020073

1 9 8 8

S U M M A R Y   R E P O R T   O F   E X P L O R A T I O N

ON THE

L O G A N #1 - 200 C L A I M   G R O U P

Watson Lake Mining District,
Little Moose River Area, Yukon Territory
Latitude 60°30'N; Longitude 130°27'W
NTS: 105/B-7,8,9,10

For

FAIRFIELD MINERALS LTD.
Vancouver, British Columbia

and

TOTAL ENERGOLD CORPORATION
Vancouver, British Columbia

By

M. A. Stammers, B.A.,FGAC
Geologist

CORDILLERAN ENGINEERING LTD.
1980-1055 W. Hastings St.
Vancouver, B.C. V6E 2E9

FEBRUARY, 1989

TABLE OF CONTENTS

FIGURES

Table of Contents Continued

Table of Contents Continued

PLATES Continued

1.0 SUMMARY AND CONCLUSIONS

The Logan zinc-silver property is located 108 kilometres northwest of Watson Lake and 38 kilometres north of the Alaska Highway in the Watson Lake Mining District, southern Yukon. Staking of the contiguous Logan 1-200 mineral claims was initiated in July 1979 and completed in December 1987. Property acquisition and subsequent work have been conducted by Cordilleran Engineering Ltd. on behalf of Fairfield Minerals Ltd. and, prior to claim ownership transfer in May, 1986, for Regional Resources Ltd. The Logan claim group is under option to Total Energold Corporation.

The claims cover mixed forest, open valley meadows, subalpine and alpine terrain with elevations from 1100 to 1700 metres above sea level. Relief ranges from gentle in the east and central areas to moderate or steep in the west. Surface exposure of bedrock is poor throughout the property. Present access is by fixed-wing aircraft from Watson Lake to the 700-metre long, Logan gravel airstrip.

A diamond drill program, completed over the west, central and east areas of the property in 1988 comprised 44 NQ wireline holes totalling 6,771.44 metres. The total metreage drilled to date (1986-1988) in 103 holes is 16,438.78 metres.

Other work completed in 1988 included bench scale metallurgical testing, geological mineral inventory calculations, road construction, grid preparation, ground control surveys, excavator trenching, and geophysical and geochemical surveys. Previous work on the property was undertaken in 1979, 1980, 1982, 1984-1987 and comprised grid preparation, surveying, diamond drilling, hand trenching, airstrip and road construction, prospecting, geological mapping, soil geochemistry and geophysical surveys.

Exploration work has delineated an 8000-metre long northeast trending fault-related structure containing the Main, West and East Zones. Within the Main Zone, an 1100-metre long zinc-silver deposit with a calculated mineral inventory of 12,300,000 tonnes grading 6.17% zinc and 0.77 oz/ton silver has been outlined by diamond drilling. The Main Zone deposit, drill tested to vertical depths of up to 275 metres, is contained within a tabular, 50 to 140 metre wide, fault-bounded mineralized body that is dipping 70 degrees to the northwest. Sphalerite with lesser pyrite, arsenopyrite, chalcopyrite, pyrrhotite, silver-bearing lead sulfo-salts and cassiterite occurs within quartz veins, breccia bodies, stockworks and silicified zones in highly altered granodiorite and andesite dyke rocks. Results of metallurgical testing are very encouraging and include zinc and silver recoveries in the mid 90% and mid 80% range respectively, and zinc concentrates assaying in the mid 50% range.

The Logan deposit, open to depth, represents an important new reserve of zinc metal in western Canada. A full review of deposit economics is required before advancing to further pre-development work that may include additional diamond drilling, baseline road and environmental studies and a possible bulk sampling program.

****

2.0 EXPLORATION POTENTIAL

The Logan property has been thoroughly examined by soil geochemical and IP geophysical surveys. The better targets outlined from this work have been tested by diamond drilling leading to the discovery of the 1100-metre long Main Zone deposit containing an estimated geological mineral inventory of 12,300,000 tonnes (13,600,000 tons) grading 6.17% zinc and 0.77% oz/ton silver. Ninety percent of this inventory is within 200 metres of surface and is amenable to open pit mining methods.

The exploration potential for expanding the mineral reserves of the East and Main Blocks of the **Main Zone** deposit is considered excellent.

> An expansion of open-pittable reserves in the East Block of up to 1,000,000 tonnes is realistic and can be accomplished by drilling six shallow holes from 575E to 825E. Specifically, these six holes would be collared approximately 40 metres grid south of drill holes 42, 44, 45, 55, 57 and 59. In addition to this near-surface postulated inventory expansion, considerable exploration potential also lies at depth in the East Block within a relatively shallow, down-dip target area.
>
> The Main Block has been drill tested to vertical depths ranging from 175 metres in DDH 100 to a maximum of 250 metres in DDH 103. It remains open to depth and additional deep drilling has the potential to rapidly expand the presently defined inventory. Given previous encouraging deep drill hole results:

DDH 23:	9.0 m of 10.07% Zn, 2.02 opt Ag;
DDH 103:	7.0 m of 10.89% Zn, 0.53 opt Ag;
DDH 100:	10.0 m of 14.30% Zn, 0.65 opt Ag and
	4.0 m of 14.34% Zn, 0.60 opt Ag,

> the probability of locating adequate grade and tonnage to support a second-phase, underground mining operation is also considered excellent.

It is estimated that an expenditure of $2.0 million, primarily for 11,500 metres of diamond drilling, is required to accomplish the above.

****

3.0 RECOMMENDATIONS

Additional work on the property is subject to a review of deposit economics. Given favourable results, future work should include:

1. Fill-in diamond drilling in selected areas of the deposit to confirm the presently defined mineral inventory.
2. Additional deep diamond drilling to test the limits of the deposit to depth.
3. Baseline environmental and access road studies.
4. A bulk sampling program.

Respectfully submitted

CORDILLERAN ENGINEERING LTD.

Mike Stammers

M. A. Stammers, B.A., FGAC
Geologist

MS/z
February, 1989

****

4.0 INTRODUCTION

This report describes a program of diamond drilling, excavator trenching, metallurgical testing, geophysical and geochemical survey work carried out on the Logan claim group during the period March 19 to November 12, 1988.

The property hosts a significant zinc-silver deposit with potential to support a medium tonnage, moderate grade mining operation utilizing open pit methods.

4.1 LOCATION AND ACCESS (Figure 1)

The property is located 108 kilometres northwest of Watson Lake, Yukon, at latitude 60 degrees 30'N and longitude 130 degrees 27'W (Figure 1). The claims are situated 38 kilometres north of the Alaska Highway and 258 kilometres east of the Yukon capital of Whitehorse.

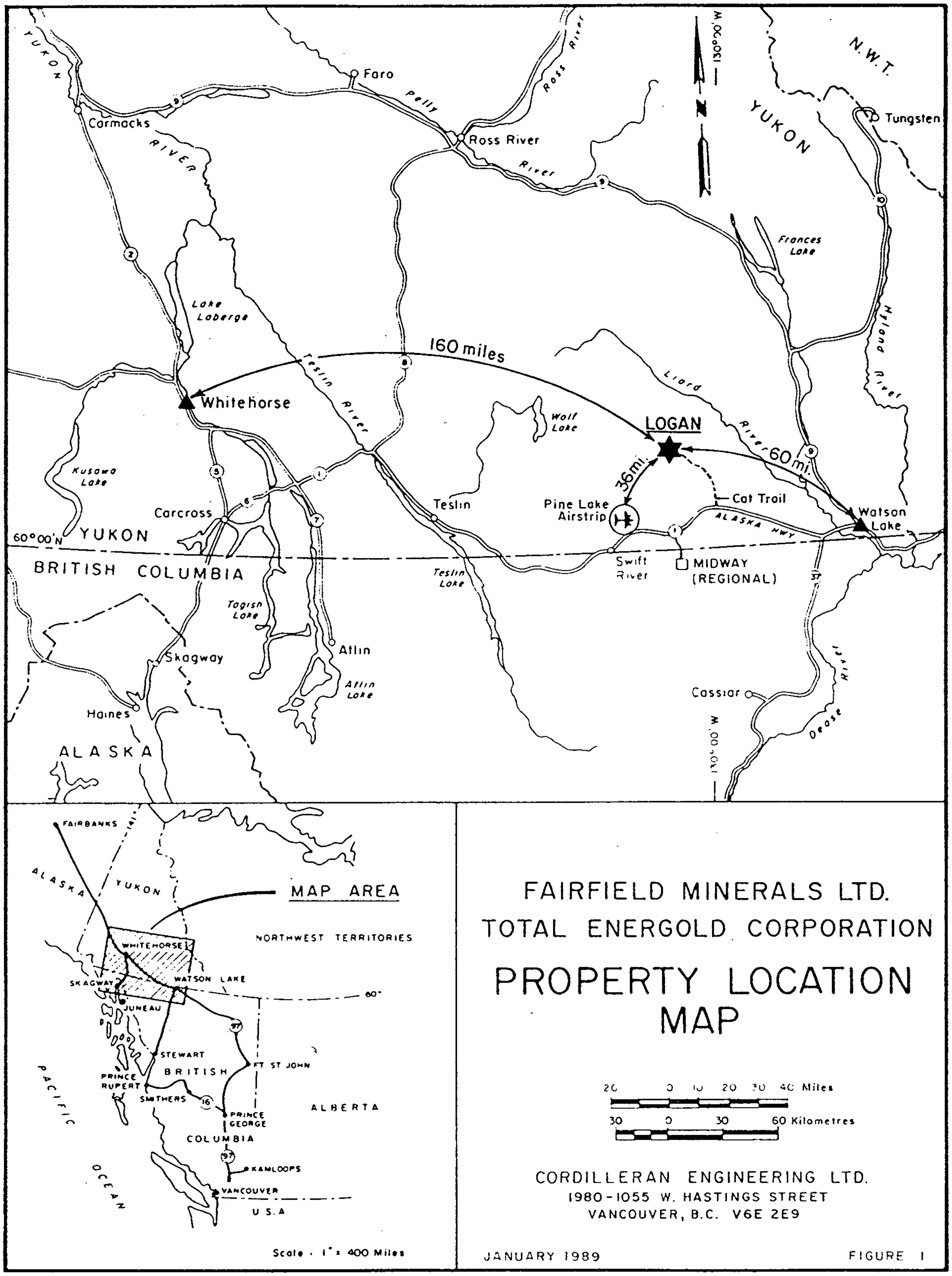
Field operations were based from a tent camp centrally located on the property. Access to the claim group is by fixed-wing aircraft from Watson Lake to a 700-metre long gravel airstrip. Light duty, four wheel drive trucks flown in by Caribou aircraft provided on-property transportation during the 1988 field season. A total of 224 flights into Logan were recorded this season giving a two year total of 495 flights.

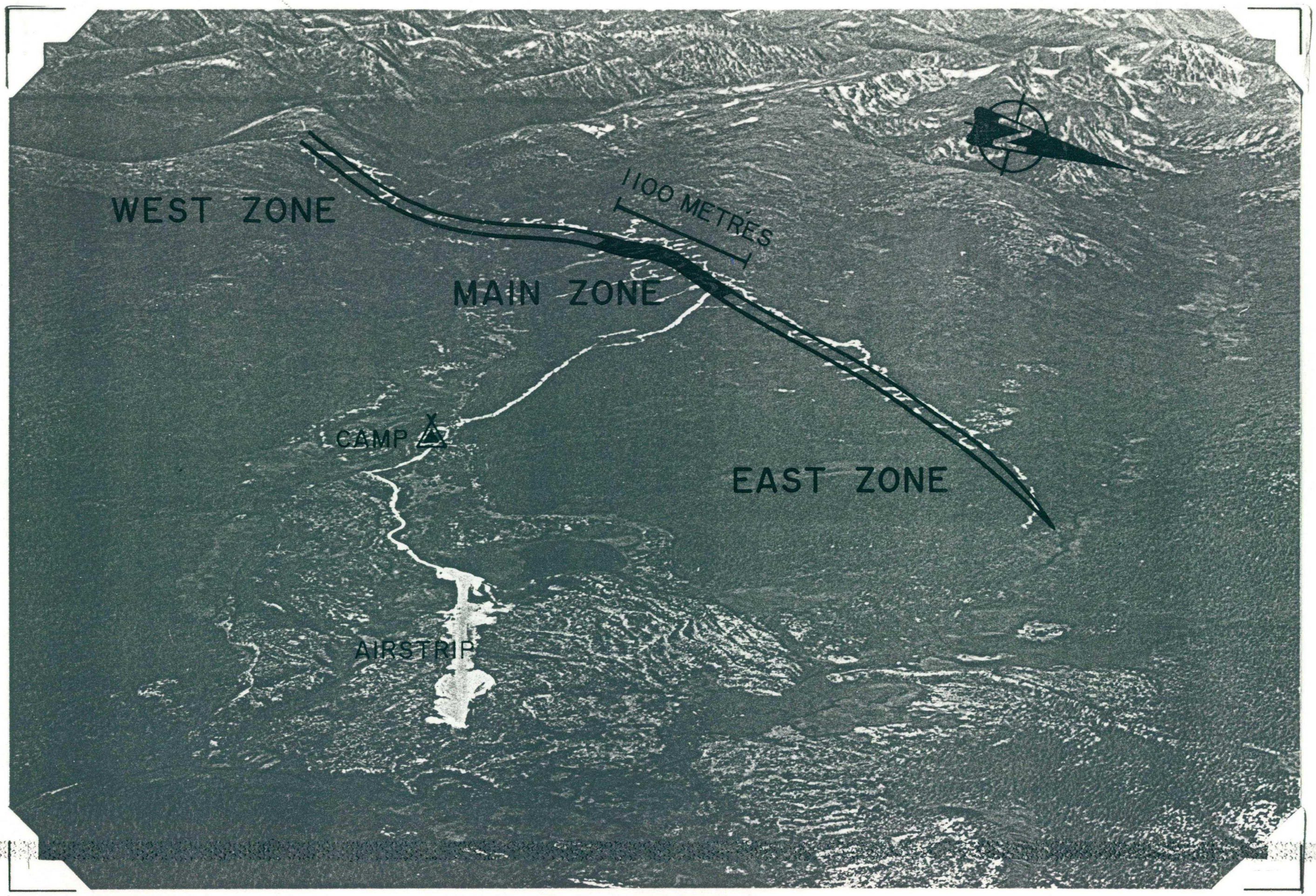
A 52-kilometre trail originating from Milepost 687 on the Alaska Highway provides November to April access to the property for track-equipped machinery.

4.2 PHYSIOGRAPHY AND CLIMATE (Figure 2)

The claims are situated in the northeastern Cassiar Mountains and cover mixed alpine, subalpine, forest and open valley meadow terrain. Glacial drift, including a prominent east-west trending esker and a large outwash fan situated near the airstrip, is found on the property. Elevations range from 1100 to 1700 metres above sea level; relief is gentle in the central and eastern claims area, becoming moderate to steep in the west.

Wildlife spotted by crews working in the claim area include moose, caribou, sheep, black bear, martin, beaver, goat, porcupine and wolverine. Vegetation is generally sparse and includes fir, spruce, pine, willow and alder.


YUKON
Faro
Pelly
Ross River
Carmacks
Ross River
RIVER
River
N.W.T.
YUKON
Tungsten
Frances Lake
Lake Laberge
160 miles
Teslin River
Liard River
Hyland River
Whitehorse
Wolf Lake
LOGAN
60mi.
36mi.
Kusawa Lake
Pine Lake Airstrip
Cat Trail
Teslin
Carcross
Watson Lake
ALASKA HWY
60°00'N YUKON
BRITISH COLUMBIA
Swift River
MIDWAY (REGIONAL)
Teslin Lake
Tagish Lake
Atlin
Skagway
Atlin Lake
Cassiar
Haines
Dease River
ALASKA
130°00'W
FAIRBANKS
ALASKA
YUKON
MAP AREA
NORTHWEST TERRITORIES
WHITEHORSE
SKAGWAY
WATSON LAKE
60°
JUNEAU
STEWART
BRITISH
FT ST JOHN
PRINCE RUPERT
SMITHERS
PRINCE GEORGE
ALBERTA
PACIFIC
COLUMBIA
OCEAN
KAMLOOPS
VANCOUVER
U.S.A.
Scale : 1" = 400 Miles
FAIRFIELD MINERALS LTD.
TOTAL ENERGOLD CORPORATION
PROPERTY LOCATION MAP
20 0 10 20 30 40 Miles
30 0 30 60 Kilometres
CORDILLERAN ENGINEERING LTD.
1980-1055 W. HASTINGS STREET
VANCOUVER, B.C. V6E 2E9
JANUARY 1989
FIGURE 1



LEGEND

PRESENTLY DEFINED ZINC-SILVER DEPOSIT

SURFACE TRACE OF MINERALIZED STRUCTURE

FAIRFIELD MINERALS LTD.

TOTAL ENERGOLD CORPORATION

LOGAN ZINC - SILVER PROPERTY

CORDILLERAN ENGINEERING LTD.

1980-1055 W. HASTINGS STREET
VANCOUVER, B.C. V6E 2E9

FEBRUARY 1989

FIGURE 2

INTRODUCTION (Continued)

Climate in the area is characterized by short, warm summers and long, cold winters. Precipitation is light to moderate year round. The best exploration season lasts from late May until the middle of September. Figure 2 is a photograph of the property looking west.

4.3 EXPLORATION HISTORY

Initial staking (Logan 1-6) was undertaken in July 1979 to cover a gossan-related discovery of zinc-silver-tin-copper mineralization. Subsequent staking was completed in October 1979 (Logan 7-36), June 1984 (Logan 37-88), July 1984 (Logan 89-94), July 1986 (Logan 95-106), September 1986 (Logan 107-168) and December 1987 (Logan 169-200) to protect areas of favourable geology and geochemistry.

A brief summary of work conducted on the Logan claims follows:

1979: Geological mapping, soil and stream sediment geochemical sampling, hand trenching and test IP, EM and magnetometer geophysical surveys.

1980: The area southeast of the present claim boundary was explored with soil geochemistry.

1982: Soil sampling was completed in the West Zone and hand trenching was carried out in the Main Zone.

1984: Grid preparation, extensive soil geochemical sampling, geological mapping, hand trenching, magnetometer and IP surveys.

1985: Grid preparation, detailed geological mapping, soil geochemistry, Induced Polarization surveys and hand trenching was completed in the East Zone.

1986: A diamond drill program comprising 15 holes totalling 1897.68 metres was completed in the Main Zone (13 holes - 1682.49 m) and in the East Zone (2 holes - 215.19 m).

1987: A diamond drill program comprising 44 holes totalling 7769.66 metres in the Main Zone with supplementary airstrip, camp and road construction; East grid soil geochemistry; IP geophysical surveys; ground control surveys; aerial photography and grid preparation work.

All work on the property has been conducted by Cordilleran Engineering Ltd. on behalf of Fairfield Minerals Ltd. and, prior to claim ownership transfer in May 1986, for Regional Resources Ltd.

INTRODUCTION Continued)

4.4 1988 EXPLORATION PROGRAM

A diamond drill program, utilizing two rigs completed 44 NQ wireline holes totalling 6771.44 metres in the Main, West and East Zones during the period June 4 to September 15, 1988. Diamond drill core was logged in detail and a total of 1140 samples were collected and analyzed for zinc and silver. Approximately 28% or 1921.36 metres of the total metreage drilled was split, bagged and shipped to Bondar Clegg & Company's North Vancouver laboratory for sample preparation and analysis. Core for all 103 drill holes is now stored at the Logan property core racks, following the transfer of holes 86-1 through 86-15 from the Meister property.

A D-6 Caterpillar tractor and a John Deere 490 excavator were walked to the property over a 52 kilometre route originating from the Alaska Highway during a five-day period in mid-March. The equipment returned to the Alaska Highway along the same route during a four-day period in mid-November. The bulldozer was used to prepare drill and trench sites, construct access roads and to move the drills.

A trenching program utilizing a leased JD490 excavator and consisting of 15 trenches totalling 2412 linear metres displacing 17,400 cubic metres was completed in the Main, East and West Zones. Trenches were systematically mapped and sampled. A total of 1368 rock and 113 soil samples were collected and shipped to Bondar-Clegg and Company for zinc-silver analyses.

Grid preparation included 41.6 kilometres of chained and picketed cut line in the West, Main and East Zones. Work was conducted by G. Clark and Associates of Whitehorse, Y.T.

A total of 1107 soil samples were collected every 50 metres on lines 100 metres apart in the West Zone and on lines 200 metres apart in the new western claims area. Samples were sent to Bondar Clegg and Co's North Vancouver laboratory for sample preparation and zinc-silver-tin analysis.

Induced Polarization geophysical surveys were carried out over the Main and West Zones during the period June 27 to August 9, 1988 by Pacific Geophysical Ltd. of Vancouver. Surveys included 9.0 kilometres of 100-metre; 6.0 kilometres of 50-metre and 10.0 kilometres of 25-metre dipole-dipole work mostly in the West Zone.

Survey work was conducted in August by G. Aucoin and Associates of Whitehorse, Yukon. Additional ground control stations were established, Main Zone deposit area claim posts were surveyed and all trenches and drill hole collars up to and including TR 810 and DDH 88-99 were assigned elevation, grid and UTM coordinates.

Reclamation work was completed in the Main, West and East Zones and included filling in non-mineralized trenches, grooming and contouring drill sites, and reseeding abandoned roads, trenches and drill sites. Approximately 725 kilograms of seed mix consisting of 23% creeping red fescue, 22% climax timmothy, 23% meadow foxtail, 24% alsike fescue and 8% sheep fescue was spread over disturbed areas by hand.

Other work completed during the course of the program included mineral inventory calculations and preliminary metallurgical testing by Lakefield Research.

INTRODUCTION Continued

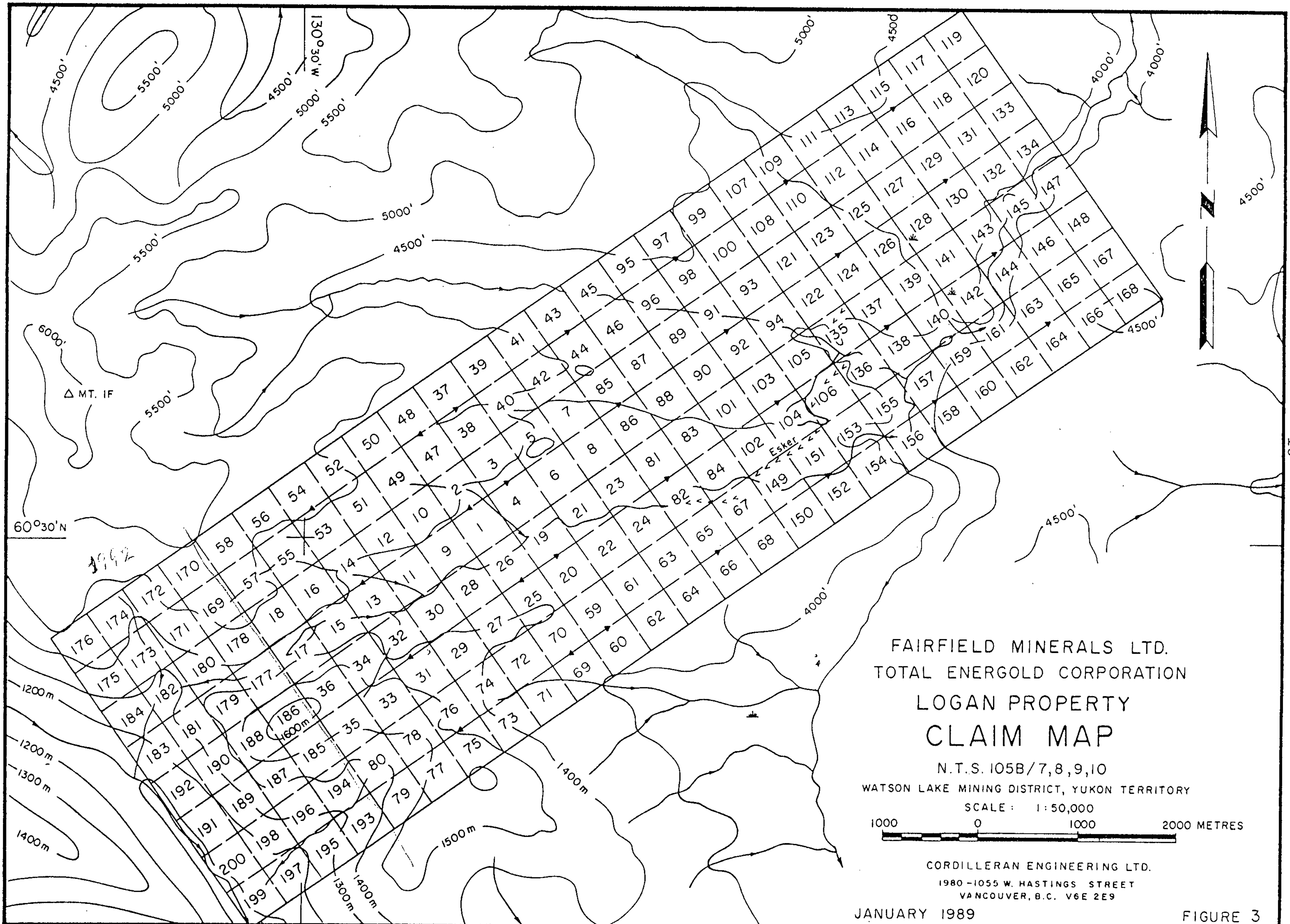
4.5 CLAIM DATA (Figure 3)

The Logan property consists of 200 contiguous Quartz claims located in the Watson Lake Mining District, Yukon Territory. The project has been operated by Fairfield Minerals Ltd. of Vancouver, B.C. and is subject to an agreement with Total Energold Corporation of Vancouver, B.C. who have recently earned a 50% interest in the property.

Table 1 **CLAIM DATA**

CLAIM	GRANT No's	EXPIRY DATE
LOGAN 1 - 6	YA 45047 - YA 45052	31 DEC. 2003
LOGAN 7 - 36	YA 46254 - YA 46283	31 DEC. 2003
LOGAN 37 - 88	YA 71027 - YA 71078	31 DEC. 2005
LOGAN 89 - 94	YA 71360 - YA 71365	31 DEC. 2002
LOGAN 95 - 106	YA 91214 - YA 91225	31 DEC. 1999
LOGAN 107 - 168	YA 98615 - YA 98676	31 DEC. 1995
LOGAN 169 - 200	YA 10686 - YA 10717	31 DEC. 1992

****


FAIRFIELD MINERALS LTD.
TOTAL ENERGOLD CORPORATION
LOGAN PROPERTY
CLAIM MAP
N.T.S. 105B/7,8,9,10
WATSON LAKE MINING DISTRICT, YUKON TERRITORY
SCALE: 1:50,000
1000 0 1000 2000 METRES
CORDILLERAN ENGINEERING LTD.
1980-1055 W. HASTINGS STREET
VANCOUVER, B.C. V6E 2E9
JANUARY 1989
FIGURE 3
130°30'W
60°30'N
MT. IF
Esker
6000'
5500'
5000'
4500'
4000'
1200m
1300m
1400m
1500m
1600m

5.0 GEOLOGY

5.1 REGIONAL GEOLOGY

Regional geology is based on mapping of the Wolf Lake map area (NTS 105/B) by Poole (1951-1955) and Roddick and Green (1959) of the Geological Survey of Canada. Recent mapping of four 1:50,000 map sheets in the Logan area has been completed by Amukun and Lowey (1986) and Murphy (1987) for the Department of Indian and Northern Affairs (DIAND) Geology Division. Maps of the Sab Lake area (NTS 105/B-7) and the Meister Lake area (NTS 105/B-8) were released in 1987 while Murphy's 1987 work for NTS 105/B-10 and 105/B-11 was published in June 1988.

The Logan claims area has been mapped by the G.S.C. as a single unit comprising biotite schist and quartzite with sills, dykes and irregular bodies of pegmatite. Amukum and Lowey of DIAND have incorporated Cordilleran Engineering Ltd. geologist's mapping in the area and show Cretaceous pegmatite and granodiorite in contact with the lower Cambrian siliciclastic rocks in the southwest claims area. This generalized mapping by both groups of federal geologists has failed to recognize the relative abundance of granodiorite over lesser pegmatitic phases of the Marker Lake Batholith.

The granodiorite of the Marker Lake Batholith differs from the nearby Cassiar Batholith by its higher percentage of muscovite versus biotite micas. The northwest trending body of the Cassiar Batholith is located about 15 kilometres south of the recently named Marker Lake Batholith.

Fault related, Tertiary-aged "felsite" dykes, quartz-feldspar porphyry dykes, quartz veins and breccias similar to those hosting the Logan deposit are commonly associated with other mineral occurrences in the Rancheria district such as those on the Meister River, YP (Butler Mountain) and Oro claims (Abbott 1983). The deposits and mineral occurrences listed above all appear to be closely related to Late Cretaceous to Early Tertiary, large scale, regionally extensive, northwest trending dextral transcurrent faults. Abbott (1983) provides an excellent review of presently known mineral occurrences in the southern Wolf Lake map area.

GEOLOGY Continued

5.2 PROPERTY GEOLOGY

The Logan property is underlain by granodiorite and pegmatite rocks of the Marker Lake Batholith. An irregular contact with Lower Cambrian and possibly older metasiliciclastic rocks is exposed in the southwestern claims area. Large xenoliths of quartz-biotite-muscovite schist occur throughout the property. Foliated granodiorite has been observed in core in close proximity to the Logan mineralized fault. Tertiary andesite dykes, quartz-feldspar monzonite-latite porphyry dykes, quartz veins and breccia bodies are also associated with the 8.0 kilometre long mineralized system. A major zinc-silver deposit containing an estimated geological mineral inventory of 12.3 million tonnes of 6.17% Zn and 0.77 oz/ton Ag is centrally located on the Logan property. Numerous other mineral occurrences and geochemical/geophysical prospects were explored with diamond drilling. No new discoveries were made. Glacial deposits of Recent age include widespread boulder till deposits, a prominent northeast trending esker centred in the main Logan Creek valley and a large fan-like deposit of sand and gravel in the vicinity of the Logan airstrip.

Faults on the property are marked by topographic depressions and are dominated by northeast trending features with minor northwest trending secondary lineaments.

Bedrock exposure on the property is poor (<5%) except in areas of steep relief where it may rise to 10%. Overburden thickness in the area of diamond drilling varied from less than 1.0 metre to a maximum of 18.3 metres.

Descriptions of lithological units follow:

Lower Cambrian - Siliciclastic Metasedimentary Rocks

This unit outcrops in the southwest claims area and was intersected in several of the West Zone drill holes. It is composed of quartzo-feldspathic-biotite-muscovite schist, banded metasiltstone and minor interbedded quartzite. Narrow lenses of pyroxene-garnet skarn have been reported at two localities on the property within the schist unit. Granodiorite sills and dykes locally intrude the siliciclastic metasedimentary rocks. Elsewhere on the property, in outcrop and drill core, xenoliths of this unit occur in all sizes, shapes and orientations.

Cretaceous - Granodiorite

This is the most common rock type occurring on the property and as a regional unit is part of the Marker Lake Batholith. The granodiorite is characteristically light grey weathering, medium to coarse-grained, quartz-plagioclase-muscovite bearing and includes both equigranular and pegmatitic phases, commonly occurring within one outcrop area. The unit locally exhibits spectacular quartz-feldspar intergrowths typical of graphic textures. Another notable feature, found particularly near the mineralized structure, is a weakly metamorphosed foliated granodiorite. This unit may have been mapped or logged previously as biotite-muscovite schist.

GEOLOGY Continued

Granodiorite seen in core has been divided into three subunits according to intensity of alteration. Fresh granodiorite, unit GD, occurs mainly outside the Logan mineral zone, above the hangingwall and below the footwall faults. Unit AGD comprises pervasively altered granodiorite with feldspar crystals totally replaced by sericite and/or minor clay minerals. This unit is the common lithology within the Logan mineral zone. Other alteration minerals present include chlorite, sausserite and rare epidote. Severely altered granodiorite, unit SAGD, is prevalent within the hangingwall and footwall fault zones. All constituent minerals except quartz have been replaced by crumbly sericite and clay minerals. Protracted meteoric water movement is the postulated cause for this intense alteration mineral assemblage.

In the mineral zone, altered granodiorite is crosscut by stockworks of mineralized quartz veins and veinlets. Sulphide mineralization of sphalerite and lesser pyrite constitutes between 1% and 20% of stockwork mineralized granodiorite. In addition, sphalerite occurs as fine disseminated grains with little or no associated quartz veining and commonly grades between 1% and 5% zinc over significant drill intercepts.

Tertiary(?) Quartz-Feldspar Monzonite/Latite Porphyry Dykes

This unit, QFP, has been recognized in drill core near the western end of the Main Zone deposit and at depth in hole 87-54. Previously described in drill logs as a quartz-feldspar porphyry, it has subsequently been determined through thin section analysis that the aphanitic variety is a latite porphyry and the fine-grained specimens are monzonite porphyry. These rocks weather dark green, are aphanitic to fine-grained and contain between 10% and 25%, two to three mm long, feldspar and quartz phenocrysts. In thin section, one specimen from DDH 86-9 comprised 40% plagioclase, 32% K-feldspar, 17% horneblende, 5% biotite and 5% quartz. Alteration minerals present include sericite, chlorite and biotite. The porphyry dyke rocks are crosscut by late stage mineralized quartz veins and are locally brecciated.

Tertiary(?) Andesite Dykes (Felsite)

Andesite dyke rocks, unit FD, occur in outcrop and drill core within the Logan mineral zone. The term felsite was originally used because dyke outcrops are light to medium grey-green weathering aphanitic rock containing up to 5% subhedral quartz phenocrysts. Thin section study has identified the felsite rocks as andesitic in composition with 75% sericitized plagioclase, 18% altered mafics and 7% quartz. The dykes lie subparallel to the major fault structures and range in thickness from 1.0 to 15.0 metres. The unit is frequently well mineralized and is often brecciated.

Tertiary(?) - Quartz, Quartz Sulphide and other Late Stage Veining

Clear to milky-white to medium grey, occasionally chalcedonic quartz and quartz-sulphide veins and veinlets contain minor to high concentrations of sphalerite and other sulphides. These multiple phase veins crosscut granodiorite, quartz feldspar porphyry and andesite dyke rocks. Crosscutting relationships seen in drill core indicate that there were several phases of quartz and quartz-sulphide veining. Another late stage phase of veining comprises ankerite and quartz-ankerite-sulphide veins.

GEOLOGY Continued)

The thickness of veinlets and veins varies from hairline fracture fillings up to about 5.0 metres. The majority of quartz and quartz-sulphide veins are confined to the Logan mineral zone.

Tertiary(?) Diatreme and Tectonic Breccias

Two types of breccia have been recognized within the Logan mineral zone. The first, a tectonic or cataclastic breccia, is composed of angular to subangular clasts of granodiorite, andesite dyke, quartz vein, and sulphides set in a quartz, quartz-ankerite or quartz-sulphide matrix. The second type, classified as a diatreme breccia pipe, has been intersected in drill holes in the centre of the deposit. This light cream-coloured breccia consists of subangular to subrounded clasts of ankerite chert, sphalerite and silicified granodiorite set in a micritic ankerite and/or dolomite matrix. The fragments in this breccia typically "float" in the cryptocrystalline matrix and its textural appearance is consistent with an explosion breccia or diatreme.

It would appear that mineralization mainly preceded the brecciation and that sphalerite has been re-brecciated.

5.3 MINERALIZATION

The Logan zinc-silver deposit is a significant base metal discovery in Western Canada. The deposit can be classified as a complex vein, breccia and stockwork mineralized body occupying a large tabular-shaped zone bounded by distinctive footwall and hangingwall faults. The sulphides present in the deposit, with an estimated overall modal percentage, include: coarse-grained, brownish-grey, sphalerite (80%); pyrite and minor marcasite (12%), arsenopyrite (5%); chalcopyrite (2%); silver-bearing lead sulfo-salts (Pb-Ag-Sb-Bi-S) (<1%); cassiterite (<1%) and rare pyrrhotite, covellite, galena, chalcocite, tetrahedrite, stannite, jamesonite, kobellite and native copper. All mineralization is hosted within altered granodiorite, andesite dykes, quartz-feldspar monzonite/latite, porphyry dykes, quartz veins, ankerite veins and tectonic and diatreme breccia bodies. The Logan mineral zone is clearly fault-bounded and may represent a major northeast trending crustal dilatant zone. Repeated fracturing of host rocks has permitted a high degree of permeability for multiple phase injection of silica and carbonate-bearing mineralizing fluids.

The length of the Main Zone mineral deposit, as defined by diamond drilling, extends from 150W to 850E, a distance of 1100 metres. However, the area containing 92% of the presently defined geological mineral inventory extends from 250W to 350E, a distance of 600 metres. The average width of the Logan mineral zone is approximately 100 metres and it has been drill tested to vertical depths of up to 275 metres.

GEOLOGY Continued)

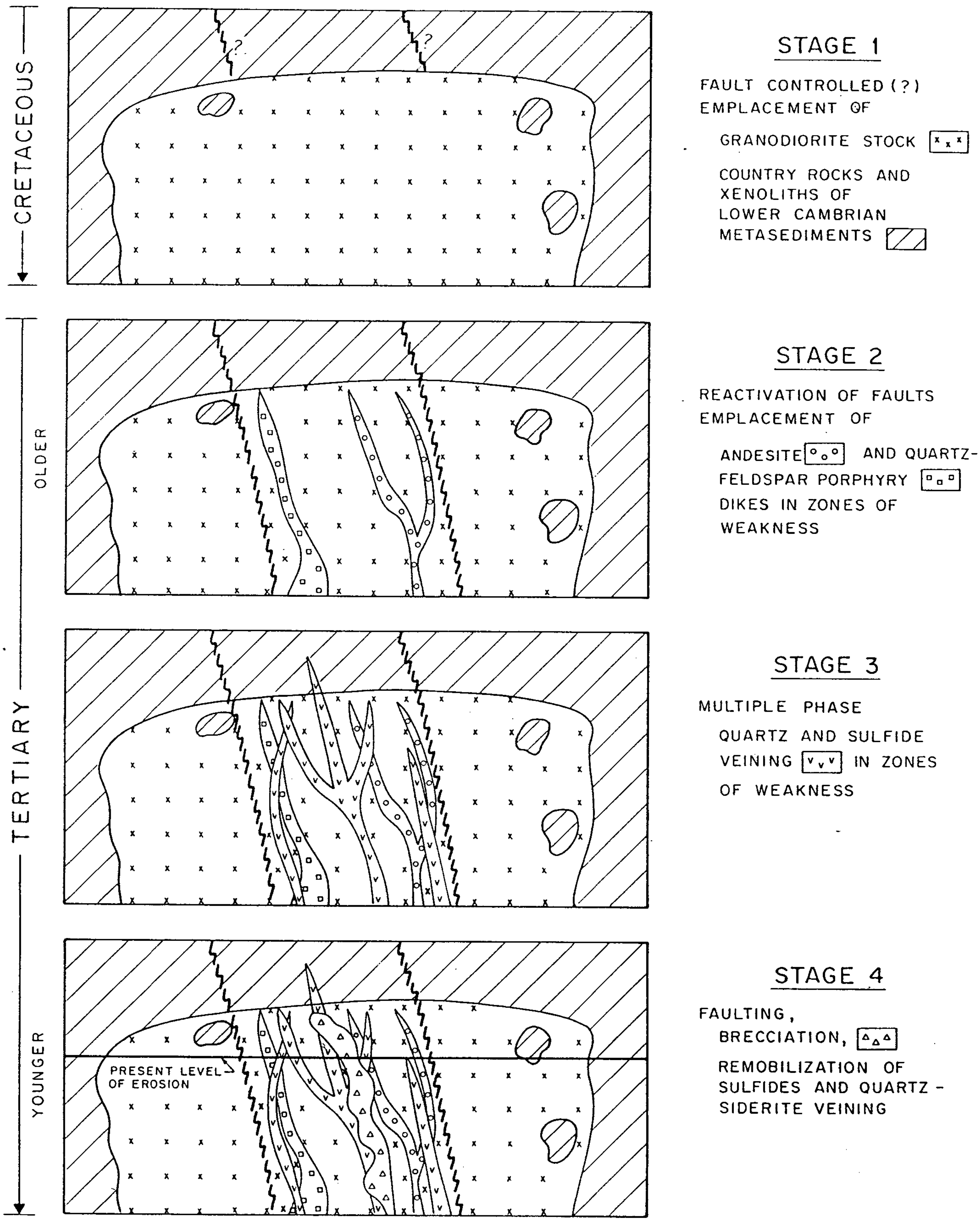
5.4 GENETIC CONSIDERATIONS (Figure 4)

A genetic model showing the development of the Logan deposit in four time-related stages is given in Figure 4. This schematic drawing is based on geological relationships seen in drill core. Cretaceous and Tertiary ages were taken from maps or other publications by Poole et al, Amukum and Lowey and Abbott (see bibliography).

Stage 1 began in the Cretaceous period with the emplacement of the Cassiar and Marker Lake Batholiths and the eastern outlying Cabin Creek, Gravel Creek and Meister Lake stocks. In the Logan area, plutonic rocks may have been emplaced along a major, northeast trending, pre-Cretaceous fault lineament connecting the Marker Lake Batholith with the Cabin Creek stock. Other geological events which occurred during this period included the metamorphism and folding of Lower Cambrian and other strata into a broad antiformal structure with its axis centred in the Cassiar Batholith. Xenoliths of metasedimentary rocks were stoped from country rock by the upwelling intrusive bodies.

Stages 2 through 4 represent probable Tertiary events. The common denominator for all three stages was repeated reactivation of a major, deep-seated linear fault structure that trends northeast through the Logan property. During stage 2, pre-mineral andesite, latite and monzonite porphyry dykes were intruded along this plane of weakness. Stage 3 was the multiple phase injection of quartz veins, quartz-sulphide veins and massive sulphide veins. Alteration of plagioclase and other constituent minerals to sericite, chlorite, biotite and minor clay and epidote began in stage 3 and continued into stage 4. The final stage, highlighted by further fault movement, included brecciation and remobilization of sulphides followed by deposition of barren quartz and ankerite veins, and the of an explosive development of a deep source diatreme breccia pipe in the centre of the deposit.

****



GENETIC MODEL
LOGAN ZINC-SILVER DEPOSIT

CORDILLERAN ENGINEERING LTD.

FIGURE 4

6.0 DIAMOND DRILLING

6.1 OPERATIONS

A diamond drill program, comprising 44 NQ wireline holes totalling 6,771.44 metres was completed on the Logan 1-3, 5-7, 9-11, 13, 15, 32, 35, 85, 87, 88, 90, 187 and 188 mineral claims during the period June 4 to September 15, 1988. The program tested a 5.8 kilometre strike length in the Main, West and East Zones.

Modularized drill equipment and supplies were transported by deHavilland DHC-4 Caribou aircraft from Watson Lake to the property airstrip. This specialized STOL aircraft, based out of Whitehorse, carries maximum payloads of 3500 and 2800 kilograms to and from Logan respectively.

Drilling was done by Arctic Diamond Drilling Ltd. of Whitehorse, Yukon, utilizing two skid-mounted Longyear 38 drills. Arctic also supplied a Caterpillar D-6 tractor which was used to move drills, prepare drill sites and access roads.

The rate of drilling, including moves, averaged 50 metres per day, per drill. The average weighted core recovery was 82.4% and only one of 44 holes was abandoned due to bad ground conditions. Due to the highly fractured nature of the rock, careful and liberal use of mud and polymer additives increased core recovery, diamond bit life and production rates.

6.2 DISCUSSION

The objective of the 1988 diamond drilling program was two-fold. First, exploratory drilling was required to systematically test favourable geochemical, geophysical and geological targets outwards in either direction from the Main Zone deposit along the 5.8 kilometre long, fault-related host structure. Results of this exploratory drilling were discouraging, with little or no zinc mineralization intersected all of the holes. Secondly, definition drilling in the Main Zone deposit area included five holes to test for the continuation of mineralization at depth and four southerly holes to test for parallel and crosscutting structures. Encouraging results were returned in the three central deep holes, while the remaining deep holes and the southerly holes failed to intersect any significant zinc mineralization. The deposit remains open to depth between 150W and 250E. Table 2 summarizes 1988 drill hole distribution by area and Table 3 is a summary record sheet for DDH 86-1 through 88-103. A complete set of sections, plans, summary and detailed drill logs comprises part of this report.

DIAMOND DRILLING Continued

Table 2 1988 DIAMOND DRILL HOLE DISTRIBUTION BY AREA

Location	No. of Holes	DDH Numbers	Metreage (m)
Exploratory:			
Westerly Main Zone	10	60 - 69	1,516.68
Easterly Main Zone	3	70 - 72	348.69
East Zone	11	73 - 83	1,377.85
West Zone	11	84 - 94	1,377.40
South Main Zone	4	95 - 98	530.65
Definition:			
Down-Dip Main Zone	5	99 - 103	1,620.17
TOTALS:	**44**	**60 - 103**	**6,771.44 m**

Westerly exploratory drilling in the Main Zone was undertaken to test IP and geological targets using 100-metre stepouts from line 510W to 1420W (Plates 1, 10). The mineral zone was intersected in seven of ten holes drilled (DDH 60-69) and varied in thickness from 30 metres in hole 60 to less than 15 metres in hole 66 (Plates 19-23, 25-29). The mineralized structure either pinches out or is faulted off in the vicinity of line 1150W, where a prominent northwest trending lineament intersects the main feature. Poor zinc mineralization in this area appears correlative to an absence of local quartz flooding and veining.

Easterly exploratory drilling, including the eastern Main Zone and the East Zone was completed over selected IP and soil anomalies using 100 and 200-metre stepouts from line 1180E to 2585E (Plate 1). The mineral zone was intersected in 10 of 14 holes drilled (DDH 70-83) and varied in thickness from 50 metres in hole 70 to less than 10 metres in hole 82 (Plates 51-63). The mineralized structure appears to pinch out east of line 2400E and was not intersected in three holes between lines 1400E and 1600E. Low grade mineralization with values generally less than 1% Zn were returned from all drill holes.

West Zone drilling was completed over several very significant geochemical, geophysical and geological targets extending from 990W to 3030W and 300S to 1035S (Plates 10, 11). Spacing of drill holes 84 to 94 ranged from 100 metres to 700 metres over five selected target anomalies. Weak pyrite-sphalerite mineralization, with generally less than 1% zinc, was intersected in eight of eleven holes drilled (Plates 12-18, 24). Discouraging results in the West Zone can in part be attributed to reduced hydrothermal activity; less intensive ground preparation; and a change in host rock lithologies from granodiorite and andesite to metasediments cut locally by granodiorite sills and dykes.

Four **South Main Zone** holes were drilled to test for mineralized structures both parallel (DDH 95-97) and perpendicular (DDH 98) to the deposit (Plate 2). Results of this work were discouraging with drill intercepts

TABLE 3

LOGAN PROPERTY 1986
DIAMOND DRILL SUMMARY RECORD

HOLE NO.	NORTHING	EASTING	ELEV'N m	SECTION	INCLINATION degrees	AZIMUTH degrees	O'BURDEN m	CLAIM	REC'Y %	DATE START	DATE FINISH	REMARKS	DEPTH m	TOTAL m
86-1	060.92 N	273.94 E	1355.60	275 E	-50	325	2.44	LOGAN 3	83	JUL 5 (D)	JUL 7 (N)	Abandoned	76.50	76.50
86-2	151.95 N	193.08 E	1374.50	195 E	-50	325	2.44	LOGAN 3	91.5	JUL 9 (D)	JUL 10 (N)		154.54	231.04
86-3	193.93 N	269.93 E	1380.80	275 E	-50	145	1.83	LOGAN 3	98	JUL 12 (D)	JUL 13 (N)		115.21	346.25
86-4	052.81 N	191.28 E	1354.20	195 E	-52	325	4.88	LOGAN 3	66	JUL 14 (D)	JUL 15 (N)	Abandoned	67.36	413.61
86-5	122.29 N	007.19 W	1356.80	005 W	-50	325	9.75	LOGAN 2	89	JUL 16 (D)	JUL 20 (D)		168.86	582.47
86-6	201.51 N	093.81 W	1368.70	105 W	-60	145	3.05	LOGAN 2	83	JUL 22 (D)	JUL 23 (D)		90.53	673.00
86-7	255.58 N	095.52 W	1375.80	105 W	-60	145	4.88	LOGAN 2	81	JUL 24 (D)	JUL 28 (D)	Abandoned	100.89	773.89
86-8	256.58 N	095.52 W	1375.50	105 W	-62	145	4.27	LOGAN 2	97	JUL 29 (D)	AUG 1 (D)		160.02	933.91
86-9	206.09 N	198.44 W	1382.50	200 W	-60	145	3.05	LOGAN 2	73.2	AUG 2 (D)	AUG 4 (D)		123.44	1057.35
86-10	164.64 N	309.78 W	1389.00	310 W	-60	145	1.83	LOGAN 2	81	AUG 5 (D)	AUG 6 (D)		102.41	1159.76
86-11	233.90 N	394.02 E	1383.80	395 E	-60	145	3.66	LOGAN 3	63	AUG 7 (D)	AUG 9 (D)		145.39	1305.15
86-12	144.20 N	2084.39 E	1312.84	2085 E	-60	145	1.83	" 88	52	AUG 11 (D)	AUG 12 (D)		102.41	1407.56
86-13	213.66 N	2185.55 E	1303.10	2185 E	-60	145	2.44	" 87	49	AUG 13 (D)	AUG 15 (D)	Abandoned	112.78	1520.34
86-14	231.63 N	094.43 E	1380.40	095 E	-60	145	7.62	LOGAN 3	42	AUG 16 (D)	AUG 19 (D)	Abandoned	156.67	1677.01
86-15	277.09 N	004.81 W	1381.20	005 W	-60	145	3.05	LOGAN 2	92	AUG 20 (D)	AUG 23 (N)		220.68	1897.69

LOGAN PROPERTY 1987
DIAMOND DRILL SUMMARY RECORD

HOLE NO.	NORTHING	EASTING	ELEV'N m	SECTION	INCLINATION degrees	AZIMUTH degrees	O'BURDEN m	CLAIM	REC'Y %	DATE START	DATE FINISH	REMARKS	DEPTH m	TOTAL m
87-16	216.59 N	006.64 W	1373.00	005 W	-60	135	9.14	LOGAN 2	83	JUN 13 (D)	JUN 16 (D)		149.35	149.35
87-17	138.54 N	007.24 W	1359.60	005 W	-60	145	15.24	LOGAN 2	90	JUN 13 (D)	JUN 16 (N)		153.01	302.36
87-18	326.48 N	004.27 W	1389.40	005 W	-60	145	7.32	LOGAN 2	92	JUN 17 (D)	JUN 22 (N)		268.22	570.58
87-19	152.39 N	200.83 W	1373.90	200 W	-60	145	9.75	LOGAN 2	66	JUN 16 (N)	JUN 21 (D)		100.58	671.16
87-20	263.05 N	198.18 W	1384.00	200 W	-60	145	9.14	LOGAN 2	68	JUN 21 (N)	JUN 27 (D)		183.79	854.95
87-21	320.60 N	200.19 W	1383.80	200 W	-60	145	12.80	LOGAN 2	89	JUN 23 (D)	JUN 27 (D)		247.49	1102.44
87-22	323.18 N	113.68 W	1384.20	105 W	-62	145	7.01	LOGAN 2	77	JUN 27 (N)	JUL 3 (D)		252.07	1354.51
87-23	376.34 N	112.62 W	1393.40	105 W	-62	145	9.75	LOGAN 2	91	JUN 28 (D)	JUL 3 (N)		324.61	1679.12
87-24	231.02 N	305.04 W	1402.20	310 W	-60	145	9.14	LOGAN 2	75	JUL 3 (N)	JUL 8 (D)		181.66	1860.78
87-25	284.37 N	095.56 E	1389.30	095 E	-60	145	9.75	LOGAN 3	87	JUL 4 (D)	JUL 9 (D)		236.83	2097.61
87-26	339.95 N	096.45 E	1398.30	095 E	-60	145	9.45	LOGAN 3	91	JUL 9 (N)	JUL 15 (D)		309.07	2406.68
87-27	110.86 N	414.41 W	1380.40	415 W	-60	145	10.36	LOGAN 2	81	JUL 8 (N)	JUL 11 (D)		138.07	2544.75
87-28	307.72 N	423.27 W	1424.40	415 W	-60	145	10.67	LOGAN 2	89	JUL 11 (N)	JUL 15 (D)		148.44	2693.19
87-29	030.51 N	511.14 W	1364.80	510 W	-60	145	15.24	LOGAN 10	53	JUL 15 (N)	JUL 21 (D)	Casing left	125.27	2818.46
87-30	027.64 N	601.84 W	1363.50	600 W	-60	145	18.29	LOGAN 10	15	JUL 22 (N)	JUL 23 (N)	Abandoned	39.17	2857.63
87-31	212.31 N	192.63 E	1382.00	195 E	-60	145	9.14	LOGAN 3	68	JUL 15 (N)	JUL 19 (D)		197.21	3054.84
87-32	268.96 N	194.25 E	1390.50	195 E	-60	145	9.75	LOGAN 3	65	JUL 19 (N)	JUL 24 (D)		234.70	3289.54
87-33	164.96 N	192.28 E	1378.10	195 E	-60	145	9.75	LOGAN 3	77	JUL 24 (N)	JUL 27 (N)		131.98	3421.52
87-34	185.69 N	092.02 E	1374.50	095 E	-60	145	7.92	LOGAN 3	69	JUL 23 (D)	JUL 26 (D)		124.36	3545.88
87-35	243.95 N	274.52 E	1388.90	275 E	-60	145	4.26	LOGAN 3	79	JUL 26 (N)	JUL 31 (N)		215.49	3761.37
87-36	299.73 N	274.58 E	1395.20	275 E	-60	145	6.40	LOGAN 3	88	JUL 27 (D)	JUL 31 (D)		248.10	4009.47
87-37	173.48 N	393.38 E	1377.30	395 E	-60	145	7.92	LOGAN 3	43	AUG 1 (D)	AUG 3 (D)		82.60	4092.07
87-38	279.46 N	393.32 E	1391.50	395 E	-60	145	6.70	LOGAN 3	94	JUL 31 (N)	AUG 4 (D)		223.42	4315.49
87-39	073.96 N	391.08 E	1363.10	395 E	-60	145	6.70	LOGAN 3	93	AUG 4 (N)	AUG 6 (N)		124.05	4439.54
87-40	224.01 N	490.35 E	1378.30	490 E	-60	145	7.62	LOGAN 5	47	AUG 3 (N)	AUG 8 (D)		128.63	4568.17
87-41	052.90 N	488.09 E	1360.70	490 E	-60	145	3.66	LOGAN 5	90	AUG 6 (N)	AUG 8 (N)		129.24	4697.41
87-42	241.01 N	577.38 E	1372.10	580 E	-60	145	7.37	LOGAN 5	74	AUG 8 (D)	AUG 12 (N)		151.49	4848.90
87-43	055.11 N	577.98 E	1365.30	580 E	-60	145	9.45	LOGAN 5	92	AUG 9 (D)	AUG 10 (N)		121.92	4970.82
87-44	228.13 N	684.58 E	1375.90	685 E	-60	145	6.71	LOGAN 5	92	AUG 11 (D)	AUG 13 (N)		140.82	5111.64
87-45	226.20 N	783.38 E	1375.60	785 E	-60	145	6.71	LOGAN 5	85	AUG 13 (D)	AUG 16 (N)		149.96	5261.60
87-46	240.81 N	890.22 E	1370.20	890 E	-60	145	9.75	LOGAN 5	78	AUG 14 (D)	AUG 16 (N)		140.82	5402.42
87-47	224.97 N	977.47 E	1365.50	975 E	-60	145	8.23	LOGAN 7	91	AUG 16 (N)	AUG 19 (D)		113.39	5515.81
87-48	224.45 N	1094.07 E	1353.50	1095 E	-60	145	6.10	LOGAN 7	90	AUG 17 (D)	AUG 19 (D)	Casing left	132.89	5648.70
87-49	232.11 N	143.92 E	1382.10	145 E	-60	145	12.50	LOGAN 3	79	AUG 19 (D)	AUG 23 (D)		172.82	5821.52
87-50	233.10 N	040.83 E	1377.40	040 E	-60	145	4.57	LOGAN 3	87	AUG 21 (N)	AUG 25 (N)		153.92	5975.44
87-51	242.99 N	054.36 W	1374.90	055 W	-60	145	12.50	LOGAN 2	87	AUG 23 (D)	AUG 26 (D)		153.92	6129.36
87-52	228.05 N	141.92 W	1372.40	140 W	-60	145	12.50	LOGAN 2	83	AUG 26 (D)	AUG 28 (N)		120.09	6249.45
87-53	115.56 N	1091.30 E	1361.00	1095 E	-60	145	4.57	LOGAN 7	95	AUG 19 (D)	AUG 21 (D)		72.85	6322.30
87-54	573.33 N	001.06 W	1429.30	005 W	-60	145	12.80	LOGAN 47	89	AUG 26 (D)	SEP 11 (D)	Casing left	609.90	6932.20
87-55	227.40 N	626.98 E	1373.83	630 E	-60	145	9.90	LOGAN 5	86	SEP 3 (D)	SEP 5 (D)		132.59	7064.79
87-56	284.44 N	684.75 E	1372.70	685 E	-60	145	12.19	LOGAN 5	83	AUG 29 (D)	SEP 2 (N)		217.02	7281.81
87-57	230.58 N	733.56 E	1376.74	735 E	-60	145	4.57	LOGAN 5	69	SEP 5 (N)	SEP 9 (D)		142.95	7424.76
87-58	283.48 N	783.95 E	1368.60	785 E	-60	145	6.71	LOGAN 5	77	SEP 9 (N)	SEP 13 (D)		214.88	7639.64
87-59	231.04 N	833.27 E	1372.47	835 E	-60	145	12.80	LOGAN 5	72	SEP 11 (N)	SEP 13 (N)		130.15	7769.79

Continued

Table 3 continued

LOGAN PROPERTY 1988
DIAMOND DRILL SUMMARY RECORD

HOLE NO.	NORTHING	EASTING	ELEV'N m	SECTION	INCLINATION degrees	AZIMUTH degrees	O'BURDEN m	CLAIM	REC'Y %	DATE START	DATE FINISH	REMARKS	DEPTH m	TOTAL m
88-60	99.60 N	511.28 W	1380.05	510 W	-60	144.4	16.76	LOGAN 10	77	JUN 4 (D)	JUN 8 (N)	Main Zone	151.18	151.18
88-61	76.71 N	598.59 W	1378.06	600 W	-60	144.4	9.14	LOGAN 10	68	JUN 5 (D)	JUN 8 (D)	" " Abandoned	113.08	264.26
88-62	64.44 N	718.04 W	1383.56	720 W	-60	144.4	12.19	LOGAN 10	93	JUN D (D)	JUN 11 (D)	Main Zone	180.44	444.70
88-63	8.25 S	813.93 W	1375.43	815 W	-60	144.4	6.40	LOGAN 9	86	JUN 9 (N)	JUN 11 (N)	Main Zone	156.67	601.37
88-64	37.25 S	920.27 W	1365.40	920 W	-60	144.4	6.10	LOGAN 11	80	JUN 11 (N)	JUN 14 (N)	" "Casing Left	167.34	768.71
88-65	89.35 S	1020.38 W	1351.93	1020 W	-60	144.4	6.40	LOGAN 11	87	JUN 12 (D)	JUN 14 (N)	Main Zone	172.51	941.22
88-66	186.94 S	1123.71 W	1330.06	1125 W	-60	144.4	18.90	LOGAN 11	83	JUN 14 (N)	JUN 18 (D)	Main Zone	146.61	1087.83
88-67	239.01 S	1217.64 W	1324.58	1220 W	-60	144.4	12.90	LOGAN 11	76	JUN 14 (N)	JUN 17 (D)	Main Zone	160.02	1247.85
88-68	301.21 S	1320.01 W	1316.45	1320 W	-60	144.4	15.54	LOGAN 11	73	JUN 17 (N)	JUN 19 (N)	Main Zone	124.36	1372.21
88-69	335.80 S	1418.67 W	1307.86	1420 W	-60	144.4	43.28	LOGAN 13	61	JUN 18 (D)	JUN 21 (N)	Main Zone	144.48	1516.68
88-70	232.73 N	1182.12 E	1349.16	1180 E	-60	144.4	6.40	LOGAN 7	84	JUN 20 (D)	JUN 21 (N)	Main Zone	113.39	1630.07
88-71	228.15 N	1280.95 E	1338.61	1280 E	-60	144.4	3.05	LOGAN 7	94	JUN 22 (D)	JUN 23 (N)	Main Zone	117.65	1747.72
88-72	211.74 N	1375.26 E	1328.04	1375 E	-60	144.4	6.10	LOGAN 85	76	JUN 22 (D)	JUN 24 (D)	Main Zone	117.65	1865.38
88-73	248.94 N	1477.77 E	1322.82	1480 E	-60	144.4	7.32	LOGAN 85	95	JUN 24 (D)	JUN 25 (D)	East Zone	121.01	1986.38
88-74	258.12 N	1559.97 E	1320.68	1560 E	-60	144.4	6.10	LOGAN 85	89	JUN 24 (N)	JUN 26 (N)	East Zone	138.99	2125.37
88-75	332.30 N	1557.67 E	1329.68	1560 E	-60	144.4	13.72	LOGAN 85	77	JUN 25 (N)	JUN 27 (N)	East Zone	122.22	2247.60
88-76	172.20 N	1760.69 E	1311.39	1760 E	-60	144.4	4.27	LOGAN 85	77	JUN 27 (D)	JUN 29 (D)	East Zone	135.64	2383.23
88-77	168.90 N	1880.32 E	1313.56	1880 E	-60	144.4	6.70	LOGAN 87	82	JUN 28 (D)	JUN 30 (D)	East Zone	99.36	2482.60
88-78	134.68 N	1974.22 E	1314.50	1975 E	-60	144.4	6.10	LOGAN 88	89	JUN 30 (D)	JUL 2 (N)	East Zone	128.02	2610.61
88-79	159.40 N	2182.52 E	1304.87	2185 E	-60	144.4	6.40	LOGAN 88	66	JUN 29 (D)	JUL 2 (D)	East Zone	129.24	2739.85
88-80	207.13 N	2097.30 E	1310.91	2085 E	-60	144.4	3.05	LOGAN 87	65	JUL 2 (N)	JUL 5 (N)	East Zone	142.95	2882.80
88-81	173.53 N	2295.93 E	1293.87	2295 E	-60	144.4	12.19	LOGAN 90	85	JUL 3 (D)	JUL 5 (D)	East Zone	110.34	2993.14
88-82	177.67 N	2415.88 E	1282.13	2415 E	-60	144.4	21.95	LOGAN 90	89	JUL 5 (N)	JUL 7 (D)	East Zone	126.64	3119.78
88-83	183.10 N	2587.08 E	1267.39	2585 E	-60	144.4	21.95	LOGAN 90	77	JUL 6 (D)	JUL 8 (D)	East Zone	123.44	3243.22
88-84	424.13 S	1718.97 W	1394.29	1720 W	-60	144.4	3.66	LOGAN 32	87	JUL 8 (D)	JUL 10 (N)	West Zone	124.97	3368.19
88-85	642.92 S	1716.31 W	1399.69	1720 W	-60	144.4	2.74	LOGAN 32	63	JUL 9 (D)	JUL 11 (N)	West Zone	125.27	3493.47
88-86	302.44 S	1717.71 W	1355.31	1720 W	-60	144.4	8.23	LOGAN 13	73	JUL 11 (D)	JUL 13 (N)	West Zone	121.92	3615.39
88-87	607.48 S	1616.47 W	1372.20	1620 W	-60	144.4	3.66	LOGAN 32	73	JUL 12 (D)	JUL 14 (N)	West Zone	125.27	3740.58
88-88	535.72 S	1620.07 W	1362.33	1620 W	-60	144.4	24.99	LOGAN 32	91	JUL 14 (D)	JUL 16 (D)	West Zone	121.92	3862.58
88-89	558.68 S	1519.49 W	1352.13	1520 W	-60	144.4	3.66	LOGAN 32	62	JUL 15 (D)	JUL 17 (N)	West Zone	124.97	3987.55
88-90	850.53 S	2431.79 W	1541.66	2430 W	-60	144.4	4.88	LOGAN 35	81	JUL 26 (D)	JUL 28 (D)	West Zone	132.59	4120.13
88-91	1036.63 S	3016.32 W	1452.60	3015 W	-60	144.4	15.54	" 187	83	JUL 29 (N)	JUL 31 (D)	West Zone	128.93	4249.06
88-92	504.66 S	3029.23 W	1634.56	3030 W	-70	324.4	3.15	" 188	94	AUG 1 (D)	AUG 4 (D)	West Zone	125.27	4374.34
88-93	418.01 S	989.57 W	1321.91	990 W	-60	144.4	5.18	LOGAN 11	80	AUG 5 (D)	AUG 7 (D)	West Zone	123.14	4497.48
88-94	144.26 S	1982.82 W	1351.09	1985 W	-60	144.4	5.74	LOGAN 15	71	AUG 8 (D)	AUG 10 (D)	West Zone	123.14	4620.62
88-95	170.27 N	887.49 E	1373.45	890 E	-50	144.4	6.71	LOGAN 5	85	AUG 10 (N)	AUG 12 (N)	Main Zone	141.73	4762.35
88-96	93.66 N	779.45 E	1372.18	785 E	-60	144.4	3.35	LOGAN 5	85	AUG 13 (D)	AUG 14 (N)	Main Zone	121.62	4883.96
88-97	78.08 S	884.97 W	1345.60	890 E	-60	144.4	2.44	LOGAN 6	87	AUG 15 (D)	AUG 16 (N)	Main Zone	122.22	5006.19
88-98	1.57 S	85.59 W	1344.12	000 N	-60	054.4	3.66	LOGAN 1	88	AUG 17 (D)	AUG 19 (D)	Main Zone	145.08	5151.27
88-99	387.16 N	5.65 W	1400.82	005 W	-60	144.4	7.92	LOGAN 2	84	AUG 19 (D)	AUG 25 (D)	Main Zone	348.69	5499.96
88-100	EST 329N	EST 194 E	EST 1404	195 E	-60	144.4	6.71	LOGAN 3	90	AUG 25 (N)	AUG 29 (N)	Main Zone	283.77	5783.73
88-101	EST 388N	EST 190 W	EST 1396	200 W	-60	144.4	6.71	LOGAN 2	92	AUG 30 (D)	SEP 4 (D)	Main Zone	315.32	6099.05
88-102	EST 359N	EST 279 E	EST 1411	275 E	-60	140.0	9.75	LOGAN 3	91	SEP 4 (N)	SEP 8 (D)	Main Zone	298.70	6397.75
88-103	EST 400N	EST 97 E	EST 1409	095 E	-60	144.4	9.14	LOGAN 3	84	SEP 8 (N)	SEP 15 (D)	Main Zone	373.68	6771.44

EST: Hole not surveyed.

Total = 22,216 ft.

DIAMOND DRILLING continued)

limited to weakly mineralized stockwork or very narrow veins (Plate 30, 48, 50). Only holes 96 and 98 reported zinc mineralization. Hole 96, located on section 785E, cut a 0.5 metre mineralized quartz vein assaying 8.10% Zn and 2.09 oz/ton Ag. DDH 98, drilled in an easterly direction, intersected approximately 30 metres of weak pyrite sphalerite ± chalcopyrite stockwork-hosted mineralization. Selected one metre samples returned peak zinc values of 3.11%, 16,500 ppm and 10,000 ppm.

Main Zone definition drilling included five deep drill holes (DDH 99-103) testing the down dip continuity of mineralization on sections drilled in 1986 and 1987 (Plates 2, 32, 36, 38, 40). Results for composite assays taken from holes 99, 100 and 103 are presented in Table 4. Hole 99, located north of DDH 87-18 on section 005W, intersected stockwork mineralization from 200 to 320 metres with the best grades of zinc occurring at a vertical depth of 220 metres. Hole 100, collared to the north of 87-32 on section 195E returned excellent results at a vertical depth of approximately 175 metres. In addition to the results presented in Table 4, a 10 metre intercept assayed 14.30% Zn and 0.65 oz/ton Ag. Hole 103, collared to the north of DDH 87-26 on section 095E, intersected significant vein, breccia and stockwork-hosted mineralization from 215 to 370 metres. A 7-metre inteval averaged 10.89% Zn and 0.53 oz/ton Ag at a vertical depth of 250 metres. Drill holes 101 and 102 were located at the western (200W) and eastern (275E) boundaries of the deposit. Results from both holes were discouraging with only weak to locally moderate stockwork-hosted sphalerite mineralization intersected. These two holes discounted the possibility of the deposit raking to either the east or west.

Table 4 **RESULTS OF 1988 COMPOSITE ASSAYS**

Hole No.	Metreage	Zn %	Ag (OPT)	Cu %	Sn %	Pb %	As %	SG
99	265-274 = 9.0 m	5.40	0.47	0.16	0.02	0.08	<0.01	2.7
100	227-252 = 25.0 m	9.58	0.53	0.03	0.08	0.18	0.02	2.9
103	305-340 = 35.0 m	7.15	0.33	0.03	0.06	0.02	<0.01	2.7

Au for all 3 samples <0.002 OPT.
WO_3 for all 3 samples 0.01%

DIAMOND DRILLING Continued

6.3 GEOLOGICAL MINERAL INVENTORY (Table 6, Appendix "C")

A geological mineral inventory of the deposit has been calculated using one preliminary and two detailed methods. Results are presented in both summary and detailed form in Table 6. The "preliminary" method is a reasonably fast, less rigorous procedure for determining a tonnage figure for a selected zinc grade. The reliability of the "preliminary" method determination was confirmed by the detailed cross section and level plan calculations. The difference between 12.2 million tonnes of 6.09% Zn, 0.78 oz/ton Ag (Preliminary); 12.3 million tonnes of 6.17% Zn, 0.77 oz/ton Ag (Cross Section); and 12.5 million tonnes of 6.19% Zn, 0.76 oz/ton Ag (Level Plan) is insignificant.

6.3.1 Preliminary Method

Results of this method of calculation should be viewed as an approximation of the mineral inventory, as no zinc cutoff grades were used and individual blocks were formed based on fixed geometric boundaries rather than on boundaries defined by geological interpretation.

The following assumptions were employed in the preliminary calculation method.

1. No zinc cutoff grade was used. For a selected zinc grade tonnage determination drill intercept averages of that grade were generated by blending low and high grade samples.
2. The minimum drill intercept length was 3.0 metres.
3. Mineralization had a uniform dip to grid north of 70 degrees.
4. Diamond drill holes were drilled to grid south at a dip angle of -60 degrees.
5. Specific gravity of mineralized material was 3.0 tonnes/cu.m.
6. Mineralization was uniform and continuous between the intersection used and:
   (a) surface; or
   (b) half way between holes above and below; or
   (c) 25 metres below lowest hole; and
   (d) 50 metres to adjacent sections. Data from intermediate drill holes 49,50,51,52,55,57 and 59 was not used in this calculation method.

6.3.2 Cross Section Method (Plates 31-50)

For this method, the inventory was divided into two classifications based on the distance from a drill hole. Of the 12.3 million tonnes reported for the deposit, 8.7 million tonnes, or 70.7% of the inventory, is within 30 metres of a drill hole. The remaining 3.6 million tonnes is greater than 30 metres from a drill hole.

DIAMOND DRILLING Continued
GEOLOGICAL MINERAL INVENTORY

Cross Section Method Continued

The deposit has also been divided into the Main and East Blocks. The Main Block of the deposit extending from 3650W to 335E, contains 11.3 million tonnes grading 6.35% Zn, 0.77 oz/ton Ag or 91.9% of the inventory. The East Block comprises 1.0 million tonnes grading 4.08% Zn and 0.77 oz/ton Ag.

The following criteria were considered and assumptions made for the cross section method of calculation:

A. DETERMINE DIAMOND DRILL HOLE INTERCEPTS:

1. A 2% zinc cutoff was used. Internal values of less than 2% zinc were only included where the adjacent value and the value of less than 2% averaged greater than 2% zinc.
2. A minimum intercept length of 4.0 metres was required.
3. A total of 44 drill holes were used in the calculation process. Table 5 shows the distribution of samples for various zinc populations in the Main Block portion of the deposit.

Table 5 DISTRIBUTION OF SAMPLES IN THE MAIN BLOCK OF THE DEPOSIT

% Zinc	No. of Samples	Percentage of Total	Cumulative Percentage
0.26- 0.99	14	1.3	1.3
1.00- 1.99	98	9.2	10.5
2.00- 2.99	225	21.0	31.5
3.00- 3.99	163	15.2	46.8
4.00- 4.99	107	10.0	56.8
5.00- 5.99	83	7.8	64.5
6.00- 6.99	54	5.1	69.6
7.00- 7.99	52	4.9	74.5
8.00- 8.99	36	3.4	77.8
9.00- 9.99	37	3.5	81.3
10.00-10.99	24	2.2	83.5
11.00-11.99	20	1.9	85.4
12.00-12.99	28	2.6	88.0
13.00-14.99	27	2.5	90.6
15.00-16.99	27	2.5	93.1
17.00-18.99	21	2.0	95.0
19.00-21.99	17	1.6	96.6
22.00-25.99	17	1.6	98.2
≥26.00	19	1.8	100.0

DIAMOND DRILLING Continued
GEOLOGICAL MINERAL INVENTORY

Cross Section Method Continued

B. MINERAL INVENTORY BLOCKS WERE DRAWN ON EACH SECTION:

1. Straight lines were drawn connecting drill intercepts from hole to hole. Particular care was taken to plot these mineral inventory boundaries in relation to geologically interpreted boundaries.
2. Each mineral inventory block was terminated half way between holes above and below; 25 metres below the lowest hole on section; and at the bedrock-overburden interface above the upper most hole.
3. The final shape and size of each individual block is plotted on the cross sections.

C. TONNAGE WAS DETERMINED:

1. To determine volume it was assumed that mineralization was uniform and continuous to the halfway point with adjoining cross sections. Data from intermediate drill holes 49-52, 55, 57 and 59 were included in this detailed method of calculation.
2. A specific gravity (SG) value of 2.95 tonnes/cu.m was employed. The value was calculated from weighted averages of 53 separate SG results determined for drill hole pulp composite samples representing 556 metres of diamond drill core.
3. Areas were calculated by measuring triangular segments of blocks.
4. Where a particular mineral block was found in one hole and not in an adjacent hole, the block was "pinched out" (as opposed to continuing as a rhomb) at a point one half the distance to the adjacent hole.(e.g. See Block Number 18B, Plate 36).
5. A total of 130 mineral inventory blocks on 20 cross sections were used in compiling this inventory. Each mineral block has been assigned a number which appears on the cross section and in Table 6 with the corresponding tonnage and grade figures.

6.3.3 Level Plan Method (Plates 5-9)

The level plan method utilizes five horizontal slices through the deposit at 1350, 1300, 1250, 1200 and 1150 metres above sea level. Tonnage and grade figures were calculated separately for each level. Using the 1300 metre level as an example, this inventory includes material from 1275 to 1325 metres elevation. Results are presented in summary and detail in Table 6.

Mineralized intercepts on level plans were derived from the points on the cross sections where mineral inventory blocks intersect the desired level. The following parameters were used:

1. A 2% zinc cutoff with the previously noted qualifications.
2. A 4.0 metre minimum diamond drill hole intercept.

DIAMOND DRILLING Continued
GEOLOGICAL MINERAL INVENTORY

Level Plan Method Continued

3. Mineral inventory blocks were drawn on each level by drawing straight lines connecting each drill intercept with its neighbouring intercept. Again, geological-mineralogical relationships were closely adhered to during the block construction process. Each mineral inventory block was terminated at the halfway point between sections. A total of 119 blocks on 5 levels was used in compiling this inventory.
4. Each mineral inventory block has been assigned a number which is shown on the level plans (Plates 5-9) and the corresponding number appears in Table 6 with the applied grade and tonnage.
5. To calculate volume, the area of each block was multiplied by 50 metres, the total vertical distance applied to each level. The main assumption was that mineralization was continuous and uniform to a point halfway between each level plan. For the 1350 metre level, the distance measured vertically from 1325 metres to the bedrock-overburden interface was used as the multiplier.
6. To determine the final tonnage value, a specific gravity of 2.95 tonnes per cubic metre was applied.

Table 6

GEOLOGICAL MINERAL INVENTORY

PRELIMINARY METHOD:

	Tonnes	Tons	% Zinc	oz/ton Ag
TOTAL LOGAN	**17,357,052**	**19,132,678**	**5.16**	**0.66**
Includes	12,171,856	13,417,036	6.09	0.78
Includes	9,745,950	10,742,960	7.07	0.86
Includes	7,334,099	8,084,377	8.03	0.92
Includes	4,479,402	4,937,645	10.20	1.12
Includes	1,803,753	1,988,277	14.38	1.43

CROSS SECTION METHOD: **(Detail calculations in Appendix "C")**

	Tonnes	Tons	% Zinc	oz/ton Ag
TOTAL LOGAN	**12,295,236**	**13,553,038**	**6.17**	**0.77**
Main Block	11,318,364	12,476,232	6.35	0.77
East Block	976,872	1,076,806	4.08	0.77

LEVEL PLAN METHOD: **(Detail calculations in Appendix "C")**

	Tonnes	Tons	% Zinc	oz/ton Ag
TOTAL LOGAN	**12,488,557**	**13,766,136**	**6.19**	**0.76**
1350 Level	2,649,291	2,920,313	6.48	1.10
1300 Level	4,312,309	4,753,458	5.87	0.80
1250 Level	2,480,419	2,734,166	5.23	0.56
1200 Level	1,822,598	2,009,050	7.40	0.48
1150 Level	1,223,940	1,349,149	6.86	0.66

7.0 TRENCHING

7.1 OPERATIONS

An excavator trenching program comprising 15 trenches totalling 2412 linear metres (17,400 cubic metres) was completed on the Logan 2, 3, 5-8, 34, 36, 87 and 88 mineral claims during the period June 5 to August 17, 1988 (Table 7). The program included eleven sites in the Main Zone, three in the West Zone and one in the East Zone. Trenches were systematically mucked, sampled and mapped at 1:100 scale. Non-mineralized trenches were backfilled and reseeded. A total of 1368 rock samples and 113 soil samples were collected. Results for the rock samples are included in the trench summary logs appended to this report and soil analyses for zinc-silver are plotted directly on the accompanying maps (Plates 3, 4, 11). Most trenches are also plotted on diamond drill sections (Plates 14, 32, 34, 36, 38, 40, 41, 43, 46, 48, 60).

To conduct the trenching program, a John Deere 490 excavator was leased from Yellowquip Rentals Ltd. of Kamloops, B.C. Arctic Diamond Drilling Ltd. of Whitehorse, Yukon supplyed a skilled operator-mechanic. The equipment was walked in to the property over a 52 kilometre trail in March and returned to the Alaska Highway over the same route in November. The best months for trenching in the Logan area are July through September. Trenching was severely curtailed in June 1988 due to adverse ground conditions caused by snow melt, rain and frost.

7.2 DISCUSSION

7.2.1. Main Zone Definition (Plate 4)

Eight trenches, spaced 100 metres apart, were completed over the Main Zone deposit from 200W to 300E and from 700E to 800E (Plate 4). Results ranged from encouraging in trenches 804 and 805 to generally discouraging in the six remaining trenches. Very low zinc values, with most values less than 0.10% Zn were returned from trench chip sampling. In underlying diamond drill holes background levels of low grade stockwork are rarely below one-half percent zinc, and are generally in the one to two percent zinc range. As a preliminary explanation, it is postulated that sphalerite and other sulphides have been, in part, leached from host rocks near surface. In contrast, silver values in all trench samples are higher than values

Table 7

1988 TRENCH SUMMARY RECORD

TRENCH #	GRID CO-ORDINATES (North End)		LENGTH (m)	AV. DEPTH (m)	AVERAGE WIDTH Bottom (m)	Top (m)	VOLUME (m³)	# SAMPLES ROCK	SOIL	ZONE	CLAIM (s)
801	216.58N	188.95E	140	2.0	2	5	980	122 A	0	Main	Logan 3
802	226.43N	87.99E	120	2.0	2	5	840	107 A	0	Main	Logan 3
803	214.55N	2181.87E	71	3.0	2	6	852	24 G	0	East	Logan 87
804	228.37N	13.29W	132	2.0	2	5	924	107 A	0	Main	Logan 2
805	222.13N	72.91W	98	2.0	2	4	588	92 A	0	Main	Logan 2
806	333.14S	1857.88W	313	2.0	2.75	3	1800	108 G	18	West	Logan 34,15
807	759.69S	2411.93W	220	1.0	1	3	440	88 A	14	West	Logan 36,35
808	668.18S	1794.44W	255	1.0	2	3	637.5	71 G	23	West	Logan 34,33
809	42.81N	481.59E	338	2.0	3	5	2704	142 G	35	Main	Logan 6,5
810	105.65N	1085.18E	109	2.0	2	4	654	35 G	11	Main	Logan 7,8
811	277S*	1206E*	117	2.0	3	5	936	41 G	12	Main	Logan 8
812	214N*	681E*	111	3.0	3	7	1665	111 G	0	Main	Logan 2
813	193N*	177W*	78	3.0	3	7	1170	77 G	0	Main	Logan 5
814	248.5N*	314E*	206	2.0	3	5	1648	156 G	0	Main	Logan 3
815	208.5N*	811E*	104	3.0	3	7	1560	87 G	0	Main	Logan 5
TOTALS:			**2412 m**				**17,398.5 m³**	**516 A = Assay** **852 G = Geochem Analysis**			

*Not surveyed.

TRENCHING Continued

reported in drill holes. At present, no explanation can be provided to account for these highly anomalous results that include values of 2.01 oz/ton Ag over 96 metres and 5.10 oz/ton over 17 metres, both from trench 804. Table 8 lists selected assay results from Main Zone deposit trenches.

Table 8: SELECTED RESULTS FROM TRENCH SAMPLING - MAIN ZONE DEPOSIT

Trench No.	Interval (m)	Length (m)	% Zinc	oz/ton Ag
801	**28-54**	**26**	**0.04**	**1.97**
	includes 28-31	3	0.17	5.43
802	**19-93**	**74**	**0.18**	**2.00**
	includes 34-39	5	0.03	4.84
804	**94-99**	**5**	**7.07**	**1.10**
	12-108	**96**	**1.18**	**2.01**
	includes 14-31	17	0.10	5.10
	includes 23-28	5	0.12	10.13
805	**67-88**	**21**	**7.08**	**1.63**
	includes 77-88	10	10.75	1.27
	includes 81-88	7	15.26	1.51
	includes 18-31	13	0.43	5.04
812	**34-47**	**13**	-	**5.06**
	includes 34-42	8	-	7.03
	includes 34-39	5	-	10.35

7.2.2. Main Zone - Exploratory (Plate 3)

Trenches 809 through 811 were excavated over selected geochemical and geophysical targets located subparallel to the Main Zone deposit. Trench 809, approximately 330 metres long, with its starting point located near DDH 87-41, intersected 13 variably mineralized quartz veins ranging in thickness from 0.3 metres to 4.0 metres. The density of quartz veining steadily decreased from north to south.

Trench 810, located south of DDH 87-53, tested a high priority geophysical anomaly. The 100-metre long trench intersected a sequence of intercalated granodiorite and quartz-biotite schist. No veining or mineralization was encountered and the strong IP response could possibly be attributed to the metasedimentary rocks.

Trench 811, located over a strong combined soil and IP anomaly, intersected a narrow, irregular shaped quartz vein assaying 35.69 oz/ton silver over 1.0 metre. The remainder of the trench was unmineralized.

TRENCHING Continued

7.2.3. West Zone (Plate 11)
Three trenches totalling 794 linear metres were completed over widely spaced geochemical and geophysical targets. No significant zinc mineralization was discovered in trenches 806, 807 and 808. In general the highest reported zinc values were associated with metasedimentary rocks.

7.2.4 East Zone (Plate 60)
Trench 803, located on line 2210E in the East Zone was abandoned after excavating 70 metres of the proposed 140-metre length. Extremely dangerous ground conditions and immediate flooding prevented trench entry. Bedrock muck piles were mapped and sampled. No significant mineralization was intersected.

****

8.0 GEOCHEMISTRY

(Plates 64, 65, 66)

A total of 1107 soil samples were collected at 50 metre intervals from the "B" soil horizon, on lines 100 metres apart in the West Zone and 200 metres apart on the adjoining Logan 169-200 claims. Samples were placed in grid-numbered kraft soil bags and the corresponding sample number was marked in the field by a piece of plastic flagging or, in the case of a cutline on picket lath. Notes were made in the field by the sampling crew concerning sample depth, colour, texture and local physiography.

The samples were sent to Bondar-Clegg and Co. Ltd.'s North Vancouver facility for preparation and zinc-silver-tin analyses. The minus 80 mesh fraction was digested using a hot extraction with HNO_3-HCl solution and zinc-silver analysis was completed by atomic absorption techniques. Tin was analyzed by X-ray fluorescence.

Results for each element are plotted separately on Plates 64, 65 and 66. The West Zone compilation map (Plate 11) summarizes results for all three elements, while the property compilation map (Plate 67) outlines zinc values greater than 400 ppm.

Anomaly 1 extends in two parts, from 1400W, 600S to 1800W, 650S and from 2400W, 850S to 3200W, 1050S. The anomaly averages 100 metres in width and includes values to 1380, 1130 and 1125 ppm zinc. Associated with the anomaly is a major northeast trending fault zone, moderately strong IP results and spot silver and tin values to 2.1 ppm Ag and 120 ppm Sn. The anomaly was tested without success by trenching and diamond drilling.

Anomaly 2 trends westerly from 1600W, 250S to 2200W, 050S and is directly associated with a series of zinc-rich springs located at a major break in slope. Values of 3200, 2200 and 1900 ppm Zn; 5.2 ppm Ag; and 110 ppm Sn were returned within this 75 metre wide anomaly. Two diamond drill holes and part of trench 806 tested this anomaly. No significant zinc mineralization was intersected.

Anomaly 3, located on a 35 degree, north-facing mountain slope, extends from 2700W to 3200W near line 400S and includes values to 2820, 1580 and 1480 ppm zinc. Drill hole 92, located just up slope from the anomaly failed to locate any zinc mineralization.

****

9.0 GEOPHYSICS

(Appendix "A")

Induced Polarization and Resistivity surveys involving 31.5 operating and 10.5 bad weather days were completed by Pacific Geophysical Ltd. of Vancouver,B.C., during the period June 28 to August 9, 1988. A total of 9.0 kilometres of 100-metre, 6.0 kilometres of 50-metre and 10.0 kilometres of 25-metre dipole-dipole separation work was completed in the West Zone, western claims area, and Main Zone.

In the West Zone, several moderate to strong IP anomalies were outlined. Diamond drill testing of the best responses were all negative, with the strong IP effects apparently caused by a low level concentration of pyrite in metasedimentary and granodiorite rocks.

In the Main Zone three 2.0 km lines (350N, 100S and 300S) all located parallel to but near the deposit, were surveyed utilizing 50-metre dipole separations. No anomalies were outlined, and as a result it can be concluded that no significant, northwest trending mineralized structures are to be found in the Main Zone deposit area.

Complete results and interpretation of data are presented in Appendix "A", a report prepared by Pacific Geophysical Ltd. of Vancouver, B.C.

Plate 67, the property compilation map, summarizes all of the IP anomalies found to date.

****

10.0 METALLURGY

(Appendix "B")

Preliminary metallurgical testing was initiated in January, 1989 by Lakefield Research of Ontario. Strathcona Mineral Services Limited of Toronto was retained to assist with the direction of the test program. Sample material was collected from 1986 and 1987 diamond drill core rejects. Results of this work to date are very encouraging and no problems are anticipated for deposit metallurgy.

Both low and high grade zinc composite samples were prepared to test for any significant metallurgical deficiencies in the finer-grained, low grade material which is prevalent in the deposit. Results of this work are encouraging; no significant differences in grade, grinding factors or recoveries arose between Sample A, with 3.60% Zn head grade and Sample B with 14.17% Zn head grade. Both samples reported zinc levels in concentrate from 50 - 54% Zn and excellent zinc recoveries between 92% and 97%.

Following the initial work, samples A and B were combined on a sixty-forty basis to produce sample C, on which further tests were conducted. Results of this work are pending.

Appendix "B", Metallurgy contains relevant background data, up to date results, and interpretations in the form of correspondence material initiating from Cordilleran, Strathcona and Lakefield. A final report from Lakefield Research will be forthcoming.

****

11.0 ECONOMIC CONSIDERATIONS

(Figures 5 and 6)

This chapter has been included for discussion purposes only and contains data of a highly preliminary nature. Two conceptual reports by Kilborn Engineering (B.C.) Ltd. are included for reference as Figures 5 and 6.

In terms of access, a 52 kilometre, all season road linking the Alaska Highway to the property and closely following the present winter cat trail would be required. Relief along the proposed route is generally gentle with only the Meister and Little Moose Rivers to cross. When completed, the total road distance to tidewater at Skagway, Alaska would be 500 kilometres. As a comparison, the Curragh Resources Inc. Faro deposit is 550 kilometres from Skagway. Assistance programs for road construction by the Yukon government are available, whereby the Territory will fund between 50 and 100% of a project depending on the ultimate number of industrial users. Given the nearby logging operations in the Meister drainage and previous interest expressed by Hyland Forest Products for a shared access road, it is very likely that the Yukon government would support the Logan access road for a full 100%.

A preliminary examination of the deposit indicates that much of the stated mineral inventory can be extracted utilizing open pit mining methods. An estimated 10,362,000 tonnes grading 6.29% zinc and 0.76 oz/ton silver can be mined from the Main Block (of the Main Zone deposit) to a depth of 200 metres at a waste to ore strip ratio of approximately 5:1. A further 903,000 tonnes of 4.20% zinc and 0.82 oz/ton silver lies within 100 metres of surface in the East Block.

Following the completion of proposed open pit production, operations could shift to selective underground mining. Several well mineralized veins and breccia zones grading in excess of 14% zinc over 4.0 metres or more have been intersected in drill holes at depth. As a favourable comparison Curragh Resources Inc. will switch operations at its Faro mine in 1991 from an open pit to an underground operation, with stated remaining reserves of 2 million tonnes grading 4.59% Pb, 7.00% Zn and 61 g/tonne Ag.

JAN 0 6 1987

KILBORN

Kilborn Engineering (B.C.) Ltd., Suite 400 - 1380 Burrard Street, Vancouver, B.C., Canada V6Z 2B7
Telex: 04-507734, Telephone: (604) 669-8811, Facsimile: (604) 669-0847

December 19, 1986

Getty Resources Limited
#509 - 700 West Pender Street
Vancouver, B. C.
V6C 1G8

Attention: Mr. Richard C. Atkinson
President

Dear Sirs:

Re: Logan Zinc/Silver Project

In response to the request in your letter dated December 8, 1986, we have prepared conceptual capital and operating costs for the above referenced property, for two different production rates. We must make it clear that due to the lack of detailed information these costs must be considered as order-of-magnitude only.

The following assumptions were made in preparing the estimates:

Production Rate	:	2000 stpd and 5000 stpd, open pit.
Stripping Ratio	:	5:1 (Waste:Ore)
Accommodation	:	Construction and Operations personnel accommodated in camp.
Power	:	To be site generated.
Water	:	Available locally from wells to be developed.
Transportation	:	Allowance for personnel transport by air and bus. No allowance made for construction of airstrip. No allowance made for transportation of concentrate.
Access	:	Allowance made for upgrading cat trail to year-round road.
General Assumptions	:	All new equipment Construction Labour rate $40/hr. Off site costs not included. EPCM costs included in individual items.

../2

CAPITAL COSTS

	2000 stpd. $	5000 stpd. $
Mine (including Preproduction Stripping)	13,600,000	25,180,000
Mill	21,000,000	39,400,000
Power Supply	4,000,000	7,000,000
Service Buildings	3,400,000	4,100,000
Tailing Disposal - Initial Capital	6,000,000	8,000,000
Fresh Water Supply	500,000	620,000
Mobile Equipment	1,800,000	2,100,000
Accommodation	1,400,000	1,800,000
Site and General	1,500,000	1,800,000
Environmental	1,000,000	1,200,000
Access Road	15,000,000	15,000,000
Sub total	69,200,000	106,200,000
15% Contingency	10,380,000	15,930,000
TOTAL CAPITAL COST	79,580,000	122,130,000

OPERATING COST

	2000 stpd. $/ton ore	5000 stpd. $/ton ore
Mine	7.00	5.40
Mill	9.50	8.00
Power Supply	6.00	4.50
Surface Crew	1.00	0.90
General and Administration	2.90	2.00
Transport and Accommodation (Personnel)	3.80	2.90
Environmental Protection	1.00	0.90
	31.50	24.60
15% Contingency	4.80	3.70
TOTAL OPERATING COST/TON	36.50	28.30

We thank you for this opportunity to assist you in this manner, and we trust that this information will be of value in your analysis of this property.

Yours truly,

KILBORN ENGINEERING (B. C.) LTD.

A. J. Booker, P. Eng.
Project Manager

AJB/mv

cc: D. R. Beaumont - Kilborn Engineering (B. C.) Ltd.

FIGURE 5

OCT 5 - 1987

KILBORN

Kilborn Engineering (B.C.) Ltd., Suite 400 - 1380 Burrard Street, Vancouver, B.C., Canada V6Z 2B7
Telex: 04-507734, Telephone: (604) 669-8811, Facsimile: (604) 669-0847

October 2, 1987

GETTY RESOURCES LIMITED			
FILE			
JAM		DRK	
RLC			
DRD		TMB	
TK		VANCOUVER	

cc RLC

Getty Resources Limited
400 - 25 Adelaide Street East
Toronto, Ontario
M5C 1Y2

Attention: Mr. John A. Macdonald, P.Eng.
Vice President, Operations

Dear Sirs:

Re: Logan Zinc Silver Property
Yukon Territory
Conceptual Assessment

1.0 INTRODUCTION

Kilborn Engineering (B. C.) Ltd. has been retained by Getty Resources Limited to undertake a preliminary review of the Logan Property and to express an opinion as to whether the deposit is amenable to either the conventional open pit or open pit/underground mining environment. This brief report is based on the knowledge derived from a single site visit, site maps and conversations with various site/staff personnel whose cooperation is gratefully acknowledged.

The scope of work for the conceptual review does not include any mineral reserve, economic, or geotechnical/hydrological analysis.

2.0 SUMMARY AND CONCLUSION

It is our conclusion that the Logan Main Zone does not conceptually possess constraints that would inhibit it from being mineable in either the open pit or underground mining environment.

However, it should be stressed that a definitive opinion of the economic viability/mineability of the Logan Main Zone can only be assessed after the completion of a detailed feasibility study. A final economic, mine planning analysis which would include the relevant geotechnical/hydrological investigations of the deposit with emphasis on the hanging wall featured shear and ore zones would be required.

"Quality with Integrity"

1947 40 1987

.../2

KILBORN
October 2, 1987
Page 2
Getty Resources Limited

3.0 PROPERTY

The Logan property is located 108 km northwest of Watson Lake, Yukon Territory, approximately 38 km north of the Alaska Highway. The property is being explored by a joint venture consisting of Getty Resources Limited and Fairfield Minerals, Limited.

The property is accessible either by fixed wing aircraft or helicopter using a newly constructed gravel runway at the site.

4.0 GEOLOGICAL SETTING

A detailed geologic description is beyond the scope of this Report. In addition the 1987 Exploration Program was in its final stage of demobilization at the time of the site visit, however a simplified geologic description is provided as follows:

The Logan property lies within Cambrian age metasediments in contact with a large granodiorite intrusive of Cretaceous Age. At or near the contact zone, veins, stockworks and breccias within intensely altered, gneissic rocks are common. The mineralization encountered to date consists of massive and disseminated sulphides including sphalerite, tetrahedrite, chalcopyrite, pyrite, arsenopyrite and unidentified tin minerals.

5.0 SITE VISIT DESCRIPTION

The site review of the Logan Property was conducted by B.H. Sanden of Kilborn Engineering (B. C.) Ltd. assisted by Messrs. J.A. Macdonald, V.P. Operations and Reginald L. Comeau all of Getty Resources Ltd., Toronto, and the site tour was conducted by Mr. M.A. Stammers of Cordilleran Engineering. The site tour consisted of:

(1) a general tour of the exploration camp, and general site layout;

(2) a review of the currently interpreted geologic cross-sections;

.../3

FIGURE 6

FIGURE 6 Continued

KILBORN

October 2, 1987
Page 3
Getty Resources Limited

(3) a general review of the diamond drill core.

The latter two items concentrated solely on the Logan Main Zone.

In summary the Logan Main Zone can be described as an ore zone bounded by a "sheared hanging wall contact zone" and a "more pronounced sheared footwall contact zone, all dipping at 70 degrees relative to grid north. The ore zone structure dips into the side of a hill with an approximate 5-6 percent topographic grade.

The hanging wall zone ranges from a tight fault to a few feet in thickness and is thought to be relatively dry. The footwall zone is more pronounced, ranges consistently from 3-4 feet in thickness and is considered to be water bearing. Visual inspection of the shear zone core indicates that this material is somewhat incompetent.

The Main Zone contains high-grade ore lenses, low grade ore zones, with various intruded dikes/materials of varying strengths.

6.0 COMMENTS

Based on what we have observed and Kilborn's experience, the following are comments on future mining plans and potential problems.

The mining, by open-pit methods, does not appear to contain major problems which are unique to this deposit. Surface water diversion will be required. Pre mining ground-water drainage may be required. The shear on the footwall side of the deposit will affect the start of the footwall pit wall and may require a slight increase in pit stripping.

The problem associated with mining ore from underground will depend on whether the full zone is mined or whether selective higher grade lenses are mined. The water problem will, in both cases, require some grouting and provision of

.../4

KILBORN

October 2, 1987
Page 4
Getty Resources Limited

adequate pumping. The shear zone on the footwall of the deposit will require ground support when developing through the structure but this can be minimized by location of development openings.

The underground mining method to be used will probably be one that requires some ground support or incorporates a form of forced caving for selective mining, cut and fill stoping may be applicable with ground support being supplied by rock bolting and tight filling. If bulk mining is used then forced block caving or sub-level caving may be the preferred system.

Prior to any selection or evaluation of methods it must be remembered that a great deal of information on the geology, geomechanics and hydrology of the deposit has yet to be obtained.

Thank you for the opportunity to review what appears to be an interesting property.

Yours truly,

KILBORN ENGINEERING (B. C.) LTD.

B H Sanden

B. H. Sanden, P.Eng.
Mining Engineer

BHS/mrm

12.0 BIBLIOGRAPHY

1. **ABBOTT, G., 1983:** Silver Bearing Veins and Replacement Deposits of the Rancheria District; Yukon Exploration and Geology 1983.

2. **AMUKUN, S. E.** and **LOWEY, G. C., 1987:** Geology of the Sab Lake (105/B-7) and Meister Lake (105/B-8) map areas, Rancheria District, Southern Yukon; For Indian and Northern Affairs, Open File 1987-1.

3. **CORDILLERAN ENGINEERING, 1980:** Preliminary Evaluation of the Logan Claim Group, for Regional Resources Ltd., January 1981.

4. **CORDILLERAN ENGINEERING, 1981:** Geochemical (Assessment) Report on the Logan Claim Group, for Regional Resources Ltd., January 1981.

5. **CORDILLERAN ENGINEERING, 1982:** Geochemical (Assessment) Report on the Logan Claim Group, for Regional Resources Ltd., November 1982.

6. **CORDILLERAN ENGINEERING, 1983:** Summary Report on the Logan Property, for Regional Resources Ltd., December 1983.

7. **CORDILLERAN ENGINEERING, 1985:** 1984 Summary Report of Exploration on the Logan Claim Group, for Regional Resources Ltd. and Getty Canadian Metals, Limited, February 1985.

8. **CORDILLERAN ENGINEERING, 1986:** 1985 Summary Report of Exploration on the Logan Claim Group, for Regional Resources Ltd. and Getty Canadian Metals, Limited, February 1986.

9. **CORDILLERAN ENGINEERING, 1987:** 1986 Summary Report of Exploration on the Logan 1-168 Claim Group, for Fairfield Minerals Ltd. and Getty Resources Limited, February 1987.

10. **CORDILLERAN ENGINEERING LTD. 1988:** 1987 Summary Report of Exploration on the Logan 1-200 Claim Group, for Fairfield Minerals Ltd. and Getty Resources Limited, February, 1988

11. **MURPHY, D.C., 1988:** Geology of Gravel Creek (105/B-10) and Irvine Lake (105/B-11) Map Areas, Southeastern Yukon, for the Canada/Yukon Subsidiary Agreement on Mineral Resources, Open File 1988-1.

****

PACIFIC GEOPHYSICAL LIMITED

REPORT ON

THE CONTINUATION OF THE

INDUCED POLARIZATION AND RESISTIVITY SURVEY

ON THE

LOGAN PROPERTY

WATSON LAKE MINING DISTRICT, YUKON

FOR

CORDILLERAN ENGINEERING LTD.

LATITUDE 60° 30'N   LONGITUDE 130° 29'W

NTS: 105B/7,8,9
CLAIMS: LOGAN 1-200

OWNER/OPERATOR: FAIRFIELD MINERALS LTD.

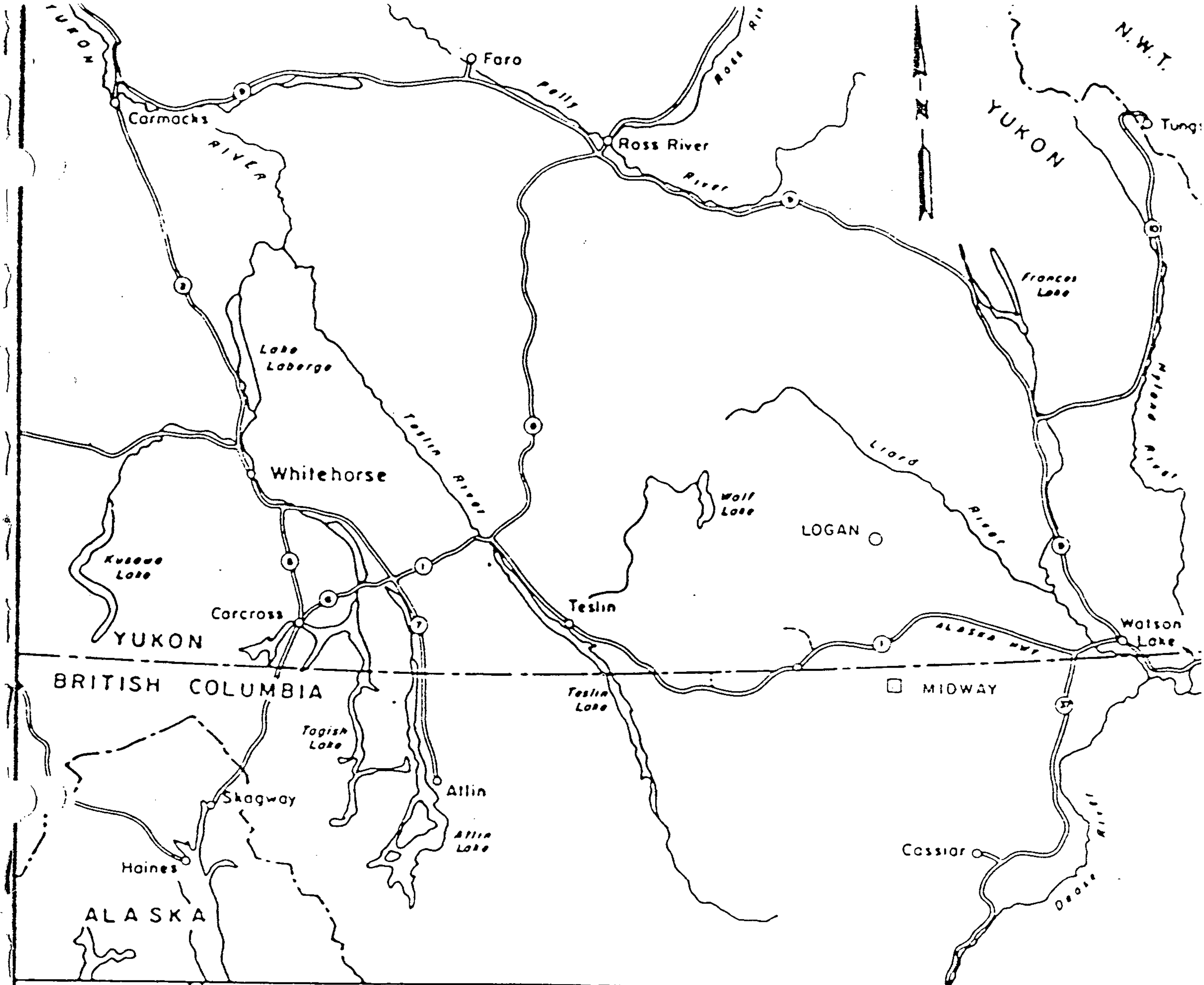
OPTION: TOTAL ENERGOLD CORPORATION

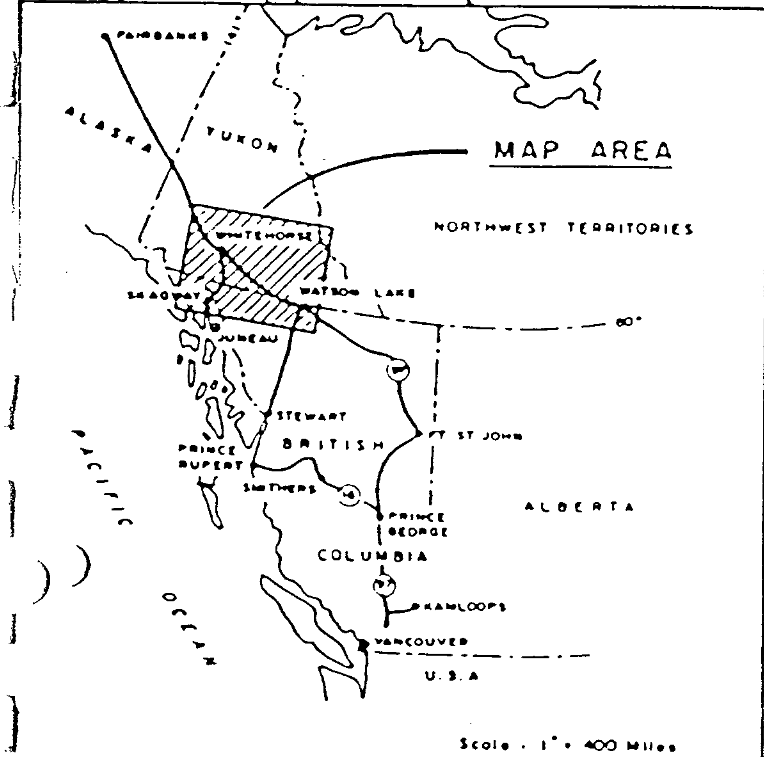
BY

PAUL A. CARTWRIGHT, P.Geoph.
Geophysicist

DATED: November 16, 1988

TABLE OF CONTENTS





FAIRFIELD MINERALS LTD.

PROPERTY LOCATION MAP

SCALE 1" = 40 MILES

BY

CORDILLERAN ENGINEERING

JANUARY 1988

FIGURE 1

PART A REPORT

1. INTRODUCTION

An induced polarization and resistivity survey has been completed on the Logan property, Watson Lake Mining District, Yukon on behalf of Cordilleran Engineering Ltd., project managers for Fairfield Minerals Ltd. and Total Energold Corp.

The property is located approximately 108 kilometers northwest of Watson Lake, Yukon. Access to the Logan camp is by fixed wing aircraft from Watson Lake. Access to the grid from the Logan camp is by 4-wheel drive vehicle and by helicopter to the most westerly grid lines.

Previous work on the property was completed in 1979, 1980, 1982, 1984, 1985, 1986 and 1987, and included soil geochemistry, hand trenching, induced polarization and resistivity surveys, and magnetic surveys. A diamond drill program was completed in the central and eastern claims area in 1986 and 1987 and included 59 NQ wireline holes totalling 9767.34 meters.

The objective of the present IP and resistivity survey was to detect metallic mineralization thought to be associated with zinc, lead, silver, copper and tin deposits.

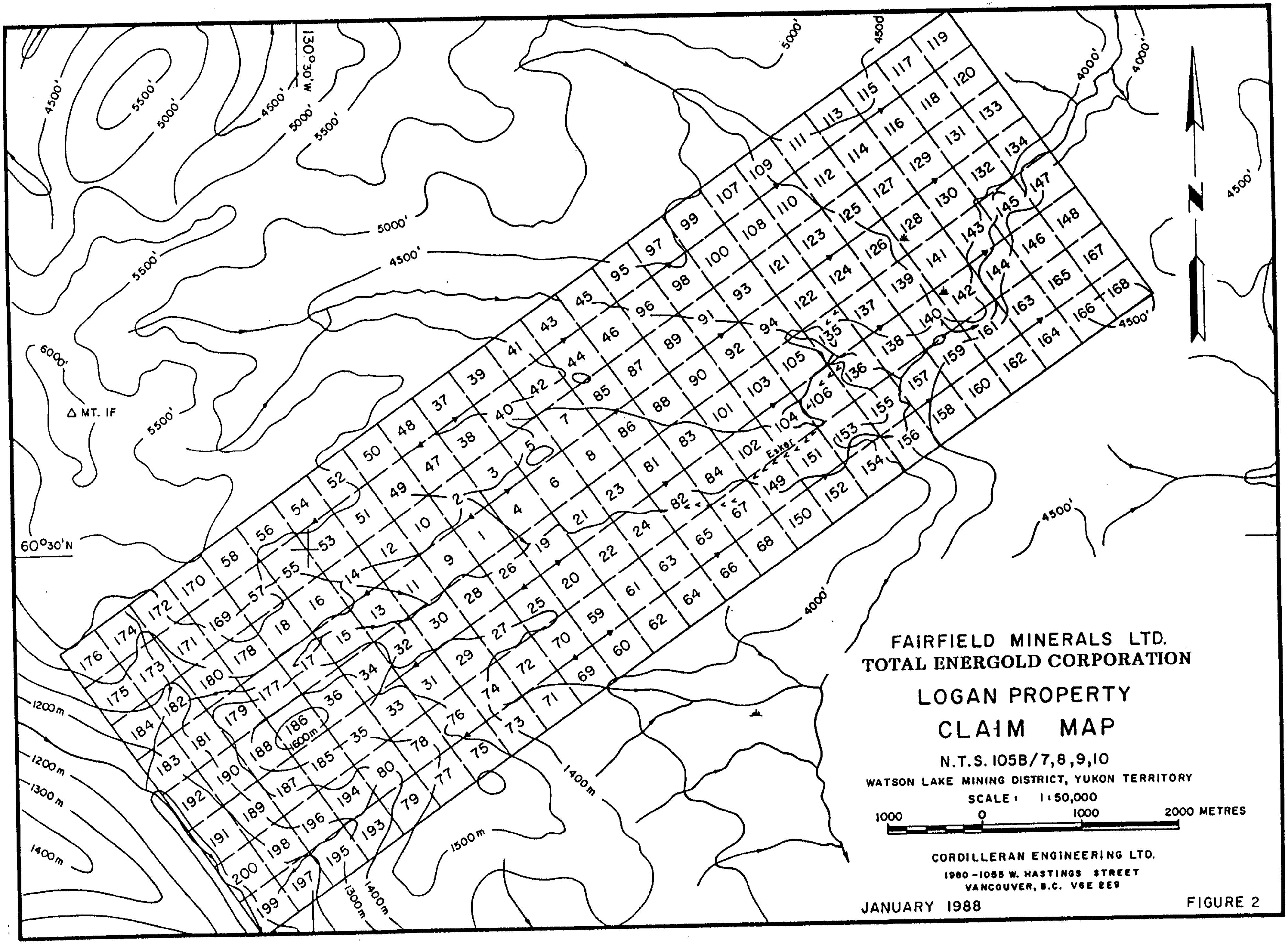
A Phoenix Model IPV-1 induced polarization and resistivity receiver unit was used, together with a Phoenix Model IPT-1 IP and resistivity transmitter powered by a 1 kw. motor-generator. IP effects were recorded as Percent Frequency Effect (P.F.E.) at operating frequencies of 4.0 HZ and 0.25 HZ, while apparent resistivity values were normalized in units of ohm-meters. Dipole-dipole array was utilized to make all of the measurements using interelectrode distances of 25 meters, 50 meters and 100 meters. Four separations were recorded in every case.

Fieldwork took place during the period June 28, 1987 to August 9, 1987, under the direction of Martin M. Makulowich, geophysical party leader. His certificate of qualification is included in this report.

2. DESCRIPTION OF CLAIMS

The Logan property consists of 200 contiguous claims located in the Watson Lake Mining District, Yukon.

Claim No.	Record No.	Expiry Dates
Logan 1-6	YA 45047 - YA 4052	December 31, 2003
Logan 7-36	YA 46754 - YA 46283	December 31, 2003
Logan 37-88	YA 71027 - YA 71365	December 31, 2005
Logan 89-94	YA 71360 - YA 71365	December 31, 2002
Logan 95-106	YA 91214 - YA 91275	December 31, 1999
Logan 107-168	YA 98615 - YA 98676	December 31, 1995
Logan 169-200	YB 10686 - YB 10717	December 31, 1992



FAIRFIELD MINERALS LTD.
TOTAL ENERGOLD CORPORATION

LOGAN PROPERTY
CLAIM MAP

N.T.S. 105B/7,8,9,10

WATSON LAKE MINING DISTRICT, YUKON TERRITORY

SCALE: 1:50,000

1000 0 1000 2000 METRES

CORDILLERAN ENGINEERING LTD.
1980-1055 W. HASTINGS STREET
VANCOUVER, B.C. V6E 2E9

JANUARY 1988

FIGURE 2

The claims are owned and operated by Fairfield Minerals Ltd. of Vancouver, B.C., and are under option to Total Energold Corporation of Vancouver, B.C.

3. DESCRIPTION OF GEOLOGY

The following geological description of the property has been provided by the staff of Cordilleran Engineering Ltd.:

> "The Logan property is underlain by intrusive granodiorite rocks related to the Cassiar Batholith. A contact with Lower Cambrian metasedimentary rocks is exposed in the southwestern claims area. Elsewhere on the property, in outcrop and drill core, large xenoliths of quartz-biotite schist of all sizes, shapes and orientations occur within granodiorite. Tertiary-aged felsite dikes and mineralized quartz veins are associated with major fault structures, such as the one that hosts the Logan zinc-silver deposit. Exposure of these rock units on the property is poor (<5%), except in areas of steep relief where exposures increase to about 20%. Overburden thickness in the area of diamond drilling ranged from less than 1.0 meter to 7.5 meters. Fault structures on the property

are marked by topographic depressions and are dominated by northeast trending features with minor northwest trending secondary lineaments."

Mineralization on the Logan property extends over a postulated 8.0 kilometer long fault structure encompassing the Main, East and West Zones. The drill indicated Logan zinc-silver deposit, approximately 1100 meters long, by an average width of 100 meters and a tested depth to 275 meters, is located centrally within this 8.0 kilometer long structure in the Main Zone.

4. PRESENTATION OF DATA

The induced polarization and resistivity results are shown on the following data plots in a pseudosection format:

Line	Electrode Interval	Dwg. No.
4400W	100 M	I.P.-5894-1
4200W	100 M	I.P.-5894-2
4000W	100 M	I.P.-5894-3
3800W	100 M	I.P.-5894-4
3600W	100 M	I.P.-5894-5
3400W	100 M	I.P.-5894-6
3200W	100 M	I.P.-5894-7
3000W	25 M	I.P.-5894-8
2800W	25 M	I.P.-5894-9
2800W	25 M	I.P.-5894-10
2600W	25 M	I.P.-5894-11

2400W	25 M	I.P.-5894-12
2200W	25 M	I.P.-5894-13
2000W	25 M	I.P.-5894-14
1800W	25 M	I.P.-5894-15
1600W	25 M	I.P.-5894-16
1400W	25 M	I.P.-5894-17
1200W	25 M	I.P.-5894-18
1000W	25 M	I.P.-5894-19
350N	50 M	I.P.-5894-20
100S	50 M	I.P.-5894-21
300S	50 M	I.P.-5894-22

Also enclosed with this report is Dwg. No. I.P.P.-4159A, a 1:5000 scale compilation plan map of the Logan property 1979, 1984, 1985, 1987, and 1988 IP grids. The definite, probable and possible induced polarization anomalies are indicated by bars, in the manner shown on the legend, on this plan map as well as on the data plots. These bars represent the surface projection of the anomalous zones as interpreted from the location of the transmitter and receiver electrodes when the anomalous values were measured.

Since the induced polarization measurement is essentially an averaging process, as are all the potential methods, it is frequently difficult to exactly pinpoint the source of an anomaly. Certainly, no anomaly can be located with more accuracy than the electrode interval length; i.e. when using 25 meter electrode interval, the position of a narrow sulphide body can only be determined to lie between two stations 25 meters apart. In order to definitely locate, and fully evaluate a narrow, shallow source, it is necessary to use shorter electrode intervals. In order to locate sources at some depth, larger electrode intervals must be used, with a corresponding increase in the uncertainties of location. Therefore, while the center of the indicated anomaly corresponds fairly well with the source, the length of the indicated anomaly along the line should not be taken to represent the exact edges of the anomalous materials.

5. DISCUSSION OF RESULTS

Results of all of the IP and resistivity surveys carried out on the Logan grid since 1979 are illustrated on plan map Dwg. No.-4159A, a 1:5000 scale compilation map of the area.

Those anomalous zones outlined by the 100 meter dipole-dipole reconnaissance surveying are displayed as wide, lightly stippled areas on Dwg. No. I.P.P.-4159A, while the zones interpreted from the more detailed 25 meter dipole lengths are marked with darker stipple.

The following discussion covers IP and resistivity data recorded during 1988. Most of this work was carried out over the south-western end of the grid, with the exception of three north-easterly trending lines surveyed adjacent to the main zinc-silver zone. For additional information concerning other IP and resistivity data measured on the north-eastern portion of the area, the reader is referred to previous reports by this author.

Subzone A4

This feature is interpreted to be at least 1000 meters in length, extending from the vicinity of Line 2800W to beyond Line 1000W. It is contained within the general confines of Zone A, outlined by 100 meter reconnaissance surveying.

Subzone A4 is marked by IP effects that range from highly anomalous to only marginally anomalous; however, in almost every case the IP effect anomalies are accompanied by higher than normal apparent resistivity values. A narrow zone of disseminated metallic sulphides could be the cause of such a signature. One exception to the above is seen in the data measured over Line 1400W, in the vicinity of Station 560S, where distinctly lower than background resistivity values are noted.

It is the author's understanding that the source of IP Subzone A4, which is indicated to be less than 25 meters beneath the surface, may already have been tested by D.D.H. No. 93 on Line 1000W, and by trenches No. 807 and No. 808, located on Line 2400W and Line 1800W respectively.

Subzone A5

This feature is outlined on Line 2000W and Line 1800W by weakly anomalous IP effects. Depth to the source is probably less than 25 meters subsurface.

Subzone D1

Data recorded on Line 1800W in the area of Station 450S best outline the source of Subzone D1. The source appears to be moderately polarizable and is definitely more resistive than the surrounding rocks. Disseminated metallic sulphides contained within a relatively narrow body of resistive rock could be the cause of the zone. Depth to the source is less than 25 meters.

Drill hole D.D.H. No. 85 and trench No. 806 may already have tested IP Subzone D1.

Subzone D2

Subzone D2 lies parallel to, and immediately northwest of the south-western end of Subzone D1. Low magnitude IP effects generally characterize the response except in the case of data recorded on Line 2600W, where moderately anomalous IP readings are noted, together with somewhat lower than background resistivities.

Depth to the top of the source is less than 25 meters subsurface.

Drill hole D.D.H. No. 92 may have already tested the extreme south-western end of Subzone D2.

Zone E

This zone is outlined by 100 meter dipole interval measurements made on Line 4400W through to Line 3200W. In general, the feature is composed of IP effects which rise above a high background level, and lie along the south-eastern flank of a more extensive region of high resistivity.

Zone E1, Zone F1

Either of these trends could represent the north-eastern extension of IP Zone E. Both zones are detected primarily by 25 meter dipole measurements, which points to relatively narrow sources being present.

Zone E1 is best outlined by the data recorded on Line 2600W, in the vicinity of Station 760S, where moderately higher than background IP effects are seen, coincident with higher than background apparent resistivity values. Depth to the top of the source is indicated to be less than 25 meters subsurface.

Data measured on Line 3000W, near Station 725S show the highest intensity results from Zone F1. The source appears to be resistive and to be buried less than 25 meters below the surface.

Zone G

Reconnaissance surveying using 100 meter dipole lengths has detected this zone, which is interpreted to strike across the north-western end of Line 4400W through to Line 3400W, at which point the source of the trend either strikes off the grid, or plunges to beyond the detection depth of the array being used.

Magnitudes of the IP values and apparent resistivity values that constitute Zone G are quite similar to Zone E, and it is quite possible that a near horizontal, or gently folded, polarizable layer is the cause of both geophysical zones.

Line 350N, Line 100S, Line 300S

These north-easterly striking lines were positioned so as to test for any mineralized zones striking across the trend of the main Logan zinc-silver deposit. Fifty meter dipole intervals were used; however, no targets similar to those measured over the main zone were detected.

6. SUMMARY AND RECOMMENDATIONS

The 1988 induced polarization and resistivity survey on the Logan Property, Watson Lake Mining District, Yukon, has detected a number of anomalous zones, and subzones, which are illustrated on plan map Dwg. No. I.P.P. - 4159A.

Subzone A4 has apparently already been tested by drilling and trenching. Therefore, no further work is recommended on this feature.

Subzone A5 is only weakly anomalous, and of limited strike length. Further work should only be considered on a low priority basis.

The north-eastern end of Subzone D1 also appears to have been tested by both drilling and trenching. No further work is recommended unless other information becomes available that puts the south-western end of the zone in a more favourable light.

Subzone D2 may have been drilled in the vicinity of the south-western end of the trend. However, because the most anomalous IP effects recorded within the subzone are noted at the north-eastern end, drilling could be considered to test this area. Priority could be established after correlating the IP results with other available information.

Zone E1 is probably caused by a very narrow, moderately to weakly polarizable, and resistive source. A drill hole, located so as to pass approximately 25 meters beneath Line 2600W, Station 760S is recommended on a low priority basis. If other favourable information becomes available the above drilling priority could be altered.

Zone F1 is also caused by moderately to weakly polarizable material; however, additional work should first take the form of additional detailed IP and resistivity surveying on Line 2800W and Line 3200W, in the projected area of the zone.

Zone E and Zone G are seen in the 100 meter reconnaissance data, and may be caused by the same source. Detailed IP surveying is required to better evaluate the cause(s) of these two zones before drilling is considered.

Three north-easterly trending lines were also surveyed parallel and adjacent to the main zinc-silver zone. No significant anomalies were detected.

PACIFIC GEOPHYSICAL LTD.

Paul A. Cartwright

Paul A. Cartwright, P.Geoph.

Geophysicist

PAC:jl

Dated: November 16, 1988

7. ASSESSMENT DETAILS

Property: Logan

Mining District: Watson Lake, Yukon

Sponsor: Cordilleran Engineering Ltd.

Location: 108 km. N.W. of Watson Lake, Yukon.

Type of Survey: Induced Polarization and Resistivity

Operating Man Days: 94.5

Consulting Man Days: 6

Drafting Man Days: 6

Total Man Days: 106.5

Date Started: June 28, 1988

Date Finished: August 9, 1988

Number of Stations: 624

Km. of Line Surveyed: 25.95

Number of Readings: 4168

Consultants:

P.A. Cartwright, 4238 West 11th Avenue, Vancouver, B.C.

Field Technicians:

M. Makulowich, #15, 7559 Humphries Court, Burnaby, B.C.
M. Hylands, 1430 Inglewood Ave., West Vancouver, B.C.
M. Cosens, 1706 Christmas Ave., Victoria, B.C.

Draughtsman:

M. Makulowich, #15, 7559 Humphries Court, Burnaby, B.C.

PACIFIC GEOPHYSICAL LIMITED

Paul A. Cartwright

Paul A. Cartwright, P.Geoph.
Geophysicist

Dated: November 16, 1988

8. STATEMENT OF COSTS

Cordilleran Engineering Ltd.

Induced Polarization and Resistivity Survey - Logan Property, Watson Lake Mining Division, Yukon Territory

Period: June 28, 1988 to August 9, 1988

Crew: M. Makulowich, M. Hylands, M. Cosens

Operating Days:	31.5 @ 925.00	$29,137.50
Bad Weather Days:	10.5 @ 575.00	6,037.50
Travel/Standby Days:	0.5 @ 575.00	287.50
1.0 day @ N.C.		N.C.
Mobilization/demobilization		4,400.00
	TOTAL	$39,862.50

PACIFIC GEOPHYSICAL LTD.

Paul A. Cartwright

Paul A. Cartwright, P.Geoph.
Geophysicist

Dated: November 16, 1988

9. CERTIFICATE

I, Paul A. Cartwright, of the City of Vancouver, Province of British Columbia, do hereby certify:

1. I am a geophysicist residing at 4238 W. 11th Avenue, Vancouver, B.C.
2. I am a graduate of the University of British Columbia, with a B.Sc. Degree (1970).
3. I am a member of the Society of Exploration Geophysicists, the European Association of Exploration Geophysicists and the Canadian Society of Exploration Geophysicists.
4. I have been practising my profession for 18 years.
5. I am a Professional Geophysicist licensed in the Province of Alberta.
6. I have no direct or indirect interest, nor do I expect to receive any interest, directly or indirectly, in the property or securities of Cordilleran Engineering Ltd., Fairfield Minerals Ltd., Total Energold Corp., or any affiliates.
7. Permission is granted to use in whole or in part for assessment and qualification requirements but not for advertising purposes.

DATED AT VANCOUVER, BRITISH COLUMBIA this 16th day of November, 1988.

Paul A. Cartwright

Paul A. Cartwright, P.Geoph.

10. CERTIFICATE

I, Martin Makulowich, of the City of Kamloops, Province of British Columbia, do hereby certify:

1. I am a geophysical crew leader residing at #15, 7559 Humphries Court, Burnaby, British Columbia.

2. I am presently employed by Pacific Geophysical Ltd., of 224 - 744 West Hastings Street, Vancouver, British Columbia.

3. I have been practising my vocation about five years.

DATED AT VANCOUVER, BRITISH COLUMBIA this 16th day of November, 1988.

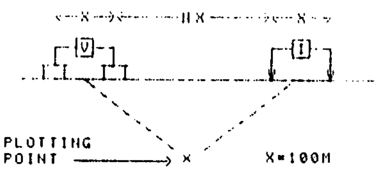
Martin Makulowich

CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M.D., YUKON

LINE NO.-44+00W



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE
PROBABLE
POSSIBLE

FREQUENCY (HERTZ)
4.0/0.25

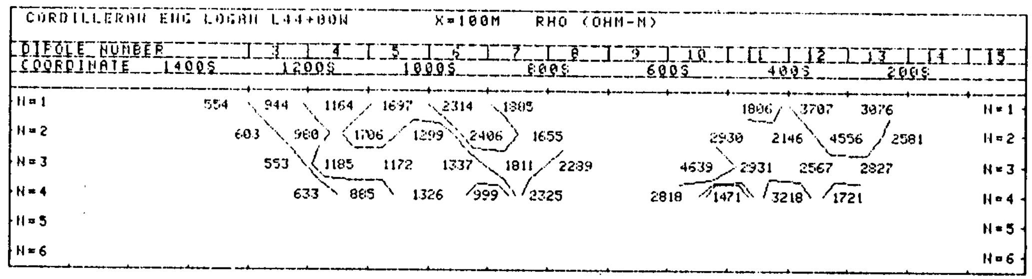
NOTE- CONTOURS AT LOGARITHMIC INTERVALS. 1,-1.5 -2,-3,-5,-7.5,-10 PLUS EACH 0.25 FROM 0.5 TO 2.0

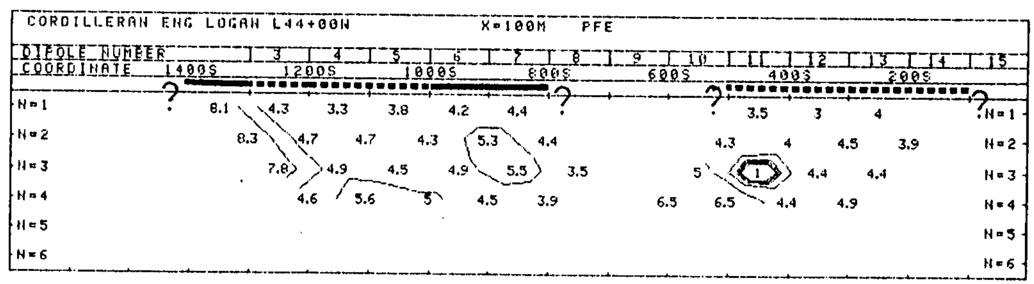
DWG. NO.-I.P.-5894-1

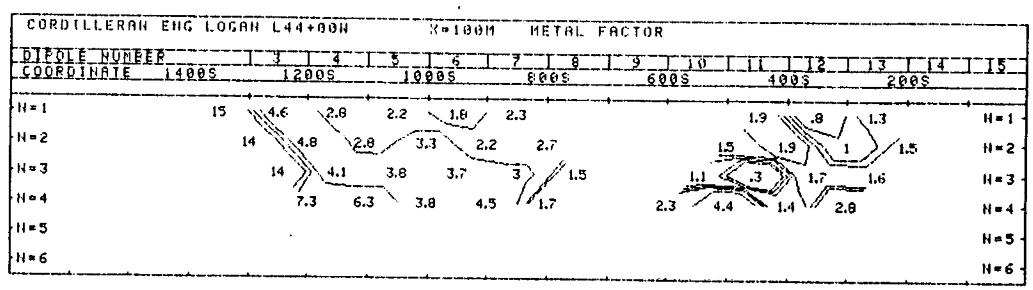
DATE SURVEYED: JULY 1988
APPROVED PAC
DATE Nov 15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY





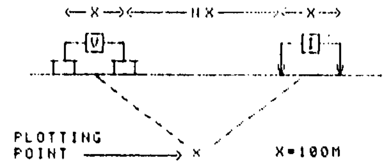


CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M.D.,YUKON

LINE NO.-42+00W



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE
PROBABLE
POSSIBLE

FREQUENCY (HERTZ)
4 0.0 25

NOTE- CONTOURS
AT LOGARITHMIC
INTERVALS, 1,-1.5
-2,-3,-5,-7.5,-10
PLUS EACH 0.25
FROM 0.5 TO 2.0

DWG. NO.-I.P.-5894-2

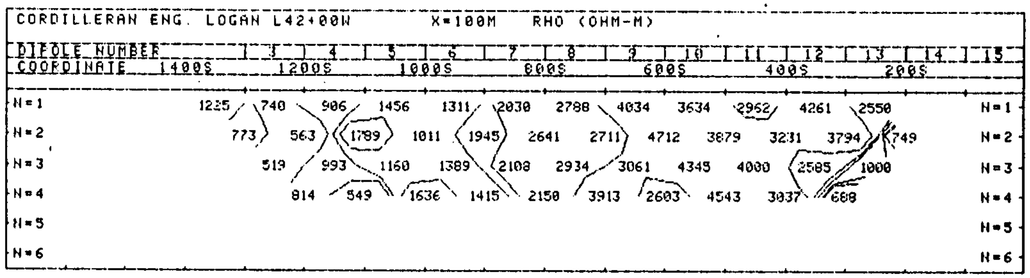
DATE SURVEYED: JULY 1988

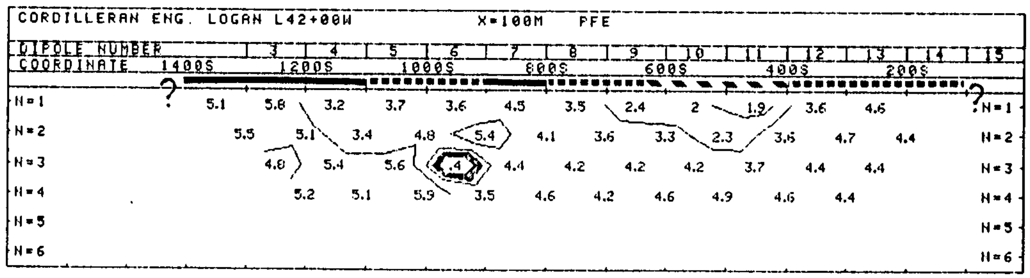
APPROVED [signature]

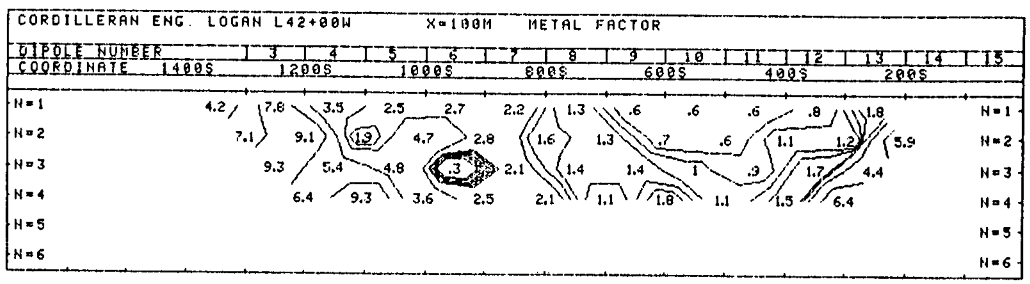
DATE Nov 15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY





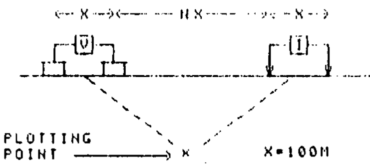


CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M.D., YUKON

LINE NO.-40+00W



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE
PROBABLE
POSSIBLE

FREQUENCY (HERTZ)
4.0/0.25

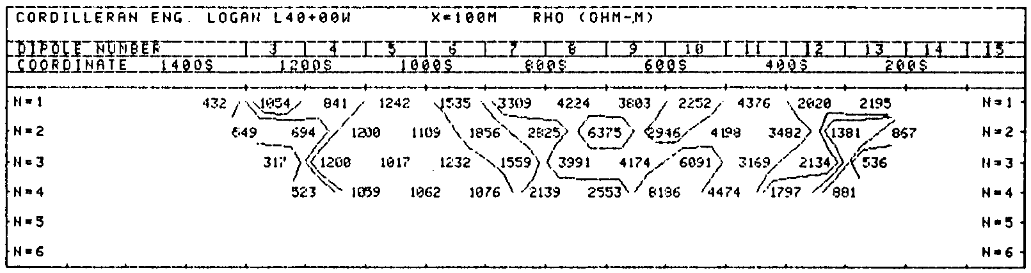
NOTE- CONTOURS
AT LOGARITHMIC
INTERVALS. 1,-1.5
-2,-3,-5,-7.5,-10
PLUS EACH 0.25
FROM 0.5 TO 2.0

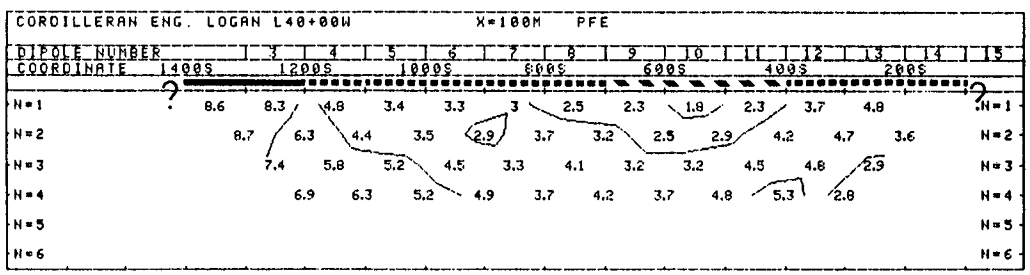
DWG. NO.-I.P.-5094-3

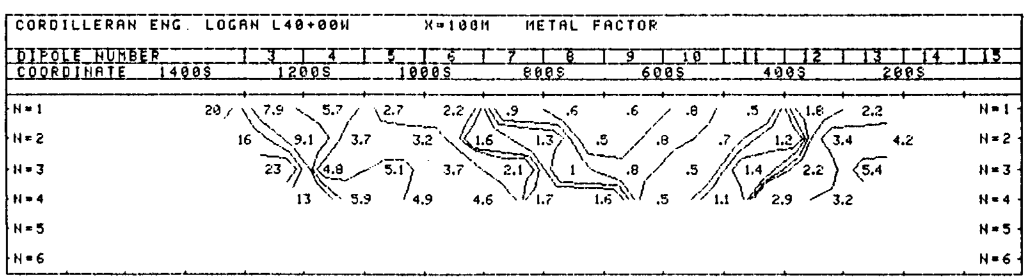
DATE SURVEYED: JULY 1988
APPROVED
DATE Nov 15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY





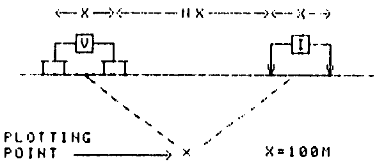


CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M.D./YUKON

LINE NO.-38+00W



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE
PROBABLE
POSSIBLE

FREQUENCY (HERTZ)
4.0/0.25

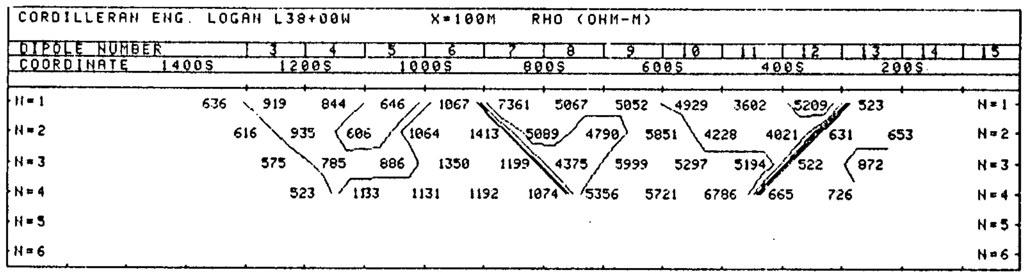
NOTE- CONTOURS AT LOGARITHMIC INTERVALS. 1,-1.5 -2,-3,-5,-7.5,-10 PLUS EACH 0.25 FROM 0.5 TO 2.0

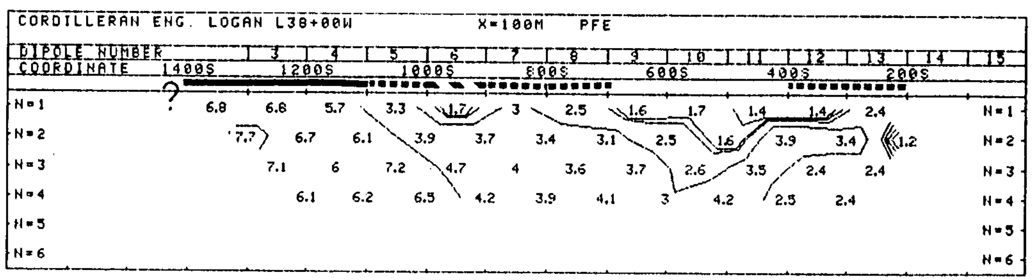
DWG NO -I P -5894-4

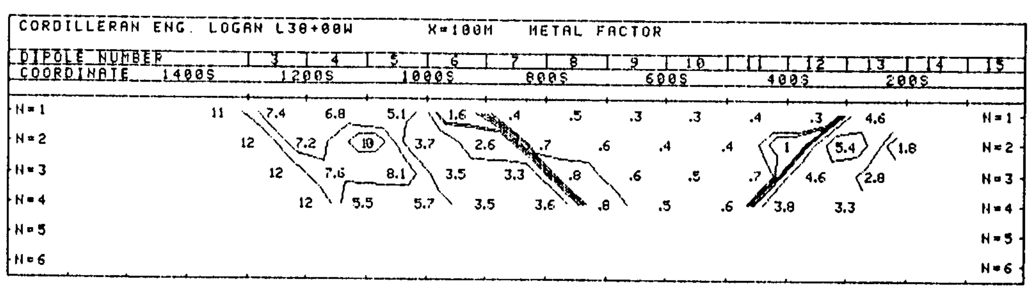
DATE SURVEYED: JULY 1988
APPROVED
DATE Nov 15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY





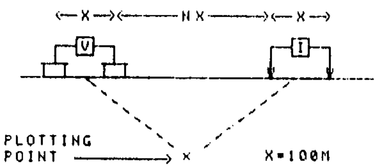


CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M.D., YUKON

LINE NO.-36+00W



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE
PROBABLE
POSSIBLE

FREQUENCY (HERTZ) 4.0/0.25

NOTE- CONTOURS AT LOGARITHMIC INTERVALS. 1,-1.5 -2,-3,-5,-7.5,-10 PLUS EACH 0.25 FROM 0.5 TO 2.0

DWG NO.-I.P -5894-5

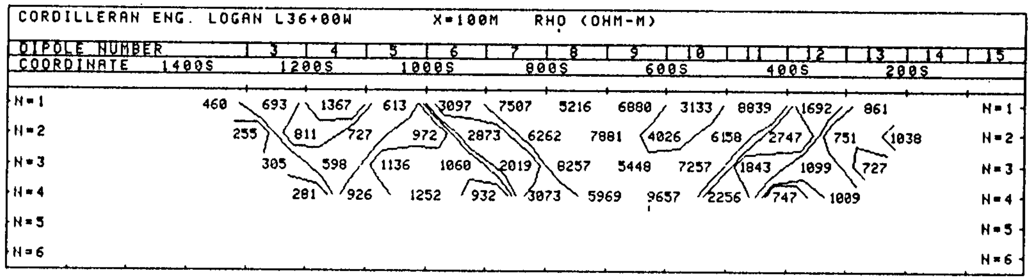
DATE SURVEYED: JULY 1988

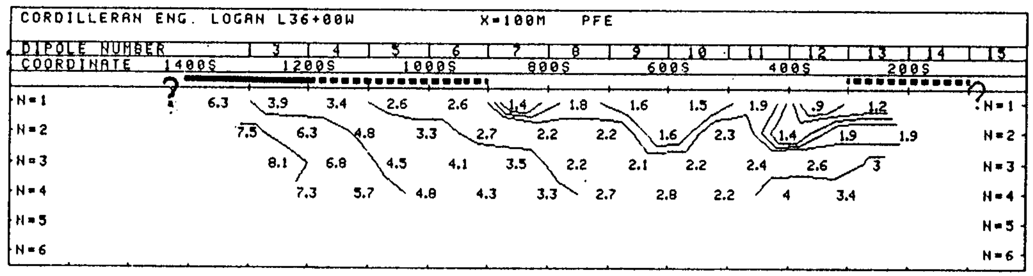
APPROVED DAC

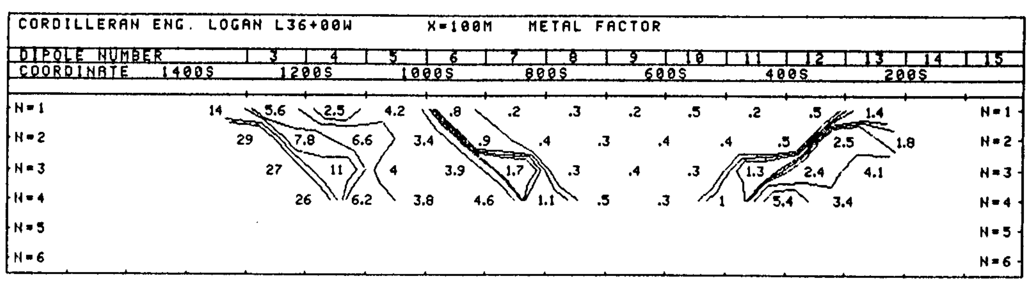
DATE Nov 15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY





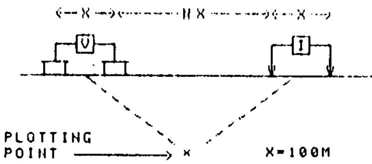


CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M.D., YUKON

LINE NO.-34+00W



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE
PROBABLE
POSSIBLE

FREQUENCY (HERTZ)
4.0/0.25

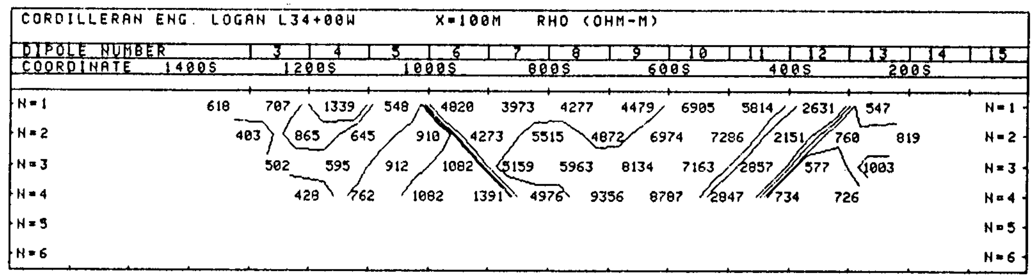
NOTE- CONTOURS AT LOGARITHMIC INTERVALS. 1,-1.5 -2,-3,-5,-7.5,-10 PLUS EACH 0.25 FROM 0.5 TO 2.0

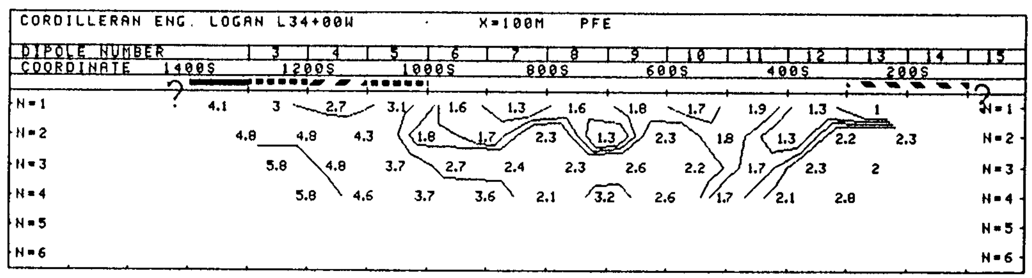
DWG. NO.-I.P.-5894-6

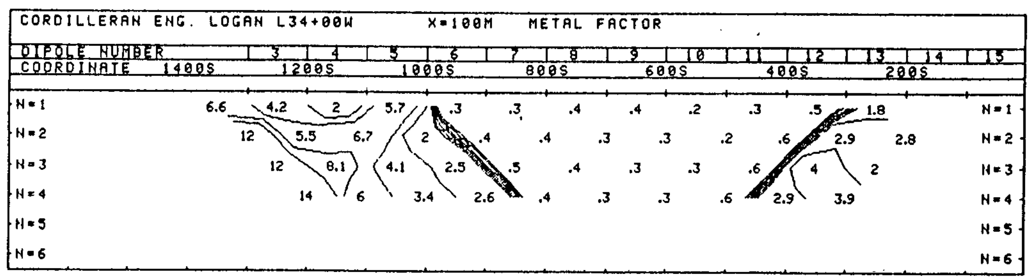
DATE SURVEYED: JULY 1988
APPROVED MAC
DATE Nov 15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY





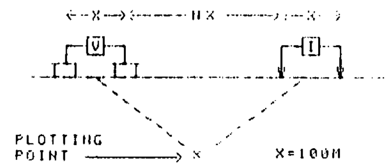


CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M.D./YUKON

LINE NO.-32+00W



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE

PROBABLE

POSSIBLE

FREQUENCY (HERTZ)
4.0/0.25

NOTE- CONTOURS AT LOGARITHMIC INTERVALS, 1,-1.5 -2,-3,-5,-7.5,-10 PLUS EACH 0.25 FROM 0.5 TO 2.0

DWG. NO.-I.P.-5894-7

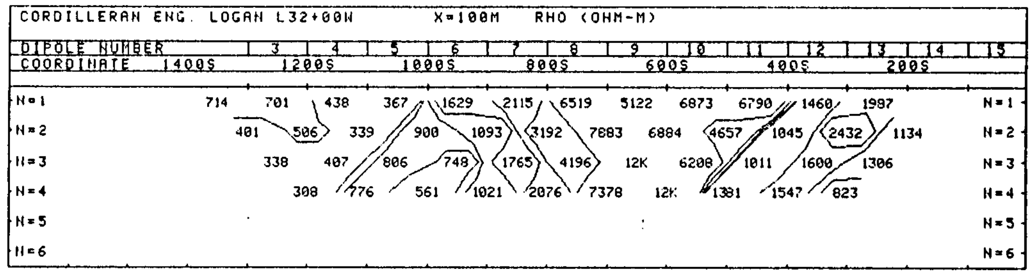
DATE SURVEYED: JULY 1988

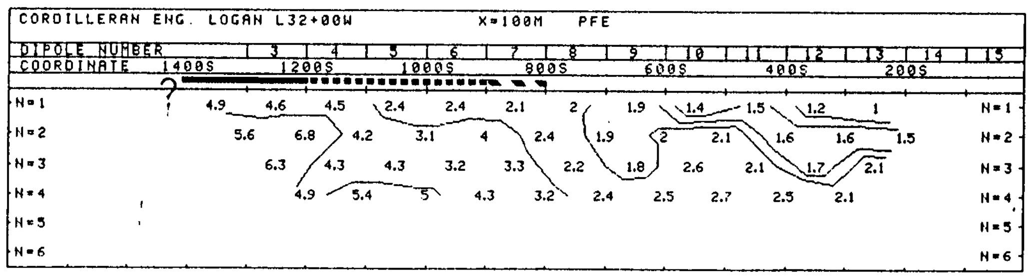
APPROVED PAC

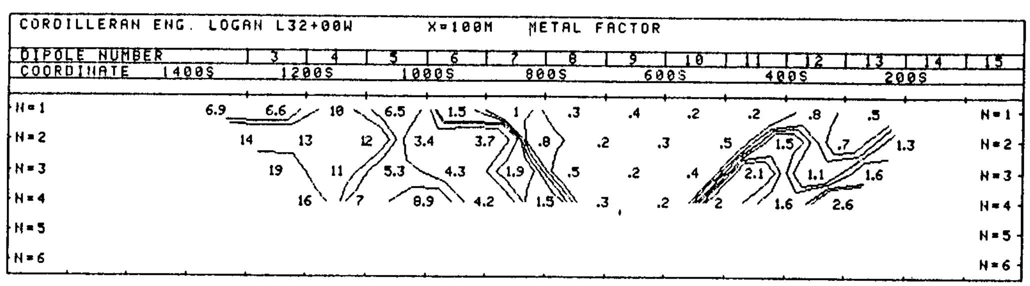
DATE NN15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY





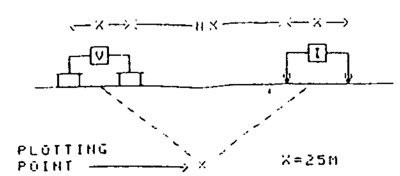


CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M.D.,YUKON

LINE NO.-30+00W



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE
PROBABLE
POSSIBLE

FREQUENC. (HERTZ)
4.0,0.25

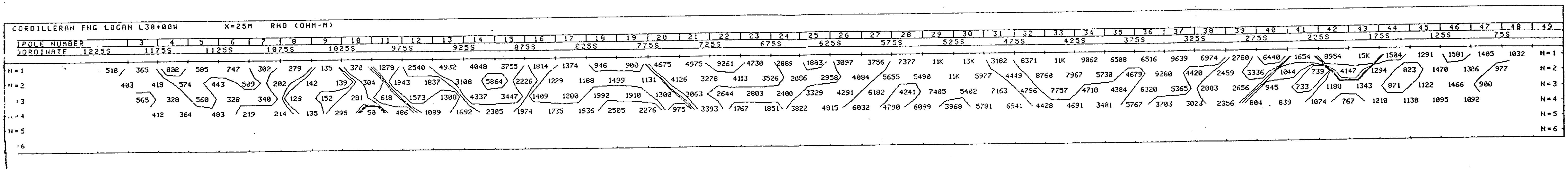
NOTE- CONTOURS AT LOGARITHMIC INTERVALS 1,-1.5 -2,-3,-5,-7.5,-10 PLUS EACH 0.25 FROM 0.5 TO 2.0

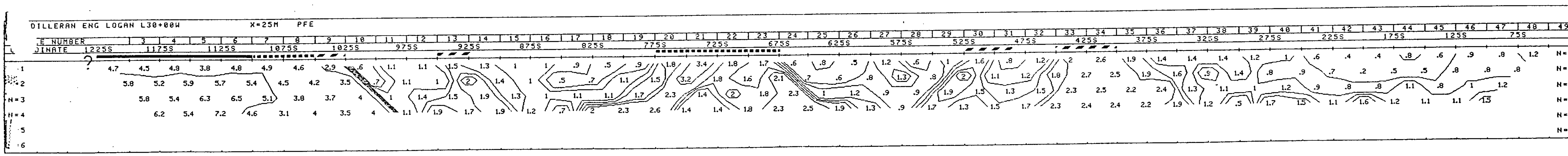
DWG NO -I P -5894-3

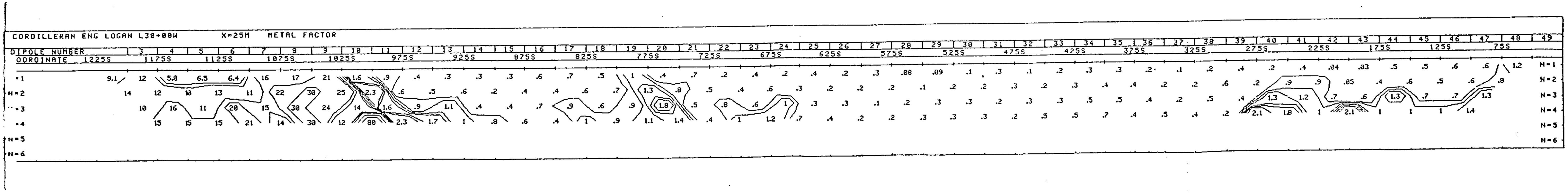
DATE SURVEYED JULY 1988
APPROVED PAC
DATE Nov 15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY





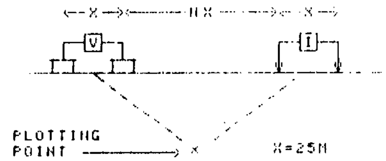


CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M.D., YUKON

LINE NO -28+00W



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE
PROBABLE
POSSIBLE

FREQUENCY (HERTZ)
4.0/0.25

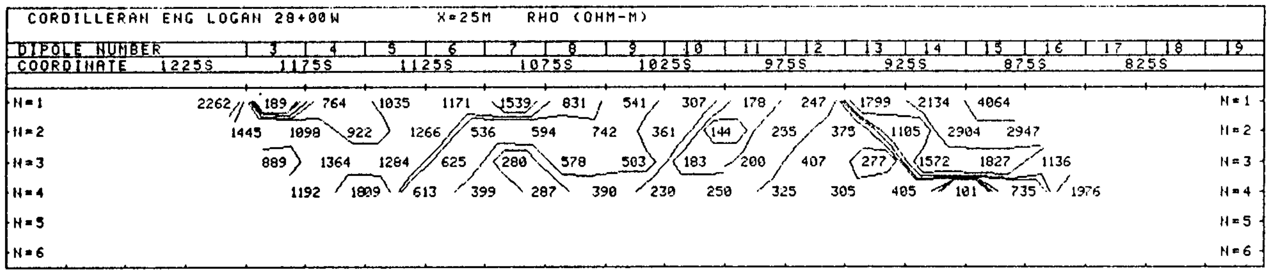
NOTE- CONTOURS
AT LOGARITHMIC
INTERVALS 1,-1.5
-2,-3,-5,-7.5,-10
PLUS EACH 0.25
FROM 0.5 TO 2.0

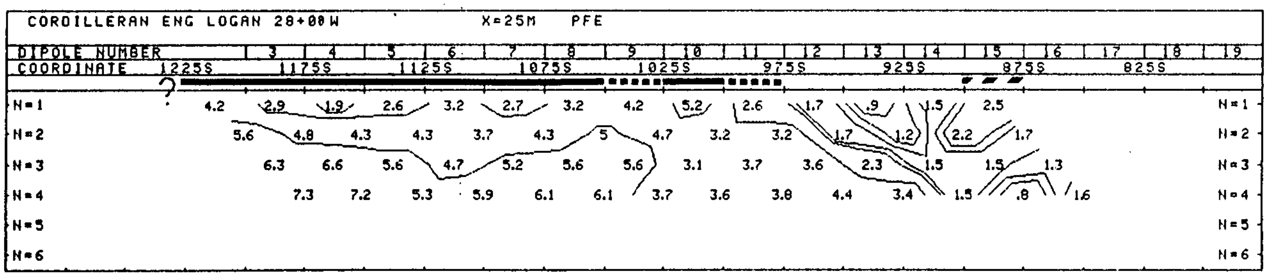
DWG NO -I.P.-5894-9

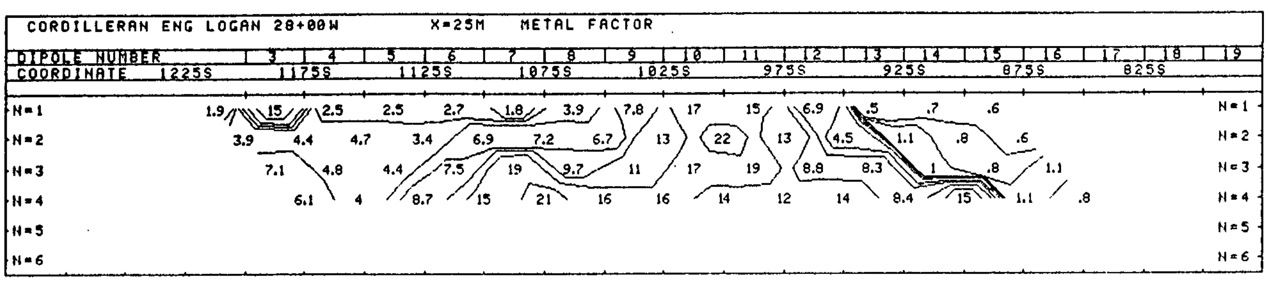
DATE SURVEYED: JULY 1988
APPROVED PRC
DATE Nov 15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY





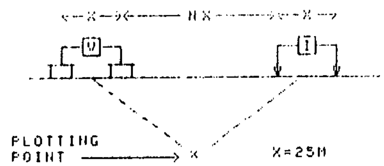


CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M.D., YUKON

LINE NO -28+00W



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE
PROBABLE
POSSIBLE

FREQUENCY (HERTZ)
4.0;0.25

NOTE- CONTOURS
AT LOGARITHMIC
INTERVALS, 1,-1.5
-2,-3,-5,-7.5,-10
PLUS EACH 0.25
FROM 0.5 TO 2.0

DWG NO -I.P -5894-10

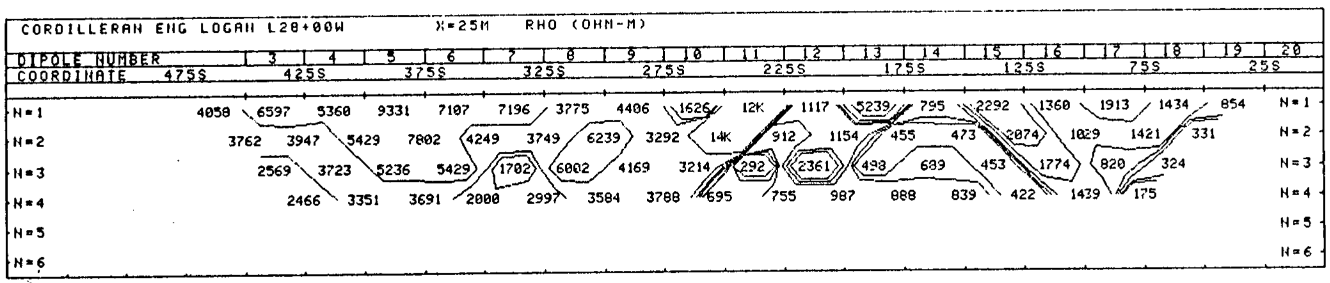
DATE SURVEYED JULY 1988

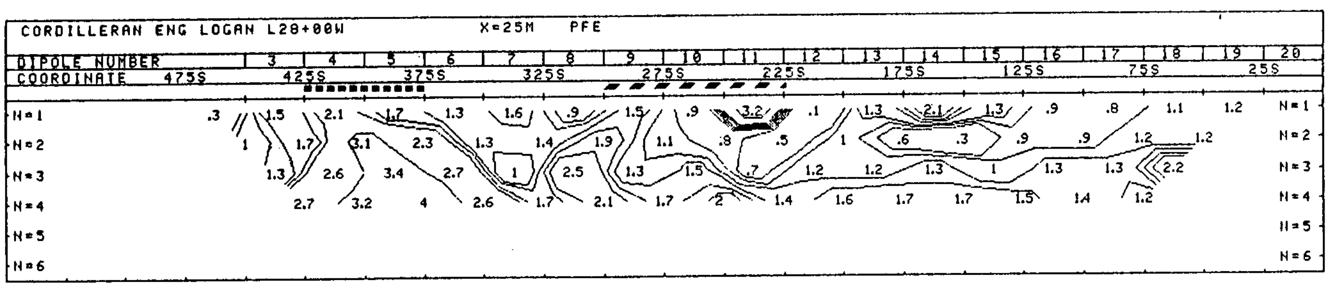
APPROVED

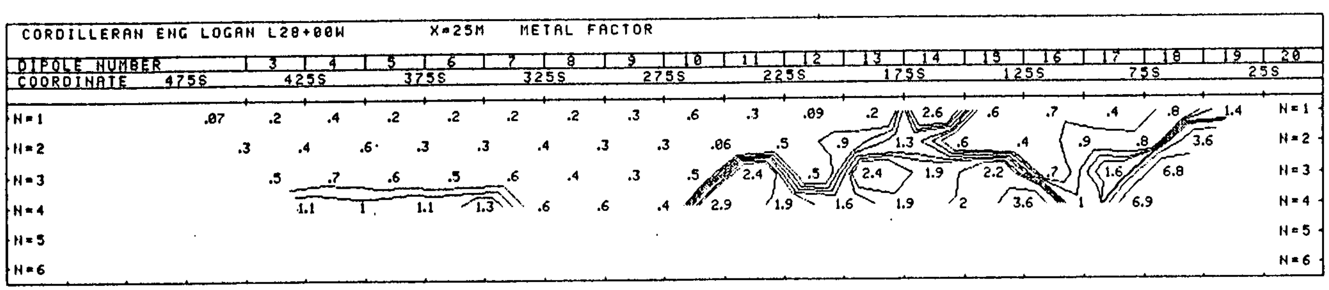
DATE Nov 15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY





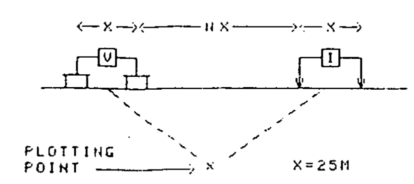


CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M.D., YUKON

LINE NO.-26+00W



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE
PROBABLE
POSSIBLE

FREQUENCY (HERTZ) 4.0;0.25

NOTE- CONTOURS AT LOGARITHMIC INTERVALS, 1,-1.5 -2,-3,-5,-7.5,-10 PLUS EACH 0.25 FROM 0.5 TO 2.0

DWG. NO.-I.P.-5894-11

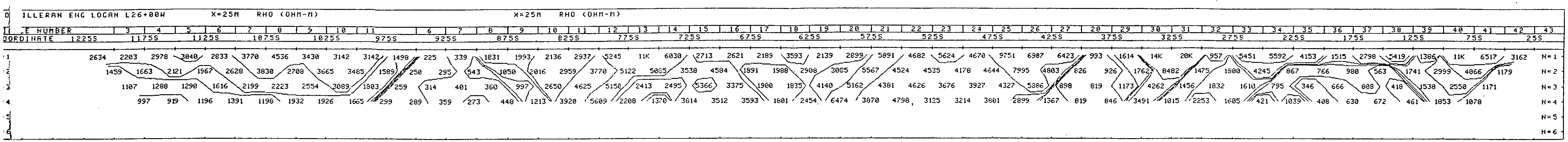
DATE SURVEYED: JULY 1988

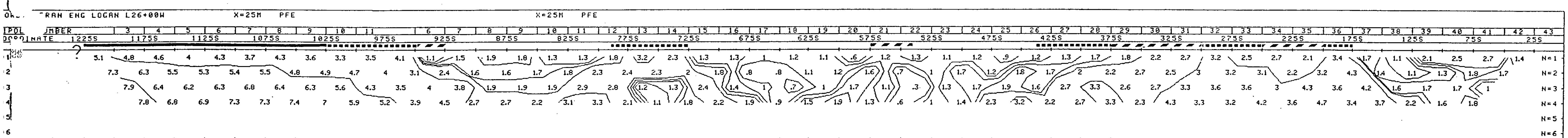
APPROVED ________

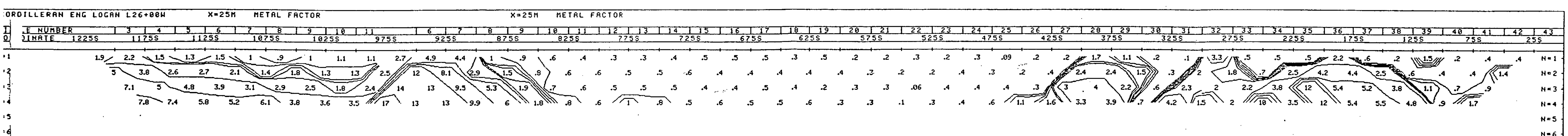
DATE Nov 15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY





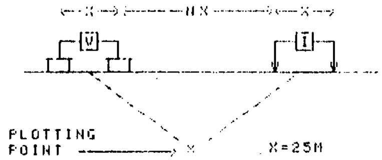


CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M D (YUKON

LINE NO.-24+00W



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE
PROBABLE
POSSIBLE

FREQUENCY (HERTZ) 4 0/0 25

NOTE- CONTOURS AT LOGARITHMIC INTERVALS. 1,-1 5 -2,-3,-5,-7.5,-10 PLUS EACH 0 25 FROM 0.5 TO 2 0

DWG NO -I P -5894-12

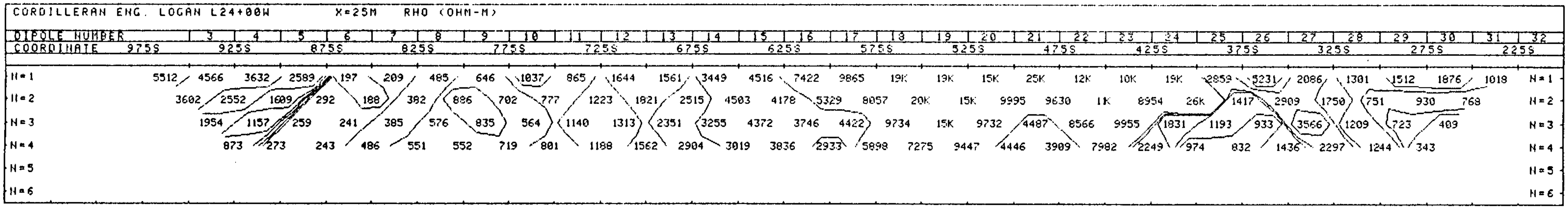
DATE SURVEYED JULY 1988

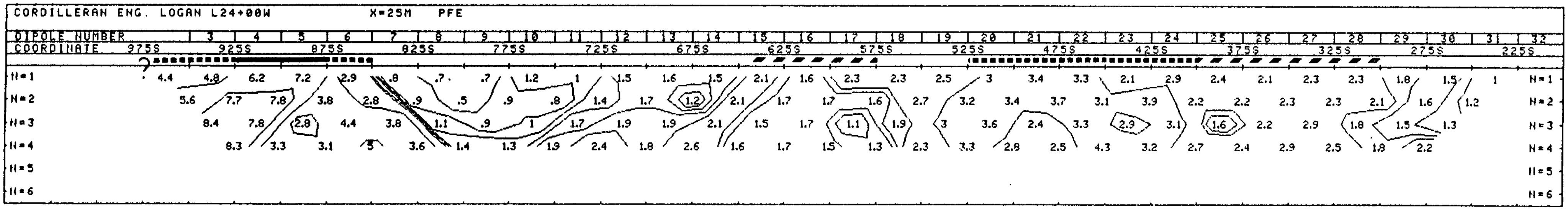
APPROVED

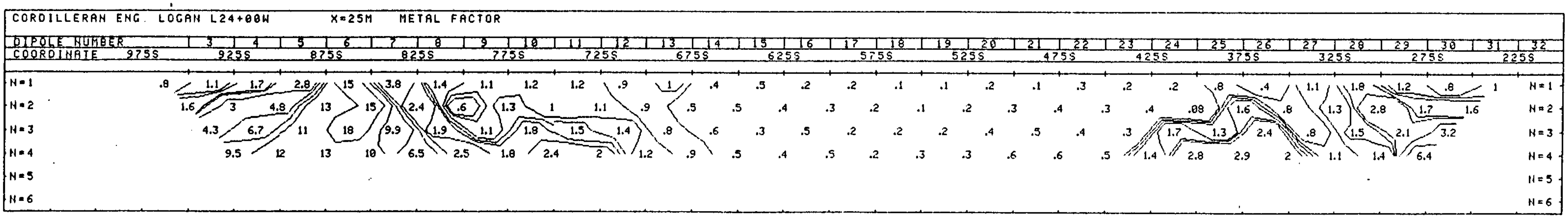
DATE Nov 15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY





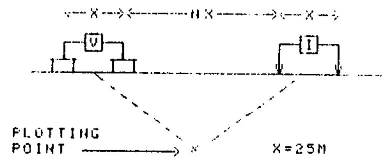


CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M.D./YUKON

LINE NO.-22+00W



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE
PROBABLE
POSSIBLE

FREQUENCY (HERTZ)
4.0/0.25

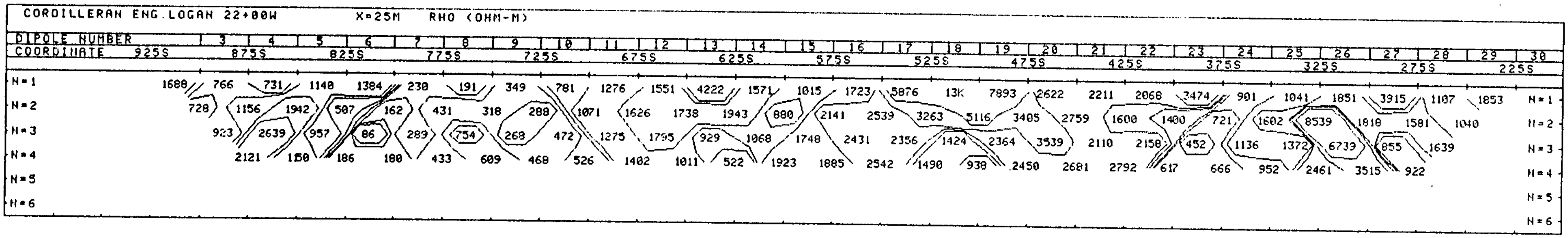
NOTE- CONTOURS AT LOGARITHMIC INTERVALS, 1,-1.5 -2,-3,-5,-7.5,-10 PLUS EACH 0.25 FROM 0.5 TO 2.0

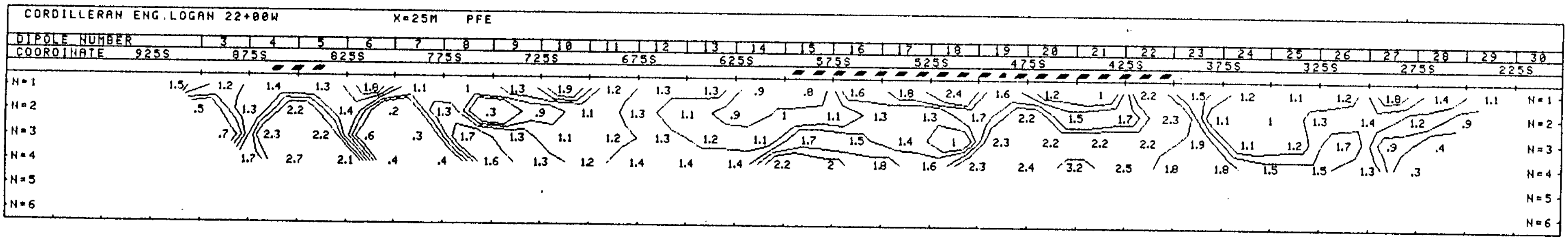
DWG NO -I.P.-5894-13

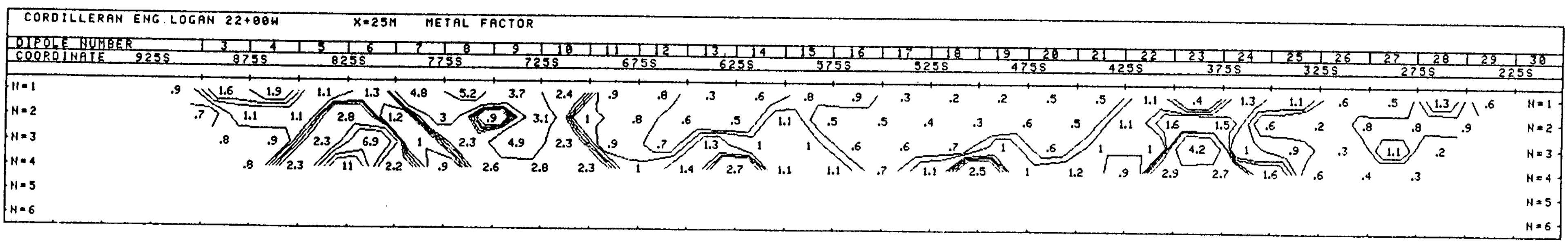
DATE SURVEYED: JULY 1988
APPROVED
DATE Nov 15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY





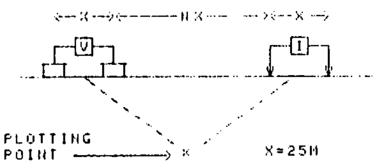


CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M.D., YUKON

LINE NO.-18+00W



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE
PROBABLE
POSSIBLE

FREQUENCY (HERTZ) 4.0/0.25

NOTE- CONTOURS AT LOGARITHMIC INTERVALS, 1,-1.5 -2,-3,-5,-7.5,-10 PLUS EACH 0.25 FROM 0.5 TO 2.0

DWG. NO.-I.P.-5894-15

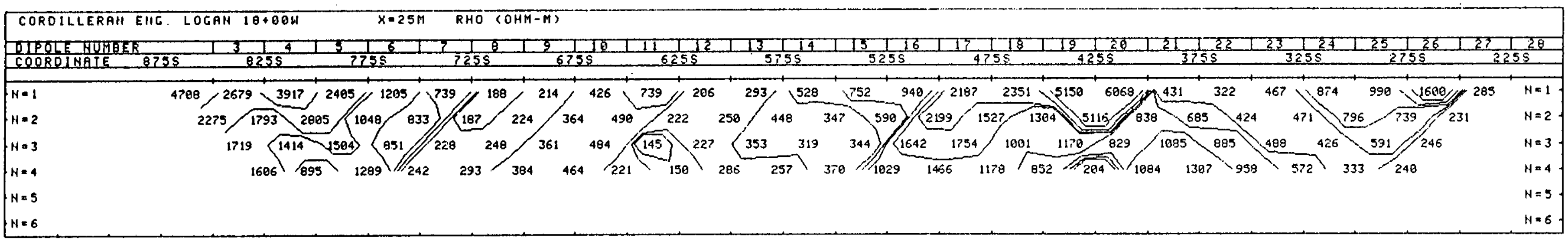
DATE SURVEYED: JULY 1988

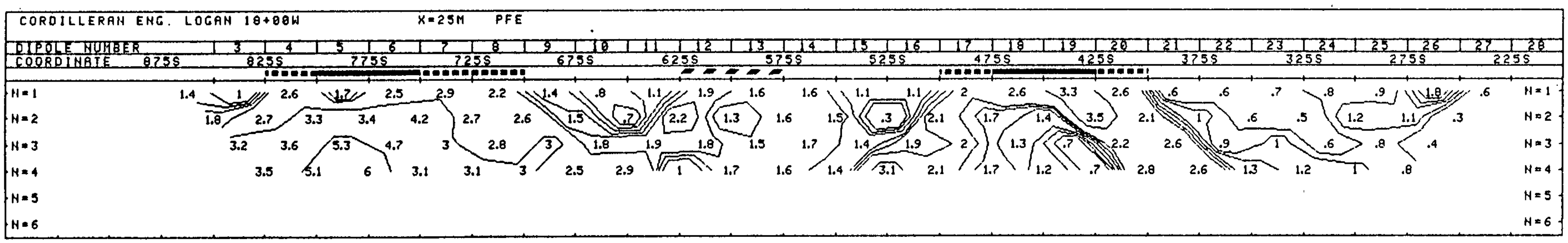
APPROVED TAC

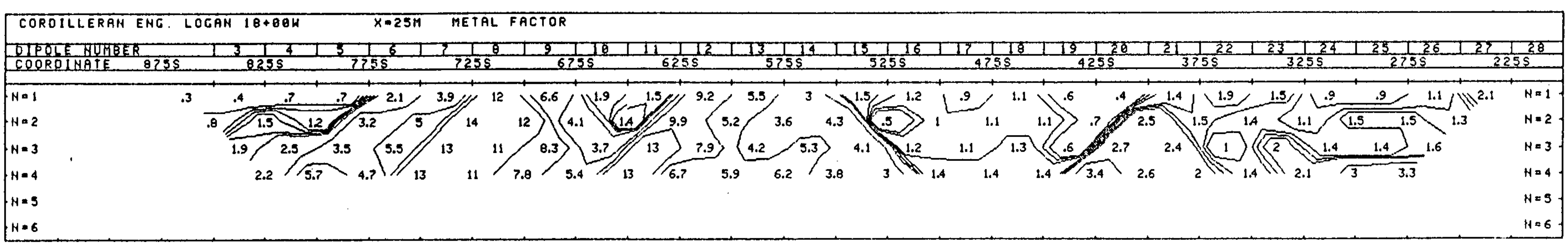
DATE Nov 15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY





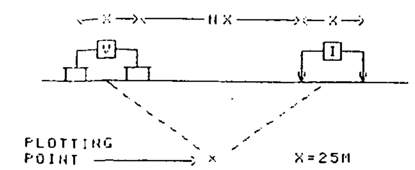


CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M.D. YUKON

LINE NO. -20+00W



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE
PROBABLE
POSSIBLE

FREQUENCY (HERTZ)
4.0:0.25

NOTE- CONTOURS
AT LOGARITHMIC
INTERVALS, 1,-1.5
-2,-3,-5,-7.5,-10
PLUS EACH 0.25
FROM 0.5 TO 2.0

DWG. NO.-I.P.-5894-14

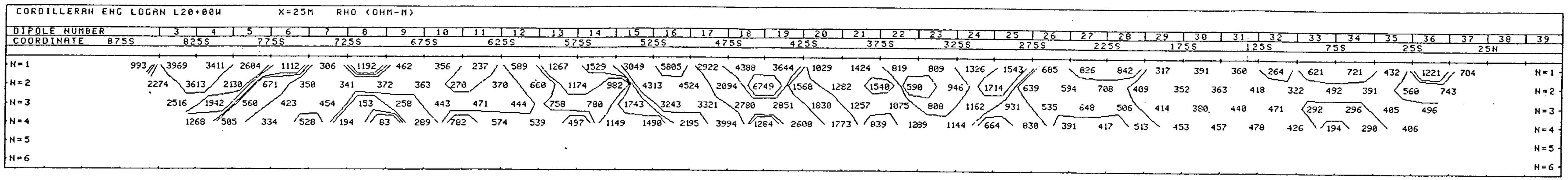
DATE SURVEYED JULY 1988

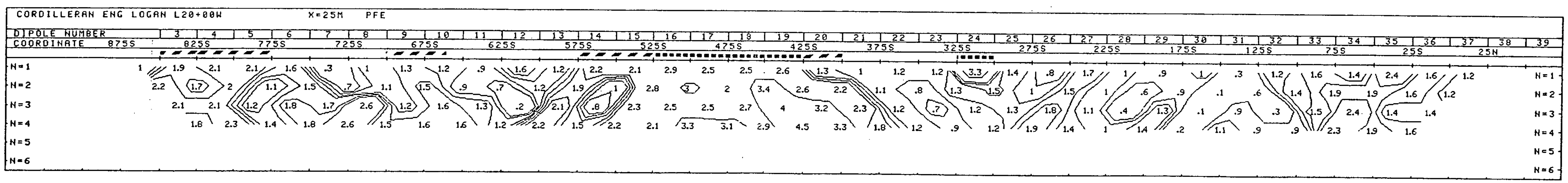
APPROVED PAC

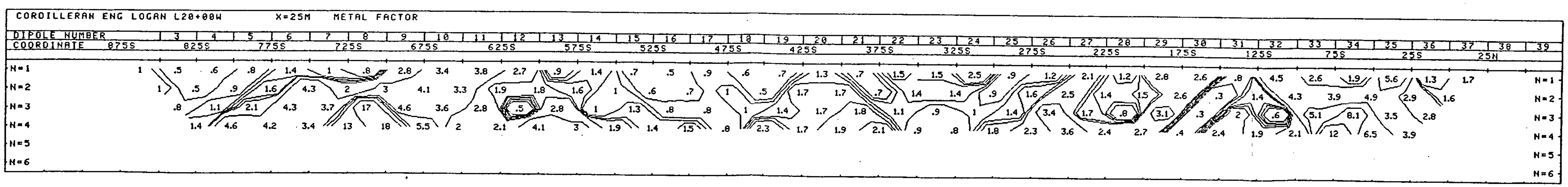
DATE Nov 15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY





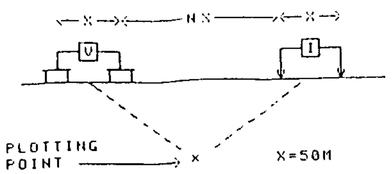


CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M.D., YUKON

LINE NO.-1+00S



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE
PROBABLE
POSSIBLE

FREQUENCY (HERTZ)
4.0/0.25

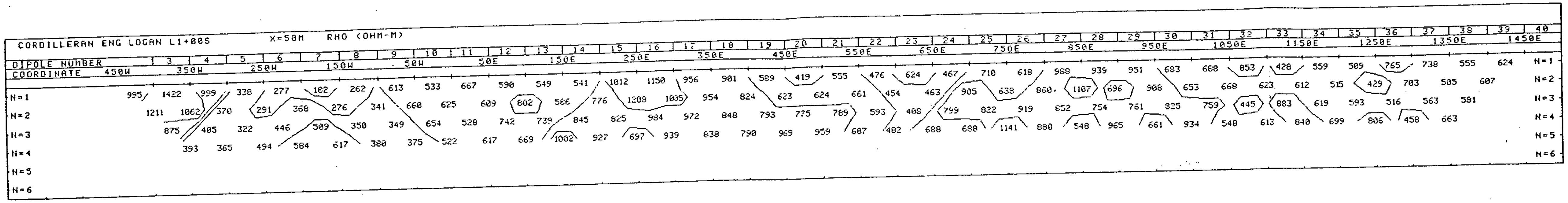
NOTE- CONTOURS
AT LOGARITHMIC
INTERVALS. 1,-1.5
-2,-3,-5,-7.5,-10
PLUS EACH 0.25
FROM 0.5 TO 2.0

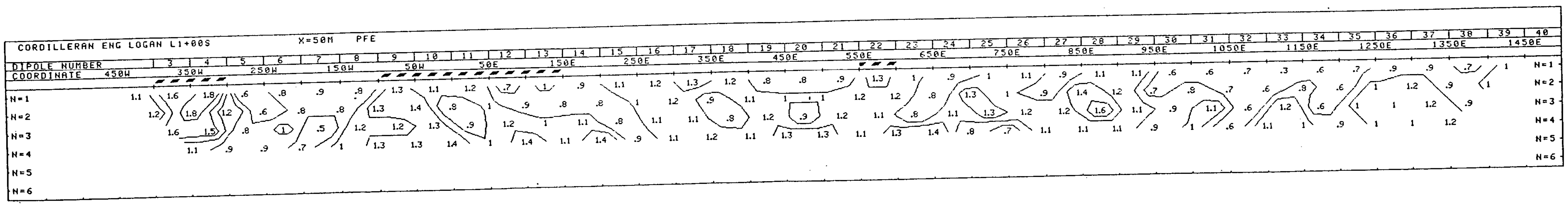
DWG NO -I P.-5894-21

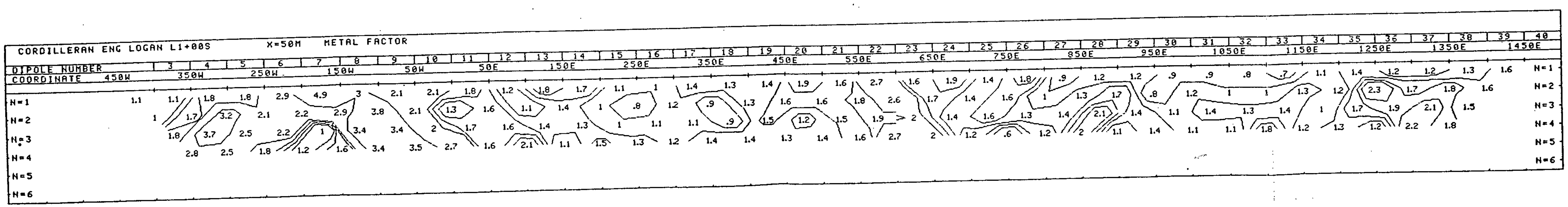
DATE SURVEYED AUGUST 1988
APPROVED [signature]
DATE Nov 15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY





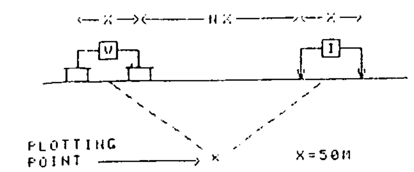


CORDILLERAN ENG.

LOGAN PROJECT

WATSON LAKE M.D.,YUKON

LINE NO. -3+00S



SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE
PROBABLE
POSSIBLE

FREQUENCY (HERTZ) 4 0;0.25

NOTE- CONTOURS AT LOGARITHMIC INTERVALS. 1,-1.5 -2,-3,-5,-7.5,-10 PLUS EACH 0.25 FROM 0.5 TO 2.0

DWG. NO -I P -5694-22

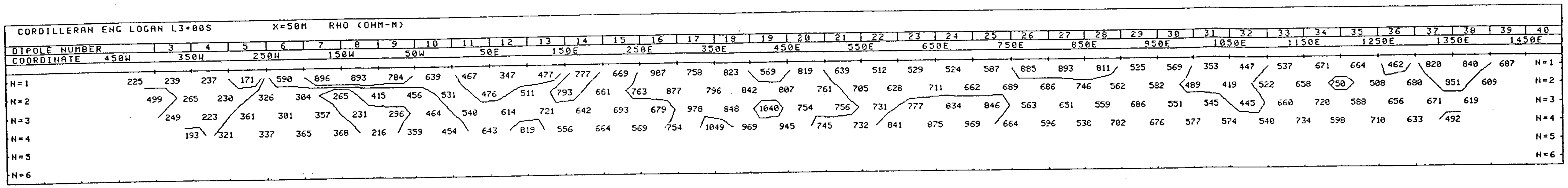
DATE SURVEYED AUGUST 1988

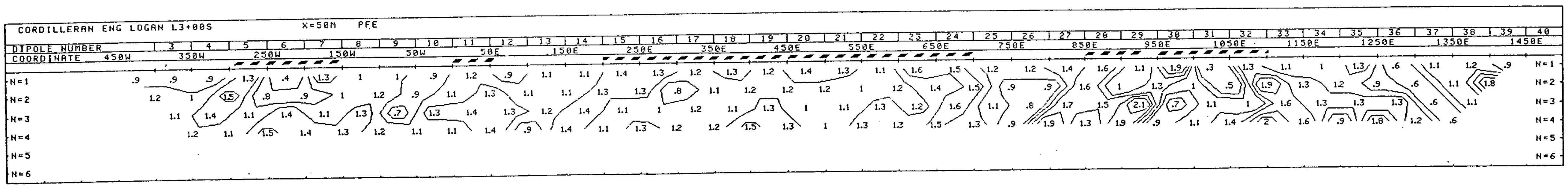
APPROVED ____

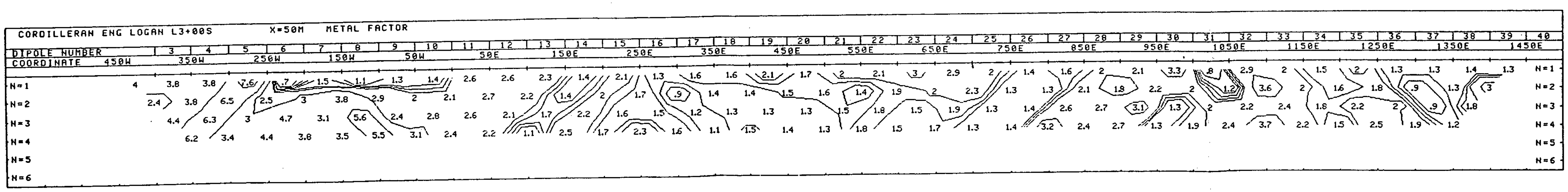
DATE Nov 15/88

PACIFIC GEOPHYSICAL LTD.

INDUCED POLARIZATION AND RESISTIVITY SURVEY







CORDILLERAN ENGINEERING LTD.

1980 GUINNESS TOWER, 1055 WEST HASTINGS STREET, VANCOUVER, B.C. V6E 2E9 TEL: (604) 681-8381

December 16, 1988

TOTAL ENERGOLD CORPORATION
#1500 - 700 West Pender Street
Vancouver, B.C.
V6C 1G8

Attention: Mr. Walter Sellmer
Vice President, Exploration

Copy to: Mr. Ken Rawling,
Strathcona Mineral Services

Dear Mr. Sellmer:

LOGAN METALLURGICAL TESTING

Please find attached, a revised list of samples to be used in metallurgical testing. All samples were examined prior to shipment to Lakefield Research on December 15, 1988. A total of five samples from the previous listing required substitution due to sample size deficiency. No change in drill hole distribution was made.

The test program is expected to be initiated early in the new year at Lakefield.

Yours very truly,

CORDILLERAN ENGINEERING LTD.

M. A. Stammers

M. A. Stammers,
Project Manager.

Encl.
MAS/ts

<u>**LOGAN PROJECT**</u>

<u>**METALLURGICAL TESTING**</u>

<u>**PROPOSED LOW GRADE BLENDED SAMPLE (A)**</u>

<u>**SUMMARY**</u>

SAMPLE TYPE	:	1986 (2) and 1987 (12) Diamond Drill Core Rejects
NUMBER OF SAMPLES	:	14
LENGTH OF EACH SAMPLE	:	1.0 metre
ESTIMATED SAMPLE WEIGHT	:	1.95kg each or 27.2kg total
ZINC RANGE	:	2.10% to 4.90%
SILVER RANGE	:	0.07 oz/ton to 1.28 oz/ton
ZINC-SILVER AVERAGE	:	3.48% Zn, 0.46 oz/ton Ag

LOGAN PROJECT - METALLL ICAL TESTING

PROPOSED LOW GRADE BLENDED SAMPLE (A)

SAMPLE LIST

SAMPLE NO.	HOLE NO.	INTERVAL(m)	% ZINC	OPT Ag	LITHOLOGY	DESCRIPTION OF MINERALIZATION
47569	16	78 - 79	2.31	0.21	ALTERED GRANODIORITE	5-20mm wide Q-Sp Veinlets; 2 per 5cm, good evenly distributed stockwork mineralization
47686	18	227 - 228	2.10	0.08	MUSCOVITE SCHIST	5-40mm wide Q-Sp Veinlets; 1 per 10cm, fairly good distribution of stockwork mineralization
47748	20	117 - 118	2.60	0.19	QUARTZ FLOODED GRANODIORITE	<1.5mm wide Sp Veinlets/Blebs; 1 per 5-10cm good distribution of stockwork mineralization
49755	50	30 - 31	2.80	0.66	ANK. FLOODED ANDESITE DIKE	<2.0mm wide Ank-Sp Veinlets; 1 per 3cm, good stockwork mineralization
50002	52	53 - 54	3.30	0.40	MIN. QUARTZ VEIN AND ANDESITE DIKE	Q vein contains 6% Sp;hairline Q-Ank Sp Vlts; 1 per 1cm good stockwork, locally blebby mineralization
48059	25	185 - 186	3.36	0.13	ALTERED GRANDIORITE & MIN.QTZ. VN.	40cm wide Q-Sp Py, Ank. banded vein with 15% Sp. Sp mineralization most concentrated in one vein
48382	31	85 - 86	3.10	0.47	ALTERED GRANODIORITE	<3mm wide Q-Sp veinlets, 2 per 5cm, good evenly distributed stockwork mineralization
16487	8	124.4-125.4	3.60	1.28	MINERALIZED QUARTZ VEIN	Section of 6.0m Q vein, blebby to disseminated Sp-Py. generally evenly dist. sulphide min.
49685	49	107 - 108	3.50	0.47	ALTERED GRANODIORITE	<30mm wide Q-Sp veinlets, 1 per 7cm, good evenly distributed stockwork mineralization
48647	33	53 - 54	3.81	0.73	ALTERED GRANODIORITE	<20mm wide Q-Sp veinlets, 1 per 10cm, good evenly distributed stockwork mineralization
49905	51	64 - 65	4.28	0.55	ALTERED GRANODIORITE	<30cm wide Q-Sp veinlets, 1 per 2 cm, only fair dist. of Zn, note 14cm vn. with 50% Sp
48541	32	148 - 149	4.30	0.60	ALTERED GRANODIORITE	<10mm long hairline Sp stringers + 13cm wide Qv with 55%Sp, good evenly dist. swk. min.
17498	14	77 - 78	4.70	0.58	ALTERED GRANODIORITE	45cm Q-Sp vein, generally evenly distributed stockwork mineralization
48277	26	255 - 256	4.90	0.07	FOLIATED GRANODIORITE	5-30mm wide, Q-Sp veinlets, 1 every 2cm generally evenly dist. swk. mineralization

LOGAN PROJECT

METALLURGICAL TESTING

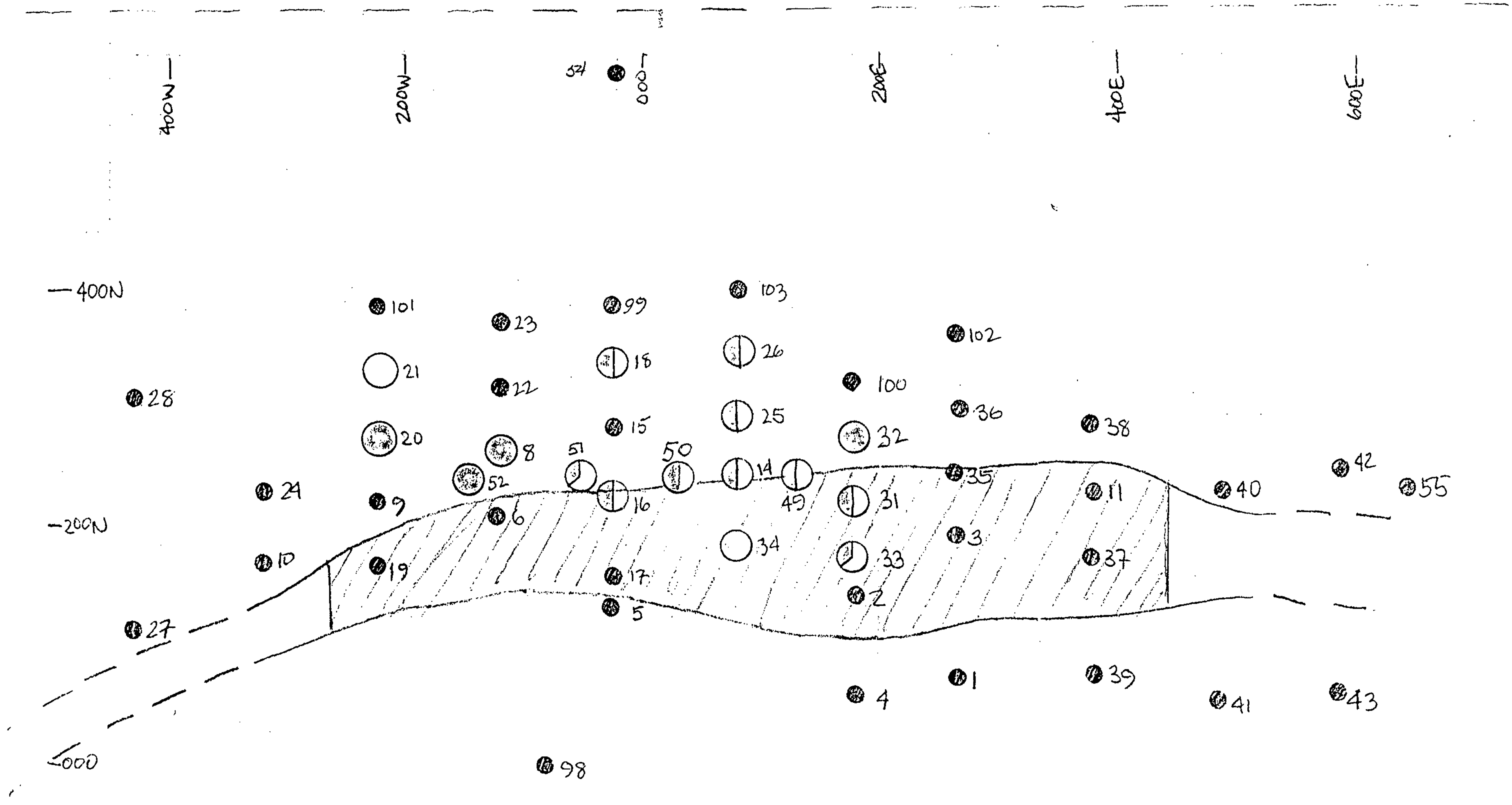
PROPOSED HIGH GRADE BLENDED SAMPLE (B)

SUMMARY

SAMPLE TYPE	: 1986 (1) and 1987 (13) Diamond drill core rejects
NUMBER OF SAMPLES	: 14
LENGTH OF EACH SAMPLE	: 1.0 metre
ESTIMATED SAMPLE WEIGHT	: 2.2kg each or 30.4kg total
ZINC RANGE	: 10.40%Zn to 16.58%Zn
SILVER RANGE	: 0.63 oz/ton Ag to 4.89 oz/ton Ag
ZINC-SILVER AVERAGE	: 13.96%Zn, 1.79 oz/ton Ag

SAMPLE LIST

SAMPLE NO.	HOLE NO.	DRILL INTERCEPT (m)	% ZINC	OPT Ag	LITHOLOGY
47576	16	83 - 84	10.40	0.63	Mineralized Quartz Vein
48662	33	68 - 69	12.17	1.14	Mineralized Quartz Vein
48397	31	100 - 101	12.98	1.75	Altered Granodiorite
47681	18	222 - 223	13.99	1.04	Andesite Dike
47772	21	164 - 165	13.79	1.92	Mineralized Quartz Vein
47975	25	101 - 102	13.34	1.95	Mineralized Quartz Vein
49626	49	47 - 48	13.55	2.91	Altered Granodiorite
49892	51	51 - 52	14.28	0.75	Mineralized Quartz Vein
48767	34	84 - 85	14.38	0.88	Mineralized Quartz Breccia
48660	33	66 - 67	16.58	4.89	Mineralized Quartz Vein
17507	14	85 - 86	13.20	2.53	Mineralized Quartz Vein
49817	50	92 - 93	16.00	2.13	Mineralized Quartz Vein
48206	26	165 - 166	15.70	1.05	Massive Sulfides
49934	51	93 - 94	15.10	1.49	Altered Granodiorite



metres

0 250

TRACE OF MINERALIZED STRUCTURE

PRESENTLY DEFINED ZINC-SILVER DEPOSIT(S)

DDH

DDH WITH METALLURGICAL SAMPLE :

LOW GRADE SAMPLE A

HIGH GRADE SAMPLE B

1 LOW, 1 HIGH SAMPLES

1 LOW, 2 HIGH SAMPLES

DEC 16, 1988

MAP TO ACCOMPANY
PROPOSED METALLURGICAL TESTING

APPENDIX "B"

INTER-OFFICE MEMO

NOV 22.88

TO J. HYLANDS/M. STAMMERS (by Fax)	**DATE** NOVEMBER 21, 1988
FROM K.R. RAWLING	**PROJECT REFERENCE** 315-1
SUBJECT TEST PROGRAM - LOGAN PROJECT - REVISION	

1. Following my conversation with Walt Sellmer, I have revised the proposal for test work at Lakefield Research.

2. Two samples will be tested

   (a) the coarsely mineralized high grade zinc material (10 - 14% Zn)

   (b) the fine grained sphalerite in siliceous rock (1 - 5% Zn)

   Testing on these samples will proceed in parallel to a point where a decision can be made regarding blending of a realistic sample for completion of the program, if the low grade material has ore potential.

3. The test program and estimated cost for the preliminary work at Lakefield Research is therefore re-estimated as follows:

Sample Preparation - Head Analysis	2	x	1 000	$ 2 000
Mineralogy	2	x	400	800
Flotation Tests	12	x	500	6 000
Grindability Tests	2	x	450	900
Concentrate Analysis	2	x	300	600
Supervision and Report				2 000
			Total	$12 300

4. The total cost for the testing program is summarized as follows:

Lakefield Research			$12 300
SMS	-	Fees	2 000
	-	Expenses	300
			$14 600

5. At the completion of this initial program, we will review the metallurgical results and determine what initial work is required to achieve the current project goal.

KRR:etk

cc: W. Sellmer
G. Farquharson

INTER-OFFICE MEMO

JAN 0 6 89
cc MAS

TO Susan S. PARKER	DATE JANUARY 3, 1989
FROM K.R. RAWLING	PROJECT REFERENCE 315-1
SUBJECT LOGAN PROJECT - METALLURGICAL TESTING	

1. The attached material supplied by Cordilleran Engineering contains:

   Mineralogical reports on selected samples, by Vancouver Petrographics Ltd.

   Details of the material to be combined in
   Sample A - Low Grade Zinc (fine grained)
   Sample B - High Grade Zinc (coarse grained)

   A scope and budget estimate for the testing program.

2. The purpose of the testing is to determine how to produce a high grade Zn-Ag concentrate from both samples with emphasis on the following factors:

   a) primary grind vs. rougher recovery

   b) regrinding required for production of final concentrate grade

   c) differences in reagents for the two samples.

   Also the possible production of a tin concentrate is to be investigated.

3. In view of the limited budget, we should proceed with the following work:

   a) Sample Preparation

   - Prepare the two separate head samples A & B.

- Cut out head assay samples of each for Pb, Zn, Ag, Au, Cu, Sb, Sn, As, Hg; semi quant scan.

- Head samples (-10 mesh)? for mineralogical examination.

b) Preliminary Tests

Two scoping tests at 80% -150 mesh on each sample to establish reagents.
Zn, Fe, Ag, Sn analyses.

c) Flotation tails to be retained without grinding for Sn recovery tests.

4. At this point we would proceed, after data review, with grind recovery tests.

5. We need some preliminary conclusions by the end of January.

KRR:etk
attach.

cc: M. Stammers (~~via Fax~~, no attach.)

Telephone: (416) 869-0772
Telex: 06-23565
Telecopier: (416) 367-3638

Strathcona Mineral Services Limited
12th Floor, 20 Toronto Street, Toronto, Ontario, Canada M5C 2B8

JAN 17. 89
CC: MAS - JJH - JWS.

January 13, 1989

Mr. M. Stammers
Cordilleran Engineering Ltd.
1980 Guinness Tower
1055 West Hastings Street
Vancouver, British Columbia
V6E 2E9

Dear Mike,

Re: Logan Project

The attached data sheets from Lakefield Research summarize the first flotation test on each of the two samples. The grind was 75-80 percent minus 150 mesh, and the reagent system was simple using a high lime addition to control the pyrite while floating the zinc and silver minerals. The essential facts of the tests are as follows:

		Sample A	Sample B
Rougher recovery	- Zn	96.7	99.4
	- Ag*	87.0	99+
* Tailing analyses not available yet			
Cleaner recovery	- Zn	72.6	90.6
	- Ag	35.8	61.3

The relatively high zinc and silver content of the several cleaner tailing products is probably due to locked middling particles and to the reagents used. Both these factors will be checked in the next two tests, by regrinding the rougher concentrate in Sample A and reducing the pH for Sample B.

Silver recovery may be improved by floating it with whatever copper is present before zinc flotation, but only as a secondary line of investigation.

In view of the excellent rougher recovery of zinc and silver in both samples we have planned a test on each sample at a grind of 80% minus 65 mesh with a view to saving grinding power.

Strathcona Mineral Services Limited

When these four tests are complete we will review them with you, but it would appear that the metallurgy of both samples will be quite satisfactory.

Sincerely,

K.R. Rawling

K.R. Rawling

KRR:etk

cc: W. Sellmer
G. Farquharson

JAN 17. 89

Test 1

Product	Weight		Assays,%,g/t					% Distribution					
	g	%	Zn	Sn	S	Au	Ag	Zn	Sn	S	Au	Ag
1 Cleaner Conc	95.7	4.9	53.9	0.013	34.0	0.13	79.3	72.6	2.7	51.0	7.6	35.8
2 3rd Cl Tail	8.7	0.4	50.9	0.023	31.2	0.43	165	6.2	0.4	4.3	2.3	6.8
3 2nd Cl Tail	35.1	1.8	34.9	0.023	32.4	0.20	186	17.2	1.7	17.8	4.3	30.8
4 1st Cl Tail	52.8	2.7	0.96	0.025	12.2	0.22	54.4	0.7	2.8	10.1	7.1	13.6
5 Scav Conc.	42.0	2.1	1.64	0.027	18.6	0.19	65.7	0.9	2.4	12.2	4.9	13.0
6 Scav. Tail	1738.8	88.1	0.096	0.024	0.17	0.070	0.00	2.3	89.9	4.6	74.0	0.0
Head(calc)	1973.1	100.0	3.60	0.024	3.24	0.083	10.7	100.0	100.0	100.0	100.0	100.0
Combined Products												
1 + 2		5.3	53.7	0.014	33.8	0.16	86.4	78.8	3.1	55.2	9.8	42.6
1 to 3		7.1	48.9	0.016	33.4	0.17	111	96.0	4.8	73.0	14.1	73.4
1 to 4		9.7	35.8	0.019	27.6	0.18	95.8	96.7	7.7	83.1	21.2	87.0
1 to 5		11.9	29.6	0.020	26.0	0.18	90.4	97.7	10.1	95.4	26.0	100.0

Screen Analysis

Mesh Size (Tyler)	% Retained Ind	% Retained Cum	% Pass Cum
65	3.5	3.5	96.5
100	8.0	11.5	88.5
150	14.0	25.5	74.5
200	17.1	42.6	57.4
270	11.6	54.2	45.8
400	9.5	63.7	36.3
-400	36.3	100.0	-
Total	100.0	-	-

Test 2

Product	Weight		Assays,%,g/t					% Distribution					
	g	%	Zn	Sn	S	Au	Ag	Zn	Sn	S	Au	Ag
1 Cleaner Conc	497.0	25.1	51.2	0.012	32.7	0.11	130	90.6	4.4	74.5	26.9	61.3
2 4th Cl Tail	76.3	3.9	19.5	0.026	32.1	0.11	122	5.3	1.5	11.2	4.1	8.8
3 3rd Cl Tail	74.8	3.8	8.33	0.042	28.1	0.22	138	2.2	2.3	9.6	8.1	9.8
4 [redacted] Tail	59.3	3.0	4.81	0.092	11.7	0.07	345	1.0	4.0	3.2	2.0	19.4
5 1st Cl Tail	78.9	4.0	0.64	0.099	1.17	0.15	9.90	0.2	5.8	0.4	5.8	0.7
6 Rougher Tail	1195.3	60.3	0.15	0.093	0.18	0.09	0.00	0.6	82.0	1.0	53.0	0.0
Head(calc)	1981.6	100.0	14.17	0.068	11.0	0.10	53.2	100.0	100.0	100.0	100.0	100.0
Combined Products												
1 + 2		28.9	47.0	0.014	32.6	0.11	129	95.9	5.9	85.8	31.1	70.1
1 to 3		32.7	42.5	0.017	32.1	0.12	130	98.2	8.2	95.4	39.2	79.9
1 to 4		35.7	39.4	0.023	30.4	0.12	148	99.2	12.2	98.6	41.2	99.3
1 to 5		39.7	35.5	0.031	27.5	0.12	134	99.4	18.0	99.0	47.0	100.0

Screen Analysis

Mesh Size (Tyler)	% Retained Ind	% Retained Cum	% Pass Cum
65	1.7	1.7	98.3
100	5.3	7.0	93.0
150	12.5	19.5	80.5
200	14.6	34.1	65.9
270	13.2	47.3	52.7
400	10.8	58.1	41.9
-400	41.9	100.0	-
Total	100.0	-	-

LAKEFIELD RESEARCH

Test No.: 1 Project No.: 3654 Date: Jan 9 Operator: SJP

Purpose: To investigate flotation of Zn-Ag from the low grade fine grained sample Composite A

Procedure: As outlined below.

Feed: 2000 grams minus 10 mesh Composite A

Grind: 20 minutes at 65 percent solids in the laboratory ball mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	$Ca(OH)_2$	$CuSO_4$	A350	M2030	MIBC			GRIND	COND.	FROTH	pH
Grind								20			
Condition 1	500								5		11.3
2		400		10					5		10.5
Zn Rougher										2	
			5	10	10				1	4	
Scavenger			10		10				1	3	
Zn 1st cleaner	200								2	2	11.7
				5	5				1	2	
Zn 2nd cleaner	900								2	2	>12
				5					[illegible]	3	
Zn 3rd cleaner	500			5					1	2	>12
					5				1	2	

Stage	108 g				
Flotation Cell					
Speed: r.p.m.					
% Solids					

LAKEFIELD RESEARCH

Test No.: 2 Project No.: 3654 Date: Jan 9 Operator: SFP

Purpose: To investigate flotation of Zn-Ag from the high grade coarse grained Sample B.

Procedure: As outlined below.

Feed: 2000 grams minus 10 mesh Composite B

Grind: 20 minutes at 65 percent solids in the laboratory ball mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	$Ca(OH)_2$	$CuSO_4$	M2030	A350	MIBC			GRIND	COND.	FROTH	pH
Grind											
Condition 1	1000								5		11.5
2		600	20						5		
Zn Rougher									1	3	
			10	10					1	4	
			5	10					1	4	
				20	10				1	4	
Zn 1st Cl	500								2	4	11.5
				5	5				1	2	
Zn 2nd Cl	300								2	4	>12
			2.5						1	2	
			2.5						1	2	
Zn 3rd Cl	500								2	6	>12
Zn 4th Cl	500								2	5	>12

570 g

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					

INTER-OFFICE MEMO

TO W. SELLMER/M. STAMMERS	DATE JANUARY 25, 1989
FROM K.R. RAWLING	PROJECT REFERENCE 315-1
SUBJECT LOGAN PROJECT	

1. Based on the attached analysis of test data I would suggest using the following preliminary data to establish a model for the mill design.

   Crushing to minus 150 mm (jaw crusher)

   SAG mill - 6 kWh/tonne

   Ball mill - 6 kWh/tonne

   Regrind - 8 kWh/tonne of rougher concentrate for 25% wt of ore

   Flotation - Rougher 15 minutes
   - Cleaners 4 stages of 10 minutes

2. The power figures will probably change somewhat when the Work Index has been established for both samples. If alternatively you were considering used equipment in a conventional crushing and grinding ball mill, I would estimate 9 kWh/tonne for a single stage ball mill from 13 mm crusher product.

3. On the basis of tests 3 and 4, the following metallurgy could be predicted at present from the mixed ore.

   Zinc recovery - 97%
   Silver recovery - 85% (tentative)
   Zinc concentrate - 50% Zn

4. Please contact me if you have any queries. The balance of the program should refine the data and hopefully raise the concentrate grade.

KRR:etk

Logan Project

Review of Test Data: Tests 1-6

1. Test Summary

Sample A	Sample B
3.6% Zn	14.1% Zn
Tests 1,3,5	Tests 2,4,6

The test data sheets for the new tests 3-6 are attached, and the information is summarized in the attached tabulation. Zinc grade-recovery curves and the ratio of silver to zinc recovery versus zinc recovery are shown in graphical form. Note that Ag reassays are scheduled for all final tailings.

2. Rougher Recovery

At grinds of 57 (Sample A) and 66 (Sample B) percent minus 200 mesh, both samples yielded zinc recovery of 99 percent and silver recoveries of 90 percent or better. The coarser grinds in tests 5 and 6 are impractical but a common grind of 80-85 percent minus 65 mesh may be a reasonable compromise, and should be tested in the interest of power cost saving.

3. Regrinding the Rougher Concentrate

Regrinding and stronger flotation conditions in tests 3-6 resulted in higher silver recoveries which almost equalled those of zinc even when rougher zinc recovery was low. However the zinc concentrate grade at high recoveries seems to reach a maximum at 51-52 percent.

4. Further Testing

- In view of their similar metallurgical behaviour, it is proposed to carry out the balance of this program on a mixture of 60 percent Sample A and 40 percent Sample B which should have a combined analysis of 7.7% Zn.

- One test will be run similar to test 3 at ~85 percent minus 65 mesh to determine the recovery at an intermediate grind.

- The balance of the testing will be designed to improve concentrate grade by reagent adjustment.

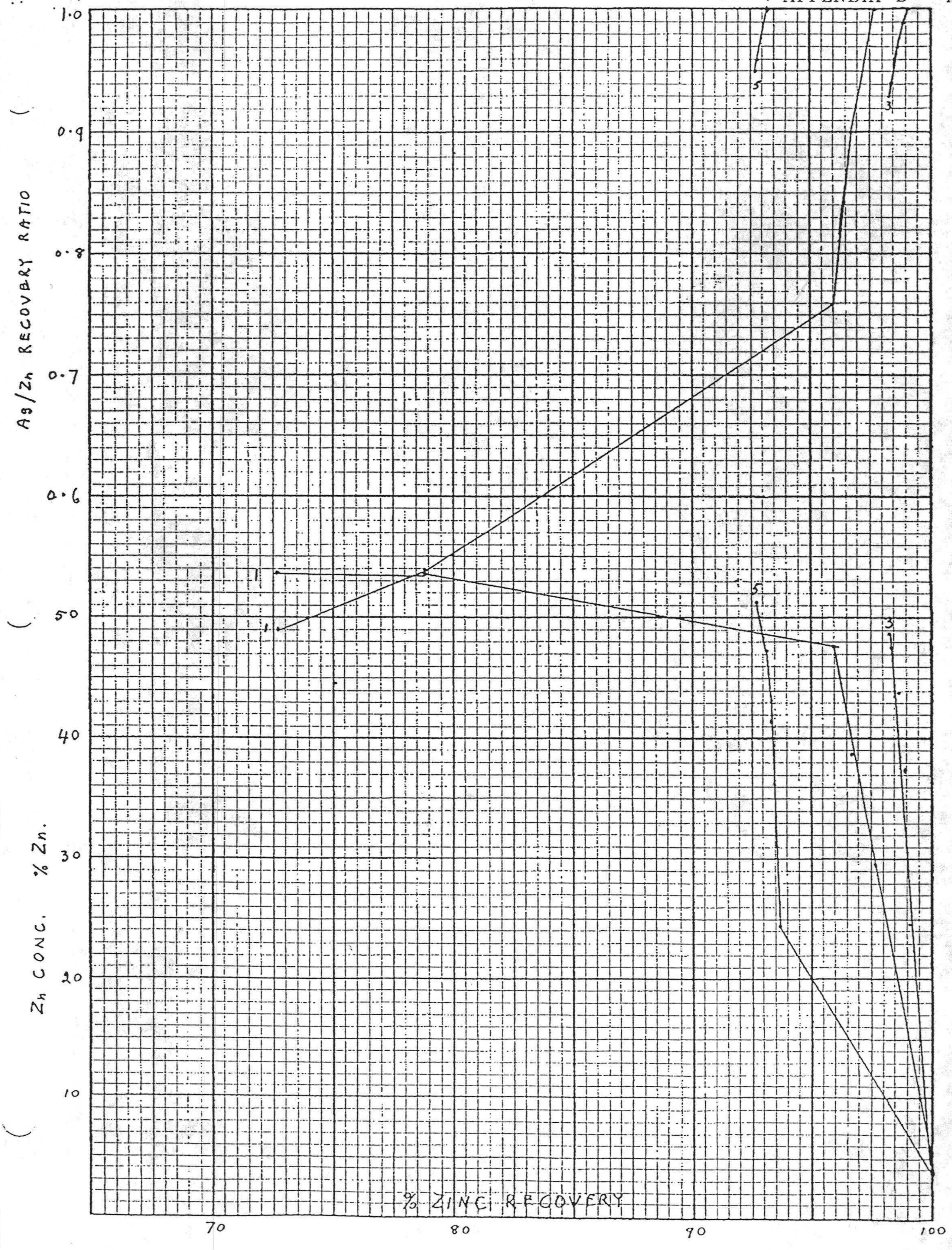
- Grindability tests and concentrate analyses will be completed.

5. This program should be completed by the end of February, and data will be forwarded as available.

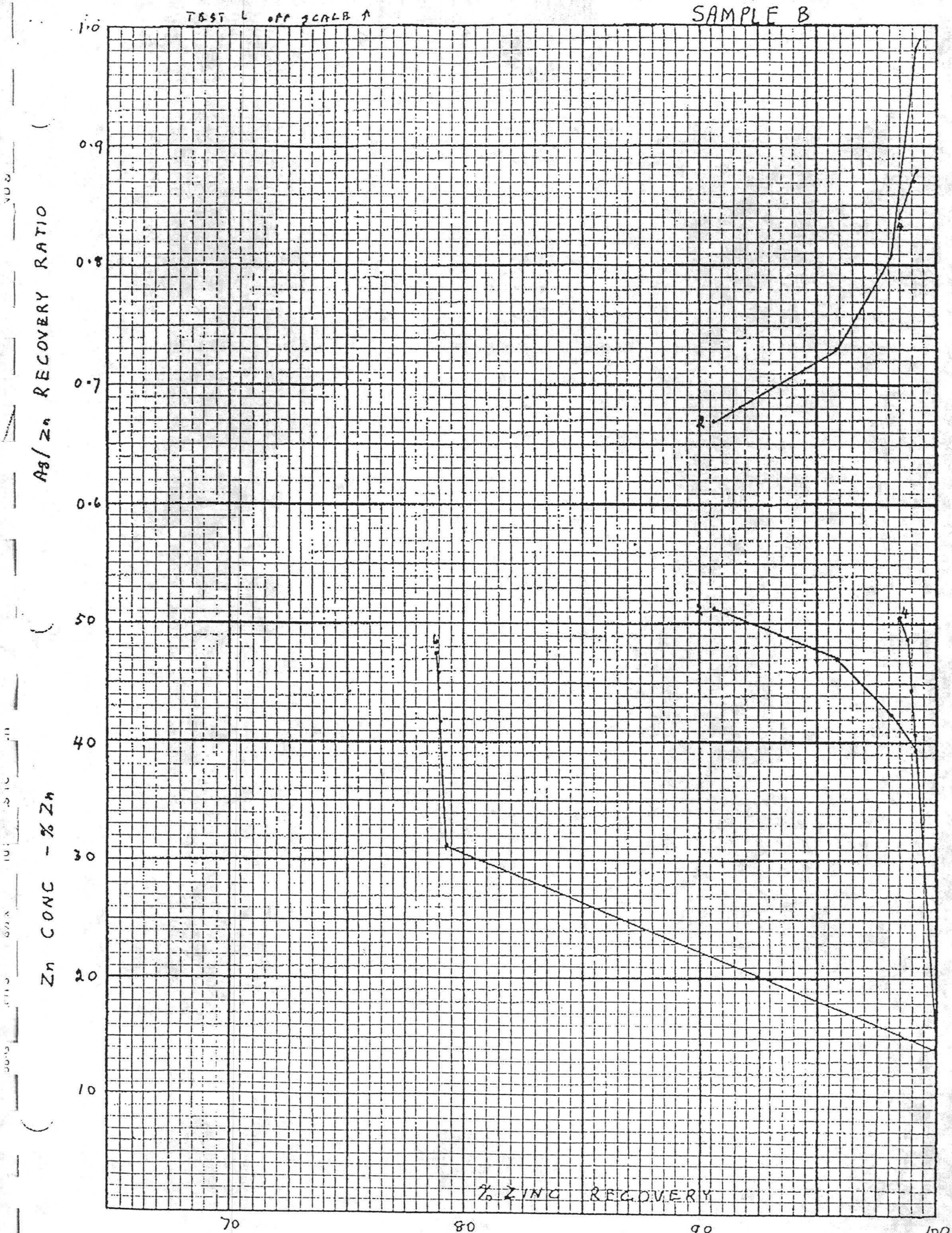
KRR:etk
encl.

TEST SUMMARY

Test	Grind - % -200# Primary	Grind - % -200# Regrind	Rougher Recy. %	Recovery 50% Zn	Max Grade	Reagent pH
Sample A						
5	29	>96	93.7	92.8	51.1	10.5
1	57.4	-	99.2	89	53.9	12+
3	57.4	96	99.1	98	48.6	10.5
Sample B						
6	21.4	>97.6	79.3	78.5	47.6	10.2
2	65.9	-	99.4	92	51.2	12+
4	65.9	97.6	99.3	98.5	50.5	10.2


1.0
0.9
0.8
0.7
0.6
50
40
30
20
10
As/Zn RECOVERY RATIO
Zn CONC. % Zn.
% ZINC RECOVERY
70
80
90
100
1
1
3
3
5
5

SAMPLE B


TEST 6 OFF SCALE ↑
1.0
0.9
0.8
0.7
0.6
50
40
30
20
10
Ag/Zn RECOVERY RATIO
Zn CONC - % Zn
% ZINC RECOVERY
70
80
90
100

LAKEFIELD RESEARCH

Test No.: 3 Project No.: 3654 Date: Jan 16/89 Operator: SSP

Purpose: To investigate the effect of regrinding on Ag recovery in the cleaner circuit

Procedure: As outlined below

Feed: 2000 grams minus 10 mesh Composite A

Grind: 20 minutes at 65 percent solids in the laboratory ball mill

Conditions:

	Ca(OH)₂	CuSO₄	M2030	Hoechst PAX	MIBC	DF 250		GRIND	COND.	FROTH	pH
	REAGENTS ADDED, GRAMS PER TONNE							**TIME, MINUTES**			
Grind								20			
Condition 1	500								5		11.0
2		400	10						5		10.0
Zn Rougher			10	5	10				1	4	
			10	10	10				1	4	
Zn Regrind (PM)	200	200						10			
Zn 1st cleaner			2.5	2.5					1	3	10.4
			2.5	2.5	10	2.5			1	3	
Zn 2nd cleaner	125	100							2	2	10.5
						2.5			1	4	
			2.5						1	2	
Zn 3rd cleaner	75	50							2	2	10.5
			2.5		2.5				1	3	
Zn 4th cleaner	75					5			1	5	11.0

	175 g					
Stage						
Flotation Cell						
Speed: r.p.m.						
% Solids						
% – mesh						

Test 3

Product	Weight g	Weight %	Assays, %, g/t Zn	Assays, %, g/t S	Assays, %, g/t Ag	% Distribution Zn	% Distribution S	% Distribution Ag	Ag/Zn
Cleaner Conc	145.8	7.3	48.6	32.9	159	98.3	78.5	91.4	.93
4th Cl Tail	3.8	0.2	3.03	37.8	82.6	0.2	2.2	1.2	
3rd Cl Tail	12.9	0.6	1.67	31.8	65.8	0.3	6.7	3.3	
2nd Cl Tail	29.3	1.5	0.43	15.3	24.6	0.2	7.3	2.8	
1st Cl Tail	99.1	5.0	0.15	1.36	3.10	0.2	2.2	1.2	
Rougher Tail	1700.0	85.4	0.037	0.11	0.00	0.9	3.1	0.0	
Head(calc)	1990.7	100.0	3.62	3.07	12.7	100.0	100.0	100.0	
Combined Products									
1+2		7.5	47.5	33.0	157	98.4	80.7	92.5	.94
1 to 3		8.2	43.9	32.9	150	98.7	87.4	95.9	.97
1 to 4		9.6	37.2	30.2	131	98.9	94.7	98.8	.99
1 to 5		14.6	24.6	20.4	87.3	99.1	96.9	100.0	1.0

Screen Analysis

Primary Grind

Mesh Size (Tyler)	% Retained Ind	% Retained Cum	% Pass Cum
65	3.5	3.5	96.5
100	8.0	11.5	88.5
150	14.0	25.5	74.5
200	17.1	42.6	57.4
270	11.6	54.2	45.8
400	9.5	63.7	36.3
-400	36.3	100.0	-
Total	100.0	-	-

Regrind

Part. Size	% Retained Ind	% Retained Cum	% Pass Cum
150m	1.0	1.0	99.0
200	3.2	4.2	95.8
270	6.5	10.7	89.3
32.3µm	8.5	19.2	80.8
25.0	9.0	28.2	71.8
17.4	15.9	44.1	55.9
12.0	12.6	56.7	43.3
9.3	7.6	64.3	35.7
-9.3	35.7	100.0	-
Total	100.0	-	-

LAKEFIELD RESEARCH

Test No.: 8 Project No.: 3654 Date: Jan 18/89 Operator: SJP

Purpose: To investigate flotation of Zn and Ag from Comp A at a coarser primary grind

Procedure: As outlined below.

Feed: 2000 grams minus 10 mesh Composite A

Grind: 10 minutes at 65 percent solids in the laboratory rod mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	$Ca(OH)_2$	$CuSO_4$	N2020	PAX	DF 250			GRIND	COND.	FROTH	pH
Grind								10			
Condition	500								5		11.0
		400	10						5		10.5
Zn Rougher			10	5	5				1	4	
			3	5	5				1	4	
				10					1	4	
				10	5				1	4	
				10	5				1	4	
Zn Regrind	200	200						15			
Zn 1st Cleaner			2.5	2.5					1	8	10.8
			2.5	2.5	5				1	6	
Zn 2nd Cleaner	125	100			2.5				2	6	10.4
			5	5	2.5				1	4	
Zn 3rd Cleaner	75	50							2	4	10.5
			2.5	2.5	5				1	3	
Zn 4th Cleaner									1	7	10.5
Zn 5th Cleaner	50				5				1	8	10.5
Zn 6th Cleaner					5				1	6	10.0

160 gr

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% — mesh					

Test 5

Product	Weight		Assays,%,g/t			% Distribution			As/Zn
	g	%	Zn	S	Ag	Zn	S	Ag	
1 Cleaner Conc	133.4	6.7	51.1	36.4	135	92.7	74.0	88.4	.95
2 6th Cl Tail	3.1	0.2	2.77	45.5	56.1	0.1	2.2	0.9	
3 5th Cl Tail	9.0	0.5	3.11	43.7	99.4	0.4	6.0	4.4	
4 4th Cl Tail	13.2	0.7	1.08	37.6	45.6	0.2	7.6	3.0	
5 3rd Cl Tail	6.9	0.3	0.72	9.58	18.1	0.1	1.0	0.6	
6 2nd Cl Tail	24.3	1.2	0.34	2.97	6.50	0.1	1.1	0.8	
7 1st Cl Tail	94.3	4.7	0.15	1.15	4.30	0.2	1.7	2.0	
8 Rougher Tail	1708.3	85.7	0.27	0.25	0.00	6.3	6.5	0.0	
Head(calc)	1992.5	100.0	3.69	3.29	10.2	100.0	100.0	100.0	
Combined Products									
1 + 2		6.9	50.0	36.6	133	92.8	76.2	89.3	.96
1 to 3		7.3	47.1	37.0	131	93.2	82.2	93.7	1.0
1 to 4		8.0	43.3	37.1	124	93.4	89.7	96.6	
1 to 5		8.3	41.5	35.9	120	93.4	90.7	97.2	
1 to 6		9.5	36.2	31.7	105	93.5	91.8	98.0	
1 to 7		14.3	24.3	21.6	72	93.7	93.5	100.0	

Screen Analysis Primary Grind

Mesh Size (Tyler)	% Retained Ind	% Retained Cum	% Pass Cum
28	0.6	0.6	99.4
35	10.2	10.8	89.2
48	20.2	31.0	69.0
65	12.3	43.3	56.7
100	11.8	55.1	44.9
150	8.8	63.9	36.1
200	7.0	70.9	29.1
270	4.7	75.6	24.4
400	3.8	79.4	20.6
-400	20.6	100.0	-
Total	100.0	-	-

LAKEFIELD RESEARCH

Test No.: 9 Project No.: 3654 Date: Jan 16 1989 Operator: SJP

Purpose: To investigate the effect of regrinding on Ag recovery in the cleaner circuit

Procedure: As outlined below

Feed: 2000 grams minus 10 mesh Composite #B

Grind: 10 minutes at 65 percent solids in the laboratory ball mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Ca(OH)2	CuSO4	MZ030	Hoechst PAX	MIBC			GRIND	COND.	FROTH	pH
Grind								20			
Condition	1000								5		11.5
		600	20						5		11.0
Zn Rougher										4	
			10	10	5				1	4	
			5	5					1	4	
Zn Regrind	500	300						30			
Zn 1st Cleaner									1	4	10.3
			5						1	4	
			2.5	2.5					1	2	
Zn 2nd cleaner									1	4	11.0
			2.5	2.5					1	3	
Zn 3rd cleaner					5				1	4	10.2
			2.5						1	3	
Zn 4th cleaner									1	6	10.0

62¢

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test 4

Product	Weight g	Weight %	Assays,%,g/t Zn	Assays,%,g/t S	Assays,%,g/t Ag	% Distribution Zn	% Distribution S	% Distribution Ag	Ag/Zn
Cleaner Conc	547.4	27.5	50.5	33.4	190	98.5	82.5	83.1	.94
4th Cl Tail	25.2	1.3	3.46	27.9	80.1	0.3	3.2	1.8	
3rd Cl Tail	51.5	2.6	1.08	29.6	35.7	0.2	6.9	1.5	
2nd Cl Tail	58.1	2.9	0.61	9.12	13.3	0.1	2.4	0.6	
1st Cl Tail	138.8	7.0	0.32	6.64	6.70	0.2	4.2	0.7	
Rougher Tail	1168.1	58.7	0.18	0.17	13.3	0.7	0.9	12.4	
Head(calc)	1989.1	100.0	14.1	11.1	62.9	100.0	100.0	100.0	
Combined Products									
1+2		28.8	48.4	33.2	185	98.8	85.7	84.8	.96
1 to 3		31.4	44.5	32.9	173	99.0	92.6	86.2	.97
1 to 4		34.3	40.8	30.8	159	99.1	94.9	86.8	.97
1 to 5		41.3	33.9	26.8	133	99.3	99.1	87.6	.98

Screen Analysis.

Primary Grind Mesh Size (Tyler)	% Retained Ind	% Retained Cum	% Pass Cum	Regrind Part. Size	% Retained Ind	% Retained Cum	% Pass Cum
65	1.7	1.7	98.3	150m	0.4	0.4	99.6
100	5.3	7.0	93.0	200	2.0	2.4	97.6
150	12.5	19.5	80.5	270	5.6	8.0	92.0
200	14.6	34.1	65.9	32.3µm	9.1	17.1	82.9
270	13.2	47.3	52.7	25.0	9.9	27.0	73.0
400	10.8	58.1	41.9	17.4	18.4	45.4	54.6
-400	41.9	100.0	-	12.0	13.7	59.1	40.9
Total	100.0	-	-	9.3	7.7	66.8	33.2
				-9.3	33.2	100.0	-
				Total	100.0	-	-

LAKEFIELD RESEARCH

Test No.: 6 Project No.: 3654 Date: Jan 19/89 Operator: S&P

Purpose: To investigate flotation of Zn and Ag from Comp B at a coarser primary grind

Procedure: As outlined below.

Feed: 2000 grams minus 10 mesh Composite B

Grind: 10 minutes at 65 percent solids in the laboratory rod mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	$Ca(OH)_2$	$CuSO_4$	M2030	PAX	DF250			GRIND	COND.	FROTH	pH
Grind								10			
Condition	1000								5		11.5
		600	20	20					5		
Zn Rougher			5		15				1	4	
			5	10	10				1	4	
			5	10	10				1	4	
			5	10	5				1	4	
			10	20	10				1	8	
Zn Regrind	300	300						30			
Zn 1st cleaner			5	5					1	4	10.0
			2.5	2.5					1	6	
Zn 2nd cleaner	50	50							1	4	10.0
			2.5	2.5					1	4	
Zn 3rd cleaner	25								1	6	10.2
Zn 4th cleaner	25								1	5	10.2
Zn 5th cleaner	25								1	5	10.2
524 g.											

Stage						
Flotation Cell						
Speed: r.p.m.						
% Solids						
% – mesh						

Test 6

Product	Weight g	Weight %	Assays,%,g/t Zn	Assays,%,g/t S	Assays,%,g/t Ag	% Distribution Zn	% Distribution S	% Distribution Ag	Ag/Zn.
1 Cleaner Conc	457.1	23.0	47.6	36.3	220	78.9	71.7	82.6	1.04
2 5th Cl Tail	16.7	0.8	1.82	33.2	72.7	0.1	2.5	1.0	
3 4th Cl Tail	15.1	0.8	0.96	22.7	37.6	0.1	1.5	0.5	
4 3rd Cl Tail	32.0	1.6	0.57	17.3	22.3	0.1	2.5	0.6	
5 2nd Cl Tail	54.2	2.7	0.46	7.14	10.3	0.1	1.7	0.5	
6 1st Cl Tail	127.4	6.4	0.29	2.95	6.70	0.1	1.7	0.7	
7 Rougher Tail	1282.4	64.6	4.45	3.24	13.5	20.7	18.5	14.2	
Head(calc)	1984.9	100.0	13.9	11.3	61.4	100.0	100.0	100.0	
Combined Products									
1 + 2		23.9	46.0	35.2	215	79.0	74.2	83.6	1.06
1 to 3		24.6	44.6	34.8	210	79.0	75.7	84.1	1.04
1 to 4		26.2	41.9	33.8	198	79.1	78.1	84.6	1.07
1 to 5		29.0	38.0	31.3	180	79.2	79.9	85.1	1.07
1 to 6		35.4	31.1	26.1	149	79.3	81.5	85.8	1.08

Screen Analysis Primary Grind

Mesh Size (Tyler)	% Retained Ind	% Retained Cum	% Pass Cum
28	1.3	1.3	98.7
35	15.3	16.6	83.4
48	20.7	37.3	62.7
65	15.1	52.4	47.6
100	11.7	64.1	35.9
150	8.8	72.9	27.1
200	5.7	78.6	21.4
270	4.5	83.1	16.9
400	3.4	86.5	13.5
-400	13.5	100.0	-
Total	100.0	-	-

INTER-OFFICE MEMO

TO K. SARBUTT/S. PARKER	DATE JANUARY 25, 1989
FROM K.R. RAWLING	PROJECT REFERENCE 315-1
SUBJECT LOGAN PROJECT - L.R. 3654	

1. Testing to date has established that a relatively coarse grind followed by a regrind of rougher concentrate is effective in yielding high recovery of both zinc and silver. The zinc concentrate grade is lower than desirable, however.

2. To obtain the most data from the remaining budget, we will combine 10 kg Sample A with 6 kg Sample B for the balance of the program to yield a mixed ore of 7.5 - 8.0% Zn.

3. Balance of Program

   3.1 Work Index determinations on both samples A and B at 100 mesh.

   3.2 Additional analyses on existing and future products.

   a) All final zinc concentrates
      Fe

   b) Concentrates; tests 4, 5 only
      Au, Cd, As, Sb, Ge, Hg, Sn

   c) All final tailings
      Ag by A.A. method.

   d) All future products only
      Cu

   3.3 Flotation Tests on Mixed Sample

   a) Primary grind (~85% minus 65 mesh), one test with other conditions as in test 3 - 17 minutes in ball mill?

b) Reagent adjustment to raise zinc concentrate grade

- Check mineralogy of concentrate #4 for pyrite.

- 3 tests based on tests 3, 4; 20 minute grind.

  Rougher pH 10.5
  Cleaner pH 11.0, 11.5, 12.0 in all 4 stages

c) In all four tests, investigate the production of a Cu-Ag concentrate before the zinc rougher.

d) Combined flotation tailings - laboratory table test for Sn recovery.

KRR:etk

INTER-OFFICE MEMO

FEB 20 89

TO	DATE
M. STAMMERS	FEBRUARY 13, 1989
FROM	**PROJECT REFERENCE**
K.R. RAWLING	315-1

SUBJECT

LOGAN PROJECT

1. The attached data updates the Lakefield results to February 10. The only outstanding work is two flotation tests designed to determine how efficiently a copper pre-float concentrate can be upgraded for sale, and the grade and recovery of Cu, Ag in zinc concentrate. These will be performed on the balance of the high grade Sample B.

2. Mineralogy

A brief report attached indicates the complexity of the silver mineralization - mostly as metallics in copper and lead sulphosalts, which explains the ready removal of some 50 percent of the silver in a prefloat concentrate.

3. Grindability

The Work Index is significantly different for each sample.

Sample A - low grade - 17.2 kWh/tonne
Sample B - high grade - 12.8 kWh/tonne

Consequently the grinding power input is a factor in establishing a cutoff grade.

These determinations indicate installed power of 15.0 kWh/tonne for Sample A and 11.2 for Sample B, higher than estimated in the memo of January 25.

4. Flotation

The attached data sheets include revisions to the silver metal balance in tests 1, 2, 3, and 5, and the inclusion of detailed analyses for zinc concentrate in tests 4 and 5.

The significant minor element contents in the zinc concentrate are:

copper - which may incur a small penalty
gold - which exceeds 1 g/t

In tests 7-11, the effect of pH on zinc cleaning was found to be minor. At the same time a prefloat of a copper-silver concentrate was tested. The problem appears to be a strong tendency for zinc to float with the copper and silver to produce a low grade concentrate, even though the recovery of copper and silver is satisfactory. A further test is planned to depress the zinc in this product.

However the copper content of the zinc concentrate during single stage flotation is not excessive.

5. Tin Recovery

A single table concentration test was performed on flotation tailings from tests 8, 9 and 10. Tin recovery was 20 percent in a concentrate at 0.28% Sn. There is no immediate indication of success for recovery of the small tin content by tabling, and it has already been shown in tests 1 and 2 that the tin does not float with the sulphides.

6. Projected Recovery

Based on current data, it is reasonable to project zinc recovery in the 93-95 percent range at 53-54% Zn with silver recovered in the zinc concentrate at 85-90% when a single zinc flotation circuit is used.

7. Balance of Work

One test is planned to study the rejection of zinc from the copper-silver prefloat concentrate, and second test on high grade ore will be used to confirm silver recovery in the single circuit arrangement.

K. R. Rawling

KRR:etk

cc: G. Farquharson
W. Sellmer

3654

BOND BALL MILL CLOSED CIRCUIT GRINDABILITY TEST

Sample: COMP B Date: FEB 7/89

Submitted by: ______

Mesh of Grind: 100 Mesh Feed: 20.7 % Passing 100 Mesh

Cycle	New Feed g	*Number of Revolutions	grams of minus ___ mesh In Mill Product	In Mill Feed	Net Product	Net Per Revolution
1	1393	100	463	288	175	1.75
2	463	173	453	96	357	2.06
3	453	174	459	94	365	2.10
4	459	144	412	95	317	2.20
5	412	142	393	85	308	2.17
6	393	146	401	81	320	2.19

Unit Volume (700 ml) = 1393 g in mill : Equivalent to 1990 kg/m³ at minus-10 mesh

Ideal potential product = 398 g

Average of last 2 periods : 397 g : 251 % circulating load

: 2.18 Net g minus 100 mesh per revolution

Bonds Formula

$$W_i = 44.5 / (P_1)^{0.23} \times (Gbp)^{0.82} \left(\frac{10}{\sqrt{P}} - \frac{10}{\sqrt{F}} \right)$$

Where:

W_i = Work Index = 11.6

P_1 = Screen size test in microns = 147

Gbp = Net grams of undersize produced per revolution of test mill = 2.18

P = Size in microns which 80 percent of test product passes = 116

F = Size in microns which 80 percent of test feed passes = 1210

3654

BOND BALL MILL CLOSED CIRCUIT GRINDABILITY TEST

Sample: Comp A Date: Feb 7/89

Submitted by: ____________

Mesh of Grind: 100 Mesh Feed: 25.0 % Passing 100 Mesh

Cycle	New Feed g	*Number of Revolutions	grams of minus ____ mesh			
			In Mill Product	In Mill Feed	Net Product	Net Per Revolution
1	1233	100	432	308	124	1.24
2	432	197	440	108	332	1.69
3	440	143	358	110	248	1.73
4	358	151	359	90	269	1.78
5	359	147	348	90	258	1.76
6	348	151	355	87	268	1.77

Unit Volume (700 ml) = 1233 g in mill : Equivalent to 1761 kg/m^3 at minus -10 mes.

Ideal potential product = 352 g

Average of last 2 periods : 352 g : 250 % circulating load

: 1.76 Net g minus 100 mesh per revolution

Bonds Formula

$$W_i = 44.5 / (P_1)^{0.23} \times (Gbp)^{0.82} \left(\frac{10}{\sqrt{P}} - \frac{10}{\sqrt{F}}\right)$$

Where:

W_i = Work Index	=	15.6
P_1 = Screen size test in microns	=	147
Gbp = Net grams of undersize produced per revolution of test mill	=	1.76
P = Size in microns which 80 percent of test product passes	=	123
F = Size in microns which 80 percent of test feed passes	=	910

Test 1

Product	Weight		Assays,%,g/t					% Distribution				
	g	%	Zn	Sn	S	Au	Ag	Zn	Sn	S	Au	Ag
1 Cleaner Conc	95.7	4.9	53.9	0.013	34.0	0.13	79.3	72.6	2.7	51.0	7.6	29.7
2 3rd Cl Tail	8.7	0.4	50.9	0.023	31.2	0.43	165	6.2	0.4	4.3	2.3	5.6
3 2nd Cl Tail	35.1	1.8	34.9	0.023	32.4	0.20	186	17.2	1.7	17.8	4.3	25.6
4 1st Cl Tail	52.8	2.7	0.96	0.025	12.2	0.22	54.4	0.7	2.8	10.1	7.1	11.2
5 Scav Conc.	42.0	2.1	1.54	0.027	18.6	0.19	65.7	0.9	2.4	12.2	4.9	10.8
6 Scav. Tail	1738.8	88.1	0.096	0.024	0.17	0.070	2.50	2.3	89.9	4.6	74.0	17.0
Head(calc)	1973.1	100.0	3.60	0.024	3.24	0.083	12.9	100.0	100.0	100.0	100.0	100.0
Combined Products												
1 + 2		5.3	53.7	0.014	33.8	0.16	86.4	78.8	3.1	55.2	9.8	35.3
1 to 3		7.1	48.9	0.016	33.4	0.17	111	96.0	4.8	73.0	14.1	60.9
1 to 4		9.7	36.8	0.019	27.6	0.18	95.8	96.7	7.7	83.1	21.2	72.2
1 to 5		11.9	29.6	0.020	26.0	0.18	90.4	97.7	10.1	95.4	26.0	83.0

Screen Analysis

Mesh Size (Tyler)	% Retained Ind	% Retained Cum	% Pass Cum
65	3.5	3.5	96.5
100	8.0	11.5	88.5
150	14.0	25.5	74.5
200	17.1	42.6	57.4
270	11.6	54.2	45.8
400	9.5	63.7	36.3
-400	36.3	100.0	-
Total	100.0	-	-

Test 2

Product	Weight g	Weight %	Assays,%,g/t Zn	Sn	S	Au	Ag	% Distribution Zn	Sn	S	Au	Ag
1 Cleaner Conc	497.0	25.1	51.2	0.012	32.7	0.11	130	90.6	4.4	74.5	26.9	57.8
2 4th Cl Tail	76.3	3.9	19.5	0.026	32.1	0.11	122	5.3	1.5	11.2	4.1	8.3
3 3rd Cl Tail	74.8	3.8	8.33	0.042	28.1	0.22	138	2.2	2.3	9.6	8.1	9.2
4 2nd Cl Tail	59.3	3.0	4.81	0.092	11.7	0.07	345	1.0	4.0	3.2	2.0	18.3
5 1st Cl Tail	78.9	4.0	0.64	0.099	1.17	0.15	9.90	0.2	5.8	0.4	5.8	0.7
6 Rougher Tail	1195.3	60.3	0.15	0.093	0.18	0.09	5.30	0.6	82.0	1.0	53.0	5.7
Head(calc)	1981.6	100.0	14.17	0.068	11.0	0.10	56.4	100.0	100.0	100.0	100.0	100.0
Combined Products												
1 + 2		28.9	47.0	0.014	32.6	0.11	129	95.9	5.9	85.8	31.1	66.1
1 to 3		32.7	42.5	0.017	32.1	0.12	130	98.2	8.2	95.4	39.2	75.3
1 to 4		35.7	39.4	0.023	30.4	0.12	148	99.2	12.2	98.6	41.2	93.6
1 to 5		39.7	35.5	0.031	27.5	0.12	134	99.4	18.0	99.0	47.0	94.3

Screen Analysis

Mesh Size (Tyler)	% Retained Ind	% Retained Cum	% Pass Cum
65	1.7	1.7	98.3
100	5.3	7.0	93.0
150	12.5	19.5	80.5
200	14.6	34.1	65.9
270	13.2	47.3	52.7
400	10.8	58.1	41.9
-400	41.9	100.0	-
Total	100.0	-	-

Test 3

Product	Weight g	Weight %	Assays,%,g/t Zn	S	Ag	% Distribution Zn	S	Ag
1 Cleaner Conc	145.8	7.3	48.8	32.9	159	98.3	78.5	81.6
2 4th Cl Tail	3.6	0.2	3.03	37.8	82.6	0.2	2.2	1.0
3 3rd Cl Tail	12.9	0.6	1.67	31.8	65.8	0.3	6.7	3.0
4 2nd Cl Tail	29.3	1.5	0.43	16.3	24.6	0.2	7.3	2.5
5 1st Cl Tail	99.1	5.0	0.15	1.36	3.10	0.2	2.2	1.1
6 Rougher Tail	1700.0	85.4	0.037	0.11	1.80	0.9	3.1	10.8
Head(calc)	1990.7	100.0	3.62	3.07	14.3	100.0	100.0	100.0
Combined Products								
1 + 2		7.5	47.5	33.0	157	98.4	80.7	82.6
1 to 3		8.2	43.9	32.9	150	98.7	87.4	85.6
1 to 4		9.6	37.2	30.2	131	98.9	94.7	88.2
1 to 5		14.6	24.6	20.4	87.3	99.1	96.9	89.2

Screen Analysis

Primary Grind

Mesh Size (Tyler)	% Retained Ind	% Retained Cum	% Pass Cum
65	3.5	3.5	96.5
100	8.0	11.5	88.5
150	14.0	25.5	74.5
200	17.1	42.6	57.4
270	11.6	54.2	45.8
400	9.5	63.7	36.3
-400	36.3	100.0	-
Total	100.0	-	-

Regrind

Part. Size	% Retained Ind	% Retained Cum	% Pass Cum
150m	1.0	1.0	99.0
200	3.2	4.2	95.8
270	6.5	10.7	89.3
32.3μm	8.5	19.2	80.8
25.0	9.0	28.2	71.8
17.4	15.9	44.1	55.9
12.0	12.6	56.7	43.3
9.3	7.6	64.3	35.7
-9.3	35.7	100.0	-
Total	100.0	-	-

Test 4

Product	Weight g	Weight %	Assays,%,g/t Zn	S	Ag	% Distribution Zn	S	Ag
1 Cleaner Conc	547.4	27.5	50.5	33.4	190	98.5	82.5	83.1
2 4th Cl Tail	25.2	1.3	3.46	27.9	80.1	0.3	3.2	1.6
3 3rd Cl Tail	51.5	2.6	1.08	29.6	35.7	0.2	6.9	1.5
4 2nd Cl Tail	58.1	2.9	0.61	9.12	13.3	0.1	2.4	0.6
5 1st Cl Tail	138.8	7.0	0.32	6.64	6.70	0.2	4.2	0.7
6 Rougher Tail	1168.1	58.7	0.18	0.17	13.3	0.7	0.9	12.4
Head(calc)	1989.1	100.0	14.1	11.1	62.9	100.0	100.0	100.0
Combined Products								
1 + 2		28.8	48.4	33.2	185	98.8	85.7	84.8
1 to 3		31.4	44.5	32.9	173	99.0	92.6	86.2
1 to 4		34.3	40.8	30.8	159	99.1	94.9	86.8
1 to 5		41.3	33.9	26.8	133	99.3	99.1	87.6

Additional Assays	Cu,%	Au,g/t	As,%	Sn,%	Hg,%	Cd,%	Sb,%	Ge,%
Zn Cl Conc	0.46	1.23	0.16	0.013	<0.00003	0.11	0.003	<0.001

Screen Analysis

Primary Grind Mesh Size (Tyler)	% Retained Ind	% Retained Cum	% Pass Cum	Regrind Part. Size	% Retained Ind	% Retained Cum	% Pass Cum
65	1.7	1.7	98.3	150m	0.4	0.4	99.6
100	5.3	7.0	93.0	200	2.0	2.4	97.6
150	12.5	19.5	80.5	270	5.6	8.0	92.0
200	14.6	34.1	65.9	32.3µm	9.1	17.1	82.9
270	13.2	47.3	52.7	25.0	9.9	27.0	73.0
400	10.8	58.1	41.9	17.4	18.4	45.4	54.6
-400	41.9	100.0	-	12.0	13.7	59.1	40.9
Total	100.0	-	-	9.3	7.7	66.8	33.2
				-9.3	33.2	100.0	-
				Total	100.0	-	-

Test 5

Product	Weight g	Weight %	Assays,%,g/t Zn	S	Ag	% Distribution Zn	S	Ag
1 Cleaner Conc	133.4	6.7	51.1	36.4	135	92.7	74.0	72.1
2 6th Cl Tail	3.1	0.2	2.77	45.5	58.1	0.1	2.2	0.7
3 5th Cl Tail	9.0	0.5	3.11	43.7	99.4	0.4	6.0	3.6
4 4th Cl Tail	13.2	0.7	1.08	37.6	45.6	0.2	7.6	2.4
5 3rd Cl Tail	6.9	0.3	0.72	9.58	18.1	0.1	1.0	0.5
6 2nd Cl Tail	24.3	1.2	0.34	2.97	6.50	0.1	1.1	0.6
7 1st Cl Tail	94.3	4.7	0.15	1.15	4.30	0.2	1.7	1.6
8 Rougher Tail	1708.3	85.7	0.27	0.25	2.70	6.3	6.5	18.5
Head(calc)	1992.5	100.0	3.69	3.29	12.5	100.0	100.0	100.0
Combined Products								
1 + 2		6.9	50.0	36.6	133	92.8	76.2	72.8
1 to 3		7.3	47.1	37.0	131	93.2	82.2	76.4
1 to 4		8.0	43.3	37.1	124	93.4	89.7	78.8
1 to 5		8.3	41.5	35.9	120	93.4	90.7	79.3
1 to 6		9.5	36.2	31.7	105	93.5	91.8	79.9
1 to 7		14.3	24.3	21.6	71.7	93.7	93.5	81.5

Additional Assays	Cu,%	Au,g/t	As,%	Sn,%	Hg,%	Cd,%	Sb,%	Ge,%
Zn Cl Conc	0.75	1.62	0.17	0.012	0.00006	0.10	0.003	<0.001

Screen Analysis Primary Grind

Mesh Size (Tyler)	% Retained Ind	% Retained Cum	% Pass Cum
28	0.6	0.6	99.4
35	10.2	10.8	89.2
48	20.2	31.0	69.0
65	12.3	43.3	56.7
100	11.8	55.1	44.9
150	8.8	63.9	36.1
200	7.0	70.9	29.1
270	4.7	75.6	24.4
400	3.8	79.4	20.6
-400	20.6	100.0	-
Total	100.0	-	-

LAKEFIELD RESEARCH

Test No.: 7 Project No.: 3654 Date: Jan 27/89 Operator: SJP

Purpose: To repeat conditions of test 3 with on the Overall Composite at a slightly coarser grind and use a Cu prefloat

Procedure: As outlined below.

Feed: 2000 grams minus 10 mesh Overall Composite

Grind: 17 minutes at 65 percent solids in the laboratory ball mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Ca(OH)2	M2030	CuSO4	PAX	MIBC	DF 250		GRIND	COND.	FROTH	pH
Grind								17			
Condition	500								2		11.0
Prefloat		10							1	4	
Condition	500		450						5	2	11.4
Zn Rougher		10		5	10	5			1	3	
Scavenger		10		10		5			1	3	
Reg. Zn Rougher	200		200					10			
Zn 1st cl		2.5		2.5					1	3	10.4
		2.5		2.5	5	2.5			1	2	
Zn 2nd cl	125		100						2	3	10.5
		2.5							1	1	
Zn 3rd cl	75		50						2	3	10.6
Zn 4th cl	30								2	3	10.5

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% — mesh					

Test 7

Product	Weight g	Weight %	Assays,%,g/t Zn	Cu	S	Ag	Fe	% Distribution Zn	Cu	S	Ag	Fe
1 Cleaner Conc	254.2	12.8	54.3	0.37	31.8	90.2	9.92	93.0	55.4	68.3	36.2	20.0
2 4th Cl Tail	2.8	0.1	13.6	0.46	18.7	291	19.9	0.3	0.8	0.4	1.3	0.4
3 3rd Cl Tail	9.4	0.5	6.86	0.48	19.7	148	26.4	0.4	2.7	1.6	2.2	2.0
4 2nd Cl Tail	20.2	1.0	1.07	0.21	16.1	20.2	21.8	0.1	2.5	2.7	0.6	3.5
5 1st Cl Tail	85.7	4.3	0.33	0.050	3.81	7.7	8.80	0.2	2.5	2.8	1.0	6.0
6 Scav Conc	90.0	4.5	1.23	0.061	15.5	65.7	20.7	0.7	3.2	11.8	9.3	14.7
7 Prefloat Conc	39.3	2.0	16.8	1.42	32.8	653	27.4	4.4	32.9	10.9	40.6	8.5
8 Scavenger Tail	1485.6	74.8	0.076	0.008	0.12	3.7	3.82	0.8	0.01	1.5	8.7	44.9
Head(calc)	1987.2	100.0	7.47	0.085	5.96	31.8	6.36	100.0	100.0	100.0	100.0	100.0
Combined Products												
1 + 2		12.9	53.9	0.37	31.7	92.4	10.0	93.3	56.2	68.7	37.5	20.4
1 to 3		13.4	52.2	0.37	31.2	94.4	10.6	93.7	58.8	70.3	39.7	22.4
1 to 4		14.4	48.6	0.36	30.2	89.1	11.4	93.9	61.3	73.1	40.4	25.8
1 to 5		18.7	37.5	0.29	24.1	70.4	10.8	94.0	63.9	75.8	41.4	31.8
1 to 6		23.3	30.4	0.25	22.4	69.5	12.7	94.8	67.1	87.6	50.7	46.6

Screen Analysis Primary Grind

Mesh Size (Tyler)	% Retained Ind	% Retained Cum	% Pass Cum
28	0.1	0.1	99.9
35	0.2	0.3	99.7
48	1.3	1.6	98.4
65	4.5	6.1	93.9
100	12.6	18.7	81.3
150	17.6	36.3	63.7
200	15.9	52.2	47.8
270	10.6	62.8	37.2
400	8.0	70.8	29.2
-400	29.2	100.0	-
Total	100.0	-	-

APPENDIX "B" xLii

Ag Zn Conc

Ag cal by AA

Cu all products
Zn
S
Ag

LAKEFIELD RESEARCH

Test No.: 8 Project No.: 3654 Date: Jan 31, 1989 Operator:

Purpose: To investigate effect of pH in cleaning on Zinc grade and Ag recovery in the cleaner concentrate

Procedure: As outlined below.

Re 10.5 (11.0 11.5 12.0.)

Feed: 2000 grams minus 10 mesh Overall Composite

Grind: 20 minutes at 65 percent solids in the laboratory ball mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Ca(OH)2	R208	CuSO4	PAX	MIBC	DF 250	R241	GRIND	COND.	FROTH	pH
Grind								20			7.2
Condition	500								5		11.0
Prefloat		10			10		5		1	4	
Condition	250	M2030	450						5		10.5
Zn Rougher		10				5			1	4	
		5		5		2.5			1	3	
		5		10					1	2	
Zn Regrind	200		200					10			
Zn 1st Cl	50*								1	4	11.0
		2.5				2.5			1	2	
Zn 2nd Cl	125		100						1	3	11.0
		2.5			2.5				1	2	
Zn 3rd Cl	125		50						1	2	11.0
					2.5				1	2	
Zn 4th Cl	125								1		11.0

291g

Stage						
Flotation Cell						
Speed: r.p.m.						
% Solids						
% – mesh						

Test 8

Product	Weight g	Weight %	Assays,%,g/t Zn	Cu	S	Ag	Fe	% Distribution Zn	Cu	S	Ag
1 Cleaner Conc	260.0	13.1	53.2	0.30	33.6	124	9.80	93.6	47.1	69.5	28.7
2 4th Cl Tail	2.9	0.1	9.80	0.28	19.7	1002		0.2	0.5	0.5	2.6
3 3rd Cl Tail	9.9	0.5	6.22	0.27	21.1	381		0.4	1.8	1.7	3.4
4 2nd Cl Tail	19.2	1.0	1.64	0.25	17.2	146		0.2	2.9	2.6	2.5
5 1st Cl Tail	122.8	6.2	0.44	0.071	16.0	169		0.4	5.3	15.6	18.4
6 Prefloat Conc	32.7	1.6	19.8	2.16	29.6	1360		4.4	42.6	7.7	39.5
7 Zn Rougher Tail	1540.0	77.5	0.076	0.011	0.20	3.6		0.8	0.01	2.4	4.9
Head(calc)	1987.5	100.0	7.43	0.083	6.33	56.6		100.0	100.0	100.0	100.0
Combined Products											
1 + 2		13.2	52.7	0.30	33.4	134		93.8	47.6	69.9	31.2
1 to 3		13.7	51.0	0.30	33.0	143		94.2	49.2	71.6	34.6
1 to 4		14.7	47.8	0.30	32.0	143		94.5	52.1	74.2	37.1
1 to 5		20.9	33.8	0.23	27.2	151		94.8	57.4	89.9	55.5
1 + 6		14.7	49.5	0.51	33.2	262		98.0	89.7	77.2	68.2

LAKEFIELD RESEARCH

No.: 9 Project No.: 3654 Date: Jan 31/89 Operator: BW

Purpose: To repeat test 8 at pH 11.5 in cleaning and use CMC in the prefloat.

Procedure: As outlined below

Feed: 2000 grams minus 10 mesh Overall Composite

Grind: 20 minutes at 65 percent solids in the laboratory ball mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	$Ca(OH)_2$	R208	$CuSO_4$	CMC 7LT	MIBC	DF 250	R241	GRIND	COND.	FROTH	pH
Grind								20			
CONDITION	500			200					5		11.0
PREFLOAT		10			10		5		1	4	
CONDITION	250	M2030	450	PAX					5		10.5
Zn ROUGHER		10				5			1	4	
		5		5		2.5			1	3	
		5		10					1	2	
Zn REGRIND	300		200					10			
Zn 1st Cl	50								1	4	11.5
		2.5				2.5			1	2	
Zn 2nd Cl	125		100						1	3	11.5
		2.5			2.5				1	2	
Zn 3rd Cl	125		50			2.5			1	2	11.5
					2.5				1	2	
Zn 4th Cl	125								1	2	11.5
						2.5			1	2	

283 g wt

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% — mesh					

Test 9

Product	Weight		Assays,%,g/t					% Distribution			
	g	%	Zn	Cu	S	Ag	Fe	Zn	Cu	S	Ag
1 Cleaner Conc	245.1	12.3	53.4	0.27	32.8	157	9.76	90.1	39.6	66.2	44.2
2 4th Cl Tail	4.1	0.2	15.7	0.36	17.0	458		0.4	0.9	0.6	2.2
3 3rd Cl Tail	9.7	0.5	9.10	0.38	16.5	297		0.6	2.2	1.3	3.3
4 2nd Cl Tail	35.5	1.8	4.13	0.24	15.3	76.3		1.0	5.1	4.5	3.1
5 1st Cl Tail	107.0	5.4	1.10	0.090	17.8	64.7		0.8	5.8	15.7	7.9
6 Prefloat Conc	38.9	2.0	21.7	1.99	23.4	782		5.8	46.4	7.6	34.9
7 Zn Rougher Tail	1547.0	77.8	0.11	0.013	0.34	2.5		1.2	0.02	4.3	4.4
Head(calc)	1987.3	100.0	7.31	0.084	6.12	43.9		100.0	100.0	100.0	100.0
Combined Products											
1 + 2		12.5	52.8	0.27	32.5	162		90.6	40.5	66.7	46.3
1 to 3		13.0	51.1	0.28	31.9	167		91.2	42.7	68.0	49.6
1 to 4		14.8	45.5	0.27	29.9	156		92.2	47.8	72.5	52.7
1 to 5		20.2	33.6	0.22	26.7	132		93.0	53.6	88.2	60.7
1 +6		14.3	49.1	0.51	31.5	243		96.0	86.0	73.6	79.1

LAKEFIELD RESEARCH

Test No.: 10 Project No.: 3654 Date: Feb 1, 1989 Operator: SJP

Purpose: To repeat conditions of test 8 at pH 12.0 in the cleaning

Procedure: As outlined below.

Feed: 2000 grams minus 10 mesh Overall Composite

Grind: 20 minutes at 65 percent solids in the laboratory ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	$Ca(OH)_2$	R208	$CuSO_4$	PAX	MIBC	DF 250	R241	GRIND	COND.	FROTH	pH
Grind								20			
Condition	500								5		
Prefloat		10			5		5		1	4	
Condition	250	M2030	450						5		10.5
Zn Rougher		10				15			1	4	
		5		5		10			1	3	
		5		10					1	2	
Zn Regrind	350		200					10			
Zn 1st Cl									1	4	12.0
		2.5				2.5			1	2	
Zn 2nd Cl	150		100						1	3	12.0
		2.5							1	1	
Zn 3rd Cl	150		50		2.5				1	3	12.0
Zn 4th Cl	150								1	3	12.0

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
– mesh					

Test 10

Product	Weight g	Weight %	Assays,%,g/t Zn	Cu	S	Ag	Fe	% Distribution Zn	Cu	S	Ag
1 Cleaner Conc	258.8	13.0	52.8	0.33	34.0	102	9.90	91.7	49.0	68.8	34.6
2 4th Cl Tail	3.4	0.2	10.0	0.42	15.8	331		0.2	0.8	0.4	1.5
3 3rd Cl Tail	5.7	0.3	5.09	0.46	16.3	231		0.2	1.5	0.7	1.7
4 2nd Cl Tail	13.2	0.7	1.27	0.30	11.2	68.4		0.1	2.3	1.2	1.2
5 1st Cl Tail	126.2	6.3	0.33	0.067	12.8	25.1		0.3	4.9	12.6	4.1
6 Prefloat Conc	52.5	2.6	19.4	1.38	35.7	763		6.8	41.6	14.6	52.5
7 Zn Rougher Tail	1533.4	76.9	0.064	0.008	0.14	2.2		0.7	0.01	1.7	4.4
Head(calc)	1993.2	100.0	7.48	0.087	6.42	38.3		100.0	100.0	100.0	100.0
Combined Products											
1 + 2		13.2	52.2	0.33	33.8	105		91.9	49.8	69.2	36.1
1 to 3		13.4	51.2	0.33	33.4	108		92.1	51.3	69.9	37.8
1 to 4		14.1	48.9	0.33	32.4	106		92.2	53.6	71.1	39.0
1 to 5		20.4	33.8	0.25	26.3	81		92.5	58.4	83.7	43.1
1 +6		15.6	47.2	0.51	34.3	213		98.5	90.5	83.4	87.1

LAKEFIELD RESEARCH

t No.: 11 Project No.: 3654 Date: Feb 6/89 Operator: SHP

rpose: To float Zn concentrate at pH 8-9 and clean twice

ocedure: As outlined below.

Feed: 2 x 2 Kg grams minus 10 mesh Overall Comp.

ind: 2x20 minutes at 65 percent solids in the laboratory ball mi

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	$Ca(OH)_2$	R208	R241	MIBC	$CuSO_4$	F-A		GRIND	COND.	FROTH	pH
Grind								20			
Condition	300	10	5						5		8.5
Prefloat				2.5					1	4	
Condition	300	M2030			450				5		11.0
n Rougher		10		10					1	4	
		5				5			1	3	
		5				10			1	2	
Pb 1st Cleaner	100	R.208							1	2	9.0
		5		5					1	2	
Pb 2nd Cleaner	150	2.5							1	3	11.2
Zn Regrind	350	M2030			200			10			
Zn 1st Cl									1	4	11.5
		2.5		2.5					1	2	
Zn 2nd Cl	150				100				1	3	11.2
		5		5					1	2	
Zn 3rd Cl	100				50				1	3	11.3
		5							1	1	
Zn 4th Cl	50								1	3	11.2

age					
Flotation Cell					
eed: r.p.m.					
Solids					
– mesh					

Test 11

Product	Weight		Assays,%,g/t					% Distribution			
	g	%	Zn	Cu	S	Ag	Fe	Zn	Cu	S	Ag
1 Cleaner Conc	499.4	12.5	54.0	0.34	34.9	64.3	9.89	90.5	51.7	67.8	25.2
2 4th Cl Tail	6.0	0.2	8.90	0.32	12.0	207		0.2	0.6	0.3	1.0
3 3rd Cl Tail	13.1	0.3	3.18	0.34	10.3	51.4		0.1	1.4	0.5	0.5
4 2nd Cl Tail	52.2	1.3	1.72	0.17	10.6	31.4		0.3	2.7	2.2	1.3
5 1st Cl Tail	228.2	5.7	0.48	0.046	13.7	24.2		0.4	3.2	12.2	4.3
6 Prefloat Conc	27.0	0.7	18.6	4.11	40.9	1892		1.7	33.8	4.3	40.1
7 2nd Cl Tail	27.7	0.7	16.1	0.28	39.7	788		1.5	2.4	4.3	17.1
8 1st Cl Tail	89.4	2.2	15.2	0.16	17.2	98.5		4.6	4.4	6.0	6.9
9 Zn Rougher Tail	3038.2	76.3	0.07	0.008	0.21	1.5		0.7	0.01	2.5	3.6
Head(calc)	3981.2	100.0	7.48	0.083	6.45	32.0		100.0	100.0	100.0	100.0
Combined Products											
1 + 2		12.7	53.5	0.34	34.6	66.0		90.7	52.3	68.1	26.2
1 to 3		13.0	52.2	0.34	34.0	65.6		90.9	53.6	68.6	26.7
1 to 4		14.3	47.6	0.32	31.9	62.5		91.2	56.3	70.8	28.0
1 to 5		20.1	34.1	0.24	26.7	51.6		91.5	59.5	83.0	32.3
6 + 7		1.4	17.3	2.17	40.3	1333		3.2	36.1	8.6	57.2
6 to 8		3.6	16.0	0.92	26.0	567		7.7	40.5	14.6	64.1
1 +6		13.2	52.2	0.53	35.2	158		92.2	85.4	72.1	65.3

LAKEFIELD RESEARCH

Test No.: 11 Sn Table Test Project No.: ______ Date: ______

Metallurgical Results Conc't RO Tails Tests 8,9, & 10

	PRODUCT	WEIGHT		ASSAYS, %					% DISTRIBUTION					METAL UNITS				
		g	%			Sn					Sn							
1	Table Conc	87.6	2.96			0.28					19.6				0.245			
2	Tail	2867.0	97.04			0.035					80.4				1.003			
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
	Head (calc.)	2954.6	100.00			0.042					100.0				1.248			

Calculated Grades and Recoveries

APPENDIX "B" [illegible]

Test 13

Product	Weight g	Weight %	Assays,%,g/t Zn	Cu	S	Ag	Fe	% Distribution Zn	Cu	S	Ag
1 Cleaner Conc	453.3	23.0	53.4	0.42	34.7	160	10.0	88.7	86.2	70.7	58.5
2 4th Cl Tail	9.6	0.5	26.6	0.54	26.2	880	18.3	0.9	2.3	1.1	6.8
3 3rd Cl Tail	17.8	0.9	15.5	0.40	23.8	551	23.8	1.0	3.2	1.9	7.9
4 2nd Cl Tail	22.1	1.1	8.15	0.24	21.3	115	23.8	0.7	2.4	2.1	2.1
5 1st Cl Tail	175.7	8.9	2.57	0.072	22.0	85.3	25.5	1.7	5.7	17.4	12.1
7 Zn Rougher Tail	1290.7	65.5	1.49	0.009	1.17	12.0	7.30	7.0	0.12	6.8	12.5
Head(calc)	1969.2	100.0	13.9	0.112	11.3	62.8	9.93	100.0	100.0	100.0	100.0
Combined Products											
1 + 2		23.5	52.8	0.42	34.5	175	10.2	89.6	88.5	71.8	65.4
1 to 3		24.4	51.5	0.42	34.1	189	10.7	90.6	91.8	73.7	73.3
1 to 4		25.5	49.6	0.41	33.6	185	11.3	91.3	94.2	75.8	75.4
1 to 5		34.5	37.4	0.33	30.5	159	14.9	93.0	99.9	93.2	87.5

Test 14

Product	Weight g	Weight %	Assays,%,g/t Zn	Cu	S	Ag	Fe	% Distribution Zn	Cu	S	Ag
1 Cleaner Conc	943.6	23.6	52.5	0.29	34.0	111	10.0	90.3	59.6	71.1	38.5
2 4th Cl Tail	12.5	0.3	8.50	0.26	14.4	76.6		0.2	0.7	0.4	0.4
3 3rd Cl Tail	19.3	0.5	2.42	0.21	12.8	80.3		0.1	0.9	0.5	0.6
4 2nd Cl Tail	50.4	1.3	1.26	0.14	14.0	31.7		0.1	1.5	1.6	0.6
5 1st Cl Tail	264.1	6.6	0.66	0.028	21.9	19.8		0.3	1.6	12.8	1.9
6 Prefloat Conc	10.0	0.3	14.9	8.66	35.9	3166		0.3	18.9	0.8	11.6
7 2nd Cl Tail	45.5	1.1	14.5	1.24	41.0	2409		1.2	12.3	4.1	40.3
8 1st Cl Tail	62.5	1.6	24.0	0.33	25.5	270		2.7	4.5	3.5	6.2
9 Zn Rougher Tail	2582.8	64.7	1.02	0.005	0.90			4.8	0.04	5.1	0.0
Head(calc)	3990.7	100.0	13.8	0.12	11.3	68.2		100.0	100.0	100.0	100.0
Combined Products											
1 + 2		24.0	51.9	0.29	33.7	111		90.5	60.3	71.5	38.8
1 to 3		24.4	50.9	0.29	33.3	110		90.6	61.2	72.0	39.4
1 to 4		25.7	48.5	0.28	32.4	108		90.7	62.7	73.6	40.0
1 to 5		32.3	38.7	0.23	30.2	88.4		91.0	64.3	86.4	41.9
6 + 7		1.4	14.6	2.58	40.1	2545		1.5	31.1	4.9	51.9
6 to 8		3.0	19.6	1.39	32.4	1340		4.2	35.6	8.5	58.1
1 +6		23.9	52.1	0.38	34.0	143		90.6	78.4	71.9	50.1

APPENDIX "C"

CALCULATIONS OF GEOLOGIAL MINERAL INVENTORY

SUMMARY - CROSS SECTION METHOD

MAIN BLOCK

	GRAND TOTALS					<30 Metres from Drill Hole					>30 Metres from Drill Hole				
SECTION	Tonnes	Weighted Zinc	Weighted Silver	% Zn	OPT Ag	Tonnes	Weighted Zinc	Weighted Silver	% Zn	OPT Ag	Tonnes	Weighted Zinc	Weighted Silver	% Zn	OPT Ag
310W	54,438	177,468	41,373	3.26	0.76	29,966	97,689	22,774	3.26	0.76	24,472	79,779	18,599	3.26	0.76
200W	788,517	4,049,170	832,659	5.14	1.06	501,957	2,580,006	517,882	5.14	1.03	286,560	1,469,164	314,777	5.13	1.10
140W	233,743	1,173,083	186,791	5.02	0.80	215,763	1,082,849	172,423	5.02	0.80	17,980	90,234	14,368	5.02	0.80
105W	1,673,328	12,097,681	1,405,868	7.23	0.84	1,181,112	8,620,017	1,006,905	7.30	0.85	492,216	3,477,664	398,963	7.07	0.81
055W	401,656	2,773,138	344,274	6.90	0.86	401,656	2,773,138	344,274	6.90	0.86	None to report				
005W	1,712,128	10,740,535	1,048,663	6.27	0.61	1,046,001	6,403,536	650,165	6.12	0.62	666,127	4,336,999	398,498	6.51	0.60
040E	371,035	1,810,860	279,249	4.88	0.75	371,035	1,810,860	279,249	4.88	0.75	None to report				
095E	2,692,144	17,759,398	1,780,777	6.60	0.66	1,766,492	11,537,559	1,188,371	6.53	0.67	925,652	6,221,839	592,406	6.72	0.64
145E	520,371	3,072,993	344,321	5.91	0.66	520,371	3,072,993	344,321	5.91	0.66	None to report				
195E	2,039,865	14,159,640	1,759,482	6.94	0.86	1,402,018	9,642,746	1,200,670	6.88	0.86	637,847	4,516,894	558,812	7.08	0.88
275E	831,139	4,019,055	683,784	4.84	0.82	488,901	2,358,253	403,060	4.82	0.82	342,238	1,660,802	280,724	4.85	0.82
	11,318,364	**71,833,021**	**8,707,241**	**6.35**	**0.77**	**7,925,272**	**49,979,646**	**6,130,094**	**6.31**	**0.77**	**3,393,092**	**21,853,375**	**2,577,147**	**6.44**	**0.76**
	(12,476,232 Tons)					**(8,736,027 tons)**					**(3,740,205 tons)**				

EAST BLOCK

	GRAND TOTALS					<30 Metres from Drill Hole					>30 Metres from Drill Hole				
SECTION	Tonnes	Weighted Zinc	Weighted Silver	% Zn	OPT Ag	Tonnes	Weighted Zinc	Weighted Silver	% Zn	OPT Ag	Tonnes	Weighted Zinc	Weighted Silver	% Zn	OPT Ag
395E	372,473	1,403,433	239,435	3.77	0.64	211,621	801,386	136,185	3.79	0.64	160,852	602,047	103,250	3.74	0.64
490E	146,963	425,949	122,687	2.90	0.83	82,747	237,843	67,963	2.87	0.82	64,216	188,106	54,724	2.93	0.85
580E	40,206	161,607	16,127	4.02	0.40	32,165	129,287	12,901	4.02	0.40	8,041	32,320	3,226	4.02	0.40
630E	18,192	152,449	79,317	8.38	4.36	18,192	152,449	79,317	8.38	4.36	None to report				
685E	126,950	658,087	146,805	5.18	1.16	126,950	658,087	146,805	5.18	1.16	None to report				
735E	21,393	65,890	8,343	3.08	0.39	21,393	65,890	8,343	3.08	0.39	None to report				
785E	120,949	560,135	84,205	4.63	0.70	120,949	560,135	84,205	4.63	0.70	None to report				
835E	83,956	386,105	40,467	4.60	0.48	83,956	386,105	40,467	4.60	0.48	None to report				
890E	45,790	173,543	17,858	3.79	0.39	35,223	133,495	13,737	3.79	0.39	10,567	40,048	4,121	3.79	0.39
	976,872	**3,987,198**	**755,244**	**4.08**	**0.77**	**733,196**	**3,124,677**	**589,923**	**4.26**	**0.80**	**243,676**	**862,521**	**165,321**	**3.54**	**0.68**
	(1,076,806 tons)					**(808,202 tons)**					**(268,604 tons)**				
TOTAL LOGAN	**12,295,236**	**75,820,216**	**9,462,485**	**6.17**	**0.77**	**8,658,468**	**53,104,323**	**6,720,017**	**6.13**	**0.78**	**3,636,768**	**22,715,893**	**2,742,468**	**6.25**	**0.75**
	(13,553,038 tons)					**(9,544,229 tons)**					**(4,008,809 tons)**				

(Detailed calculations of sections follow)

CROSS SECTION METHOD

	MAIN BLOCK				
	Tonnes				
	Total	<30m DDH	>30m DDH	% Zn	OPT Ag
1. SECTION 310W (Plate 31)					
Block #24	54,438	29,966	24,472	3.26	0.76
2. SECTION 200W (Plate 32)					
Block #19	173,438	100,060	73,378	4.92	1.79
9UA	44,486	25,665	18,821	4.85	1.12
9UB	75,626	43,630	31,996	5.24	1.02
9UC	39,118	22,568	16,550	5.02	0.67
9UD	27,382	15,797	11,585	5.11	0.43
9LA	71,446	51,753	19,693	4.85	1.12
9LB	57,064	41,335	15,729	5.24	1.02
9LC	17,832	12,917	4,915	5.02	0.67
9LD	22,291	16,147	6,144	5.11	0.43
20UA	66,361	48,069	18,292	4.96	1.00
20UB	38,542	27,918	10,624	3.75	0.29
20LA	67,446	39,099	28,347	4.96	1.00
20LB	15,428	8,961	6,467	3.75	0.29
21	72,057	48,038	24,019	7.39	0.75
Total Section Tonnes	788,517			5.14	1.06
Total <30m from DDH		501,957		5.14	1.03
Total >30m from DDH			286,560	5.13	1.10
3. SECTION 140W (Plate 33)					
Block #52A	60,976	56,286	4,690	8.05	1.53
52B	91,465	84,429	7,036	3.13	0.48
52C	81,302	75,048	6,254	4.87	0.61
Total Section tonnes	233,743			5.02	0.80
Total <30m from DDH		215,763		5.02	0.80
Total >30m from DDH			17,980	5.02	0.80
4. SECTION 105W (Plate 34)					
Block #6UA	12,574	7,576	4,998	12.77	2.12
6UB	332,725	203,709	129,016	10.29	1.27
6LA	36,020	36,020	-	12.77	2.12
6LB	112,835	112,835	-	10.29	1.27
8UA	35,422	35,422	-	4.83	0.76
8UB	15,316	15,316	-	3.28	0.25
8UC	139,548	139,548	-	6.08	0.45
8LA	96,084	61,330	34,754	4.83	0.76
8LB	65,859	42,038	23,821	3.28	0.25
8LC	308,499	188,877	119,622	6.08	0.45
22A	105,683	66,747	38,936	3.81	0.78
22UB	41,617	26,284	15,333	2.96	0.37
22UC	152,402	98,324	54,078	6.73	0.36
22LB	14,403	9,292	5,111	2.96	0.37
22LC	70,370	45,400	24,970	6.73	0.36
23	133,971	92,394	41,577	8.95	1.73
Total Section Tonnes	1,673,328			7.23	0.84
Total <30m from DDH		1,181,112		7.30	0.85
Total >30m from DDH			492,216	7.07	0.81

GEOLOGICAL MINERAL INVENTORY
Cross Section Method Continued

	MAIN BLOCK				
	Tonnes				
	Total	<30m DDH	>30m DDH	% Zn	OPT Ag
5. SECTION 055W (Plate 35)					
Block #51AW	68,645	68,645	-	9.04	1.26
51BW	88,272	88,272	-	5.17	0.53
51AE	111,349	111,349	-	9.04	1.26
51BE	133,390	133,390	-	5.17	0.53
Totals	**401,656**	**401,656**		**6.90**	**0.86**
6. SECTION 005W (Plate 36)					
Block #16UA	6,621	4,182	2,439	6.34	1.27
16UB	81,657	51,573	30,084	5.21	0.81
16UC	348,289	222,312	125,977	6.16	0.62
16UD	241,968	-	241,968	6.16	0.62
16LA	24,599	24,599	-	6.34	1.27
16LB	80,606	80,606	-	5.21	0.81
16LC	131,569	131,569	-	6.16	0.62
15UA	24,928	24,928	-	6.43	0.76
15UB	80,673	80,673	-	6.34	0.70
15UC	50,594	50,594	-	3.11	0.34
15UD	16,567	16,567	-	2.44	0.15
15LA	18,469	11,726	6,743	6.43	0.76
15LB	93,668	59,472	34,196	6.34	0.70
15LC	38,025	24,143	13,882	3.11	0.34
15LD	38,750	24,603	14,147	2.44	0.15
18A	105,934	58,852	47,082	3.52	0.28
18B	198,364	109,191	89,173	11.96	0.72
99	130,847	70,411	60,436	5.43	0.49
Total Section tonnes	**1,712,128**			**6.27**	**0.61**
Total <30m from DDH		**1,046,001**		**6.12**	**0.62**
Total >30m from DDH			**666,127**	**6.51**	**0.60**
7. SECTION 040E (Plate 37)					
Block #50A	112,764	112,764	-	5.18	0.88
50B	42,038	42,038	-	6.97	0.69
50C	27,081	27,081	-	4.52	1.48
50D	45,180	45,180	-	7.41	1.34
50E	143,972	143,972	-	3.31	0.35
Totals	**371,035**	**371,035**		**4.88**	**0.75**
8. SECTION 095E (Plate 38)					
Block #34A	137,440	82,464	54,976	10.40	1.68
34B	444,927	273,801	171,126	5.40	0.74
14UA	37,613	27,447	10,166	3.04	0.30
14ULA	46,868	46,868	-	3.04	0.30
14UB	180,657	131,162	49,495	6.35	0.88
14ULB	242,251	242,251	-	6.35	0.88
25UA	25,554	18,399	7,155	6.87	0.61
25ULA	141,157	84,694	56,463	6.87	0.61
25UB	3,111	2,240	871	6.78	0.58
25ULB	28,619	17,258	11,361	6.78	0.58
25UC	57,173	41,721	15,452	5.97	0.58

GEOLOGICAL MINERAL INVENTORY
Cross Section Method Continued

	MAIN BLOCK				
	Tonnes				
	Total	<30m DDH	>30m DDH	% Zn	OPT Ag
SECTION 095E continued:					
Block #25ULC	74,907	45,170	29,737	5.97	0.58
25UD	68,656	50,100	18,556	4.15	0.38
25ULD	75,201	45,347	29,854	4.15	0.38
25UE	69,223	50,514	18,709	11.41	0.52
25ULE	60,225	34,745	25,480	11.41	0.52
26A	40,074	23,806	16,268	7.11	1.43
26B	104,431	62,038	42,393	9.94	0.79
26C	109,398	63,419	45,979	5.42	0.55
26D	116,756	67,685	49,071	4.32	0.28
103A	82,001	47,082	34,919	5.82	0.75
103B	67,728	38,887	28,841	3.97	0.63
103C	71,852	40,480	31,372	9.95	0.41
103D	406,322	228,914	177,408	7.09	0.34
Total Section Tonnes	**2,692,144**			**6.60**	**0.66**
Total <30m from DDH		**1,766,492**		**6.53**	**0.67**
Total >30m from DDH			**925,652**	**6.72**	**0.64**
9. SECTION 145E (Plate 39)					
Block #49A	47,392	47,392	-	5.11	0.95
49B	71,765	71,765	-	5.34	1.19
49C	201,116	201,116	-	3.64	0.30
49D	67,702	67,702	-	6.39	0.43
49E	132,396	132,396	-	9.69	0.94
Totals	**520,371**	**520,371**		**5.91**	**0.66**
10. SECTION 195E (Plate 40)					
Block #33A	44,205	29,470	14,735	13.27	3.60
33B	184,708	123,139	61,569	5.71	1.00
33C	209,445	133,688	75,757	9.69	1.65
31UA	66,077	41,843	24,234	13.10	1.37
31LA	69,677	54,764	14,913	13.10	1.37
31UB	51,123	32,373	18,750	4.90	0.55
31LB	24,592	19,328	5,264	4.90	0.55
31UC	113,762	72,039	41,723	6.21	1.51
31LC	104,674	82,270	22,404	6.21	1.51
32U	214,450	180,842	33,608	4.23	0.47
32L	321,972	213,462	108,510	4.23	0.47
100A	118,816	78,340	40,476	7.21	0.28
100B	516,364	340,460	175,904	7.47	0.44
Total Section Tonnes	**2,039,865**			**6.94**	**0.86**
Total <30m from DDH		**1,402,018**		**6.88**	**0.86**
Total >30m from DDH			**637,847**	**7.08**	**0.88**
11. SECTION 275E (Plate 41)					
Block #3A	79,261	47,578	31,683	3.63	0.83
3B	186,845	104,660	82,185	5.36	0.83
35	78,883	47,808	31,075	4.41	0.68
36A	24,426	14,656	9,770	8.31	0.76
36B	57,466	34,480	22,986	5.40	0.99

GEOLOGICAL MINERAL INVENTORY
Cross Section Method Continued

MAIN BLOCK

	Tonnes Total	Tonnes <30m DDH	Tonnes >30m DDH	% Zn	OPT Ag
SECTION 275E Continued					
Block #36C	46,787	28,072	18,715	4.38	0.51
36D	196,030	114,749	81,281	5.45	0.49
102A	11,227	6,770	4,457	5.40	0.99
102B	150,214	90,128	60,086	3.56	1.35
Total Section Tonnes	**831,139**			**4.84**	**0.82**
Total <30m from DDH		**488,901**		**4.82**	**0.82**
Total >30m from DDH			**342,238**	**4.85**	**0.82**

EAST BLOCK

	Tonnes Total	Tonnes <30m DDH	Tonnes >30m DDH	% Zn	OPT Ag
12. SECTION 395E (Plate 42)					
Block #37	30,805	16,957	13,848	2.75	0.75
11	78,691	44,126	34,565	3.00	0.66
38A	54,285	30,727	23,558	3.00	0.33
38B	143,539	83,615	59,924	4.96	0.73
38C	65,153	36,196	28,957	3.19	0.64
Total Section Tonnes	**372,473**			**3.77**	**0.64**
Total <30m from DDH		**211,621**		**3.79**	**0.64**
Total >30m from DDH			**160,852**	**3.74**	**0.64**
13. SECTION 490E (Plate 43)					
Block #40A	30,532	19,912	10,620	2.32	0.51
40B	116,431	62,835	53,596	3.05	0.92
Total Section Tonnes	**146,963**			**2.90**	**0.83**
Total <30m from DDH		**82,747**		**2.87**	**0.82**
Total >30m from DDH			**64,216**	**2.93**	**0.85**
14. SECTION 580E (Plate 44)					
Block #42A	22,302	17,842	4,460	4.87	0.41
42B	17,904	14,323	3,581	2.96	0.39
Total Section Tonnes	**40,206**			**4.02**	**0.40**
Total <30m from DDH		**32,165**		**4.02**	**0.40**
Total >30m from DDH			**4,041**	**4.02**	**0.40**
15. SECTION 630E (Plate 45)					
Block #55	**18,192**	**18,192**	**-**	**8.38**	**4.36**

GEOLOGICAL MINERAL INVENTORY
Cross Section Method Continued

	EAST BLOCK				
	Tonnes				
	Total	<30m DDH	>30m DDH	% Zn	OPT Ag
16. SECTION 685E (Plate 46)					
Block #44A	89,816	89,816	-	5.88	1.25
44B	37,134	37,134	-	3.50	0.93
Totals	**126,950**	**126,950**		**5.18**	**1.16**
17. SECTION 735E (Plate 47)					
Block #57	**21,393**	**21,393**	**-**	**3.08**	**0.39**
18. SECTION 785E (Plate 48)					
Block #45	101,958	101,958	-	4.84	0.77
58	18,991	18,991	-	3.51	0.30
Totals	**120,949**	**120,949**		**4.63**	**0.70**
19. SECTION 835E (Plate 49)					
Block #59A	22,381	22,381	-	2.56	0.46
59B	61,575	61,575	-	5.34	0.49
Totals	**83,956**	**83,956**		**4.60**	**0.48**
20. SECTION 890E (Plate 50)					
Block #46	**45,790**	**35,223**	**10,567**	**3.79**	**0.39**

GEOLOGICAL MINERAL INVENTORY Continued

L E V E L   P L A N   M E T H O D

SECTION LINE	BLOCK NUMBER		TONNES	% Zinc	oz/ton Ag
1350 LEVEL (Plate 5)					
310W	MAIN	10	41,300	3.18	0.90
200W	MAIN	19	189,626	4.92	1.79
140W	MAIN	52	44,206	8.05	1.53
105W	MAIN	6A	292,499	10.29	1.27
105W	MAIN	6B	46,607	12.77	2.12
055W	MAIN	51	119,296	9.04	1.26
005W	MAIN	16A	319,727	6.16	0.62
005W	MAIN	16B	83,354	5.21	0.81
005W	MAIN	16C	56,593	6.34	1.27
040E	MAIN	50A	33,751	6.97	0.69
040E	MAIN	50B	97,921	5.18	0.88
095E	MAIN	34A	188,196	5.40	0.74
095E	MAIN	34B	119,576	10.40	1.68
095E	MAIN	14	66,832	3.04	0.30
145E	MAIN	49A	148,259	3.64	0.30
145E	MAIN	49B	52,374	5.34	1.19
145E	MAIN	49C	21,983	5.11	0.95
195E	MAIN	33A	113,950	9.69	1.65
195E	MAIN	33B	72,051	5.71	1.00
195E	MAIN	33C	36,360	13.27	3.60
195E	MAIN	31	36,282	4.58	0.95
275E	MAIN	3A	51,285	5.36	0.83
275E	MAIN	3B	135,331	3.63	0.83
395E	EAST	37	19,948	2.75	0.75
395E	EAST	11	82,883	3.00	0.66
395E	EAST	38	10,841	3.00	0.33
490E	EAST	40	38,866	3.05	0.92
580E	EAST	42	12,777	4.87	0.41
630E	EAST	55	31,012	8.38	4.36
685E	EAST	44A	7,936	3.50	0.93
685E	EAST	44B	58,509	5.88	1.25
780E	EAST	45	19,160	4.84	0.77
Total 1350 Level			**2,649,291**	**6.48**	**1.10**
			(2,920,313 tons)		

GEOLOGICAL MINERAL INVENTORY
Level Plan Method Continued

SECTION LINE	BLOCK NUMBER		TONNES	% Zinc	oz/ton Ag
1300 LEVEL (Plate 6)					
310W	MAIN	24	50,334	3.26	0.76
200W	MAIN	9A	36,846	5.11	0.43
200W	MAIN	9B	46,640	5.02	0.67
200W	MAIN	9C	78,854	5.24	1.02
200W	MAIN	20	127,027	4.96	1.00
140W	MAIN	52A	80,638	4.87	0.61
140W	MAIN	52B	71,420	3.13	0.48
140W	MAIN	52C	67,835	8.05	1.53
105W	MAIN	6	176,086	10.29	1.27
105W	MAIN	8A	32,347	3.28	0.25
105W	MAIN	8B	64,162	4.83	0.76
055W	MAIN	51A	204,774	5.17	0.53
055W	MAIN	51B	159,684	9.04	1.26
005W	MAIN	16	251,001	6.16	0.62
005W	MAIN	15A	161,173	6.34	0.70
005W	MAIN	15B	41,492	6.43	0.76
040E	MAIN	50A	123,870	3.31	0.35
040E	MAIN	50B	77,747	7.41	1.34
040E	MAIN	50C	22,125	4.52	1.48
040E	MAIN	50D	43,808	6.97	0.69
040E	MAIN	50E	105,566	5.18	0.88
095E	MAIN	14	387,025	6.35	0.88
095E	MAIN	25	113,782	6.87	0.61
145E	MAIN	49A	130,242	9.69	0.94
145E	MAIN	49B	71,818	6.39	0.43
145E	MAIN	49C	227,445	3.64	0.30
145E	MAIN	49D	66,198	5.34	1.19
145E	MAIN	49E	46,389	5.11	0.95
195E	MAIN	31A	172,619	6.21	1.51
195E	MAIN	31B	52,422	4.90	0.55
195E	MAIN	31C	104,983	13.10	1.37
195E	MAIN	32	41,698	4.22	0.28
195E	MAIN	100	54,782	1.91	0.10
275E	MAIN	3	96,742	5.36	0.83
275E	MAIN	35	44,176	4.41	0.68
275E	MAIN	36	92,925	5.40	0.99
395E	EAST	38A	105,315	4.96	0.73
395E	EAST	38B	59,516	3.00	0.33
490E	EAST	40A	74,517	3.05	0.92
490E	EAST	40B	41,167	2.32	0.51
680E	EAST	44A	25,208	3.50	0.93
680E	EAST	44B	22,568	5.88	1.25
680E	EAST	56	11,652	3.28	0.58
735E	EAST	57	35,134	3.08	0.39
780E	EAST	45	94,076	4.84	0.77
835E	EAST	59A	104,976	5.34	0.49
835E	EAST	59B	11,505	2.56	0.46
Total 1300 Level			4,312,309	5.87	0.80
			(4,753,458 tons)		

GEOLOGICAL MINERAL INVENTORY
Level Plan Method Continued

SECTION LINE	BLOCK NUMBER		TONNES	% Zinc	oz/ton Ag
1250 LEVEL (Plate 7)					
310W	MAIN	24	77,467	3.26	0.76
200W	MAIN	21	117,676	7.39	0.75
140W	MAIN	52A	60,328	4.87	0.61
140W	MAIN	52B	72,983	3.13	0.48
105W	MAIN	8	254,364	6.08	0.45
105W	MAIN	22A	34,294	2.96	0.37
105W	MAIN	22B	106,908	3.81	0.78
055W	MAIN	51	116,599	5.17	0.53
005W	MAIN	15A	40,621	2.44	0.15
005W	MAIN	15B	76,154	3.11	0.34
005W	MAIN	18	103,545	3.52	0.28
040E	MAIN	50A	138,090	3.31	0.35
040E	MAIN	50B	34,677	7.41	1.34
095E	MAIN	14	217,798	6.35	0.88
095E	MAIN	25	84,237	5.97	0.58
095E	MAIN	26A	113,000	9.94	0.79
095E	MAIN	26B	18,069	7.11	1.43
145E	MAIN	49A	121,555	9.69	0.94
145E	MAIN	49B	69,236	6.39	0.43
145E	MAIN	49C	193,446	3.64	0.30
195E	MAIN	32	394,046	4.23	0.47
780E	EAST	58	35,326	3.51	0.30
Total 1250 Level			**2,480,419**	**5.23**	**0.56**
			(2,734,166 tons)		
1200 LEVEL (Plate 8)					
105W	MAIN	22A	20,355	2.96	0.37
105W	MAIN	22B	145,022	6.73	0.36
005W	MAIN	99	68,824	5.43	0.49
005W	MAIN	18	233,640	11.96	0.72
095E	MAIN	25	151,836	11.41	0.52
095E	MAIN	26A	130,021	4.32	0.28
095E	MAIN	26B	104,179	5.42	0.55
095E	MAIN	103A	58,631	3.97	0.63
095E	MAIN	103B	47,348	5.82	0.75
195E	MAIN	100A	514,775	7.47	0.44
195E	MAIN	100B	94,636	7.21	0.28
275E	MAIN	36	253,331	5.45	0.49
Total 1200 Level			**1,822,598**	**7.40**	**0.48**
			(2,009,050 tons)		
1150 LEVEL (Plate 9)					
105W	MAIN	23	92,217	8.95	1.73
005W	MAIN	99	141,748	5.43	0.49
095E	MAIN	103A	95,610	9.95	0.41
095E	MAIN	103B	205,762	7.09	0.34
195E	MAIN	100A	35,901	7.21	0.28
195E	MAIN	100B	463,814	7.47	0.44
275E	MAIN	102	188,888	3.56	1.35
Total 1150 Level			**1,223,940**	**6.86**	**0.66**
			(1,349,149 tons)		
TOTAL ALL LEVELS:		MAIN BLOCK	11,585,665	6.35	0.75
		EAST BLOCK	902,892	4.20	0.82
			12,488,557	6.19	0.76
			(13,766,136 tons)		