

4335

GEOLOGICAL, GEOCHEMICAL AND GEOPHYSICAL REPORT

on the

TC-PO GROUPS OF CLAIMS

SIMILKAMEEN MINING DIVISION

BRITISH COLUMBIA

92 H / 16 E

- for -

PAN OCEAN OIL LTD.  
1050 - Three Calgary Place  
355 - 4th Avenue S.W.  
Calgary 1, Alberta

Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
No. 4335 MAP

Covering:

PO #1 to PO #53 inc., PO #54 FR.,  
PO #55 FR., PO #56 FR., PO #57 to  
PO #62 inc., TC #5 to TC #14 inc.,  
TC #27 to TC #34 inc., TC #36,  
TC #51 to TC #62 inc., TC #75 to  
TC #86 inc., TC #97 to TC #112 inc.,  
TC #121, TC #123 to TC #132 inc.,  
TC #145 to TC #148 inc.

Work Performed:

April 28 - November 24, 1972

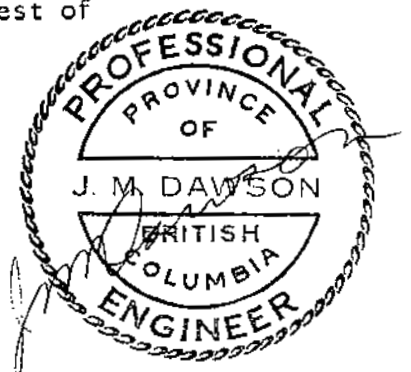
Located:

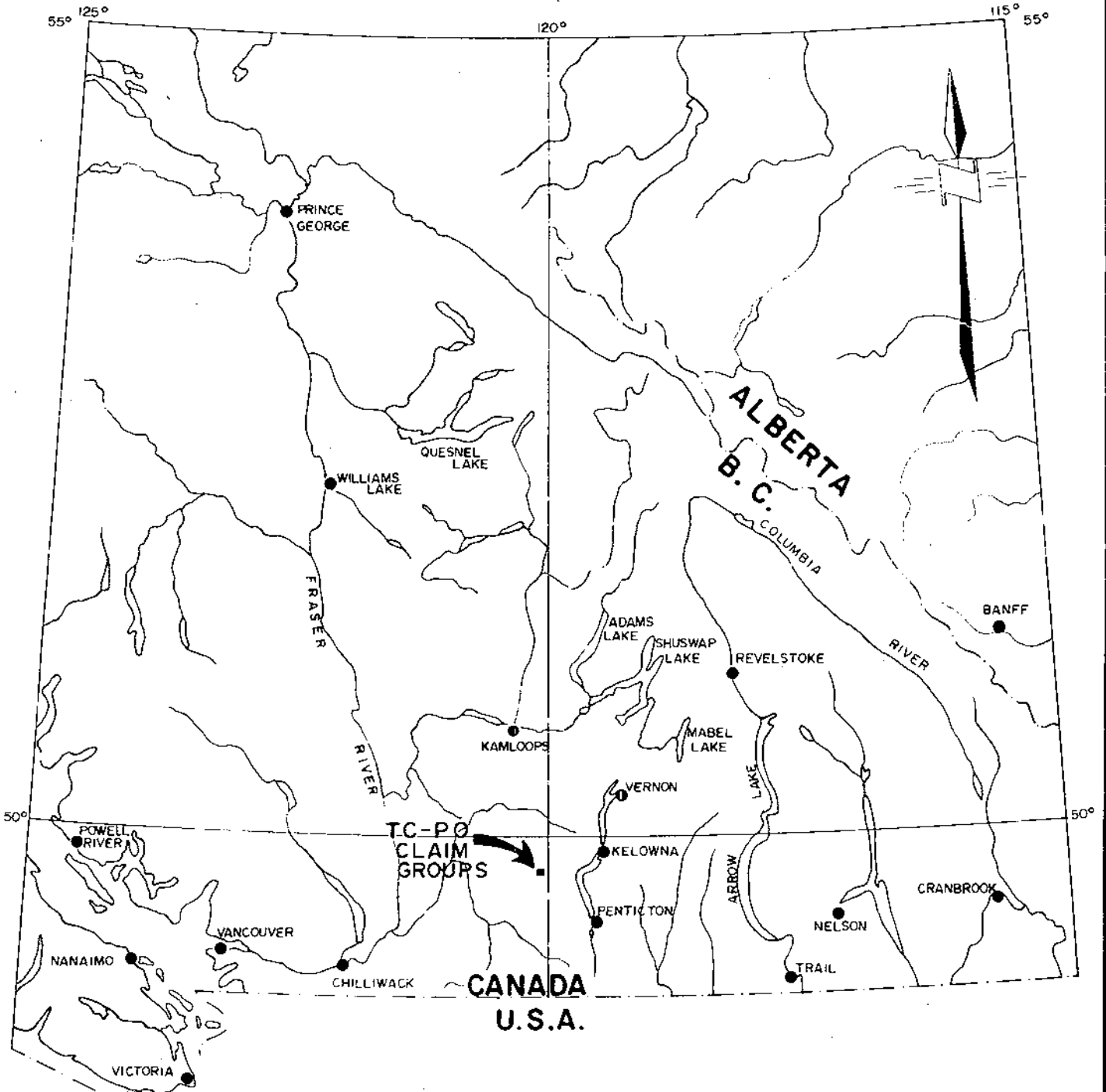
- 1) 49°47'N, 120°08'W
- 2) N.T.S. MAP 92H/16E
- 3) On Trout Creek, 18 miles West of Peachland.

prepared by

KERR, DAWSON & ASSOCIATES LTD.  
9-219 Victoria St.  
Kamloops, B. C.

J.M. Dawson, P. Eng.  
November 24, 1972





Department of  
 Mines and Petroleum Resources  
 ASSESSMENT REPORT  
 NO. **4335** MAP # **1**

PAN OCEAN OIL LTD.	
LOCATION MAP TC-PO CLAIM GROUPS SIMILKAMEEN MINING DIVISION BRITISH COLUMBIA	
Date: 31 / 10 / 72	Scale: 1" to 64 miles
Drawn by: J. Ravenhill	Drawing no.: 71-1

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I N T R O D U C T I O N

The TC-P0 claim block was staked to cover a younger Tertiary intrusive body which was known to have minor copper mineralization associated with it. Preliminary exploration carried out during 1971 indicated areas anomalous in zinc, and several minor showings were located.

The present report describes the results of a follow-up exploration programme carried out during the 1972 field season. The work was done during April and May, and September - October, 1972 and consisted of line cutting, geochemical soil sampling, geological mapping and a ground magnetometer survey.

The results of this work were interpreted and are included on a series of maps with this report.

P R O P E R T Y

The property consists of 133 full sized and 3 fractional, contiguous claims as follows:

GROUP I

<u>CLAIM NAME</u>	<u>RECORD NO.</u>	<u>TAG NO.</u>	<u>EXPIRY DATE</u>
TC #5 to TC #14 inc.	33631 to 33640 inc.	257005M to 257014M inc.	June 10, 1973
TC #27 to TC #34 inc.	33653 to 33660 inc.	257027M to 257034M inc.	June 10, 1973
TC #36	33662	257036M	June 10, 1973

GROUP II

TC #51 to TC #62 inc.	33424 to 33435 inc.	256151M to 256162M inc.	May 31, 1973
TC #79 to TC #82 inc.	33452 to 33455 inc.	256179M to 256182M inc.	May 31, 1973
TC #83 to TC #86 inc.	33456 to 33459 inc.	256383M to 256386M inc.	May 31, 1973

GROUP III

TC #75 to TC #78 inc.	33448 to 33451 inc.	256175M to 256178M inc.	May 31, 1973
TC #97 to TC #100 inc.	33470 to 33473 inc.	256397M to 256400M inc.	May 31, 1973

GROUP III cont.

<u>CLAIM NAME</u>	<u>RECORD NO.</u>	<u>TAG NO.</u>	<u>EXPIRY DATE</u>
TC #101 to TC #104 inc.	33474 to 33477 inc.	256301M to 256304M inc.	May 31, 1973
TC #121	33507	256321M	June 24, 1973
TC #123 to TC #126 inc.	33509 to 33512 inc.	256323M to 256326M inc.	June 24, 1973

GROUP IV

TC #105 to TC #112 inc.	33478 to 33485 inc.	256305M to 256312M inc.	May 31, 1973
TC #127 to TC #132 inc.	33513 to 33518 inc.	256327M to 256332M inc.	June 4, 1973
TC #145 to TC #148 inc.	33527 to 33530 inc.	256345M to 256348M inc.	June 4, 1973

The following claims are ungrouped as of the time of writing:

<u>CLAIM NAME</u>	<u>RECORD NO.</u>	<u>TAG NO.</u>	<u>EXPIRY DATE</u>
PO #1 to PO #4 inc.	35455 to 35458 inc.	340201M to 340204M inc.	May 5, 1973
PO #5	35522	340257M	May 15, 1973
PO #6 to PO #45 inc.	35459 to 35498 inc.	340206M to 340245M inc.	May 5, 1973
PO #46 to PO #53 inc.	35523 to 35530 inc.	340246M to 340253M inc.	May 15, 1973
PO #54 FR.	35499	340254M	May 5, 1973
PO #55 FR.	35500	340255M	May 5, 1973
PO #56 FR.	35501	340256M	May 5, 1973

<u>CLAIM NAME</u>	<u>RECORD NO.</u>	<u>TAG NO.</u>	<u>EXPIRY DATE</u>
PO #57 to PO #62 inc.	35901 to 35906 inc.	340258M to 340263M inc.	June 14, 1973

OWNER: Pan Ocean Oil Ltd.  
1050 - 355 4th Ave. S.W.  
Calgary 1, Alberta

F.M.C. 115159

LOCATION AND ACCESS

The property is located in southern British Columbia, about 27 miles northeast of the town of Princeton and about 18 miles west of the village of Peachland. The Brenda Mines open pit is located about 8 miles northeast of the claims. The approximate geographic center of the claims is at  $49^{\circ}47'$  north latitude and  $120^{\circ}08'$  west longitude.

Access to the property is gained by travelling west from Peachland on the Brenda Mines road for 7 miles and thence 18 miles on the North Trout Creek logging road. At this point a jeep road leads south for  $1\frac{1}{2}$  miles to the northeastern part of the property. About 3 miles further west along the main logging road another jeep road leads south for about 2 miles to near Whitehead Lake. A good horse trail is present along Trout Creek and a system of grid lines covers the entire property.



PHYSIOGRAPHY AND VEGETATION

The property covers the prominent, northeasterly-striking valley containing Trout Creek and Spring Creek. At the center of the claim block this prominent linear is intersected by the valley containing North Trout Creek and the south-trending extension of Trout Creek proper. The terrain slopes gently to moderately down to the valleys containing these creeks. Elevation varies from about 3900 feet A.S.L. in the lower parts of the main Trout Creek Valley to about 5500 feet A.S.L. on the northwesterly slopes of Mount Kathleen.

The claim area is completely tree covered and pine is the predominant species except on some north-facing slopes as well as valley bottoms. Undergrowth is fairly sparse and walking is not difficult except on the northwest slope of Mount Kathleen where there is a great profusion of deadfall and dense second growth trees. The valley bottom containing Trout Creek northeast of about 20W is an almost continuous beaver swamp.

The property is predominantly overburden covered and outcrops are scarce except in well-dissected creeks. The eastern half of the property is especially bad in this respect and contacts are very interpretive in this area.

## H I S T O R Y

There is no record of any previous work having been done on the area covered by the TC-P0 claim block, however, old claim posts from the middle and early 60's indicate that the area was probably staked during the "Brenda Rush".

There are a few old pits in the south central part of the property and some very old claim posts which indicate that at least some prospecting was done 20 or 30 years ago.

In May, 1971 approximately 160 claims were staked by Pan Ocean Oil Ltd.'s predecessor company Royal Canadian Ventures Ltd. and a preliminary exploration programme including line cutting, prospecting and geochemical soil sampling was carried out. This work indicated that minor copper, lead and zinc mineralization was present and that several areas showed anomalous amounts of zinc in soils.

SCOPE OF THE PRESENT EXPLORATION  
PROGRAMME

In late April, 1972 an additional 56 claims were staked to the east of the original claim block and 80 of the original TC claims were allowed to lapse. An additional six claims were staked on June 1, 1972 to cover ground which came open on that day and which covered the area surrounding some of the old showings.

During late April and May, 1972 approximately 47 line miles of grid were laid out tightening up the grid on the existing claims from 1400 to 700 foot spacing and covering the new claims on a 700 foot spacing. Soil samples were collected on most of this new grid and magnetometer survey was run over the entire grid.

During late September and early October, 1972 the soil sampling of the expanded grid was completed and the property was geologically mapped by the writer at a scale of 1000 feet equals 1 inch.

G E O L O G Y

The property is underlain primarily by a younger Tertiary intrusive stock. This pluton intrudes various phases of the older "Coast Intrusions". A small area of hornfelsic metavolcanic and/or metasediments (probably Nicola Group) is located in the northeast corner of the property.

The Tertiary intrusive stock is considered to be one of the Otter Intrusions, a series of dikes, sills and small stocks found throughout the Princeton Map-Area. This particular pluton is a fairly uniform quartz-feldspar porphyry. The phenocrysts may vary greatly in size and the groundmass may be contaminated near the borders or along main fault zones, however, the rock typically consists of rounded to euhedral quartz grains and euhedral orthoclase crystals in a buff to greenish felsic groundmass. Orthoclase crystals can vary from less than  $\frac{1}{4}$ " to more than  $1\frac{1}{2}$  inches long. They are always well formed and near-perfect monoclinic crystals can be found where alteration or weathering has produced a friable rock. Quartz grains vary from tiny anhedral quartz eyes to euhedral prisms up to  $\frac{1}{2}$  inch long.

The quartz-feldspar porphyry is relatively unaltered except in the area near the junction of North Trout Creek, Spring Creek and Trout Creek proper (14W to 42W, 8S to 80S). In this area, where outcrop is visible (principally along creeks) there is frequent evidence of hydrothermal activity — disseminated pyrite, conversion of pheno-

crysts and groundmass to clay minerals, and frequent limonite staining. There is some evidence of brecciation along some of the steep scarps, which are interpreted as faults or shear zones by the writer (see figure 71-2).

There are several areas within the quartz-feldspar porphyry where apparently stoped blocks or large breccia fragments of the older "Coast Intrusions" are found. In particular this has been noted at or near all four Cu-Pb or Zn occurrences along the NNE-trending main fault on Trout Creek. In addition, blocks of skarn containing disseminated to semi-massive sphalerite-specularite mineralization have been found near some old prospect pits in the south-central part of the property. This evidence suggests that the present erosion surface is very near the original top of the quartz-feldspar porphyry body.

In the west and southwest portions of the property, the quartz-feldspar porphyry intrudes a relatively fresh, coarse grained granite. This rock is typically pinkish in colour and is somewhat porphyritic, potash feldspar crystals being up to 1" long. Orthoclase makes up about 50% of the rock, quartz about 30%, plagioclase about 10% and biotite about 10%. A few minor dikes of fine grained, quartz-feldspar porphyry cross-cut this granite at some distance from its contact with the main quartz-feldspar porphyry pluton.

In the southeastern part of the claim block the younger stock intrudes a medium to fine-grained, grayish granodiorite. This rock is

typically equigranular and consists of about 65% plagioclase, 25% quartz and about 10% ferromagnesian. The dark minerals consist primarily of fine grained biotite with lesser hornblende. The northern contact of this rock type has been arbitrarily drawn at the fault-controlled valley of Trout Creek. Outcrops are particularly scarce in this area.

In the northeastern part of the property, the quartz-feldspar porphyry intrudes an area of more basic intrusive rocks. These rocks vary from fine to coarse grained and range from biotite-rich granodiorite, through dioritic and even gabbroic types. The most typical rock type is a quartz diorite with about 60% plagioclase, 10% quartz and 30% ferromagnesian, about 75% of which are biotite. These rocks sometimes contain a faint foliation and frequently have xenoliths and small roof pendants of basic volcanics (?) now largely altered to a biotite-rich hornfels. This rock type (quartz diorite-diorite) may in fact be similar to the gray granodiorite — except that it has been contaminated by large amounts of material from stopped basic volcanics.

In the extreme northeastern corner of the claim block, there is a small outcrop area of hornfelsic, intermediate to basic volcanics and/or detrital sediments. These rocks have obviously been subjected to extreme thermal metamorphism. They now consist of a black, dense mixture of biotite and hornblende with a sugary mixture of fine grained feldspathic minerals. They are frequently foliated and some contain relic bedding.

Only a few outcrops of this material were seen, so its outcrop

extent is largely conjectural. It is probable that a number of small outliers of this altered, Nicola (?) volcanic rock exist outside the postulated boundary. This is indicated by the many xenoliths of this material found in the nearby quartz diorite.

It is not possible to get a clear picture of the structure of the area because of both the lack of outcrop and the scale of mapping. There appear to be two major faults: one trending about  $N 70^{\circ} E$  and probably controlling the valley containing Trout Creek and Spring Creek, and the other trending about  $N 30^{\circ} E$  and occupying the southern part of Trout Creek valley. Both these major faults show strong topographic lineaments. A series of en echelon faults paralleling the main  $N 30^{\circ} E$  fault are found in the southern part of North Trout Creek. They show up topographically and there is evidence of brecciation and much hydrothermal activity in their vicinity. Jointing shows no particular pattern except that there are a few sets which parallel the two main fault directions.

## MINERALIZATION

Traces of pyrite are found in a few outcrops of the older "Coast Intrusion". Within the Tertiary, quartz-feldspar porphyry stock, pyrite is found primarily near the inferred fault zones along Trout Creek and North Trout Creek. It occurs primarily as very fine grained, disseminated specks. In the same area, specularite is less commonly found as thin seams and veinlets.

Four minor occurrences of lead, zinc and copper were found near the central part of the property, in the general vicinity of the two main fault zones and occurring in or near blocks of older intrusive rocks contained within the quartz-feldspar porphyry.

At 14W, 17S along a small creek, an outcrop of very altered granodiorite, surrounded by quartz-feldspar porphyry, contains minor sphalerite and galena along with pyrite in tiny stringers in quartz veins and along fractures. The altered granodiorite is exposed over an area of 25' X 25' but the mineralization occurs in only one small zone.

At 30W, 47S a small outcrop of very altered granodiorite (?) contains traces of disseminated chalcopyrite and galena. Again these sulphides are accompanied by minor pyrite and specularite and the rock appears to be silicified. At 28W, 56S a block of altered granodiorite as much as 70 feet in diameter is surrounded by less altered quartz-



feldspar porphyry. A poorly exposed, rubble-strewn area roughly 3 feet square contains scattered grains and blebs of chalcopyrite along fractures and narrow quartz veins. A number of fracture surfaces are also malachite-stained.

At 67S, between 36W and 38W there are at least five old prospect pits which are now sloughed in so that bedrock is obscured. On the ground near these pits are large boulders and rubble of altered limestone and skarn. This rock usually a dark brown, limonitic, very tough material which contains much disseminated specularite, as well as disseminations and blebs of sphalerite. None of this rock was actually seen in outcrop but it is assumed to come from the nearby pits. A small outcrop(?) of altered granodiorite is exposed near one of these pits, however, the surrounding area appears to be underlain by quartz-feldspar porphyry. The skarn and accompanying specularite-sphalerite mineralization is assumed to represent one or more altered roof pendants within the quartz-feldspar porphyry.

G E O C H E M I S T R Y

Soil sampling was conducted at 400 foot intervals on grid lines which are spaced 700 feet apart. On the TC claims, the original sampling had been carried out on lines 1400 feet apart so only the fill in lines were sampled in this area. Sample stations were marked on the ground by orange flagging. B-horizon soils were collected where possible and stored in waterproof, kraft envelopes.

A total of 380 soil samples were collected during the spring of 1972 and these were analysed for copper, molybdenum, manganese and zinc by Core Laboratories of Vancouver. An additional 251 samples were collected during September - October, 1972 and these were analysed for copper, molybdenum, lead and zinc by Bondar-Clegg and Company Ltd. of Vancouver. Both groups of samples were analysed by atomic absorption spectrophotometric methods.

Histograms were plotted for copper, lead, zinc and manganese and indicate essentially unimodal distributions. The mean and standard deviation was calculated for these four elements and the data were classified into the following categories:

Negative	0 - Mean
Possibly Anomalous	Mean - (Mean + 1 Std. Dev.)
Probably Anomalous	(Mean + 1 Std. Dev.) - (Mean + 2 Std.Dev.)
Definitely Anomalous	> (Mean + 2 X Std. Dev.)

The values were plotted on 1000 scale base maps of the property and definitely anomalous, probably anomalous and possibly anomalous areas were outlined (see figures 71-3 to 71-6 inclusive).

Molybdenum values were not plotted on a base map as the majority of samples reported less than 1 PPM. The highest value obtained was 13 PPM, however it is an isolated high. More than 90% of the molybdenum values are 1 PPM or less so it can be concluded that this element is insignificant in the TC-P0 claim area.

Copper values appear to be somewhat higher overall in the eastern part of the property (P0 claims) than in the west. There is also a rough grouping of sporadic high values in the vicinity of the two major fault or shear zones. In the eastern part of the property two larger anomalous areas appear to be located in the valley bottom where there are appreciable areas of beaver swamps. These may be spurious anomalies caused by abnormal retention of metallics by organic complexes. The largest area of anomalous copper values is found near the northern edge of the claim block along the projected strikes of one of the major fault zones. There is a known lead-zinc showing in this area and pyrite has been noted in several outcrops of quartz-feldspar porphyry, however no copper mineralization was seen. There are no outcrops present in the area outlined as anomalous. The highest copper value is located just outside the southeast corner of the claim area and occurs in a NNE-trending zone which parallels the main N 30° E fault zone. It is probable that these values are related to copper mineralization in a minor shear zone.

Lead values were only obtained for about 250 samples in the extreme east end of the claim block. Again there is a rough grouping of higher values around the main Trout Creek fault zone. However this can probably be partly ascribed to higher values occurring in organics in swamps along Trout Creek. The highest lead value coincides with the highest copper value just outside the southeast edge of the claims.

Zinc values are on the whole much higher in the western part of the property (TC claims) than in the east. There is a grouping of anomalous areas around the main N 70° E fault zone. However, it appears that most of the higher zinc values lie within the area which is underlain by the Tertiary, quartz-feldspar porphyry. Sphalerite in skarn was noted at one locality, however, no evidence of zinc mineralization was noted in the west central part of the property where so many of the anomalous zinc values occur. Outcrop is not abundant in this area so appreciable areas of mineralized rock could be masked by overburden. Since the two known occurrences of zinc on the property are found in xenoliths or roof pendants it is logical to assume that the anomalous zinc values are a reflection of similar mineralization which is presently overburden-covered.

Manganese values show a clear correlation with zinc (see figures 71-3 and 71-5). In the main, higher manganese values are primarily confined to the area underlain by quartz-feldspar porphyry. Areas of anomalous high manganese roughly coincide with zinc highs and are grouped around the main N 70° E trending fault zone. Minor amounts of pyrolusite were

noted by the writer at several localities and there is a known mineral showing containing copper in manganese carbonates about 1 mile south of the southern edge of the property. It is probable that some manganese carbonates are present in the dark brown skarn material which contains specularite-sphalerite mineralization.

In summary, there are a number of areas which show anomalous zinc values in soils. Some of this is probably due to manganese "scavenging" as there is a fairly good correlation between zinc and manganese highs. However, zinc mineralization is present in skarn and in altered granodiorite so it is probable that at least some of the soil anomalies represent zinc mineralization in bedrock.

There are several areas of anomalous copper values, the most interesting of which is located near the northern boundary of the property and is still open on one side. There are a number of other sporadic copper highs which can probably be ascribed to minor vein or shear zone occurrences.

Molybdenum values are all extremely low and the metal is insignificant on this property.

There are a few scattered higher lead values but since only a small portion of the property was sampled for this element no appreciable trends can be observed. There is a rough coincidence of higher lead values with some of the anomalous copper values.

G E O P H Y S I C S

A ground magnetic survey was carried out over the property using a Scintrex model MF-1 fluxgate magnetometer. Approximately 60 line miles of grid were surveyed (see figure 71-7), baselines being oriented E-W at 2800 foot intervals and traverse lines located approximately 700 feet apart and oriented N-S.

Measurements of relative magnetic intensity (vertical field) were made at 100 foot intervals along the cross lines. Grid control was maintained by first taking measurements along the baselines and then time correcting all subsequent traverse line measurements to the baseline stations. In this manner, all diurnal and instrument drift was kept to a minimum in the final corrected readings.

Resultant observations are plotted and contoured on an enclosed map (see figure 71-7).

The major portion of the subject area is one of moderately, magnetically susceptible rock having fairly gentle magnetic relief. There are a few narrow, high amplitude magnetic features which roughly parallel the major N 70° E trending fault zone. The narrow, high amplitude, features may be caused by more basic xenoliths or roof pendants incorporated into the quartz-feldspar porphyry or older intrusives. There is a ENE-trending area of low magnetic relief which roughly corresponds with the N 70° E

trending fault zone. However, it is probably due at least in part to topography.

A large area of higher magnetic intensity exists in the area roughly bounded by 91W to 150W and 28S to 60S. This area overlaps the contact between the quartz-feldspar porphyry and may reflect inclusions of more basic rocks. An area of highest magnetic intensity is found in the northeast corner of the property and correlates well with the area underlain by biotite hornfels and the inclusion-rich, more basic intrusive rocks.

## E C O N O M I C P O T E N T I A L

No appreciable areas of mineralized rock have been found on the property to date. However, since vast areas are completely overburden-covered and the spacing between the small outcroppings of bedrock which are exposed is usually quite large, it is possible that fairly large areas of mineralization could exist in areas now covered by glacial till.

From field evidence which has been collected to date on geology, mineralization, structures, geochemistry and geophysics, three interesting possibilities exist:

- (1) a deep-seated area of disseminated, porphyry-type copper mineralization.
- (2) a number of mineralized roof pendants of either skarn or older intrusives could contain significant Cu-Pb-Zn mineralization.
- (3) base metal mineralization could be associated with the two main fault zones at depth or with subsidiary shear zones at some distance from these main channelways.

There are a number of features which indicate that the presently exposed surface could reflect the peripheral zone of a typical porphyry-type deposit: (a) the presence of specularite, (b) the presence of two, major, through-going faults, (c) a Tertiary, acid, porphyritic stock, and (d) pyrite and clay alteration in the deepest part of the exposed intrusive. Whether these factors do reflect porphyry-type copper mineralization at depth,



and whether in fact it would be shallow enough to be of economic significance could only be determined by drilling.

All four showings of lead, zinc and copper are found in, or closely associated with xenoliths or roof pendants of older rock occurring in the Tertiary intrusive body. A copper occurrence about 2 miles south of the claim block near the contact of the quartz-feldspar porphyry with older granodiorite, consists of minor fine grained chalcopyrite in altered and silicified granodiorite as well as "small irregular bodies of manganese-bearing carbonate". This evidence suggests that the presently exposed surface of the quartz-feldspar porphyry is very near the top of the original magma chamber and that other xenoliths or larger roof pendants could be expected to occur within the borders of the younger intrusive. Since all the known mineral occurrences are associated with such bodies and since most of the copper and zinc geochemical anomalies are in areas where little bedrock is presently exposed, it is possible that such types of occurrences could be responsible for the anomalous copper and zinc values. If sufficiently large and well mineralized roof pendants are present, an economically viable mining operation might be conceivable.

The presently known mineral occurrences seem to be clustered around the two major faults occurring on the property. Where there is outcrop exposed near the projected trace of these faults, there is considerable evidence of hydrothermal activity (i.e. brecciation and recementing of material, bleaching and silicification, frequent disseminated pyrite and limonite staining, and conversion of portions of phenocrysts and groundmass of

the porphyry to clay minerals). Areas of anomalous zinc and copper, and to a lesser extent, lead tend to be localized around one or both of these major fault zones as if these were the loci for the introduction of hydrothermal fluids. It is possible that shear zones paralleling these major structures or parts of the major faults themselves might contain sufficient concentrations of base metals to be of economic interest.

## S U M M A R Y   A N D   C O N C L U S I O N S

- 1)        The TC-P0 claim group consists of 133 full sized and 3 fractional contiguous claims located about 18 miles west of Peachland in the Similkameen Mining Division, British Columbia.
  
- 2)        The property was staked in the spring of 1971 to cover a Tertiary intrusive which was known to have minor Cu-Pb-Zn mineralization associated with it. Preliminary exploration located several small showings and outlined some fairly large areas with anomalous zinc values in soils. During 1972, a more detailed exploration programme included soil sampling, geological mapping and a magnetometer survey.
  
- 3)        The property is underlain by a Tertiary, quartz-feldspar porphyry stock which intrudes various phases of the older "Coast Intrusions". A small area of (?) Nicola volcanics now thermally altered to biotite hornfels is found near the northeast corner of the property. Two major, through-going faults are found on the property and are thought to be a mineralization control.
  
- 4)        Soil geochemistry has outlined a number of zinc anomalies and at least one sizeable, valid, copper anomaly. The zinc anomalies may be due in part to scavenging by manganese as there is a distinct correlation between higher zinc and manganese values.
  
- 5)        Four minor showings of copper, lead and zinc were noted and it is

significant that all four are located in or very close to xenoliths or roof pendants of older rocks of either intrusive or sedimentary origin. These showings are also all in the vicinity of the two major fault zones.

6) Field evidence indicates three possible modes of mineralization which could produce potential economic situations:

- a) a deep-seated area of disseminated, porphyry-type, copper mineralization.
- b) a number of mineralized roof pendants of either skarn or older intrusives could contain significant Cu-Pb-Zn mineralization.
- c) base metal mineralization could be associated with the two main fault zones at depth or with subsidiary shear zones at some distance from these main channel-ways.

7) The property warrants further exploration to test these various possibilities.

RECOMMENDATIONS

It is recommended that:

- 1) The main zinc and copper anomalies be soil sampled on a 200 X 200 grid spacing.
- 2) An EM-16 survey be carried out over these detailed grids.
- 3) Reconnaissance I.P. surveys be run using various spacings and arrays to get some idea of size and depth of possible sulphide zones.
- 4) Selective bulldozer trenching be done where most feasible and where interesting targets are located.
- 5) Contingent upon the success of this preliminary work, percussion drilling should be carried out to test selective targets at depth.



Respectfully Submitted:

*James M. Dawson*

James M. Dawson, M. Sc., P. Eng.

GEOLOGIST

APPENDIX A

PERSONNEL

P E R S O N N E L

FIELD

J.M. DAWSON, P. Eng.	Geologist	Sept. 28, 1972 ½ day Sept. 29-30 Oct. 1-6 Oct. 7 ½ day	9 days
J.S. DREVER, B. Sc.	Geologist	May 28, 29	2 days
M. HJELT	Prospector	April 28-30, May 1-5 May 9-16, May 28-31 June 2-6 Sept. 28 ½ day Sept. 29-30 Oct. 1-4	31½ days
T.R. MUNN	Technician	May 9-16 May 28-31, June 1-6	18 days
W. MAKORTOFF	Fieldman	April 28- May 4 May 9-16	15 days

OFFICE

J.M. DAWSON, P. Eng.	Geologist	Oct. 11, 1972 ½ day Oct. 23-27 Oct. 30 ½ day Oct. 31 Nov. 1 ½ day Nov. 6 ½ day	8 days
J.S. DREVER, B. Sc.	Geologist	May 11, 1972 ½ day May 17-18 June 14 ½ day June 26 Sept. 19 Nov. 20-21	7 days

M. MCGINNIS

Technician

May 23-26  
June 22-23  
June 26  
June 27 ½ day

7½ days

D. PAN

Draftsman

Sept. 14-15  
Sept. 18-19  
Oct. 24  
Nov. 15-17  
Nov. 23

9 days



APPENDIX B

STATEMENT OF EXPENDITURES

PROGRAMME COSTS

ON

T.C. - P O CLAIMS

(1) LABOUR

1 Geologist (P. Eng.) 17 days @ 125.00/day	\$ 2,125.00
1 Geologist (B. Sc.) 9 days @ 100.00/day	900.00
1 Technician 7½ days @ 60.00/day	450.00
1 Draftsman 9 days @ 60.00/day	<u>540.00</u>

\$ 4,015.00

(2) CONTRACT SERVICES TO RELCOM EXPLORATION CO.  
(M. HJELT)

Linecutting (May, 1972)	\$ 2,520.00
Magnetometer Survey (May-June, 1972)	1,280.00
Geochemical Survey (May-June, 1972)	570.00
Geochemical Survey (Sept.-Oct., 1972)	<u>555.00</u>

\$ 4,925.00

(3) EXPENSES & DISBURSEMENTS

Geochemical Analyses	\$ 1,409.47
Blue Prints, Colouring & Miscellaneous Drafting	78.76
Xerox	31.60
Telephone, Freight & Secretarial	63.45
Truck Rental (4X4) 9 days @ 15.00/day	\$. 135.00
686 miles @ 0.15/mile	<u>102.90</u>
	237.90
Board & Lodging	<u>174.30</u>

\$ ~~1,995.48~~  
~~1,625.48~~

\$ ~~10,565.48~~  
10,235.48

APPENDIX C

AFFIDAVIT IN SUPPORT OF STATEMENT  
OF EXPENDITURES



APPENDIX D

REFERENCES

## REFERENCES

- Rice, H.M.A. (1946): Geology and Mineral Deposits of the Princeton Map-Area, British Columbia; G.S.C. Memoir 243.
- Vollo, N.B. (1972): Geochemical Report on the TC Group; Private Report to Pan Ocean Oil Ltd.
- Horsnail, R.F. and Elliott, I.L. (1971): Some Environmental Influences on the Secondary Dispersion of Molybdenum and Copper in Western Canada; Paper in C.I.M.M. Special Volume No. 11.
- De Geoffroy, J. and Wignall, T.K. (1972): A Statistical Study of Geological Characteristics of Porphyry-Copper-Molybdenum Deposits in the Cordilleran Belt; Econ. Geol; Vol. 67, No. 5.
- Lowell, J.D. and Guilbert, J.M. (1970): Lateral and Vertical Alteration-Mineralization zoning in Porphyry Ore Deposits; Econ. Geol; Vol. 65, No. 4.

APPENDIX E

WRITERS' CERTIFICATES

**JAMES M. DAWSON, P. ENG.  
GEOLOGIST**

9-219 VICTORIA STREET  
KAMLOOPS, B.C.

PHONE (604) 374-6427

C E R T I F I C A T E

I, JAMES M. DAWSON, of Kamloops, B. C., HEREBY CERTIFY THAT:

- (1) I am a geologist residing at 383 West Columbia St., Kamloops, and employed by Kerr, Dawson and Associates Ltd., of Suite #9, 219 Victoria St., Kamloops, B. C.
- (2) I am a graduate of the Memorial University of Newfoundland - B. Sc. (1960), M. Sc. (1963), a fellow of the Geological Association of Canada and a member of the Association of Professional Engineers of B. C. I have practised my profession for nine years.
- (3) I am the author of the author of this report which is based on an exploration programme that included geological mapping, geochemical soil sampling and a magnetometer survey carried out on the TC-P0 group of claims.
- (4) I have no beneficial interest in Pan Ocean Oil Ltd. or in the property discussed in this report, nor do I expect to receive any.



KERR, DAWSON & ASSOCIATES LTD.

A handwritten signature in cursive script, appearing to read "J. M. Dawson", written over a horizontal line.

James M. Dawson, M. Sc., P. Eng.  
GEOLOGIST

November , 1972  
Kamloops, B. C.

KERR, DAWSON AND ASSOCIATES LTD.  
CONSULTING GEOLOGISTS AND ENGINEERS



A P P E N D I X F

M A P S

# Pan Ocean Oil Ltd.

1050 Three Calgary Place 355 Fourth Avenue S.W. Calgary, Alberta, Canada T2P 0J1

Telephone: (403) 265-6211


Telex: 038-22681

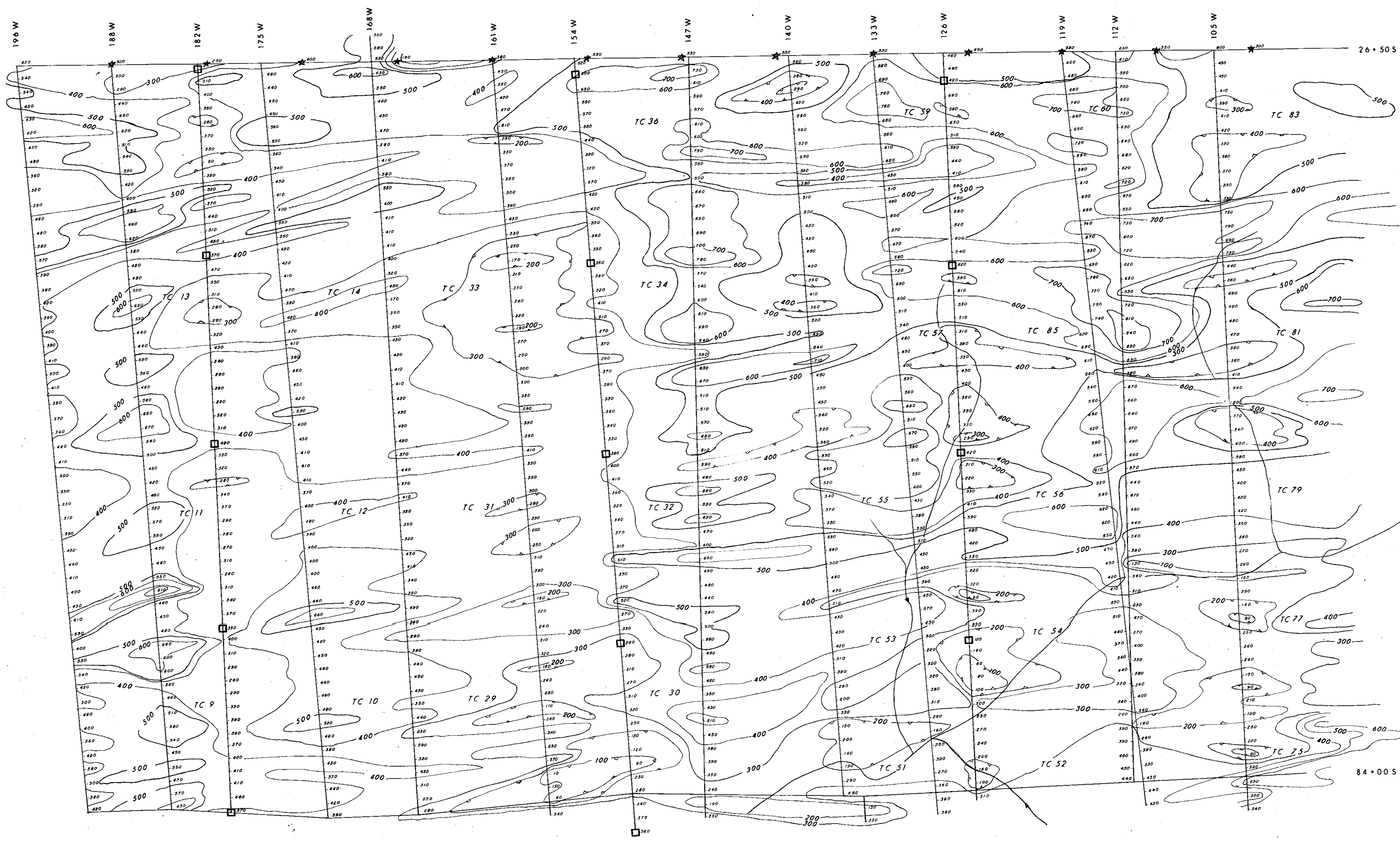
## CERTIFICATE OF QUALIFICATION

I, J.S. Drever, of Calgary, Alberta, hereby certify that:

1. I am a Geologist residing at #128 - 330 Canterbury Drive, SW, Calgary, Alberta, and employed by Pan Ocean Oil Ltd., Suite 1050, Three Calgary Place, 355 - 4th Avenue, SW, Calgary, Alberta.
2. I am a graduate of the University of Manitoba, B.Sc., 1965, and have practiced my profession for seven years.
3. I supervised Mauri Hjelt of Relcom Exploration Co. in the carrying out of the magnetometer survey and portions of the geochemical survey that accompany the report by J.M. Dawson on the TC-PO claims and know Mr. Hjelt's work to be conscientiously and competently carried out.

October 26th, 1972

  
J.S. Drever,  
Project Geologist,  
Mining Division

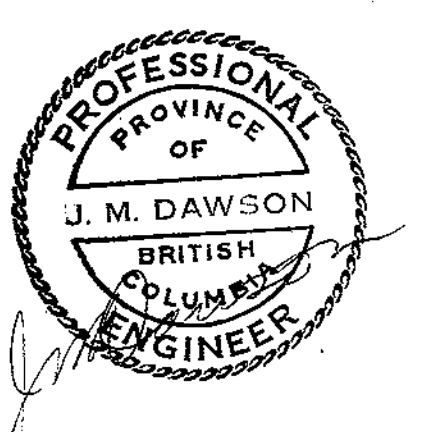


**LEGEND**

○ 520 MAGNETOMETER SURVEY STATION WITH VALUE IN GAMMAS  
 \* CONTROL STATIONS  
 □ CLAIM POST  
 — GRID LINE

○ 0 - 200 GAMMAS  
 ○ 201 - 400 GAMMAS  
 ○ 401 - 600 GAMMAS  
 ○ 601 - 800 GAMMAS  
 ○ 801 - 1000 GAMMAS  
 ○ 1001 - 1200 GAMMAS

TO ACCOMPANY A REPORT BY J. M. DAWSON, P. ENG.

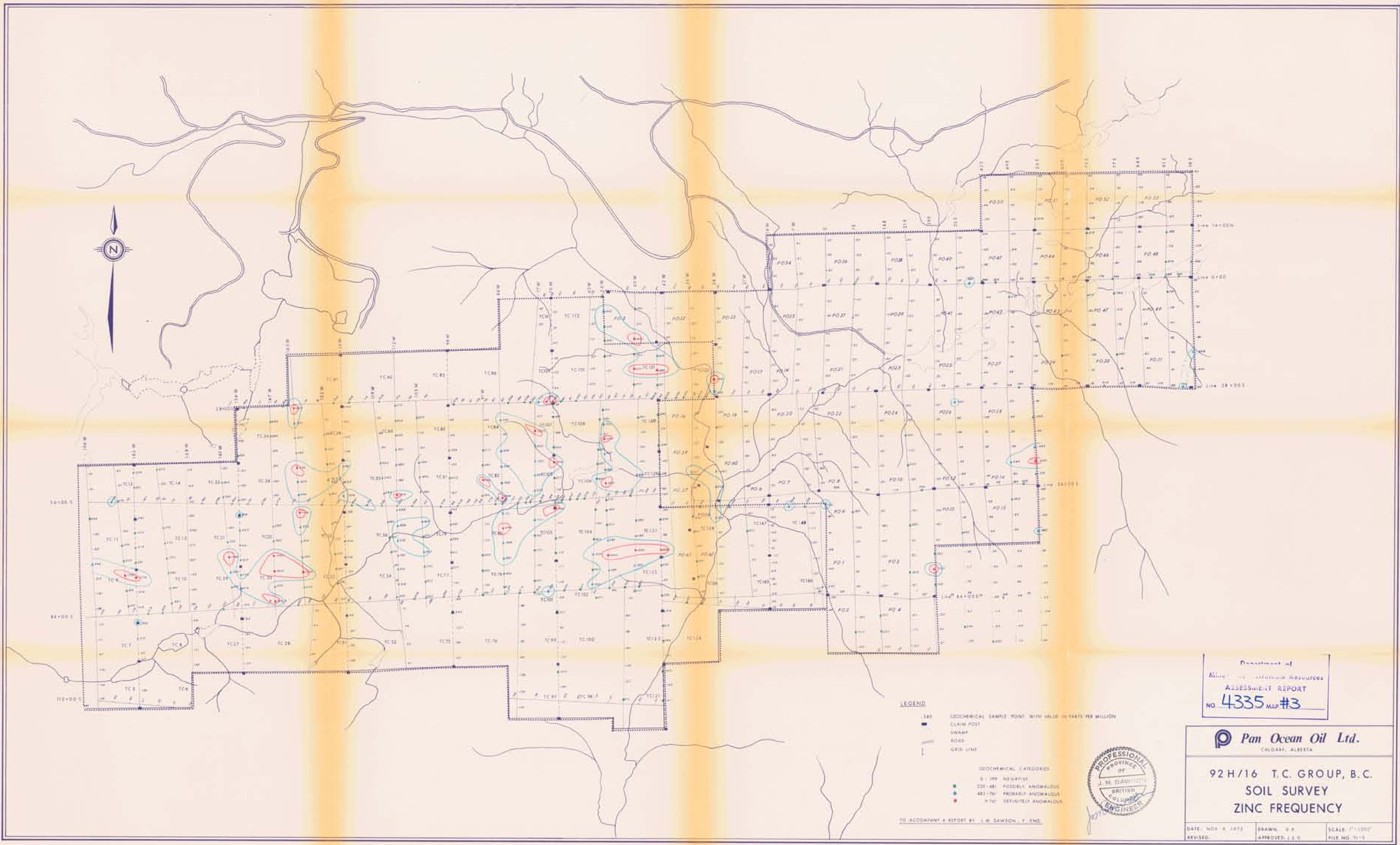


**Pan Ocean Oil Ltd.**  
 CALGARY, ALBERTA

**92H/16 T.C. GROUP, B.C.**  
**MAGNETIC SURVEY**

DATE: NOV. 23, 1972 DRAWN: D.P. SCALE: 1"=400'  
 REVISED: APPROVED: J.S.D. FILE NO. 71-7

Department of  
 Mines and Petroleum Resources  
 ASSESSMENT REPORT  
 NO. 4335 MAP #9



Department of  
 Mineral and Petroleum Resources  
**ASSESSMENT REPORT**  
 NO. **4335** MAP #3

**Pan Ocean Oil Ltd.**  
 CALGARY, ALBERTA

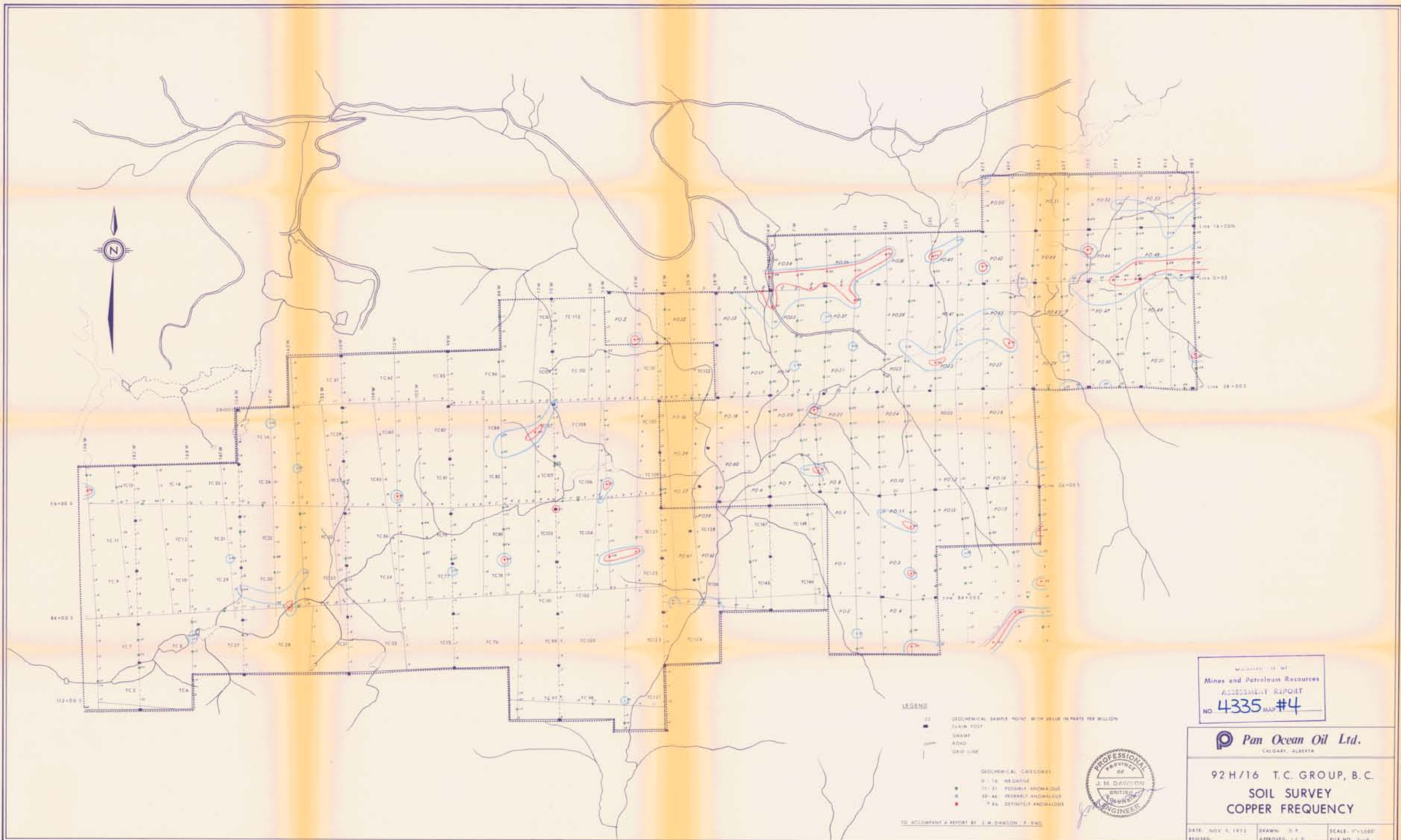
**92H/16 T.C. GROUP, B.C.**  
**SOIL SURVEY**  
**ZINC FREQUENCY**



- LEGEND**
- GEOCHEMICAL SAMPLE POINT WITH VALUE IN PARTS PER MILLION
  - CLAIM POST
  - SWAMP
  - ROAD
  - GRID LINE
- GEOCHEMICAL CATEGORIES**
- 0 - 999 NEGATIVE
  - 1000 - 4000 POSSIBLY ANOMALOUS
  - 4001 - 7000 PROBABLY ANOMALOUS
  - 7001 + DEFINITELY ANOMALOUS

TO ACCOMPANY REPORT BY L.M. DAWSON, P. ENG.

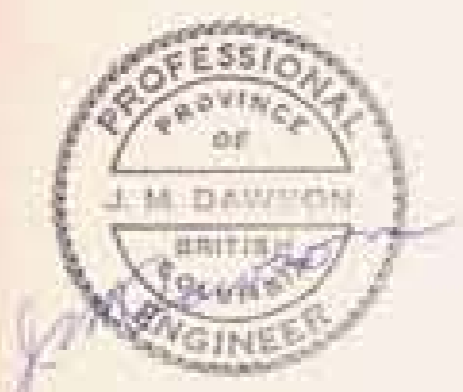
DATE NOV 4 1973 DRAWN G.P. SCALE 1"=1000'  
 REVISED APPROVED J.S.O. FILE NO. 71-1



MINES AND PETROLEUM RESOURCES  
ASSESSMENT REPORT  
NO 4335 MAP #4

**Pan Ocean Oil Ltd.**  
CALGARY, ALBERTA

92 H/16 T.C. GROUP, B.C.  
**SOIL SURVEY  
COPPER FREQUENCY**



**LEGEND**

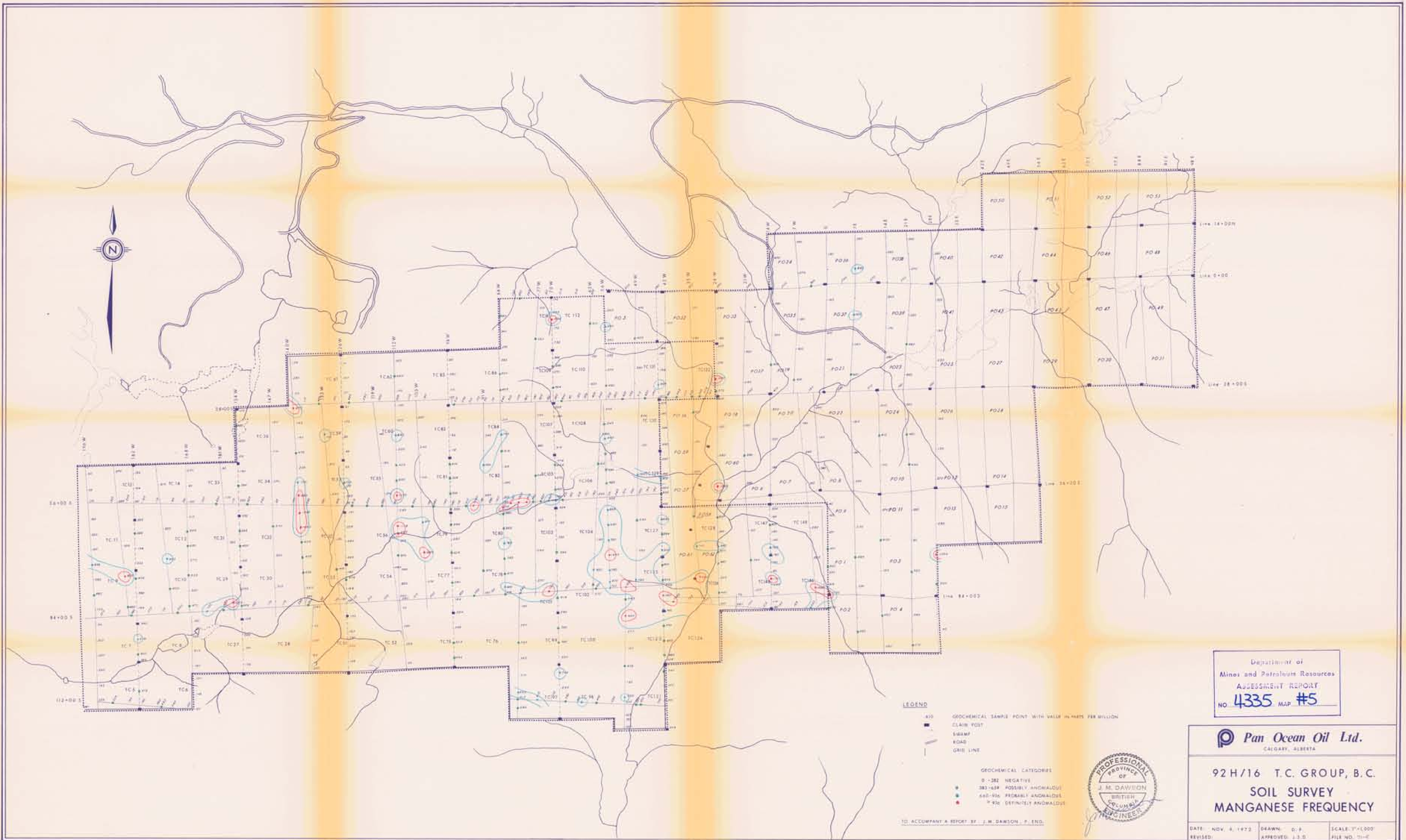
● GEOCHEMICAL SAMPLER POINT WITH VALUE IN PARTS PER MILLION  
 ■ CLIMB POST  
 --- SWAMP  
 --- ROAD  
 --- GRID LINE

**GEOCHEMICAL CATEGORIES**

● 0-10 NEGATIVE  
 ■ 11-21 POSSIBLY ANOMALOUS  
 ■ 22-48 PROBABLY ANOMALOUS  
 ■ 49- DEFINITELY ANOMALOUS

TO ACCOMPANY A REPORT BY J.M. DAWSON, P. ENG.

DATE: NOV 9, 1973    DRAWN: S.P.    SCALE: 1"=1000'  
 REVISED:    APPROVED: J.E.D.    FILE NO.: 43-4



**LEGEND**

430 GEOCHEMICAL SAMPLE POINT WITH VALUE IN PARTS PER MILLION  
 CLAIM POST  
 SHAMP  
 ROAD  
 GRID LINE

**GEOCHEMICAL CATEGORIES**  
 0-382 NEGATIVE  
 383-659 POSSIBLY ANOMALOUS  
 660-936 PROBABLY ANOMALOUS  
 937 DEFINITELY ANOMALOUS



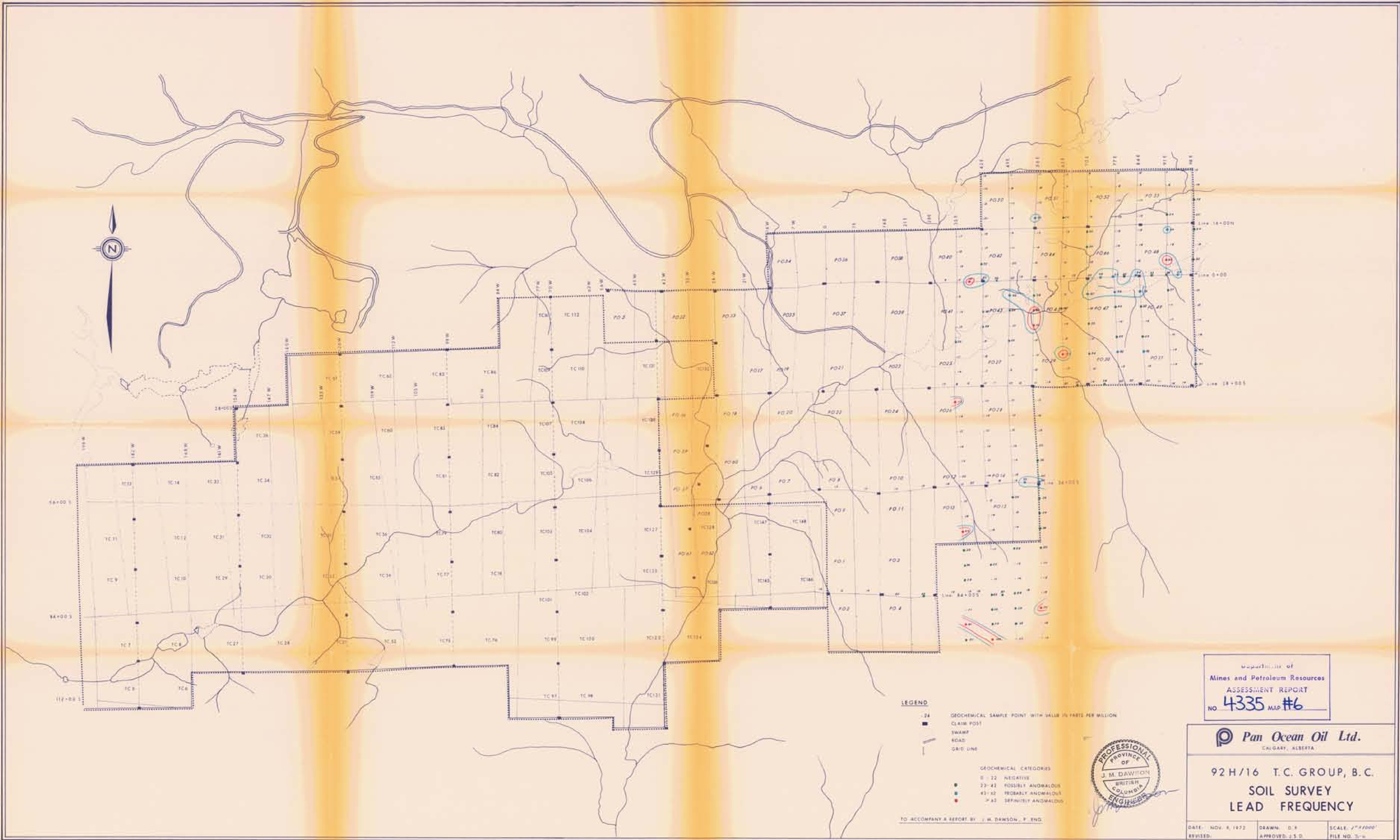
Department of  
 Mines and Petroleum Resources  
 ASSESSMENT REPORT  
 NO. 4335 MAP #5

**Pan Ocean Oil Ltd.**  
CALGARY, ALBERTA

92 H/16 T.C. GROUP, B.C.  
 SOIL SURVEY  
 MANGANESE FREQUENCY

DATE: NOV. 9, 1972 DRAWN: D.P. SCALE: 1"=1,000'  
 REVISED: APPROVED: J.S.D. FILE NO. 71-6

TO ACCOMPANY A REPORT BY J.M. DAWSON, P. ENG.



**LEGEND**

- 24 GEOCHEMICAL SAMPLE POINT WITH VALUE IN PARTS PER MILLION
- CLAIM POST
- SWAMP
- ROAD
- GRID LINE

**GEOCHEMICAL CATEGORIES**

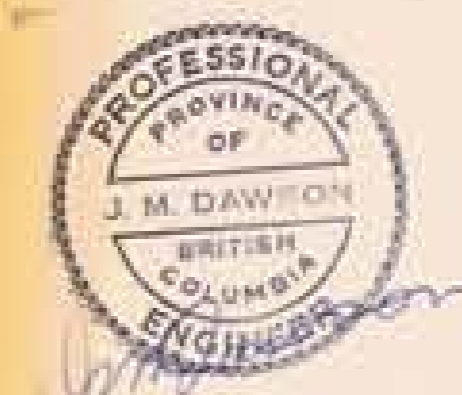
- 0 - 22 NEGATIVE
- 23 - 41 POSSIBLY ANOMALOUS
- 42 - 60 PROBABLY ANOMALOUS
- > 61 DEFINITELY ANOMALOUS

TO ACCOMPANY & REPORT BY J. M. DAWSON, P. ENG.

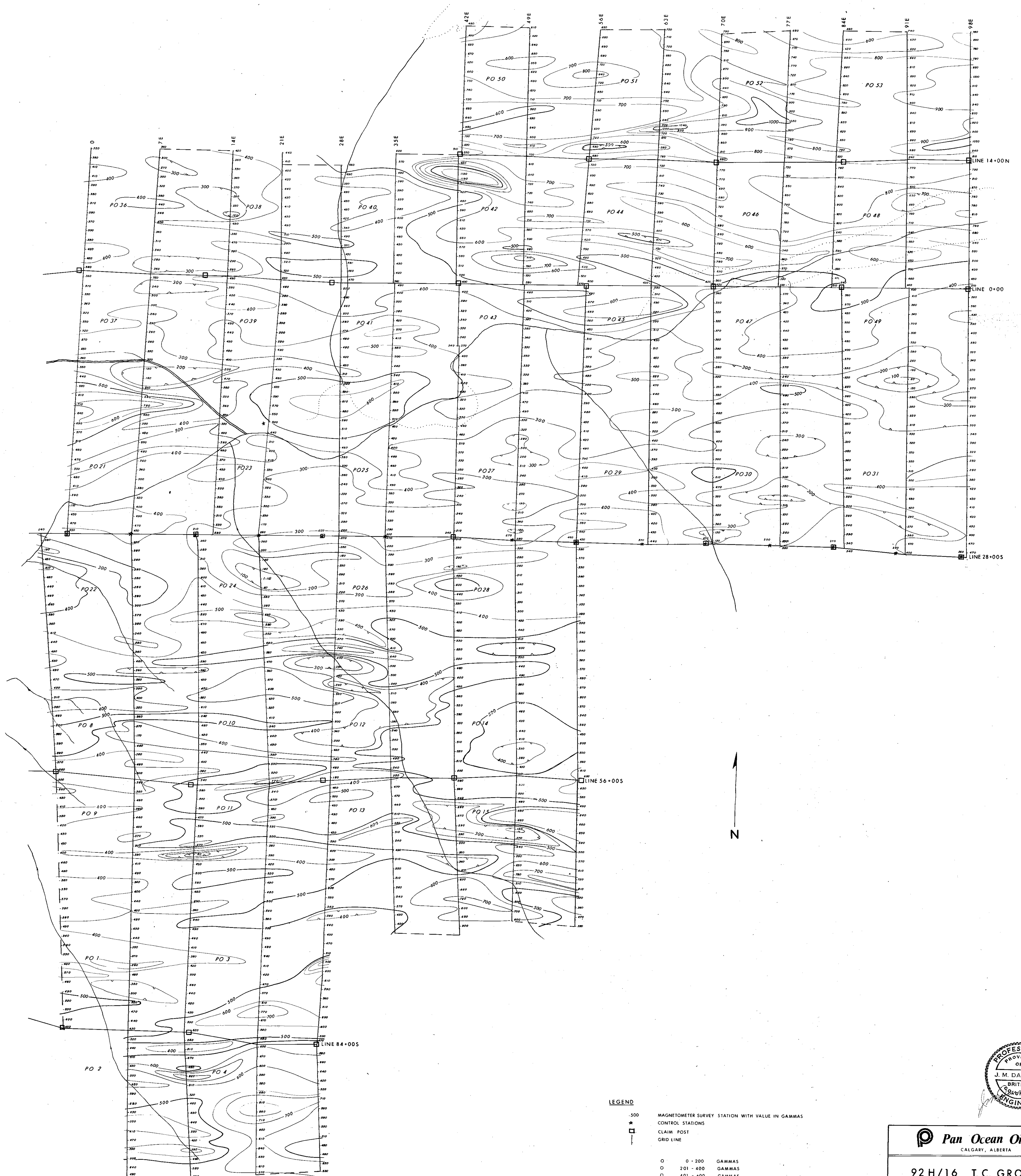
Department of  
**Mines and Petroleum Resources**  
 ASSESSMENT REPORT  
 NO. **4335** MAP #6

**Pan Ocean Oil Ltd.**  
 CALGARY, ALBERTA

**92H/16 T.C. GROUP, B.C.**  
**SOIL SURVEY**  
**LEAD FREQUENCY**

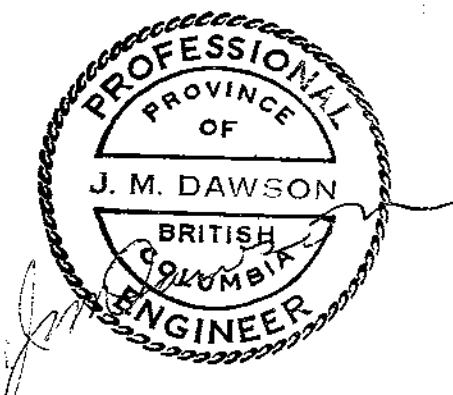


DATE: NOV. 8, 1972 DRAWN: D.F. SCALE: 1" = 4000'  
 REVISED: APPROVED: J.S.D. FILE NO. 3-6



- LEGEND**
- .500 MAGNETOMETER SURVEY STATION WITH VALUE IN GAMMAS
  - ★ CONTROL STATIONS
  - CLAIM POST
  - GRID LINE
- 
- 0 - 200 GAMMAS
  - 201 - 400 GAMMAS
  - 401 - 600 GAMMAS
  - 601 - 800 GAMMAS
  - 801 - 1000 GAMMAS
  - 1001 - 1200 GAMMAS

TO ACCOMPANY A REPORT BY J. M. DAWSON, P. ENG.



1 OF 3

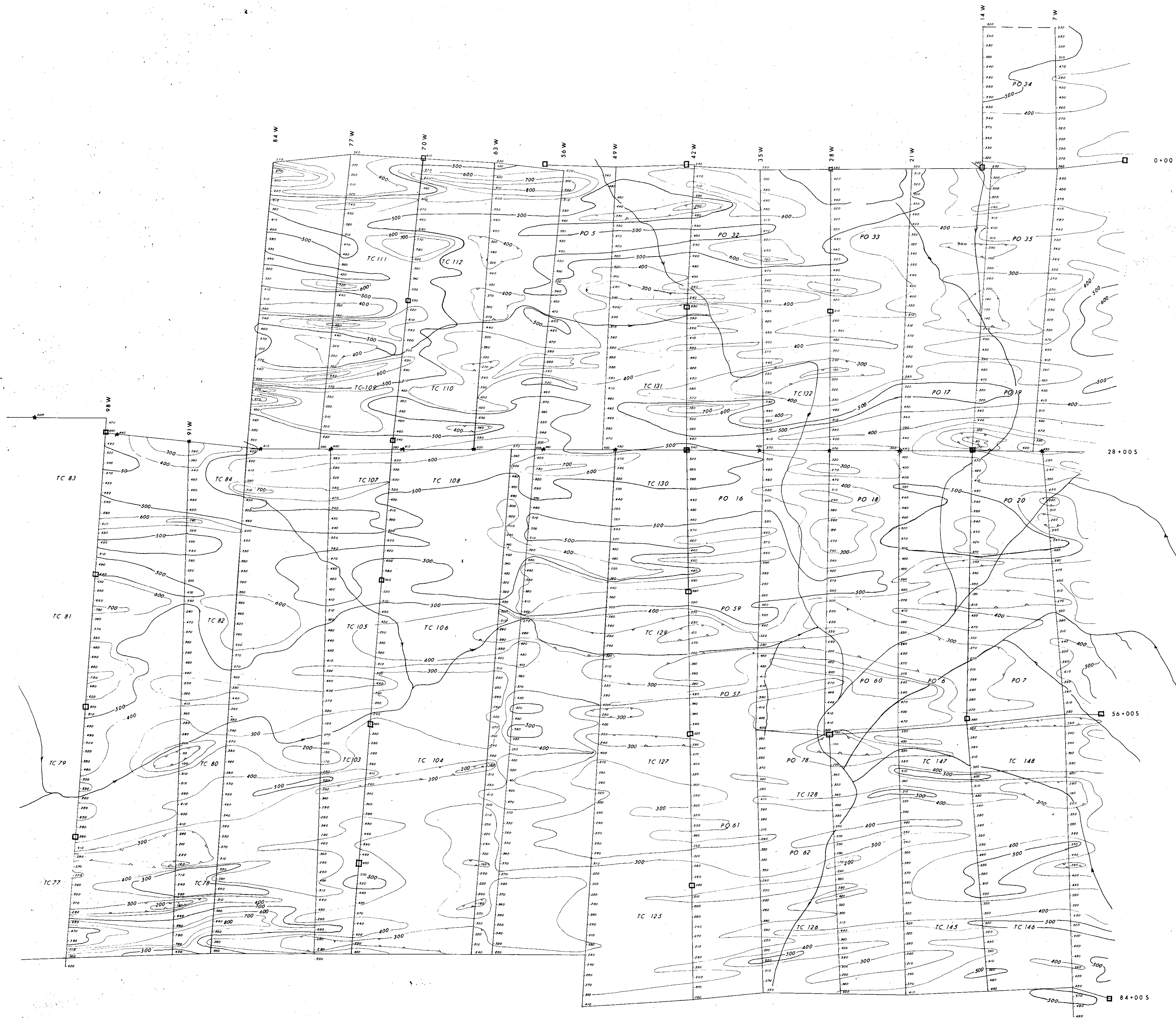
**Pan Ocean Oil Ltd.**  
CALGARY, ALBERTA

**92 H/16 T.C. GROUP, B.C.**  
**MAGNETIC SURVEY**

DATE: NOV. 23, 1972 DRAWN: D.P. SCALE: 1"=400'  
 REVISED: APPROVED: J.S.D. FILE NO. 3-7

DEPARTMENT OF  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO. 4335 M.P. #7

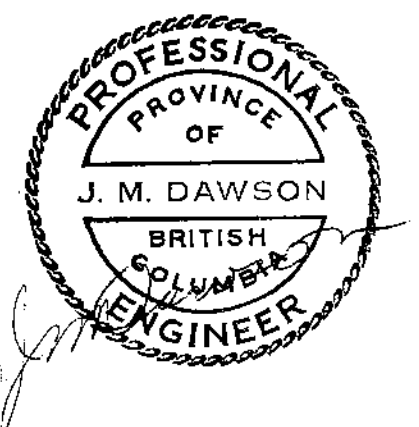




**LEGEND**

- 520 MAGNETOMETER SURVEY STATION WITH VALUE IN GAMMAS
- CONTROL STATIONS
- CLAIM POST
- GRID LINE
- 0 - 200 GAMMAS
- 201 - 400 GAMMAS
- 401 - 600 GAMMAS
- 601 - 800 GAMMAS
- 801 - 1000 GAMMAS
- 1001 - 1200 GAMMAS

TO ACCOMPANY A REPORT BY J. M. DAWSON, P. ENG.

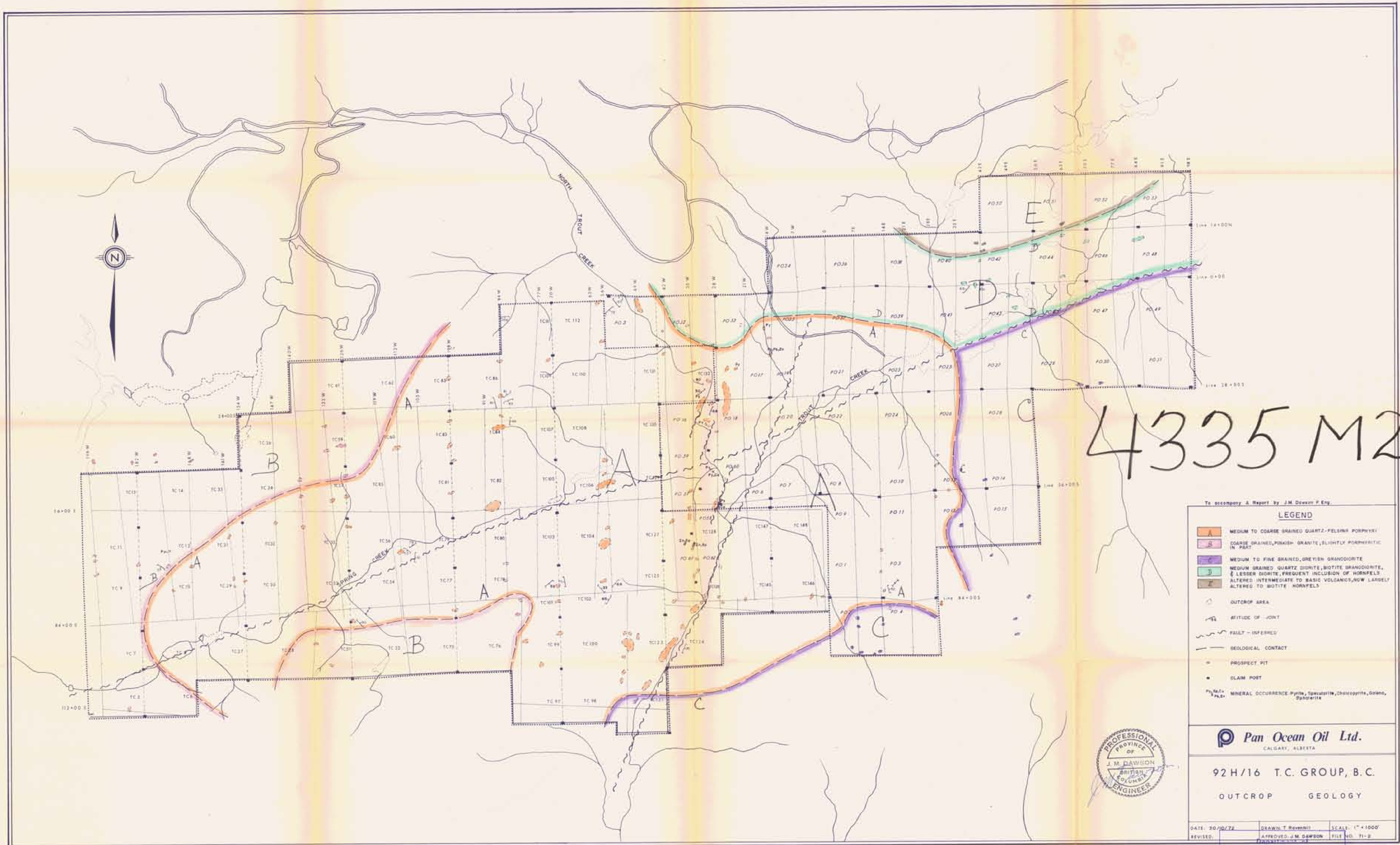


**Pan Ocean Oil Ltd.**  
CALGARY, ALBERTA

**92 H/16 T.C. GROUP, B.C.**  
**MAGNETIC SURVEY**

DATE: NOV. 23, 1972 DRAWN: D.F. SCALE: 1"=400'  
REVISED: APPROVED: J.S.D. FILE NO. 71-1

Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO. 4335 MAP #8



4335 M2

To accompany a Report by J.M. Dawson P. Eng.

LEGEND

- MEDIUM TO COARSE GRAINED QUARTZ-FELSIC PORPHYRY
- COARSE GRAINED, PINKISH GRANITE, SLIGHTLY PORPHYRYIC IN PART
- MEDIUM TO FINE GRAINED, GREYISH GRANODIORITE
- MEDIUM GRAINED QUARTZ DIORITE, BIOTITE GRANODIORITE, & LESSER DIORITE, FREQUENT INCLUSION OF HORNFELS
- ALTERED INTERMEDIATE TO BASIC VOLCANICS, NOW LABELLED ALTERED TO BIOTITE HORNFELS
- OUTCROP AREA
- ATTITUDE OF JOINT
- FAULT - INFERRED
- GEOLOGICAL CONTACT
- PROSPECT PIT
- CLAIM POST
- MINERAL OCCURRENCE: Pyrite, Sphalerite, Chalcocyanite, Galena, Spinelite



**Pan Ocean Oil Ltd.**  
CALGARY, ALBERTA

92 H/16 T.C. GROUP, B.C.

OUTCROP GEOLOGY

DATE: 30/10/72 DRAWN: T. Rowland SCALE: 1" = 1000'  
REVISED: APPROVED: J.M. DAWSON FILE NO. 71-2

Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO. 4335 MAP #2