dodge	1863.00
	Maintenance & Fuel	Bovill Motors	201.14
	Maintenance & Fuel	Standard Oil	36.63
	Helicopter Charter	Okanagan Heli- copters	1698.69
		Haida Helicopters	67.00
			<u>3866.46</u>
Transportation (Rent)	Accommodation - Vancouver	Abbotsford Hotel	404.80
	- Smithers	Tyee Motor Hotel	864.58
	- McDonnel Lake	Copper Lakes Ranch	1386.50
			<u>2655.88</u>

... continued

BUDGET EXPENDITURE, continued

28.

Explanation	Service or Requirements	Supplier	Cost		
Transportation (Travel Expense)	Expense (Food & Travel)	G. Gormley			
		May 25 - Sept. 6	740.00		
		G. Cave			
		May 13 - Sept. 4	635.00		
		N. Osborne			
		June 22 - Sept. 1	200.00		
			1575.17		
	Travel Agency	McKenzie Travel	98.00		
	Car Rental	Hertz	72.79		
			170.79		
Geology	Cu & MoS ₂ Assays	T.S.L. Lab's	54.50		
Domicile & Camp Services	Camp Construction	Jones Tent & Awning	40.00		
		Russell Equip.	134.40		
		Apex Equipment	1404.00		
		Woods Bag & Canvas	76.55		
		Skeena Bldg. Supply	73.94		
		B.C. Industries	126.45		
					1855.34
		"	"	Camp Food	Super Valu
"	"	Camp Field Supplies	Versatile Equip.	58.79	
			Manex Mining	116.18	
			Smithers Hardware	427.28	
"	"	Draughting Services	Altair Draught. Van. Cal Reproductions	959.86	
			Western Reproductions	33.34	
				6.58	
			999.78		

BUDGET EXPENDITURE, continued

Explanation	Service or Requirements	Supplier	Cost
Wages	Supervision		
	J.E. Morris	June 1 - Sept. 1	900.00
	& A. Johnson	June 1 - Sept. 1	900.00
	Office Staff		500.00
	Field Crew:		
	G. Gormley	May 25 - Sept. 6	3468.00
	G. Cave	May 13 - Sept. 4	2468.40
	N. Osborne	June 22 - Sept. 1	1428.00
			<u>9664.40</u>
Communication	Telephone	B.C. Tel.	90.25
	Radio	Cdn. Marconi	<u>571.46</u>
			<u>661.71</u>
		TOTAL	45,984.35
	Exploration OVERHEAD 15%		<u>6,897.65</u>
	Total Expenditure		52,882.00

BIBLIOGRAPHY

Author	Year of Publication	Title
Black, J.E.	1969	Report (Property Appraisal for Western Coal & Coke Ltd.)
Canada Dept. Energy, Mines & Resources	1968	Fuel Research Centre Divisional Report - FRC 69/18 - Prep.
Carter, N. C. & Kirkham, R.V.	1969	B.C. Dept. of Mines & Petroleum Resources Map 69 - 1 (A geological compilation Map of Smithers, Terrace & Hazelton areas)
Chettleburgh, F.B.	1923	Copper River Coalfield (map)
Dept. of Mines & Resources (B.C.)	1944	Mines & Geology Branch Preliminary Map 44-23 - Smithers
Garde, A.C., P.Eng.	1923	Report - Copper River Coalfield
Geological Survey of Canada	1936	Paper 36 - 20
Geological Survey of Canada	1947	Coal reserves of Canada
Huang	1962	Petrology
Kindle, E.D.	1954	G.S.C. Memoir 223 Mineral Resources Hazelton & Smithers Area, B.C.
Lahee	1961	Field Geology
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Morgan, D.R.	1968	Preliminary Report
Morgan, D.R.	1968	Diamond Drill Logs A, B & C

cont'd

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Author	Year of Publication	Title
Sargent, H. S.	1968	Report on Work Done May 1968 - June 1969
Sargent, H. S.	1968	Preliminary Appraisal of Published Data on the Coal Creek Deposit
Sargent, H. S.	1968	Part I. Dependability of Coke Samples in Determining the Coking Quality of Coal Part II. Dependability of Determining the Coking Quality of Coal in the Prospect Stage. Part III. Coal in Coal Creek, Upper Zymoetz River, B. C..
Sargent, H. S.	1968	Interim Report #1, Part A & B
Sargent, H. S.	1968	Interim Report #2

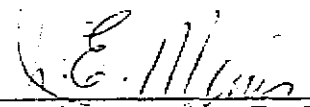
STATEMENT OF QUALIFICATIONS

Mr. Alan A. Johnson planned and directed the field exploration of Kaiser Resources Ltd. 1970 Coal Creek - Telkwa project under the general supervision of the undersigned. The field mapping and trenching were done as directed by Mr. Gordon P. Gormley.

Alan A. Johnson, B.Sc., graduated in Geology from Mount Allison University, Sackville, New Brunswick in 1963. Mr. Johnson has had a number of years experience as a geologist employed by mining companies in British Columbia. He currently holds the position of Senior Geologist, Vancouver, for Kaiser Resources Ltd.

Gordon P. Gormley, B.Sc., graduated in Geology from the University of British Columbia in 1970. Prior to his graduation Mr. Gormley worked as a field assistant for a number of major mining companies in British Columbia.

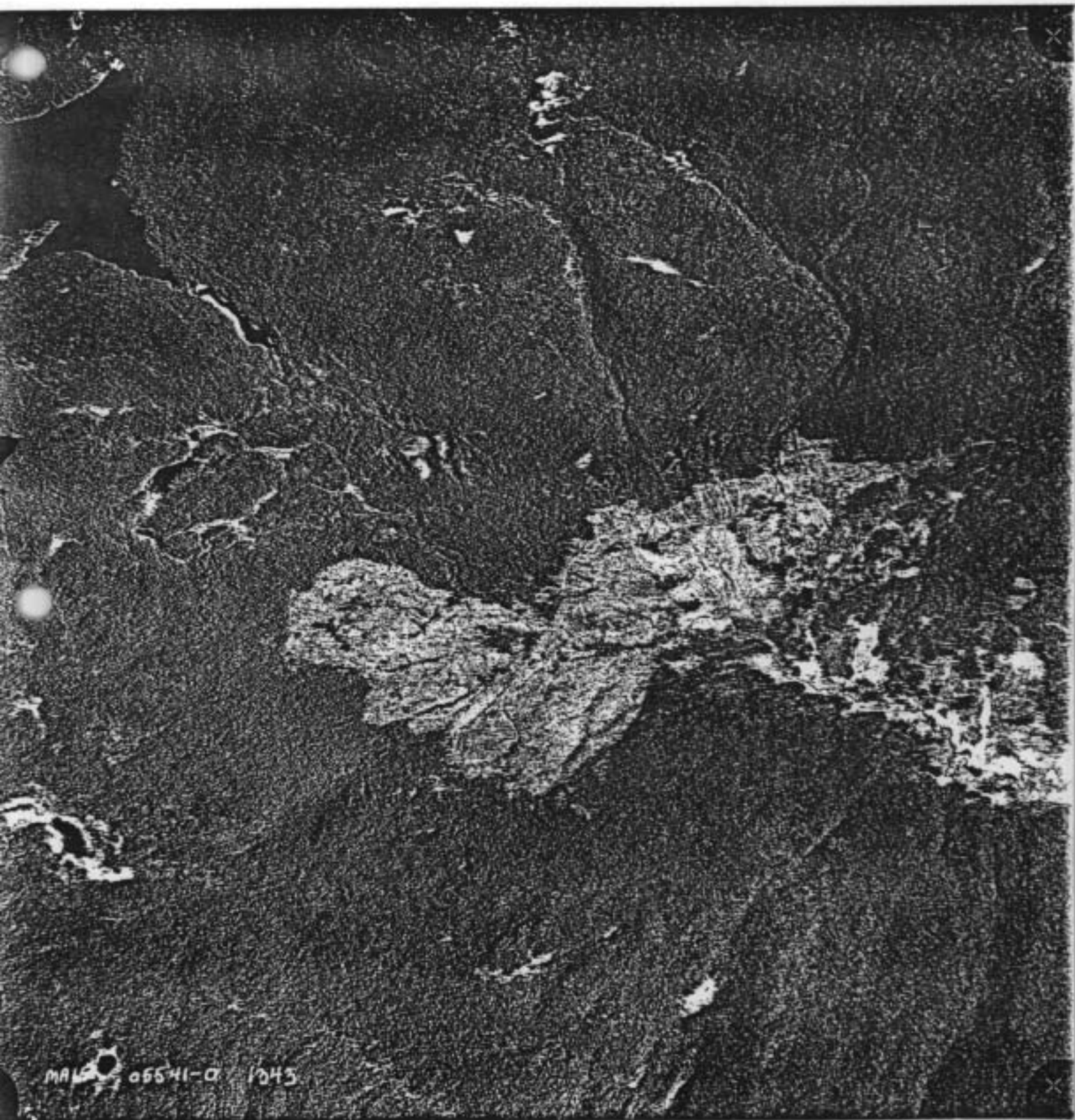
I consider both of the aforementioned geologists to be well qualified to undertake the responsibilities they were assigned on this project. I am satisfied that the attached report dated October 1, 1970 has been competently prepared and fairly represents the information obtained from this program.



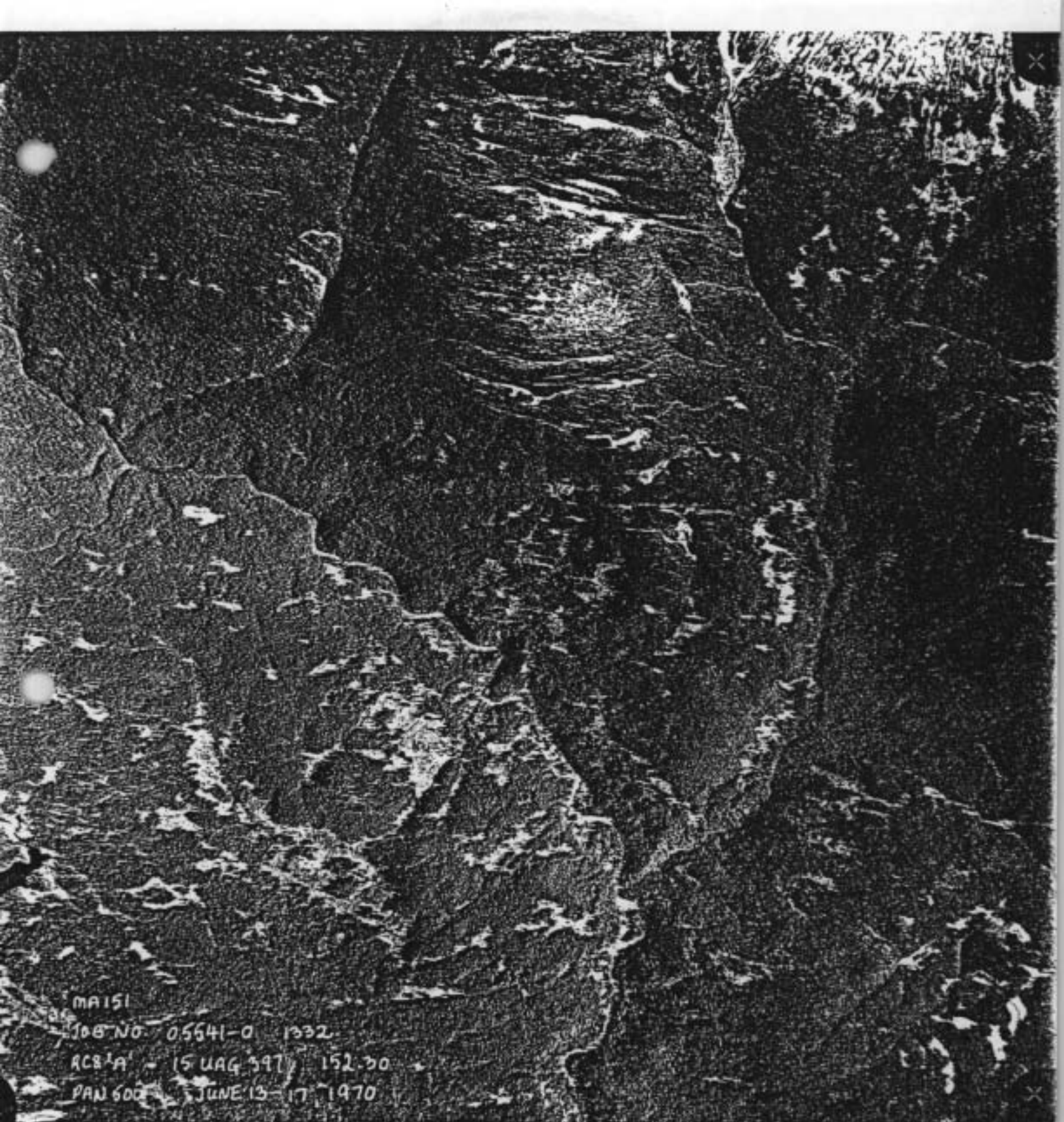
J. E. Morris, P. Eng.

October 1, 1970

PQ



MA 15 05541-0 1245



MAISI

JOB NO. 05541-0 1332

RCB'A - 15 UAG 397 152.30

PAN 600 JUNE 13-17 1970

PQ



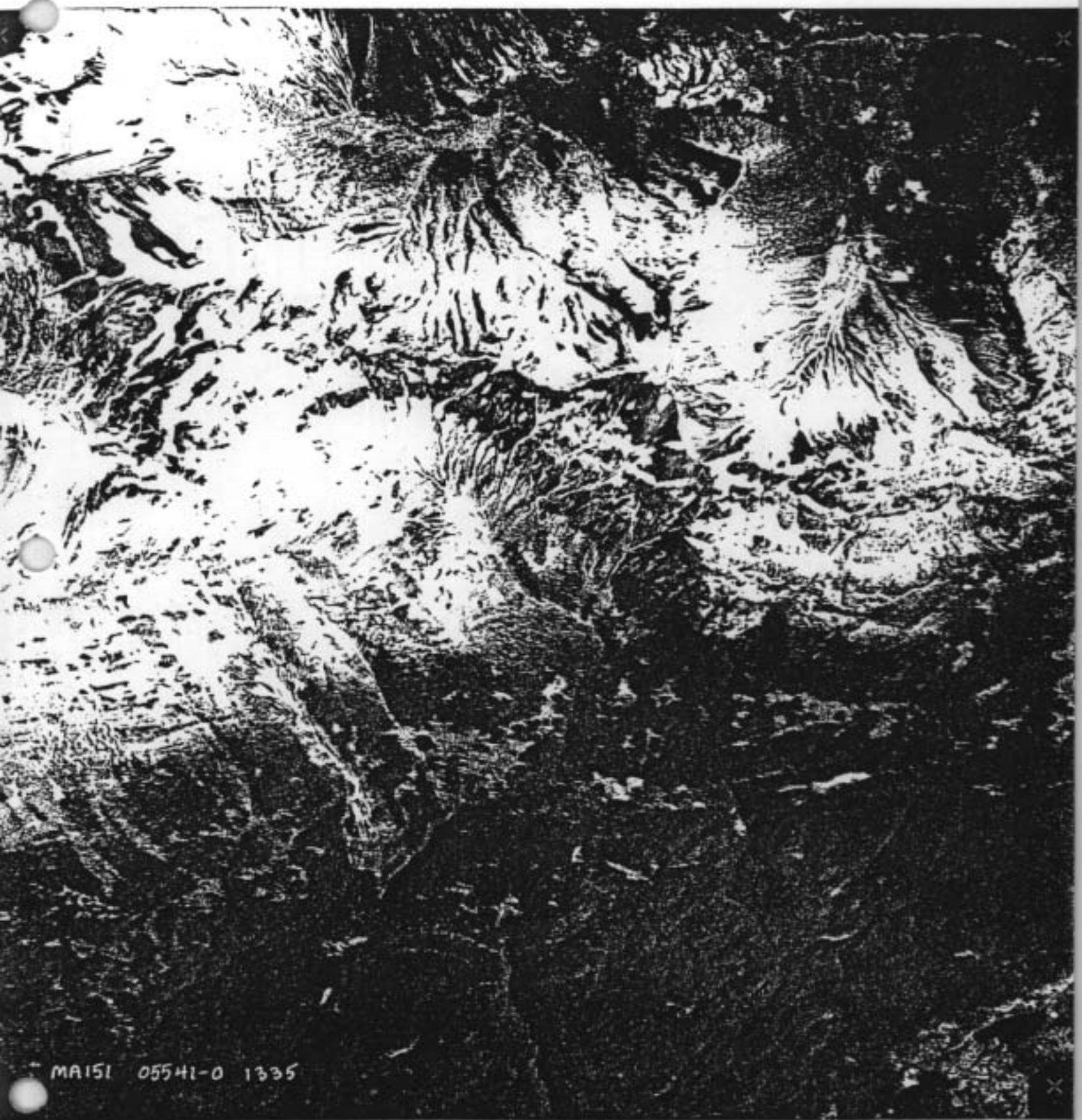
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MA 151 05541-D 1336

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MA 61-05641-D-1339

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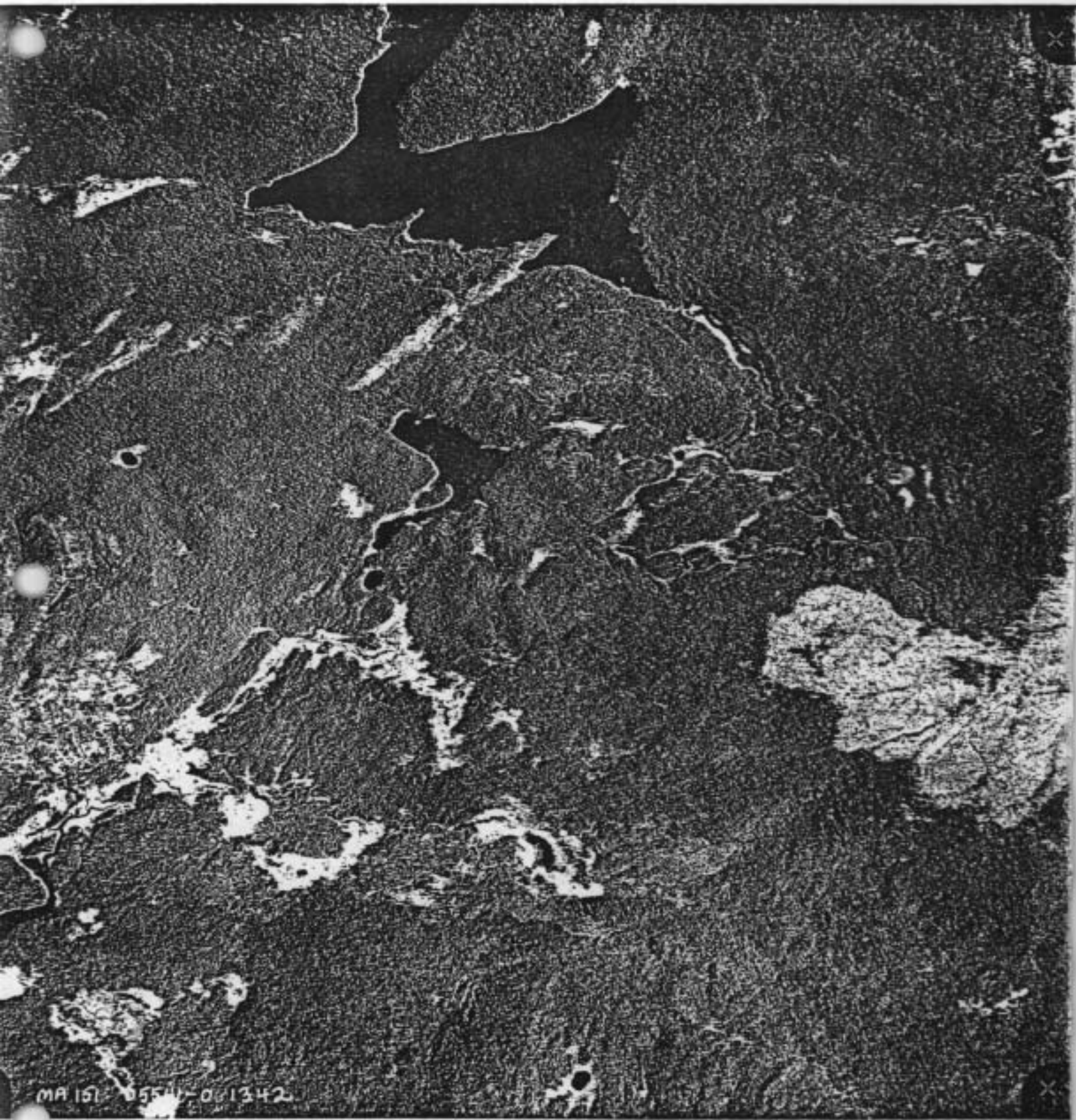
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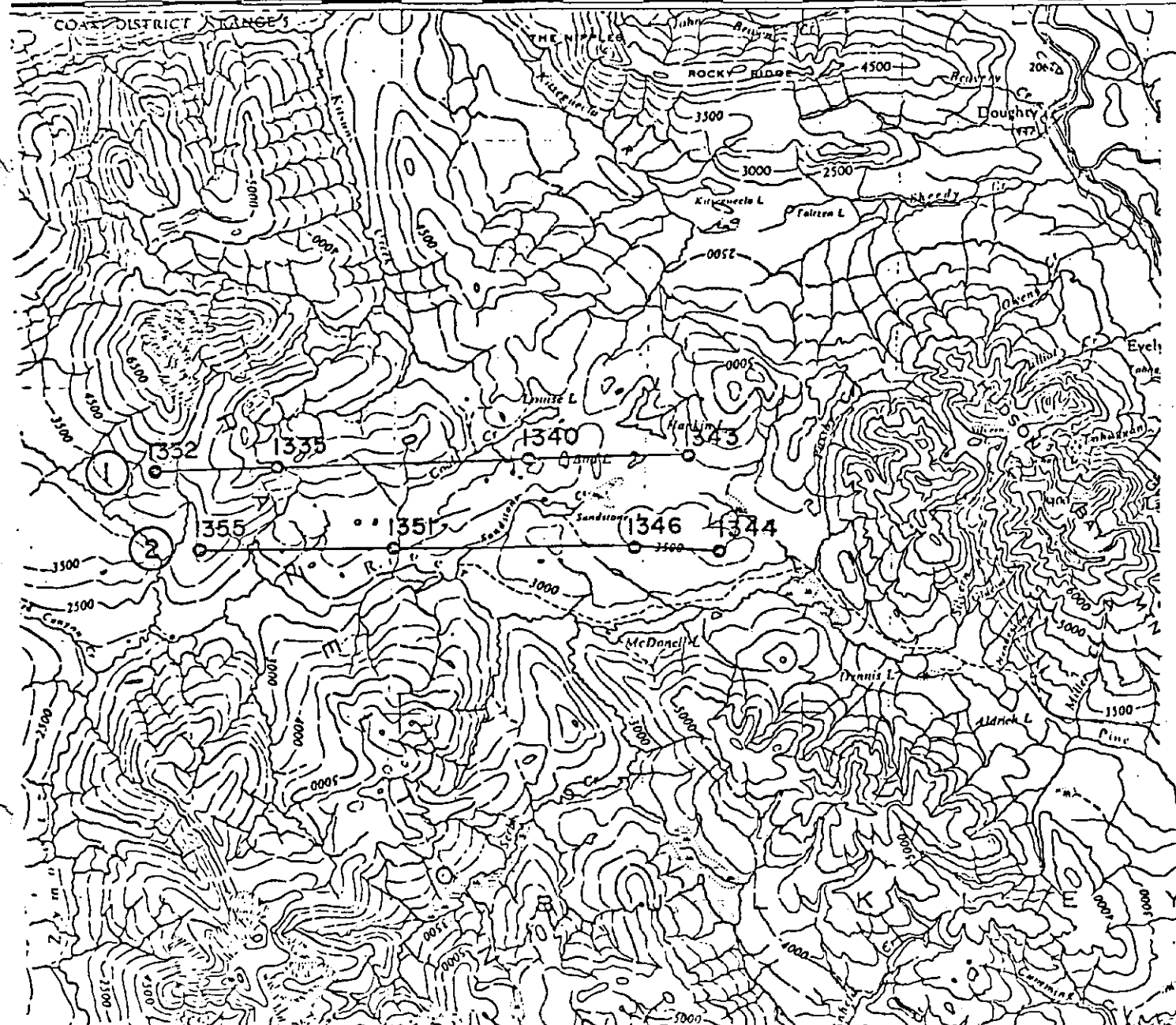
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MA 151 05541-061342

PQ



INDEX OF AERIAL PHOTOGRAPHY
OF
COPPER RIVER
FOR
KAISER RESOURCES LTD.

SCALE OF PHOTOGRAPHY 1" to 2000' (Approx.)

SCALE OF INDEX MAP 1 : 250,000

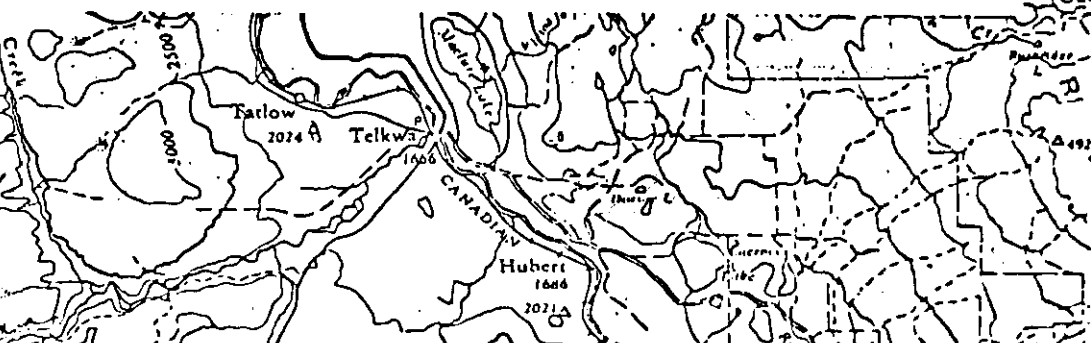
DATE OF PHOTOGRAPHY 13-17, JUNE 1970

ANNOTATED ROLL No. MA151 MASTER ROLL No.

McELHANNEY SURVEYING & ENGINEERING LTD.

Ref No. 05541-0 00223a

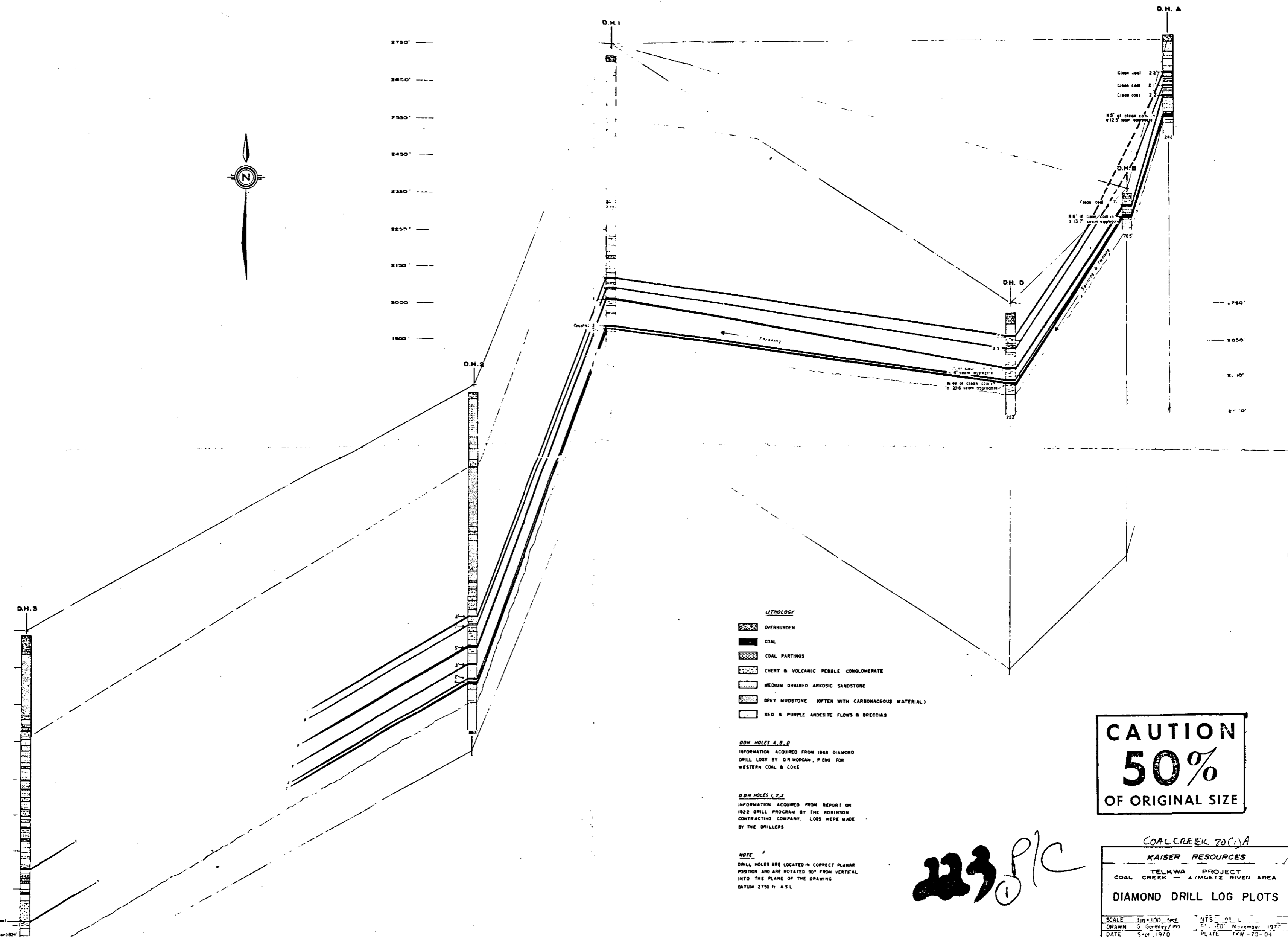
Gen - COAL CREEK 70(1)A





2750'
2650'
2550'
2450'
2350'
2250'
2150'
2000'
1950'

2750'
2650'
2550'
2450'
2350'
2250'
2150'
2050'
1950'



- LITHOLOGY**
- OVERBURDEN
 - COAL
 - COAL PARTINGS
 - CHERT & VOLCANIC PEBBLE CONGLOMERATE
 - MEDIUM GRAINED ARKOSIC SANDSTONE
 - GREY MUDSTONE (OFTEN WITH CARBONACEOUS MATERIAL)
 - RED & PURPLE ANDESITE FLOWS & BRECCIAS

D.M. HOLES A, B, D
 INFORMATION ACQUIRED FROM 1968 DIAMOND
 DRILL LOGS BY D.R. MORGAN, P. ENG FOR
 WESTERN COAL & COKE

D.M. HOLES 1, 2, 3
 INFORMATION ACQUIRED FROM REPORT ON
 1922 DRILL PROGRAM BY THE ROBINSON
 CONTRACTING COMPANY. LOGS WERE MADE
 BY THE DRILLERS

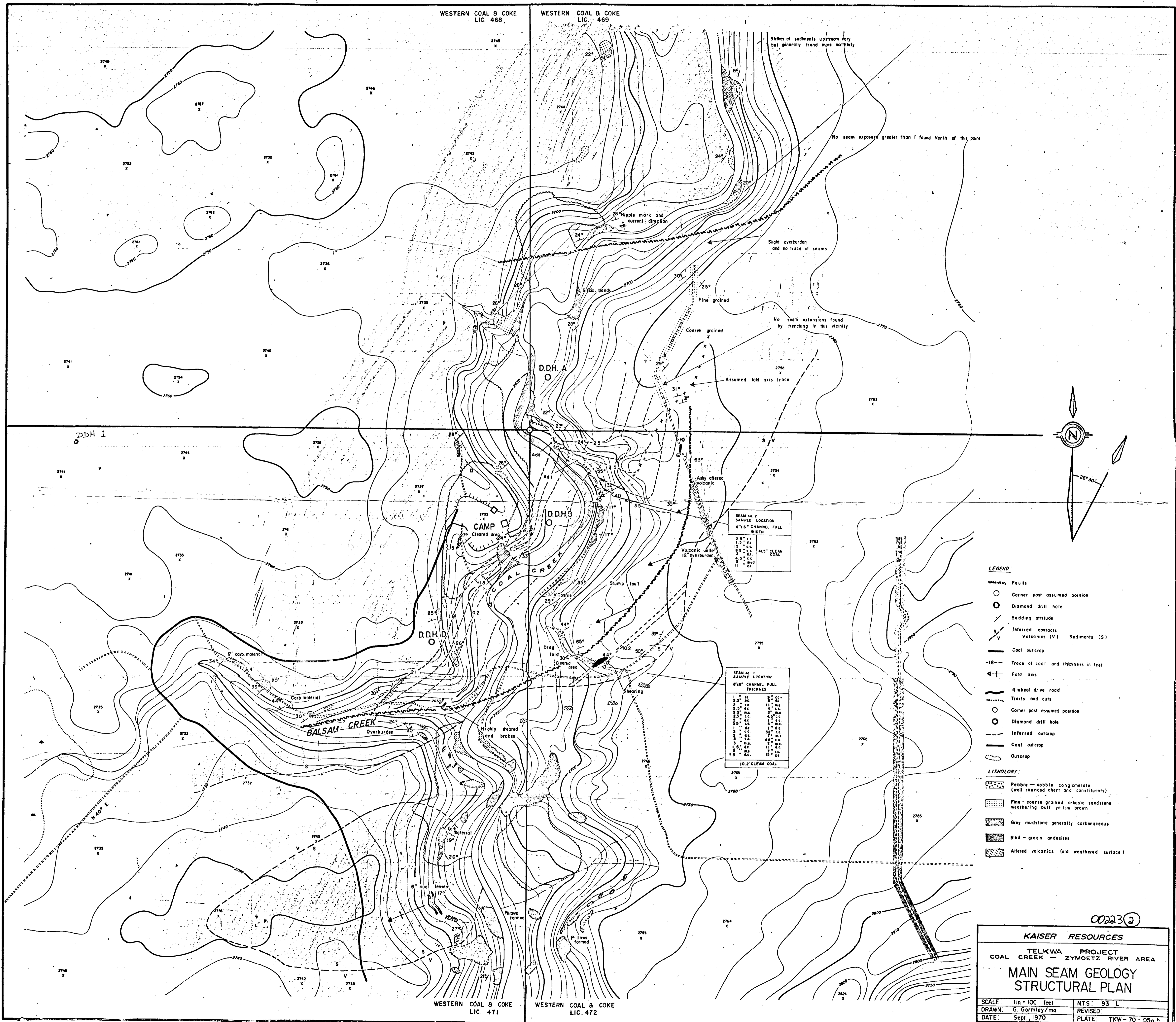
NOTE
 DRILL HOLES ARE LOCATED IN CORRECT PLANAR
 POSITION AND ARE ROTATED 90° FROM VERTICAL
 INTO THE PLANE OF THE DRAWING
 DATUM 2750 FT. A.S.L.

CAUTION
50%
OF ORIGINAL SIZE

223 PIC

COAL CREEK ZON(A)
 KAISER RESOURCES
 TELKWA PROJECT
 COAL CREEK - 2 / MGETZ RIVER AREA
DIAMOND DRILL LOG PLOTS

SCALE 1 in = 100 feet	NTS 93 L
DRAWN G. Gormley / ms	ET. RED November 1970
DATE 5-14-70	PLATE TW-70-04



WESTERN COAL & COKE
LIC. 468

WESTERN COAL & COKE
LIC. 469

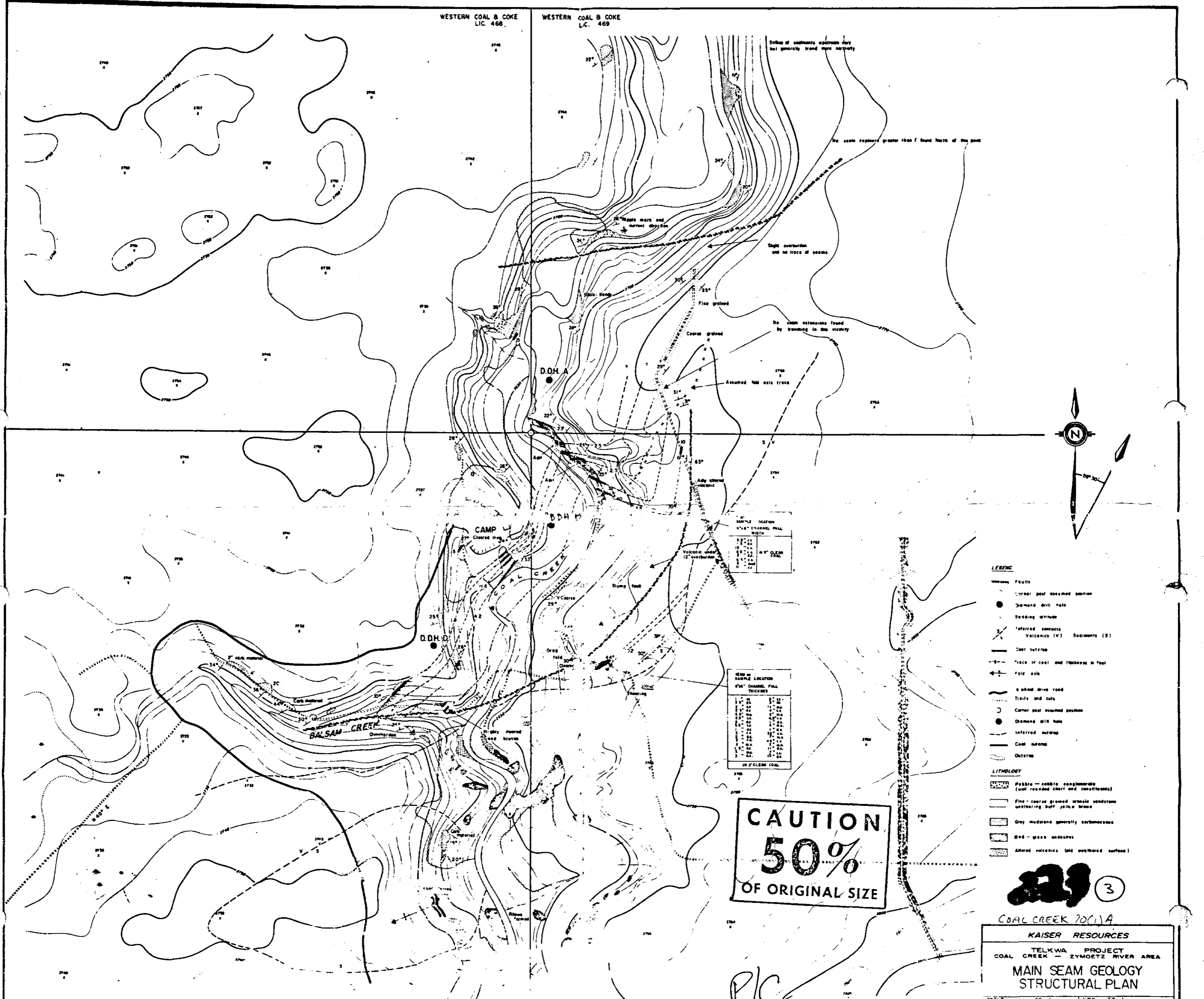


TABLE LOCATION
SAMPLE LOCATION
4" x 8" CHANNEL FILL
WIDTH

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

TABLE LOCATION
SAMPLE LOCATION
4" x 8" CHANNEL FILL
THICKNESS

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

CAUTION
50%
OF ORIGINAL SIZE

- LEGEND**
- Fault
 - Corner post assumed position
 - Diamond drill hole
 - Bedding strike
 - Inferred contacts
 - Volcanics (V) Sediments (S)
 - Coal outcrop
 - Trace of coal and thickness in feet
 - Fold axis
 - 4 wheel drive road
 - Trails and cuts
 - Corner post assumed position
 - Diamond drill hole
 - Inferred outcrop
 - Coal outcrop
 - Outcrop
- LITHOLOGY**
- ▨ Rubble - cobble conglomerate (well rounded chert and concretionary)
 - ▨ Fine - coarse grained arkosic sandstone weathering buff yellow brown
 - ▨ Grey sandstone generally carbonaceous
 - ▨ Red - gray sandstone
 - ▨ Altered volcanics (old weathered surface)

223 ③

COAL CREEK 70C1A

KAISER RESOURCES

TELKWA PROJECT
COAL CREEK - ZYMOETZ RIVER AREA

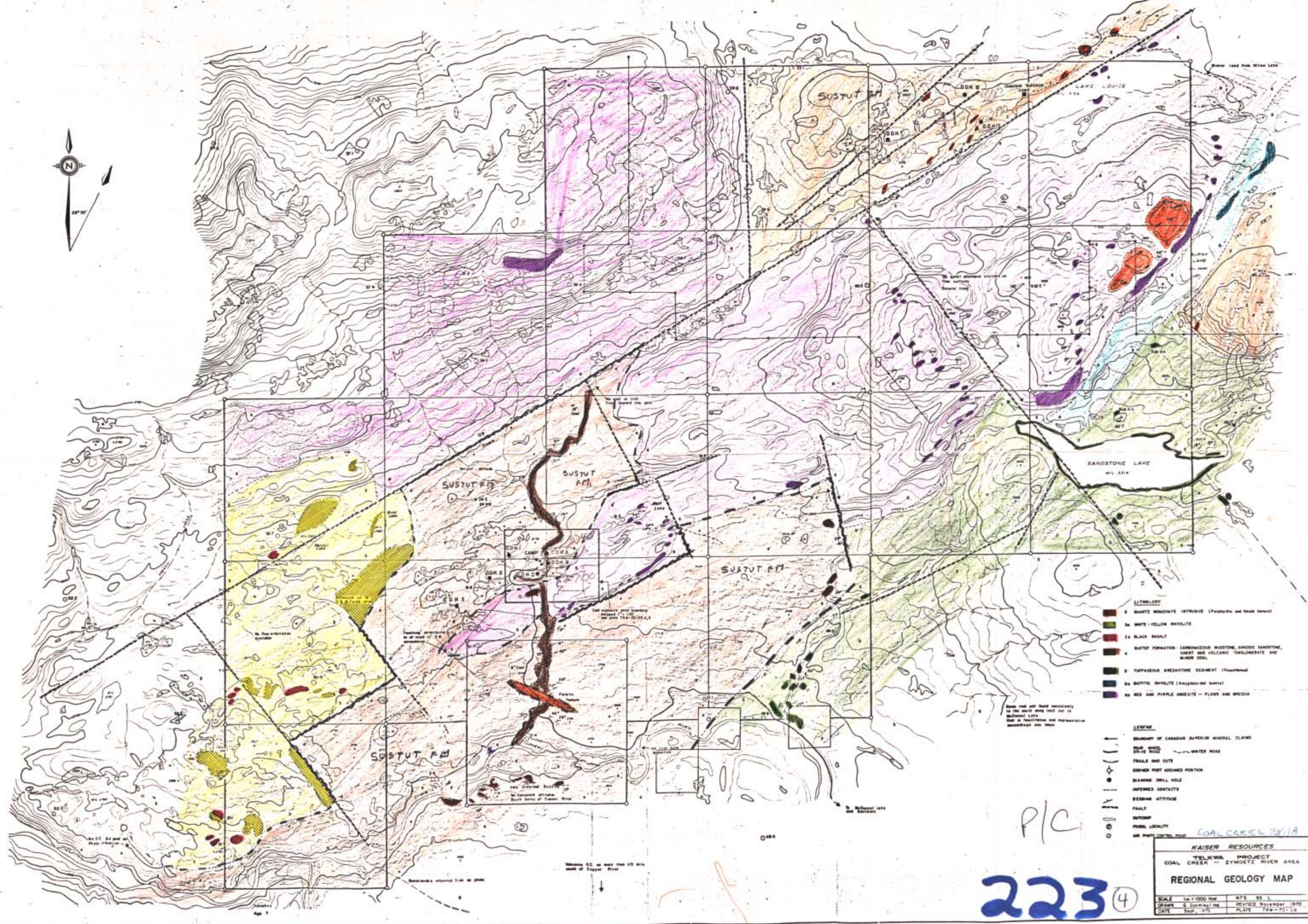
**MAIN SEAM GEOLOGY
STRUCTURAL PLAN**

SCALE	1 in = 100 feet	NTS 93 L
DRAWN	G. Gormley/mg	REVISED
DATE	Sept. 1970	PLATE TKW-70-05a,b

WESTERN COAL & COKE
LIC. 471

WESTERN COAL & COKE
LIC. 472

PIC



- LITHOLOGY**
- 1 QUARTZ MONZONITE INTRUSIVE (Felsophyric and Neomonzonitic)
 - 2a WHITE-YELLOW BIFOLITE
 - 2b BLACK BASALT
 - 3 BATHOLITIC FORMATION - CARBONACEOUS MUDSTONE, ARGILLIC SANDSTONE, CHERT AND VOLCANIC TONGUESTONE AND MINOR GYPSUM
 - 4 TUFFACEOUS BRECCIA SEDIMENT (Fossiliferous)
 - 5a BOTTLE BIFOLITE (Amphibolitic units)
 - 5b RED AND PURPLE ANDESITE - FLUOR AND BRECCIA

- LEGEND**
- BOUNDARY OF CANADIAN SUPERIOR MINERAL CLAIMS
 - ROAD WITH DRIVE ROAD
 - TRAILS AND CUTS
 - CORNER POINT ASSUMED POSITION
 - DIAMOND DRILL HOLE
 - INFERRED CONTACTS
 - BOUNDARY ALTITUDE
 - FAULT
 - SETBACK
 - PERM. LOCALITY
 - AN. POINT CONTROL POINT

KAISER RESOURCES
 TELKWA PROJECT
 COAL CREEK - ZYMDETZ RIVER AREA
REGIONAL GEOLOGY MAP

SCALE 1:1000 feet
 DRAWN & CHECKED BY
 DATE Sep. 1970

NTS 95 L
 REVISED November 1970
 PLATE TW-70-04

PIC
 223 (4)

Whitson DC at base of Tepper River

Stratigraphic interval 1000 to 1000

Page 1