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FINAL REPORT 1964

<u>MAYO SILVER MINES LTD. (N.P.L.)</u>

MAYO - YUKON

January 21, 1965

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INTRODUCTION

During the summer of 1964 between the dates of June 15 - September 15, Mayo Silver Mines was engaged in active exploration on their property situated approximately 50 miles north of Mayo Landing, Yukon Territory. Work consisted of geological mapping, soil sampling, panning, prospecting, and trenching by means of a D7 Caterpillar. A considerable number of soil samples were analyzed and interpreted, resulting in the location of a dozen or more anomalies on the property. Several of these anomalies were investigated on a priority basis by means of the cat. Others remain to be investigated.

Due to the short summer season, the heavy overburden and moss covering, and the presence of permafrost, exploratory operations in the area are subject to difficulty and expense not normally encountered in more southerly located properties. Maximum use may be made of the long daylight hours but despite this, work often progresses slowly due to the difficulties in transportation.

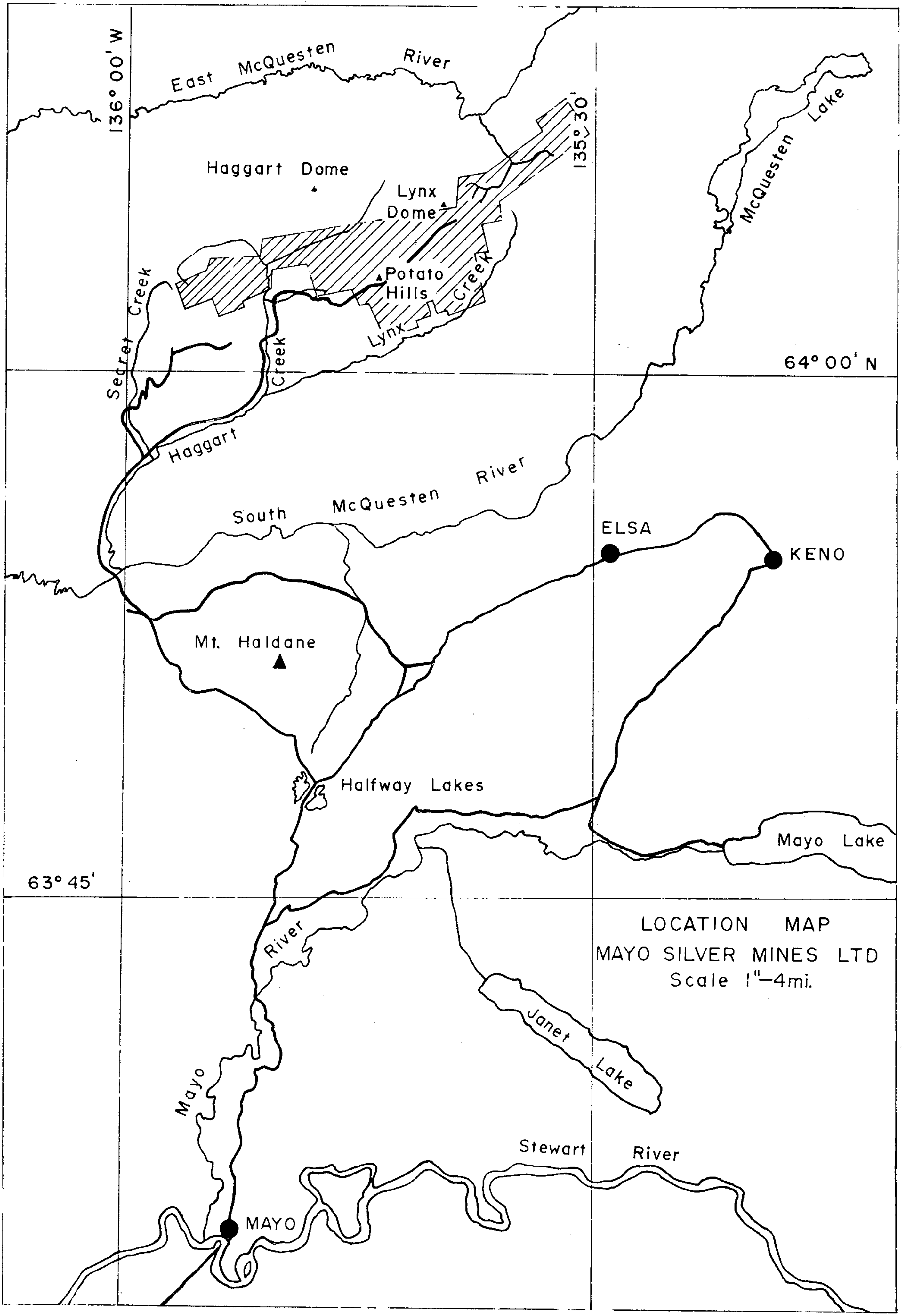
The area mapped includes a total area of about 65 square miles and lies within a broad belt of silver-lead-antimony mineralization which follows Tintina Trench, the northern extension of the Rocky Mountain trench. United Keno Hill Mines lies within this belt of mineralization. The rock sequence, structure and general geology of Mayo Silver Mines property is similar to that of Keno Hill although no underground information of the property is available for comparison. Mayo Silver Mines is approximately 15 miles northwest of Keno Hill.

ACKNOWLEDGMENTS

Most of the work was done in the field by Mayo Silver Mines personnel during the summer of 1964. A certain amount of information was gathered from G.S.C. Publications, listed at the end of this report, and from the very extensive geological thesis prepared by D.J. Tempelman-Kluit.

Thanks are offered to Dr. R.E. Delavault, Associate Professor of Geochemistry at the University of British Columbia, whose advice and technical knowledge made possible the large silt and soil sampling programme completed in the summer of 1964.

B.J. Thurber, T. Heard and R.W. Harvey deserve special credit for their cheerful willingness in performing routine tasks and completing necessary work. B.J. Thurber offered substantial suggestions on geological problems;



East McQuesten River
136° 00' W
135° 30'
Haggart Dome
Lynx Dome
Potato Hills
Lynx Creek
Secret Creek
Creek
Haggart
McQuesten Lake
64° 00' N
South McQuesten River
ELSA
KENO
Mt. Haldane
Halfway Lakes
Mayo Lake
63° 45'
River
Mayo
Janet Lake
Stewart River
MAYO
LOCATION MAP
MAYO SILVER MINES LTD
Scale 1"–4mi.

R.W. Harvey did the laboratory and analysis work; T. Heard took charge of surveying of roads, trenches and soil sample grids.

C.F. Gleeson and W.H. Poole of the Geological Survey of Canada, offered suggestions on geochemical and geological problems. Their suggestions were greatly appreciated.

LOCATION AND ACCESS

The property lies approximately 50 miles north of Mayo Landing between Lynx Creek on the south, East McQuesten River on the north and east, and Secret Creek on the west. It is reached from Mayo by leaving the gravelled Mayo-Elsa Road, 25 miles out of Mayo and travelling 10 miles on "Proctor Construction Road". This 35 mile stretch is maintained by Government crews. The remaining 15 miles of road which follows Haggart Creek is suitable only for 4-wheel drive vehicles, is not regularly maintained and is at times - especially during break-up and heavy rains - not serviceable. It is used by F. Taylor, J. Acheson (Waddco), Placer miners at Dublin Gulch and Haggart Creek respectively, and in part by Peso Silver Mines. Mayo Landing is serviced tri-weekly out of Whitehorse by C.P.A.

TOPOGRAPHY AND CLIMATE

The topography consists of a series of rounded hills with elevations ranging from approximately 2500 feet (lynx Creek) to just over 5000 feet (Potato Hills). Lynx Dome, Potato Hills, and Haggart Dome are prominent landmarks of the property. The north facing slopes are almost always underlain by permafrost, somewhat steeper than the south facing slopes, and generally less covered by outcrop. Relief is moderate.

At least 2 stages of glaciation seem to have covered the general region although to what extent these glacial periods invaded the map area is not very accurately known. Considerable detail work restricted to the gathering of data necessary in determining the glacial history would be required to provide the answer to this problem. It is known, however, that most of the slopes and valley floors have been glaciated and that glacial till and overburden cover these lower slopes and valley bottoms to depths of possibly 60 feet or more. The average depth of overburden on the slopes generally does not exceed 6 feet unless a topographic hollow has allowed the accumulation of greater amounts of till locally. The ridges and tops of hills are unglaciated.

The soils consist of poorly developed (heavily leached) brown to black tundra soils. Soils on the property consist of two groups. There are glacial soils which are poorly drained and contain considerable organic material; and residual soils which are moderately drained, except on hill tops, and contain less organic material.

The soil contains in many places a great deal of peat and organic material which forms the top layer of the subsoil.

Vegetation consists of a heavy covering of moss, stunted spruce, birch, alders, aspen and willow. Above 4500 feet, the hills are flat or gently rounded and are either bare or covered with moss and alpine vegetation only.

The climate is moderate with extremes both during the winter and summer season. The average precipitation annually is approximately 12 inches but precipitation for 1964 must have been considerably more since, during the entire summer, creeks and streams were swollen with rainfall.

TRANSPORTATION

The problems encountered in transporting men and supplies to and from the property and in communication are numerous and at times almost insurmountable. Vehicles, even when new and in perfect condition, are subject to frequent "break-downs" due to the deterioration of the roads as the summer advances (a combination of receding permafrost and the occasional heavy rainfall). Brakes on new vehicles may be expected to require relining at 6000 mile intervals due to the frequent fording of streams and mudholes. Front wheel drive hubs should be checked occasionally. Universal driveshafts, especially for front wheel drive, may require replacing within 10,000 miles. In connection with maintenance of vehicles it cannot be emphasized too strongly that all units be serviced as regularly as possible and on the rougher sections of the road be driven at slow speeds. Garage facilities are available at Mayo, and more completely at Whitehorse, 225 miles south of Mayo, but if two or more vehicles are operated it would be advantageous to supply a basic set of tools and provide for one member of the crew employed in exploration work to be familiar with the repairing of such vehicles and machinery as is used. Repairs during the summer season are often unavoidably delayed due to the heavy demand of the facilities available at that time.

SIZE OF THE AREA

The property owned by Mayo Silver Mines Ltd., N.P.L., comprises 402 claims over an area 16 miles long by 1½ to 4 miles wide. A road from west of Dublin Gulch to almost the eastern limit of the property is serviceable for approximately 12 miles of the total distance by 4-wheel drive vehicles. The remaining 4 miles may be travelled by caterpillar or similar equipment only. A complete breakdown of the claim names, numbers, groupings and expiry dates may be found elsewhere in this report.

PURPOSE OF INVESTIGATION

The purpose of the investigation carried out during the 1964 field season was, as recommended by L.G. White, Consulting Geologist for Mayo Silver Mines, to eliminate by means of a reconnaissance Geochemical Grid, those areas of no economic significance, and to delineate, during the systematic investigations, those areas of economic potential. In addition to this the property was to be mapped and prospected. Individual showings were to be examined, sampled (both soil and assay) mapped and trenched. This, in the opinion of the author, was carried out as recommended. Sufficient information and geochemical data were gathered to allow a considerable number of claims to be dropped as indicated by the information available.

METHOD OF INVESTIGATION

The methods employed in investigating a major part of the property consisted of the following:

a) Silt sampling of streams at 500 to 1500 foot intervals. (See Overlay)
b) Soil sampling of as much of the property as feasible, both grid and contour at 300 foot intervals. (See Overlay)
c) Detailed grid sampling of all prospects and any indicated anomalies.
d) Prospecting.
e) Panning of junctions of streams.
f) Follow-up trenching.

In order to expedite and correlate results with the work in the field a laboratory was set up in the main camp at Dublin Gulch, under the supervision of Dr. R.E. Delavault, Associate Professor of Geochemistry at the University of British Columbia. The silt and soil samples were analyzed for lead and zinc and in a small number for copper and arsenic. The samples were analyzed by

R.W. Harvey, whose report on the laboratory methods recommended by Dr. Delavault, is appended to the section headed Geochemistry - Methods Employed.

HISTORY

Interest has centered on the area since 1895 (Cairns 1915). Initially, all prospecting was carried out for gold but in 1904 placer scheelite was recognized and subsequently the area was prospected for tungsten as well. In 1943, cassiterite

> "was found ... on the hill about one mile northeast of the mouth of Dublin Gulch"
>
> R.M. Thompson, An Occurrence of Cassiterite at Dublin Gulch, Yukon Territory.

Emphasis shifted to silver-lead veins and prospecting for silver led to the formation of United Keno Hill Mines which started production in 1947 and developed Galena - Keno Hills.

Most of the Mayo property was staked in 1962 by Gordon Dickson. Mayo Silver Mines was incorporated on June 5, 1962.

SUMMARY AND CONCLUSIONS

Primarily geochemical investigations of the entire property have revealed widely dispersed anomalous zones, sometimes containing strong homogeneity and occurring in thin to thick bedded quartzites schists and greenstones. North trending fault zones, northeast trending (transverse) ore bearing veins and longitudinal fault or shear zones occur on the property. Structural control is related to the McQuesten Anticline and to the Lynx Creek fold south of Lynx Dome.

Mineralization is related to granitic intrusions which cut all metamorphic formations, and to fracture systems occurring on the steeper dipping limb or the nose of the Lynx Creek Anticline.

Trenching of both anomalous areas and known prospects has proved in most cases ineffective and costly when compared to the results obtained.

Mineralization consists of:

1. Gold, tin, tungsten, placer deposits
2. Gold bearing pyrite-arsenopyrite deposits
3. Silver bearing lead antimony deposits

4. Chalropyrite-pyrrhotite bearing fractures in greenstones.
5. Manganese-siderite veins containing galena, antimony in quartz porphyry.
6. Scheelite bearing quartz diopside skarn deposits.
7. Pegmatite tin deposits.

The survey was mainly a reconnaissance type and served as the basis for the elimination of certain groups of claims. Several of the prospects investigated are considered not economic. Assessment work was recorded on eleven groups of claims before the end of the field season and sufficient work completed to permit all remaining groups to be recorded.

Mineralized veins existing on the property, and heretofore unknown, have been located by means of geochemical reconnaissance soil sampling. It is the writer's firm conviction that additional veins not yet uncovered exist within the greenstone area.

In practically all cases where zinc values were anomalous (in soils), lead values were anomalous as well. It is obvious that extractions for zinc only may be used as an indicator in areas not containing swamps, excessive amounts of peat or excessive depths of glacial material. Occasional extractions of lead of the anomalous zinc values obtained will serve as checks on high zinc values.

The spacing interval of sample stations varied from 100-300 feet perpendicular to trends of mineralized zones on reconnaissance grids, and contour sampling; and from 25-100 feet on close grids of anomalous areas or individual prospects.

Variations in sampling at different depths were not investigated due to the difficulty of obtaining soil samples at depths greater than one foot below the surface. However, according to Boyle samples obtained near bedrock are much more effective than those obtained close to the surface, especially in glacial soils or thick residual soils.

The effects of mechanical dispersion generally are thought to be not very great. Where lead is used as an indicator, the apex of the anomaly, even on slopes, is probably not far removed from the source of the mineralization.

The dispersion of copper in glacial soils is difficult to interpret due to the low range of variation in copper values. However, a marked variation exists between copper values obtained from greenstone areas and thin bedded quartzites or schists. The copper content of the greenstone areas is sufficiently high to be able to separate on the basis of geochemical analyses of lead, the greenstone from other rock types.

Wide spaced grids or contour samples are considered to be efficient and effective reconnaissance methods which will not allow any major lodes or vein faults to be overlooked. However, for best results on detailed grids, a spacing of not more than 25 feet is recommended.

The presence of the permafrost promotes difficulty of sampling (mechanically) but does not appear to affect the accuracy of the results obtained.

Relatively inexpensive power driven drilling tools were found to be useless in penetrating the permafrost. Hand methods of sampling still remain the most economical and utilitarian techniques.

The overall background of both lead and zinc is considerably higher than that normally obtained from rocks of this kind and age.

Several creeks tested for copper (water samples) gave high colour indexes but generally did not reveal easily recognizable cut-off points. The dithizone being used for these samples is suspected of having been deteriorated (oxidized).

Sufficient mineralization as indicated by both pedogeochemical anomalies and specific prospects points to the area in the vicinity of Lynx Dome as a potential ore bearing zone. Further work, geochemical, prospecting, panning, magnetometer, and possible diamond drilling is warranted and strongly recommended for this area.

RECOMMENDATIONS

It is recommended that:

1. An eight man crew be employed to continue exploration of the property; the crew to consist of:
   - 1 geologist
   - 1 geological assistant
   - 1 cook
   - 1 laboratory analyst
   - 4 prospectors and/or general help

2. The structure of the quartzite be worked out by means of magnetometer; the contacts be located by: No.
   - a) magnetometer
   - b) extraction of copper in soil samples.

The base map prepared of this area be on a scale of 1"=500' or larger; every effort be made to locate any or all fracture systems, shear zones, and changes of rock types within this area; this work to be completed before the spring thaw to facilitate the exploration since a large part of this area is in low lying, swampy, and heavily vegetated ground.

3. The geochemical programme be limited to detailed sampling of the quartzite greenstone area between Dodd, Dela, and Lynx Creek; this to be done in conjunction with or after the completion of part 2; the number of samples be limited to approximately 1000.

4. The following prospects be eliminated from further investigations:

1) Elson Gulch gold show
2) Cascallen Gulch
3) Fisher Gulch - main anomaly
4) Lucky Strike

5. Shallow diamond drilling be initiated on the following prospects:

1) Potato Hill gold show - 3 holes - No. 1 hole, 100' north of the vein, -45° due south, to intersect the vein 100' below the surface; No. 2 hole, 200' west of No. 1 hole and 100' north of the vein at -65° due south to intersect the vein 200' below the surface; No. 3 hole, 150' northeast of No. 1 hole at -45° southwest to intersect the vein 100' below the surface.

2) Wallace Creek Prospect - 5 holes to intersect the vein at various depths up to 250' in the vicinity of the shaft.

3) Lynx No. 26 M.C. - 3 to 5 holes, both north and south of the domed structure indicated on the geologic sketch to explore mineralization below the surface.

6. The following claims be allowed to lapse: Group #M-501
502
503
504
507
508
509
510
511
514
515
143447

7. Provision be made to ensure a water supply for drilling purposes since during a normal year, water at higher elevations, is extremely scarce.

8. The trenching be dispensed with except in very favourable and easily accessible areas; investigations of target areas to be completed directly by means of

diamond drilling after preliminary geochemical, magnetometer, and prospecting methods.

9. The Company consider a programme of property examination and encourage property submissions.

ESTIMATE OF COST - 1965

PRE-SEASON EXPENSES	
Engineering supplies, maps, etc.	$ 50.00
FIELD EXPENSES	
Caterpillar	3,000.00
Wages	18,500.00
12% W.C.B.	2,220.00
Insurance, U.I.C., etc.	350.00
SUPPLIES	
Camp supplies	450.00
Food supplies	5,000.00
Geochem supplies	165.00
TRANSPORTATION	
Crew fares (return)	1,600.00
Equipment rental	2,000.00
Truck operation	2,500.00
GENERAL EXPENSES	
Communications, freight, etc.	1,000.00
Assaying	750.00
Board and room	600.00
Recording assessment work	1,000.00
DIAMOND DRILL COSTS	
2500' contract at $15.00 per foot	37,500.00
Crew transportation, incidentals	1,000.00
ADMINISTRATION (4 months)	5,000.00
CONTINGENCIES 15%	12,000.00
TOTAL	$94,705.00

The total requirements for the 1965 field season are estimated to be not less than $94,705.00 if the programme as outlined in the Recommendations is to meet with success.

CLAIMS

The names of claims, their numbers, group numbers and dates of expiry are listed below in order of Group #'s. All claims, except for Group M-507 and M-508, (which are in good standing subject to the completion of requirements imposed on all claims recorded under Section 53(4) of the Yukon Quartz Mining Act. - Conditions governing acceptance of Geological, Geophysical, Geochemical and Engineering Evaluation Surveys as assessment work) are in good standing as indicated. Sufficient assessment work was done during the 1964 season to allow all claims to be recorded for one additional year. Group #M-505 was recorded for 5 years.

During 1964, 36 additional claims were staked; 12 on the former "Cannex" ground north of Fisher Gulch and, 24 in the area enclosed by Dodd, Bobsie, and Lynx Creeks. These claims comprise the Mel Group (12 claims - Group No. 143447); Snow Group (16 claims - Group No. 167079) and Moose Group (8 claims-Group No. 167079) respectively.

Name	No.	Date of Expiry	Group #
PAT #7	81119	May 24, 1966	M-501
PAT #8	81120		
PAT #9	81121		
PAT #10	81122		
PAT #11	81123		
PAT #12	81124		
PAT #13	81125		
PAT #18	81130		
PAT #19	81131		
PAT #20	81132		
PAT #21	81133		
PAT #22	81134		
PAT #23	81135		
PAT #24	81136		
PAT #191	81137		
PAT #192	81138		
PAT #1	81113	May 24, 1966	M-502
PAT #2	81114		
PAT #3	81115		
PAT #4	81116		
PAT #5	81117		
PAT #6	81118		
PAT #14	81126		
PAT #15	81127		
PAT #16	81128		
PAT #17	81129		

Name	No.	Date of Expiry	Group #
JA #25	80797	Sept. 1, 1965	M-502
JA #26	80798		
JA #29	80801		
JA #30	80802		
JA #31	80803		
JA #32	80804		
LS #1	61869	Aug. 6, 1965	M-503
LS #2	61870		
LS #3	61871		
LS #4	61872		
LS #5	61873		
LS #6	61874		
JA #9	80778	Sept. 1, 1965	
JA #10	80782		
JA #11	80783		
JA #12	80784		
JA #13	80785		
JA #14	80786		
JA #15	80787		
JA #16	80788		
JA #17	80789		
JA #18	80790		
JA #1	80773	Sept. 1, 1965	M-504
JA #2	80774		
JA #3	80775		
JA #4	80776		
JA #5	80777		
JA #6	80778		
JA #7	80779		
JA #8	80780		
JA #19	80791		
JA #20	80792		
JA #21	80793		
JA #22	80794		
JA #23	80795		
JA #24	80796		
JA #27	80799		
JA #28	80800		
LYNX #15	80819	Sept. 1, 1969	M-505
LYNX #16	80820		
LYNX #17	80821		
LYNX #18	80822		
LYNX #19	80823		
LYNX #20	80824		
LYNX #21	80825		
LYNX #22	80826		
LYNX #23	80827		
LYNX #24	80828		
LYNX #25	80829		
LYNX #26	80830		

Name	No.	Date of Expiry	Group #
DOME #73	82937	May 24, 1971	M-505
DOME #74	82938		
DOME #186	81100		
DOME #188	81102		
DOME #1	82863	May 24, 1965	M-506
DOME #2	82864		
DOME #3	82865		
DOME #4	82866		
DOME #5	82867		
DOME #6	82868		
DOME #7	82869		
DOME #8	82870		
DOME #9	82871		
DOME #10	82872		
DOME #11	82873		
DOME #12	82874		
DOME #41	82905		
DOME #44	82908		
DOME #46	82910		
DOME #48	82912		
JO #1	82651	Sept. 13, 1965	M-507
JO #2	82652		
JO #19	82669		
JO #20	82670		
JO #21	82671		
JO #22	82672		
JO #23	82673		
JO #24	82674		
PS #1	82627		
PS #2	82628		
PS #3	82629		
PS #4	82630		
PS #5	82631		
PS #6	82632		
PS #21	82647		
PS #22	82648		
JO #3	82653	Sept. 13, 1965	M-508
JO #4	82654		
JO #5	82655		
JO #6	82656		
JO #7	82657		
JO #8	82658		
JO #9	82659		
JO #10	82660		
JO #11	82661		
JO #12	82662		
JO #13	82663		
JO #14	82664		
JO #15	82665		
JO #16	82666		
JO #17	82667		
JO #18	82668		

Name	No.	Date of Expiry	Group #
PS #13	82639	Sept. 13, 1965	M-509
PS #14	82640		
PS #15	82641		
PS #16	82642		
DOME #125	81039	May 24, 1966	
DOME #126	81040		
DOME #127	81041		
DOME #128	81042		
DOME #141	81055		
DOME #142	81056		
DOME #143	81057		
DOME #144	81058		
DOME #147	81061		
DOME #148	81062		
DOME #149	81063		
DOME #150	81064		
PS #7	82633	Sept. 13, 1965	M-510
PS #8	82634		
PS #9	82635		
PS #10	82636		
PS #11	82637		
PS #12	82638		
PS #17	82643		
PS #18	82644		
PS #19	82645		
PS #20	82646		
PS #23	82649		
PS #24	82650		
DOME #145	81059	May 24, 1966	
DOME #146	81060		
DOME #151	81065		
DOME #152	81066		
LYNX #11	80815	Sept. 1, 1965	M-511
LYNX #13	80817		
LYNX #29	80833		
LYNX #30	80834		
LYNX #31	80835		
LYNX #32	80836		
LYNX #33	80837		
LYNX #34	80838		
LYNX #35	80839		
LYNX #36	80840		
LYNX #37	80841		
LYNX #38	80842		
LYNX #39	80843		
LYNX #40	80844		
DOME #189	81103	May 24, 1966	
DOME #190	81104		

Name	No.	Date of Expiry	Group #
LYNX #1	80805	Sept. 1, 1965	M-512
LYNX #2	80806		
LYNX #3	80807		
LYNX #4	80808		
LYNX #5	80809		
LYNX #6	80810		
LYNX #7	80811		
LYNX #8	80812		
LYNX #9	80813		
LYNX #10	80814		
LYNX #11	80815		
LYNX #12	80816		
LYNX #13	80817		
LYNX #14	80818		
LYNX #27	80831		
LYNX #28	80832		
DOME #54	82918	May 24, 1965	M-513
DOME #56	82920		
DOME #58	82922		
DOME #60	82924		
DOME #62	82926		
DOME #64	82928		
DOME #66	82930		
DOME #68	82932		
DOME #70	82934		
DOME #72	82936		
DOME #130	81044		
DOME #132	81046		
DOME #134	81048		
DOME #136	81050		
DOME #138	81052		
DOME #140	81054		
DOME #13	82875	May 24, 1965	M-514
DOME #15	82877		
DOME #17	82879		
DOME #19	82881		
DOME #21	82883		
DOME #23	82885		
DOME #25	82887		
DOME #27	82889		
DOME #29	82891		
DOME #31	82893		
DOME #33	82895		
DOME #35	82897		
DOME #37	82899		
DOME #39	82903		
DOME #121	81035		
DOME #123	81037		

Name	No.	Date of Expiry	Group #
DOME #14	82876	May 24, 1965	M-515
DOME #16	82878		
DOME #18	82880		
DOME #20	82882		
DOME #22	82884		
DOME #24	82886		
DOME #26	82888		
DOME #28	82890		
DOME #30	82892		
DOME #32	82894		
DOME #34	82896		
DOME #36	82898		
DOME #38	82900		
DOME #40	82904		
DOME #122	81036		
DOME #124	81038		
DOME #53	82917	May 24, 1965	M-516
DOME #55	82919		
DOME #57	82921		
DOME #59	82923		
DOME #61	82925		
DOME #63	82927		
DOME #65	82929		
DOME #67	82931		
DOME #69	82933		
DOME #71	82935		
DOME #129	81043		
DOME #131	81045		
DOME #133	81047		
DOME #135	81049		
DOME #137	81051		
DOME #139	81053		
DOME #81	82945	May 24, 1965	M-517
DOME #83	82947		
DOME #85	82949		
DOME #86	82950		
DOME #88	81002		
DOME #90	81004		
DOME #92	81006		
DOME #94	81008		
DOME #105	81019		
DOME #106	81020		
DOME #107	81021		
DOME #108	81022		
DOME #169	81083		
DOME #170	81084		
DOME #171	81085		
DOME #172	81086		

Name	No.	Date of Expiry	Group #
DOME #45	82909	May 24, 1965	M-518
DOME #47	82911		
DOME #49	82913		
DOME #50	82914		
DOME #51	82915		
DOME #52	82916		
DOME #77	82941		
DOME #78	82942		
DOME #79	82943		
DOME #80	82944		
DOME #82	82946		
DOME #84	82948		
DOME #101	81015		
DOME #102	81016		
DOME #103	81017		
DOME #104	81018		
DOME #42	82906	May 24, 1965	M-519
DOME #43	82907		
DOME #75	82939		
DOME #76	82940		
DOME #97	81011		
DOME #98	81012		
DOME #99	81013		
DOME #100	81014		
DOME #161	81075		
DOME #162	81076		
DOME #163	81077		
DOME #164	81078		
DOME #165	81079		
DOME #166	81080		
DOME #167	81081		
DOME #168	81082		
DOME #115	81029	May 24, 1965	M-520
DOME #117	81031		
DOME #119	81033		
DOME #153	81067		
DOME #155	81069		
DOME #156	81070		
DOME #157	81071		
DOME #158	81072		
DOME #159	81073		
DOME #160	81074		
DOME #179	81093		
DOME #180	81094		
DOME #181	81095		
DOME #182	81096		
DOME #183	81097		
DOME #184	81098		

Name	No.	Date of Expiry	Group #
DOME #113	81027	May 24, 1965	M-521
DOME #114	81028		
DOME #116	81030		
DOME #118	81032		
DOME #120	81034		
DOME #154	81068		
DOME #177	81091		
DOME #178	81092		
DOME #193	81105		
DOME #195	81107		
DOME #197	81109		
DOME #198	81110		
DOME #199	81111		
DOME #200	81112		
DOME #87	81001	May 24, 1965	M-522
DOME #89	81003		
DOME #91	81005		
DOME #93	81007		
DOME #95	81009		
DOME #96	81010		
DOME #109	81023		
DOME #110	81024		
DOME #111	81025		
DOME #112	81026		
DOME #173	81087		
DOME #174	81088		
DOME #175	81089		
DOME #176	81090		
DOME #194	81106		
DOME #196	81108		
RAIN #1	81705	July 10, 1965	M-523
RAIN #2	81706		
RAIN #3	81707		
RAIN #4	81708		
RAIN #5	81709		
RAIN #6	81710		
RAIN #7	81711		
RAIN #8	81712		
RAIN #9	81713		
RAIN #10	81714		
RAIN #11	81715		
RAIN #12	81716		
RAIN #13	81717		
RAIN #14	81718		
RAIN #15	81719		
RAIN #16	81720		

Name	No.	Date of Expiry	Group #
MOOSE #1	83726	November 3, 1965	167079
MOOSE #2	83727		
MOOSE #3	83728		
MOOSE #4	83729		
MOOSE #5	83730		
MOOSE #6	83731		
MOOSE #7	83732		
MOOSE #8	83733		
SNOW #1	83734	November 3, 1965	167079
SNOW #2	83735		
SNOW #3	83736		
SNOW #4	83737		
SNOW #5	83738		
SNOW #6	83739		
SNOW #7	83740		
SNOW #8	83741		
SNOW #9	83742		
SNOW #10	83743		
SNOW #11	83744		
SNOW #12	83745		
SNOW #13	83746		
SNOW #14	83747		
SNOW #15	83748		
SNOW #16	83749		
MEL #1	83558	July 31, 1965	143447
MEL #2	83559		
MEL #3	83560		
MEL #4	83561		
MEL #6	83562		
MEL #7	83563		
MEL #8	83564		
MEL #9	83565		
MEL #11	83566		
MEL #12	83567		
MEL #13	83568		
MEL #14	83569		

GEOLOGY

GENERAL GEOLOGY

A considerable amount of work has been done in the general area. The first report of the geology of the Mayo Area was prepared by Keele in 1906. Cockfield did further work in 1920. Bostock mapped the area in 1947. Boyle described the geology and geochemistry of Keno Hill in 1956. Tempelman-Kluit mapped the area from Secret Creek to Ray Gulch in 1962 on a scale of 1 inch to

1000 feet. Poole mapped the Mount Haldane (105-M13) and Dublin Gulch (106-D4) map areas on a scale of 1 inch to 1 mile in 1964. In addition to this a reconnaissance geochemical investigation was completed over this area to determine the heavy metal content and the heavy mineral content of stream waters, springs and rivers. This was carried out by C.F. Gleeson in 1964. Other writers include Kindle and McTaggart.

The mapping carried out by Mayo Silver Mines Ltd. incorporated Tempelman-Kluit's map of the western part of the property. The reconnaissance map prepared by Mayo in the field on a scale of 1" = 500' was reduced to 1" = 1000' after completion of the project. Due to the scarcity of outcrop, aerial photo interpretations were included in the map wherever possible to corroborate or extend data gathered in the field.

The map units shown on the base map belong to the Yukon Group which was classified by Bostock. The sequence is not definitely known since stratigraphic tops were not determined in the field. It is assumed, for lack of evidence, that the beds although tilted have not been overturned and that the sequence is of precambrian or late paleozoic age. A limestone bed which could be used as a marker horizon and which crops out in three localities is displaced by faulting to such an extent that, correlation though possible, is by no means certain.

Among other problems encountered in the mapping of this area and the tracing of sequences is the gradation of one rock type into another without clearly recognizable boundaries being present to accurately locate contacts. A phyllite may blend into a micaceous quartzite which in turn may grade into a massive quartzite. It becomes increasingly more difficult as the area mapped decreases in size to accurately locate contacts and boundaries of the general formations being mapped. Nevertheless, the map units shown, located as accurately as possible, were traced in some cases, over considerable distances.

FORMATIONS

The formations as exposed appear as indicated below. The formations mapped appear to be youngest in the northern part of the map area. This is supported by:

a) The law of deposition.

b) The degree of metamorphorism.

(Assuming no overturning of sedimentary beds has occurred.)

Period	Lythology
1. Recent	Stream deposits, permafrost
2. Pleistocene	Glacial till, gravel, stratified glacial deposits.
3. Jurassic?	Quartz feldspar porphyry, granodiorite to quartz diorite.
4. Jurassic or Late Paleozic	Greenstone
5. Paleozoic or Precambrian	Massive quartzite
	Phyllite
	Quartz chlorite schist
	Limestone
	Micaceous to Sericitic quartzite
	Brown micaceous quartzite containing
	Andalusite Hornfels
	Grey micaceous thin to thick bedded quartzite.
	Skarn

STREAM DEPOSITS, PERMAFROST

As stated previously, most of the rivers and creeks draining the property contain gravels and boulders of varying size and composition. Andesitic material which must have been derived from areas a considerable distance removed from the property were noted in many of the riverbeds especially the upper part of west Haggart Creek.

Permafrost underlies practically all of the slopes in the area but is commonly very near the surface on north dipping slopes. In many localities it requires merely the removal of the thick moss covering to encounter the permafrost. In such cases trenching is an expensive and practically useless proposition. Permafrost at Keno has been encountered at depths of 400 feet without signs of terminating.

GLACIAL TILL, GRAVEL, STRATIFIED GLACIAL DEPOSITS

This formation covers the lower slopes and the valley floors up to elevations of 3500 to 4000 feet. Where trenches cut through the glacial material, a thickness varying from 2 - 3 feet to 15 feet or more was exposed. At elevations of 3500 feet or more, the thickness of the material is generally between 2 - 6 feet.

QUARTZ FELDSPAR PORPHYRY

This unit is found as dykes associated with related granodiorite bodies from which it is thought to originate. It consists of rounded quartz grains and phenocrysts of feldspar in a light coloured micaceous ground mass. The rock has been heavily altered and

> "is indistinguishable from the altered basic quartz diorite in thin section". Geology of the Haggart Creek - Dublin Gulch Area, Mayo District, Yukon Territory, D.J. Tempelman-Kluit.

It is easily recognizable in the field by its appearance as described above. The unit should properly be included with the granodiorite intrusive because it is too small to be shown on the reconnaissance map except in one or two cases. However, due to its age relationship and its association with galena-pyrite-arsenopyrite mineralization and its occurrence in several localities to the south of the map area, it has been mapped as a separate unit. It occurs more frequently in the Fisher Gulch group of claims than elsewhere possibly due to the fact that sills are more readily exposed in this part of the map sheet.

GRANODIORITE TO QUARTZ DIORITE

The location of the granodiorite stock south of Dublin Gulch and of the various granodiorite to quartz diorite sills is shown on the geological map accompanying this report. The stock and most of the sills were mapped by D.J. Tempelman-Kluit during the summer of 1962; several smaller sills were mapped by Mayo Silver Mines in 1964. According to Tempelman-Kluit, these rocks vary from west to east in colour and composition as well as other minor features. In the western part they become darker coloured, contain less K Feldspar and more quartz and generally tend more toward the quartz gabbro end of the classification table. In the field or in hand specimens, under megascopic examination, this difference is easily discernible. The rock is light grey, medium to coarse grained, well-jointed, and weathered. The average composition based on a megascopic examination would be approximately as indicated below.

Quartz - 30%
K Feldspar - 35%
Na Feldspar - 25%
Mafic Minerals (chiefly biotite) - 10%

The granodiorite stocks and sills are the source of the placer gold mined for years at Dublin Gulch. Scheelite, associated with pegmatites and in non-commercial quantity, also occurs in the granodiorite. Tin is found, again in pegmatites, in one or two localities in the granodiorite stock, or sills. It is also found in great quantity in the placer gravels being mined for gold at Dublin Gulch.

The sparsely mineralized dyke encountered during the trenching of the Fisher Gulch anomaly is thought to be a fine grained off-shoot of this stock system.

GREENSTONE

This unit crops out in one part of the claim group as shown on the geologic map. It is intrusive into the limy, grey quartzite as a sill which theoretically should taper out at the edges. That it does not do so is apparent from the strike and dip information of the greenstone outcrops shown on the map. It has been injected into the metamorphosed sedimentary unit between bedding planes and subsequently altered. At some localities it is schistose; at others, massive. One feature of the greenstone map unit is the presence of rhyolite dykelets and veinlets, always barren but distinctively younger. Rhyolite dykes were seen only in float material, especially on the west side of Moose Creek. Of the area mapped, only a very small percentage consists of outcrop. The greenstone probably is an altered andesite.

MASSIVE QUARTZITE

The massive quartzites located on the geological map are composed of slightly feldspathic, green to red siliceous looking rocks. Essentially they consist of quartz, a little kaolin, biotite and some limonite. Phyllites mapped separately are interbedded with this rock type. Massive quartzites are found mainly in that part of the claim block west of Haggart Creek.

PHYLLITE

This formation mapped in the northwestern part of the claim block consists of light green, red, and dark coloured slaty to phyllitic material. In the field mapping, the differently coloured sub-units of this formation could be distinguished on the basis of colour, but since their structural relationship identifies them as the same rock type, no such distinction was made. The phyllitic formation offers a very limited potential for mineralization on the property.

QUARTZ CHLORITE SCHIST

This unit consists predominately of a greenish coloured micaceous to chloritic schist containing narrow lenses of quartz parallel to the bedding and narrow 2" wide bands of rusty weathering, ferruginous dolomite. The rock has been folded and faulted extensively and is thought to overlie conformably the limestone bed in the central section of the map area. According to Stockwell, the schist forms the upper part of the lower schist series described by him in 1926. Its exact relationship structurally and genetically is not certain on Mayo Silver Mines property.

This unit contains galena-sphalerite-jamesonite-siderite showings along Wallace Creek.

LIMESTONE

The limestone formation consists of a light blue, fine grained, well jointed series of disrupted lenses interbedded with quartz chlorite schist. It is exposed in three places as outcroppings which are terminated abruptly on both ends by faulting. Very little outcrop exists in the area containing the limestone so that tracing of the unit is difficult and uncertain. Minor amounts of quartz chlorite schist outcropping occur scattered within the general area mapped as limestone. A considerable quantity of limestone float encountered between Dela and Lime Creeks, and east of Lime Creek served as the basis for locating limestone contacts. The limestone mapped immediately east of the major cross faults cutting the Lynx Creek greenstone - limy, grey quartzite fold, is believed to consist to a considerable extent of quartz chlorite schist. Similarly, this applies to that section mapped as limestone due north of Wallace Creek. In the neighbourhood of faults, schists, injected by 1 foot wide quartz veins containing siderite and some pyrite, may be found.

MICACEOUS TO SERICITIC QUARTZITE

This formation was traced from the middle part of Bobsie Creek to Potato Hills and then south toward Lynx Creek. It is a rusty looking, weathered, limonitic quartzite containing a considerable proportion of mica or sericite or both. It is within this area that the Potato Hill gold showing is found. The micaceous quartzite at the eastern extremity of the claim block is considered to be a genetic equivalent of the quartz chlorite schist described previously, but it has been mapped as a quartzite due to its change in composition and structurally simple? origin. The unit contains quartz lenses up to 6 inches wide parallel to the bedding and strong joints at right angles to the bedding. At a distance this formation possesses a distinctive reddish brown colouration.

BROWN MICACEOUS QUARTZITE CONTAINING ANDALUSITE HORNFELS

Similar to the micaceous quartzite described above but containing occasional outcrops of andalusite hornfels. The hornfels occurs mostly as float and consists of a purplish yellow, compact, massive rock containing large well developed andalusite prisms. According to Tempelman-Kluit the rock contains cordierite, chlorite, corundum, sillimanite and plagioclase in amounts up to 20%.

GREY MICACEOUS QUARTZITE

The rocks of this unit consist of light green, thin bedded quartzites composed of grey to green phyllitic material, grey to brown ferruginous dolomite, and numerous quartz lenses parallel to the bedding. It varies from locality to locality in its bedding thickness and is intruded by sills of basic diorite which have caused little contact metamorphism locally. The Elsom Gulch gold showing occurs within this unit.

SKARN

Occurs mainly at Ray Gulch and around occasional granitic intrusions to the east of Ray Gulch.

STRUCTURAL GEOLOGY

The structural geology is complex. Little surface information is available to verify any conclusions or assumptions arrived at during the field season investigation. Faults which show up well on air photographs invariably cannot be located on the ground. Shear zones, fracture systems, and other lineaments are all covered by the extensive overburden covering more than 95% of the property. For this reason the interpretation presented is little more than guesswork based on the study of that surface information gathered during the summer and the conclusions arrived at by others during their investigations of geologically similar areas, notably that of Keno Hill. Longitudinal faults, cross faults and vein faults all are present on the property as indicated by aerial photos. Their intersection points below the surface, however, and their dips as well as thicknesses cannot even be guessed at since no underground information is available as a reference framework.

The property lies on the north limb of the McQuesten River west plunging anticline which

> "is some 30 miles wide and 70 to 80 miles long, trends N70°E, and shows dips in the order of 15 to 30° on its limbs".
> A.E. Aho, Mineral Potential of the Mayo District. Western Miner, October 1964, Vol. 37, No. 10, Page 83.

Northwest trending faults which offset the formations (NE, SW) are similar to Keno Hill cross faults and may be mineralized at junctions with vein faults which are displaced by these cross faults.

Longitudinal faults trending northeast, (parallel to the axis of the anticline), and dipping moderately to steeply to the north, may also be mineralized when such faults form acute angles with vein faults resulting in a fracture zone which when subsequently mineralized, will form ore bodies. The showing at Wallace Creek is believed to lie on a longitudinal fault offset by cross faults at either end and mineralized where it is joined by a vein fault - indicated by a 30 foot wide shear zone - at an acute angle. The extension of this vein fault should be sought on the east side of the cross fault which has displaced the limestone band at Wallace Creek. Displacement to the north (east of the fault) is thought to be in the order of 250 - 500 feet.

Northeast vein faults - these are ore bearing zones dipping moderately to steeply to the north. At Keno these faults have been extensively mapped in underground workings. At Mayo, except for the Wallace Creek showing, all vein faults of economic potential should occur in the greenstone or thick bedded quartzites in the vicinity of Dodd, Moose, Bobsie and Lynx Creeks. This area has been locally warped and forms what is known as the "Lynx Creek Anticline", or more accurately the Lynx Creek fold.

Of the number of faults mapped on the basis described above, several deserve mention, in particular. These are:

A. Cross Faults

1. Lime Creek fault which localized the creek by that name.
2. Greenstone fault, which appears to cut the eastern end of the Lynx Creek anticline.
3. The fault falling between these two.
4. The fault falling on Haggart Creek.

B. Longitudinal Faults

5. Lynx Creek fault

6. East Arm Haggart Creek fault

C. Vein Faults

7. Wallace Creek shear

8. Other northeast trending faults in the vicinity of Wallace Creek.

The Lynx Creek anticline closes to the west, has fairly uniform dips, and extends as far as Haggart Creek. It is cut on the east by the major cross fault described earlier and on the south by a longitudinal fault along Lynx Creek - not shown on the map. This anticline was formed by the intrusion of the altered andesite sill.

PARTICULAR STRUCTURAL FEATURES OF THE PROPERTY

1. Greenstone sills and laccoliths are confined to the quartzite horizon of the middle quartzite series exposed on the upper part of Lynx Creek.

2. Quartz diorite to granodiorite sills and irregular bodies cut all formations and have altered metasomatically those formations with which they have come in contact.

3. Jointing consists of 2 sets; one striking approximately N-S dipping vertically; the other striking E-W dipping 55°S.

4. Foliation has served as the basis for locating the anticline along Lynx Creek.

5. The limestone bed south of Lynx No. 26 mineral claim is approximately 200' thick. It has been displaced to the S-W by a bedding fault so that it is now exposed next to the quartz chlorite schist. It has been faulted by cross faults on either end.

6. Quartz chlorite schist overlies conformably the limestone formation which is exposed partly because of faulting along bedding planes.

7. The micaceous quartzite in the vicinity of the Lucky Strike mineral claims is a genetic equivalent of the quartz chlorite schist mapped in the central portion of the claim block.

8. Thrusting, if it has occurred at all, has occurred along bedding planes.

9. Repetition of bedding, though not mapped, is believed to exist on the property.

The structural control of the Mayo property is related to the McQuesten anticline and on a smaller scale to the Lynx Creek anticline. The structural control of ore bearing veins is related to N-S deformation; to fractures, gleitbrett structures and joints on the nose of the Lynx Creek fold, or on the steeper dipping limb of this fold.

GEOLOGIC HISTORY

Briefly the history of the area is as follows:

1. Deposition of siltstones, sandstones, and interbedded argillites.
2. Deformation (shearing) to produce folds in the siltstones and sandstones; displacement of limestone beds.
3. Faulting in an east-west direction along bedding accompanied by regional metamorphism.
4. Intrusion of granodiorite stocks and sills accompanied by local contact metamorphism; local distortion of sediments; fracturing; faulting in a N-S direction.
5. Filling of fractures by mineralizing solutions and vapors from granitic intrusions.
6. Intrusion of andesite sill (laccolith) forming the incomplete fold structure along Lynx Creek.
7. Continuing mineralization of concommitant fracturing and faulting including those of the andesite sill.
8. Continuing deformation causing the alteration of the andesite sill to greenstone.
9. Glaciation.
10. Erosion.
11. Glaciation.
12. Erosion.

Periods of quiescence are believed to have separated the bedding plane shearing from subsequent faulting and later intrusions of granodiorite bodies.

ECONOMIC GEOLOGY

GEOCHEMICAL ANOMALIES

Geochemical anomalies occurring on the property are widespread and numerous. It appears that mineralization scattered over a considerable portion of the property is sufficient to allow for the dispersion of both lead and zinc in amounts large enough to create anomalous zones and point to specific areas as favourable exploratory targets. The investigation of some of these anomalous zones has yielded discouragingly poor results when such anomalies occur in schists or thin bedded quartzites. However, it is emphasized that these conditions do not hold true for any anomalous areas outlined in thick bedded quartzites or greenstone formations. The most persistent veins at Keno have been shown to occur only in thick bedded quartzites or greenstones. Where veins enter thin bedded quartzites or phyllites they lense out and eventually disappear entirely.

The greenstone area south of Lynx Dome is considered to be the most favourable location for the occurrence of mineralized veins. The general competent nature of the host rock, the presence of chalcopyrite in fractures, which at Keno Hill is usually found at fault intersections with veins in dilatant zones containing the ore material, the increase in values in ppm. of the Cu in soil samples from an average of approximately 20 ppm outside the area to an average of approximately 200 ppm as the area is approached, the general low values of the silt samples which become anomalous in some of the streams draining this area, and the presence of N-S trending fractures, and/or fault zones all point strongly to the possibility of the existence of ore bearing veins within this quartzite-greenstone formation. In addition to this, the significantly high lead values (see profiles) reinforce this possibility when it is remembered that such anomalous values are much more meaningful if they occur in competent thick bedded quartzites or greenstones. Attention is directed to the necessity of finding:

a) Fracture zones
b) Greenstone quartzite contacts
c) All anomalous areas
d) Changes in rock types favourable for the formation of breccia zones.

Conditions governing the location of ore bearing veins are subject to the possession of this knowledge.

MINERAL POTENTIAL

Genetically, all mineralization is related to the more acid intrusive bodies since it is believed that the veins formed during the last part of the cooling stage of these intrusives. (Cockfield 1923; Stockwell 1925)

The main types of mineral deposits found on the property are:

1. Placer deposits containing gold, tin, scheelite, galena and tungsten.
2. Gold bearing arsenopyrite veins.

3. Pyrite, arsenopyrite veins - generally barren but sometimes containing gold.

4. Scheelite bearing quartz diopside skarn deposits.

5. Chalcopyrite - pyrrhotite bearing fractures in greenstones - also containing small amounts of nickel.

6. Manganese - siderite veins containing galena, tetrahedrite, pyrite, jamesonite occurring in greenstone?, quartzite schists and in fractures in quartz porphyry.

7. Minor amounts of molybdenite in granodiorite bodies. C.F. Gleeson, Report of Activities, Field 1964.

8. Pegmatite tourmaline - tin deposits.

PROBLEMS PECULIAR TO THE AREA AND TO MAYO SILVER MINES

Various problems encountered in the exploration of this area tend to delay or hinder development. Some of these problems - not necessarily listed in order of importance - are:

1. Transportation.

2. Lack of outcrop.

3. Scarcity of water.

4. Permafrost.

5. Sampling - mechanical problem - it is difficult to sample properly in frozen ground. A churn drill powered by a chainsaw motor proved completely useless; percussion drills, such as the copco, etc., are equally useless.

6. Poorly developed, poorly drained soil.

7. Ice action - though beneficial in bringing B horizon or even parent rock to the surface, ice action, frost boils, excessive soil creep, etc., distort and cause anomalies to spread fanwise.

8. Peat - large amounts of peat in the soil act as a sponge and give inaccurate geochemical readings in zinc.

9. Residual and glacial soils - the presence of both types of soils promotes uncertain sampling procedures. Values which are anomalous in one type of soil may fall within the background range of another type of soil. A different background value must be established for the different soil type.

10. Contamination - one part of the area gave rise to at least one anomaly caused by contamination - that of Cascallen Gulch. Old leaded tin cans, both in streams and at old workings are believed to be the source of the anomalous

values in lead of both soils and silts gathered by Mayo and Peso crews.

11. Laboratory - the accuracy of readings and the contamination factor are affected adversely due to the temporary laboratory facilities.

SUGGESTIONS FOR PROSPECTING

All prospecting should be restricted to the quartzite - greenstone formations south of Lynx Dome and to the skarn deposits east of Ray Gulch. A number of specific statements in this report suggest additional target areas should a large exploration project be continued for 1965.

GEOCHEMISTRY

GENERAL STATEMENT

A total of 5200 silt and soil samples were taken and analyzed between the dates of June 20 and September 10, 1964. Extractions for total heavy metals (lead, zinc) were made on all these samples. A few samples were run for copper (see Wallace Creek grid) and one or two for arsenic. The samples were plotted and interpreted as indicated on the overlays and the detail maps. The geology, contours (or form lines) structural elements, trenches, patterns of streams and topographic features all are indicated on the main grids and areas. Axes of the anomalies are indicated by the general shape or trend of the anomalies. The soil type (i.e. glacial or residual) is indicated for most of the grids in the description of specific areas.

Two profile curves were constructed but are not considered necessary except possibly for the greenstone area, where the overlay at a scale of 1" = 1000' does not permit the plotting of the values obtained for each sample. If required a profile of isolated traverses may be prepared from the base map and the analysis data (for each soil sample station) listed in this report.

For a complete description of technical problems and procedures related to Mayo Silver Mines Geochemical methods consult the report prepared by Dr. R.E. Delavault. For general information on geochemistry consult U.S.G.S. Bulletin # 1000-F Hawkes and Webb 1962; G.S.C. Bulletin #36,39.

Most of the samples were gathered in the field by D.E.C. Jones, M. DeBriske, M. Martin, F. Dodd, J.F. Schaefle. They were analyzed by R.W. Harvey who was supervised by Dr. Delavault. R. Belhouse assisted Harvey with the analysis work. All interpretations were made by J. Buchholz.

FIELD METHODS

The methods employed by Mayo Silver Mines Ltd., (N.P.L.) in taking soil and silt samples in the field are described below.

A. Soil Samples

After location of the station (pace and compass or as indicated on the detail maps and overlays) the person sampling (by means of an 18" soil auger) bores through the moss cover and humus containing top-soil until the non-leached, light coloured sub-soil (B horizon) is encountered. The soil adhering to the auger is transferred into a plastic sample bag (3½" x 7") by inserting the auger into the sample bag and twisting counter clockwise while holding shut the top of the bag with the left hand. In this way, the auger is extracted from the bag leaving the soil, which is not touched by hand, within the sample bag. The process is repeated until approximately one-third of the sample bag is filled. Before inserting the auger in the bag, all organic material such as rootlets, bits of moss and decaying twigs are removed by hand. Pebbles are removed by "kneading" the material in the bag until they are separated from the soil, allowing the top or coarse material to be eliminated by turning the sample bag upside down while pinching the middle to retain the sample. (A little water in the bag facilitates this "panning" action). The top half of the numbered bag is then folded over twice, rolled around the bottom half, and "tied" with one or two rubber bands. A numbered piece of flagging tied to a bush marks the location of the sample on the ground. All sample bags are numbered the preceding day to speed up the actual sampling process.

B. Silt Samples

After location of the station on the ground (500-1500 intervals), a sample is taken at the edge of the stream in the manner described for soils or by means of an aluminum spoon. The sampler must ensure that the silt sample is not contaminated by slope wash from the banks of creeks and streams. This is best accomplished in creek beds containing water, by sampling 1 - 3' away from the water's edge; and in dry creek beds by sampling at the edge of the channel at moderate depths of 3 - 6". The sample is numbered, marked and tied as described for soils and analyzed according to the laboratory methods described by Harvey. Interpretations of silts depend on the variation of background values (usually higher) and the "cut off" levels of the samples taken at successive intervals in the stream.

LABORATORY METHODS

The following descriptions of the laboratory methods as used by Mayo Silver Mines Ltd. during the summer of 1964 was prepared by R.W. Harvey under the supervision of Dr. R.E. Delavault. Harvey's report is included complete and forms an accurate basis for all future laboratory work.

NOTE:

The laboratory procedures described by Harvey are confidential. His report has been included on separate pages so that it may be deleted from the text of the main report without disturbing the continuity of this report.

SPECIFIC AREAS

Description of specific areas are appended to the Geochemistry section because the geochemical data collected of these areas play a significant part in the evaluation of the individual prospects present on the property.

The various showings may be identified on the base map by referring to the index given below. Prospects are indicated on the base map by the large circled numbers.

INDEX OF PROSPECTS

Prospect No.	Prospect Name
1	Fisher Gulch Main Anomaly
2	Gill Gulch - Peso Ground
3	Haggart Creek
4	Potato Hill North Gold Showing
5	Elson Gulch Gold Showing
6	Lynx #26 M.C.
7	Greenstone Area
8	Wallace Creek
9	Lucky Strike
Not Numbered	Cascallen Gulch

Detail maps were prepared of prospects #1, 2, 4, 5, 6 and 8. #7 and 9 may be evaluated by referring to the overlay and by studying the descriptions of the individual showings.

1. FISHER GULCH MAIN ANOMALY (SEE OVERLAY)

SOIL - Residual and Glacial

Residual - approximately above 3750 feet elevation

Glacial - approximately below 3750 feet elevation

BACKGROUND VALUES

Residual Soil

	Lead	Zinc
Median PPM	38	60
Average PPM	57	78

Range of non-significant variation

Lead PPM - 35 - 250

Zinc PPM - 50 - 400

Threshold value of Lead - 500 PPM

GEOCHEM LABORATORY ANALYSES PROCEDURES FOR LEAD, ZINC AND COPPER IN SOILS, AS USED BY MAYO SILVER MINES LTD. IN SUMMER, 1964

by R. W. HARVEY

GENERAL DESCRIPTION OF KEY REAGENTS AND METHODS EMPLOYED

A one gram sample of soil is heated to dryness with aqua regia. Then a ml. of 1:10 HCL is added to the sample and with stirring and the addition of water, the sample solution is brought up to 20 mls. Approximately 80% of the total lead, zinc and copper is thus bought into solution in ionic form. To simplify calculations, it is assumed that 100% of these elements are in solution. Aliquots of this "test solution" are then analyzed separately for their lead, zinc and copper content. These determinations are colorimetric.

In the determination of the lead and zinc, the key chemical compound is diphenylthiocarbazone (dithizone), and in the determination of copper a biquinoline solution is used.

Dithizone in dilute solution with carbon tetrachloride, chloroform, toluene and other organic compounds is a green solution. Under certain conditions dithizone will form complexes with specific metals. In the case of lead and zinc, these complexes (metal dithizonates) are bright red.

Dithizone in an immiscible organic solvent will react with metals which are present in an accompanying aqueous solution. Under certain conditions, the resulting metal dithizonate will be kept almost entirely in the immiscible organic solvent.

"Although Dithizone reacts with nearly a score of metals, the reaction can be made almost or quite specific for certain metals by resorting to one or more of the following devices:

1. Adjusting the pH of the solution to be extracted.
2. Altering the oxidation state of interfering metals (of minor importance).
3. Adding a complex-forming agent which will tie up other reacting metals."

(Sandell: Colorimetric Determination of Traces of Metals, 1959)

Biquinoline is an organic reagent which gives a colorless solution with amyl alcohol, and complexes copper to give a purplish red compound. Both biquinoline and the copper-biquinoline complex are soluble in amyl alcohol but insoluble in water.

Using dithizone and biquinoline for the colorimetric reagents, the general procedure is to prepare a set of color standards containing known amounts of lead, zinc and copper. For example, in the case of lead, known amounts of lead in a properly prepared aqueous solution (i.e. prepared so that no other metals but lead will react with the dithizone) are shaken with a given amount of dithizone solution. If 1 ml. of 10 mg Dz (dithizone) per liter chloroform solution is shaken with the properly prepared aqueous solution containing no lead, the chloroform layer will be green; if, prior to shaking, the aqueous solution contains 0.5 gamma (10^{-6} grams = 1 gamma) lead, the resulting chloroform layer will be blue (a mixture of the green color of the dithizone and the red color of the lead dithizonate); with 2.0 gammas lead (again, prior to shaking) in the aqueous solution, the resulting chloroform layer will be purplish red (very little uncomplexed dithizone left). More standards are introduced between the 0.0 gamma and 2.0 gamma lead standards, and a graduation of color from green to red results. Similarly, sets of standards are prepared for zinc and copper.

Aliquots of the "test solution" are prepared in the same manner as the standards, and the resulting chloroform layers are compared with the standards. Thus the amount of metal in the unknown is determined.

DETAILED PROCEDURES FOR PREPARATION OF SAMPLE AND DETERMINATION OF LEAD, ZINC AND COPPER

PREPARATION OF "TEST SOLUTION"

The optimum soil sample is a non-leached clay (without pebbles) which is found usually a few inches under the black, humus-containing top soil. A ¼ teaspoonful of this soil (approximately one gram) is used for the analysis; the measuring spoon is stamped in pure aluminum (aluminum must be pure to be easily stamped). The ¼ teaspoon of sample soil is taken on the spoon from the sample bag, and transferred onto a piece of hand towel (4" x 4" is a good size). The water in the sample is squeezed onto the towel as best as possible, and the sample transferred to a 22 x 175 mm. pyrex test tube. The spoon is then cleaned with the remaining hand towel. It is emphasized that the sample is not touched by hand throughout this procedure.

Two mls. of aqua regia (1:3, HNO_3:HCl) is then added to the test tube containing the sample. (The sample must not contain too much water to assure a good attack by the undiluted aqua regia).

The sample is then heated close to dryness. On a Coleman stove this requires approximately one hour. Boil the sample slowly to assure a good attack by the aqua regia. If the sample is not taken practically to dryness, the NO_2 left from the aqua regia will interfere with the analyses, especially in the case of zinc; if the sample is heated too long, it will adhere to the bottom of the tube.

After the sample has cooled slightly, 1 ml. of 1:10 HCl is added. Using a wash bottle, water is added to the tube and all the sample material on the bottom and walls of the tube is scraped free with a glass rod. The glass rod is then washed off with the wash bottle, the wash water going into the t. t. The test tube is filled with water up to the 20 ml. mark and the substance in the test tube is mixed.

ANALYSIS FOR LEAD

REAGENTS

Dithizone Stock Solution:

1 mg. of Dz per 1 ml. of C.P. chloroform. Will be quite stable if kept in a cool place away from direct sunlight.

Dithizone Working Solution:

1 mg. Dz per liter of C.P. chloroform. Prepared by bringing 10 mls. of Dz stock solution up to 1 liter with C.P. chloroform. This solution will keep for at least five days.

Citrate Buffer:

500 gms. ammonium citrate and 50 gms. hydroxylamine hydrochloride dissolved in 1½ liters of water. Ammonia is added to the solution, either by bubbling ammonia gas through the solution (care should be taken to ensure that the solution will not 'back-fire' into the cylinder when removing the hose from the solution, i.e. remove the hose from the solution, then shut off the gas), or by adding fairly concentrated ammonium hydroxide to the solution; the pH of the solution is thus brought up to 9.0 to 10.0. This pH is checked with pHydrion paper of the range, 8.2 to 9.8.

Cyanide Solution:

10 gms. of potassium cyanide per 100 mls. of water. This solution should be prepared daily as it deteriorates quickly.

Ascorbic Acid:

Lead Standard Stock Solution:

100 gamma Pb per ml. of water. Prepared by dissolving 0.040 gms of dry Pb $(NO_3)_2$ in a little water containing a drop of concentrated nitric acid. Then dilute to 250 mls. with water. Store in a polyethylene bottle.

Lead Standard Working Solution:

1 gamma per ml. Prepared by diluting 1 ml. of the Pb standard stock solution of 100 mls. in a glass-stoppered graduated cylinder.

PROCEDURE

Preparation of Standards:

Aliquots of the 1 gamma per ml. lead standard solution are pipetted into test tubes according to the scheme given below; to these aliquots, 2 mls. of citrate buffer is added; shake; then add ½ ml. cyanide solution (using a pipet and pipet filler) and the required Dz per the scheme below. Shake for 40 strokes.

The aliquots are taken and the dithizone added according to the following scheme:

Gammas of lead	0.0	0.2	0.5	0.8	1.0	1.5	2.0	3.0	4.0	5.0	8.0
Mls. of dithizone	½	½	½	1	1	2	2	3	3	3	4

The standards may keep for more than one day when there is little direct sunlight and the air temperature is not high. But it is recommended that these standards be prepared every day.

Lead Determination:

Pipet a one ml. aliquot of the "test solution" in the 22 x 175 mm. test tubes into an 18 x 150 mm. t.t. To this "test aliquot" in the 18 x 150 mm. t.t. add 4-6 mgm. (approx. 3 cu. mm.) of ascorbic acid, and mix. (The ascorbic acid serves to prevent iron interference.) Add 2 mls. of citrate buffer, and mix. Then add ½ ml. of cyanide solution to complex out the zinc; mix.

Carrying on the determination, add to the prepared test aliquot ½ ml. of Dz solution from a buret, shake 40 strokes, and compare with the ½ ml. Dz standards. If the color of the chloroform layer is redder than the 0.5 gamma lead standard, add ½ ml. more Dz solution and compare with the 0.8 and 1.0

gamma Pb and 1 ml. Dz standards, and so on. If the test aliquot can be compared with a given standard or the lead content in this test aliquot can be decided upon by interpolation, then the amount of lead in the original soil sample in ppm will be twenty times the value of the compared standard. The factor of 20 enters since only 1/20 (1 ml.) of the test solution containing the total lead in a gram of soil is used.

If the test aliquot contains so much lead that it does not even fall within the range of the ' 8 gamma Pb : 4 ml. Dz solution ' standard, then a dilution can be made of the test solution; that is, 1 ml. of the test solution is diluted to 20 mls., and then 1 ml. of this solution is taken as the test aliquot. Then, whatever standard this test aliquot compares with, the multiplication factor for the total lead in the soil in ppm is 400.

Notes:

a) Due to the action of iron or copper in basic cyanide aqueous solutions shaken with a chloroform solution of dithizone, oxidation of the dithizone occasionally occurs. This can be recognized by a decrease in the depth of the color in the chloroform layer (an apparent watering down of the color). It is best remedied by taking a smaller test aliquot -- for instance, 0.2 mls.; the multiplication factor for the total lead in the soil is then 100.

b) Occasionally a ½ ml. of cyanide solution is not sufficient to complex out all the zinc. When an anomalous lead value is obtained, it should be checked by shaking the test aliquot with an additional ½ ml. of cyanide solution and noting if the color reverts back towards the green end of the colorimetric scale.

c) The extraction of lead by dithizone in chloroform under the determination conditions stated in the procedure is not complete. If it were practically complete, it would be quite satisfactory to add up to 9 mls. of dithizone solution and to compare with the 3 ml. dithizone standards, thus introducing an additional factor of 3 for total lead in the soil.

d) Ascorbic acid is used in the solid state because solutions of it will not keep well. Although it does not replace hydroxlamine hydrochloride as a protection against manganese, it is the best defence against oxidation by ferric iron.

ANALYSIS FOR ZINC

REAGENTS

Dithizone Stock Solution: 1 mgm. per ml. in chloroform.

Dithizone Working Solution: 20 mgms. Dz per liter in carbon tetrachloride or toluene.

Prepare from above Dz stock solution. If 100 determinations a day are performed, it is best not to prepare more than 500 mls. of this solution at a time since the solution oxidizes quite rapidly. Keep the toluene solutions in a glass bottle.

Acetate Buffer: 500 gms. of sodium acetate and 110 gms. of sodium thiosulfate are mixed in 2 liters of water. 90 mls. glacial acetic acid is added and the total solution is brought up to 3 liters with water.

Hydroxylamine Hydrochloride.

Ascorbic Acid.

Zinc Standard Stock Solution: 100 gamma Zn per ml.; obtain by dissolving 0.050 gms. of zinc in 2 or 3 mls. of concentrated HCl and diluting to 500 mls. with water. Store in a polethylene bottle.

Zinc Standard Working Solution: 1 gamma Zn per ml. Prepare in a stoppered graduated cylinder with 1 ml. Zn standard stock solution diluted to 100 mls. Prepare this solution every time a new set of standards is made up.

PROCEDURE

Preparation of Zinc Standards:

Pipette out 0.2 ml., 0.5, 0.8, 1.0, 1.5, 2.0, 3.0, 4.0, 5.0 ml. aliquots of the zinc standard working solution into test tubes. To these, and also a blank (that is, a test tube containing no zinc), add 5 mgms. of ascorbic acid and 5 mgms. of hydroxylamine hydrochloride, and mix. Then add 2 mls. of acetate buffer and mix. Add 1 ml. of dithizone solution to all the standards and shake each test tube 100 strokes.

The standards may not keep even a full day when the lab is warm and direct sunlight is present.

Zinc Determination:

Take a one ml. test aliquot from the test solution. To this test aliquot add 5 mgms. ascorbic acid and 5 mgms. hydroxylamine hydrochloride; mix. Then add 2 mls. acetate buffer; mix. Add 1 ml. of dithizone solution and compare with the standards. The multiplication factor to obtain total zinc in the sample is 20.

The extraction of zinc is virtually complete when dithizone in CCl_4 (or toluene) is used. As described above, 1 ml. of dithizone solution is added and the test aliquot is matched with the standards. If all the dithizone is complexed (indicated by a red organic layer in the t.t.), add a total of 2, 3, 4, or up to 8 mls. of dithizone solution, to get a mixed color; now multiply the value of the matched standard by 40, 60, 80, up to 160, respectively, for the total zinc in the soil sample.

If this above procedure fails to bring the test aliquot within the range of the standards after addition of 8 mls. of dithizone solution, then a dilution must be performed as outlined for lead.

Notes:

a) Oxidation presents a common problem in the determination of zinc. It manifests itself by a decrease in the depth of the color in the CCl_4 layer, and introduces colors into this layer which cannot be matched with any of the standards. This oxidation can be caused by, among other things, not heating the original soil sample close enough to dryness. If the oxidation is quite pronounced, either perform a dilution or take only a 0.2 ml. aliquot.

b) Emulsions in the CCl_4 layer also occur quite frequently during the zinc determinations. This often makes it difficult to get an exact color match with the standards. Dithizone solution is added until the emulsion takes on a definite bluish color, and it is apparent that the color of the CCl_4 layer in the test aliquot is not off the end of the scale. Then a sufficiently accurate reading may be taken.

Remedies for avoiding these emulsions are: (1) to make sure that the test solution has settled as much as possible after scraping it down (normally takes at least 3 hours), (2) takes a smaller aliquot of the test solution.

c) CCl_4 as opposed to toluene: It is found that there is less oxidation (colors are obtained that can be matched directly with the standards) and less emulsification with CCl_4 than with toluene. But toluene is quite adequate. And CCl_4 is about 2½ times as expensive as toluene per volume.

d) The hydroxylamine hydrochloride cannot be put in with the buffer, as it deteriorates rapidly. (Experimental finding).

e) It may be found more convenient to take a test aliquot of ½ ml. instead of 1 ml. if the background for the zinc in the soil is 100 ppm or more. In this case 1/40 of the total zinc in the soil is in the test aliquot. However, the same amounts of ascorbic acid, hydroxylamine hydrochloride, and buffer are added to this smaller test aliquot.

ANALYSIS FOR COPPER

REAGENTS

Biquinoline Solution: 2,2'-biquinoline solution, 0.02-percent: add 0.20 gms. of 2,2'-biquinoline to 900 mls. of isoamyl alcohol. This is shaken vigorously to dissolve the biquinoline. It is best to warm the solvent to facilitate solution (away from open flame -- possibly in hot water). Bring the solution up to 1 liter. The solution should be colorless, or practically so; if it is yellow, the reagent is impure and should not be used.

Acetate-Citrate Buffer: Dissolve 100 gms. ammonium citrate (dibasic). 100 gms. sodium acetate, 20 mls. glacial acetic acid, 50 gms. hydroxylamine hydrochloride, and 100 mgms. of iron (as $FeCl_3$ or $FeSO_4$) in 1 liter of water. Add the acetic acid after dissolving the other reagents.

Ascorbic Acid.

Copper Standard Stock Solution: 100 gamma per ml.: Dissolve 0.200 gms. of copper sulfate ('$CuSO_4.5\ H_2O$) in 500 mls. of 0.1 M. HCl.

Copper Standard Working Solution: 1 gamma Cu per ml. Made from above in graduated cylinder.

PROCEDURE

Preparation of Copper Standards:

Using the Pb standard working solution, pipette out 0.2 ml., 0.5, 1.0, 1.2, 1.5, 2.0, 3.0, 4.0 and 5.0 ml. aliquots (containing 0.2 gamma, 0.5 gamma, ...of copper). Using the stock solution pipette out 0.8, 1.0, and 1.5 ml. aliquots for the 8 gamma, 10 gamma and 15 gamma standards respectively. (Note: the pipets marked "S" are serological pipets and all the liquid must be blown out of them for accurate work).

Add 5 mgms. of ascorbic acid to a blank and to each standard, and mix. Add 1 ml. of acetate-citrate buffer and make each standard up to 6-7 mls.

Tubes can be marked to this volume). Add one ml. of biquinoline solution to each of these and shake 100 strokes.

Copper Determination:

A 1 ml. test aliquot is taken from the test solution and ascorbized, buffered, and made up to 6-7 mls. as for the standards. One ml. of biquinoline solution is added; then shake the resulting solution 100 strokes. Comparison is made with the standards. If a test aliquot is beyond the range of the standards, a smaller test aliquot may be taken or a dilution made.

Note:
As long as the test solution has settled fairly well, there is usually little trouble in the copper determinations.

Water:

Stream water from many localities can be used. But it should first be tested for heavy metals by shaking with dithizone solution (10 or 20 mgm. per liter) to see that there is no change in the color of the organic layer, and that no lasting emulsions form.

Purification of Reagents:

Purification of C.P. reagents will probably not be required; but, if needed, purification procedures are outlined in the reference below.

Contamination:

It is a good idea to run a blank to check the reagents -- i.e. start by boiling 2 ml. of aqua regia with no sample to dryness; then perform the tests and see that no lead or zinc (or copper) has been introduced.

It was found advisable to use only glass stirring rods for scraping the sample tubes down. Nalgene bottles did not introduce lead, zinc or copper.

SETTING UP THE LAB FOR 100-200 SAMPLES PER DAY -- LEAD AND ZINC DETERMINATION (Two Men)

The determinations are performed in batches of 20 samples, using 24-hole test tube racks for the 22 x 175 mm. t.t.'s. A 1 liter beaker will hold 22 x 175 mm. t.t.'s used for the aqua regia digestion of the samples. And a set of these tubes numbered from 1 to 160 will be adequate for one or two men.

After the aqua regia has been added, the samples are heated in batches of ten tubes in a 1 liter beaker with aluminum foil in the bottom of the beaker. The heating is done on a regular Coleman stove on which is placed an aluminum sheet covering about 3/4 of the stove surface (this is to give a more even heat). The samples are digested, scraped down, filled up to the 20 mls. (the tubes are all marked to this volume), and left to settle over night.

The next morning, the determinations for lead and zinc are made as described earlier. Still working in sets of 20, two sets of twenty 18 x 150 mm test tubes in suitable 36-hole test tube racks are set one in front of the other. Test aliquots are pipetted into these sets for lead and zinc from a set of 20 test solution tubes. (It is considered adequate, in this case, to clean the pipet after each sample solution by wiping it on a piece of absorbent paper and rinsing it out once with each new test solution to be pipetted.) Then the separate operations for lead and zinc are carried out.

Burets are used for dispensing the dithizone solutions; 1 ml. and 10 ml. pipets are adequate for measuring out the other solutions.

The easiest method for dispensing the hydroxylamine hydrochloride and the ascorbic acid was found to be: taking a good portion of the reagent on a folded piece of paper and scraping off 5 mgm. portions (using a toothpick) into the various test aliquots.

Shaking Rack:

The shaking was also carried out in batches of 20 by stoppering twenty 18 x 150 mm. t.t.'s in a rack, and then setting on top of the stoppers a board covered with 3/4" thick foam rubber. The test tube rack is constructed in such a way that the board may be held over the stoppers and all the tubes shaken at the same time.

REAGENTS NECESSARY FOR 1000 DETERMINATIONS

Digestion of the Samples and for Wash Purposes:

500 mls.	HNO_3
3 liters	HCl

Lead Determinations:

.150 gms.	diphenylthiocarbazone
100 gms.	hydroxylamine hydrochloride
600 gms.	ammonium citrate
500 mls.	ammonium hydroxide, sp. gr. 0.900
150 gms.	potassium cyanide
0.2 gms.	lead nitrate
5 liters	chloroform (approx. 7 lbs.)
10 gms.	ascorbic acid

Zinc Determinations:

.150 gms.	diphenylthiocarbazone
110 gms.	sodium thiosulfate
500 gms.	sodium acetate
100 mls.	glacial acetic acid
.05 gms.	zinc, analytical grade
5 liters	carbon tetrachloride (or toluene)
10 gms.	ascorbic acid
10 gms.	hydroxylamine hydrochloride

Copper Determinations:

0.3 gms.	2,2'-biquinoline
1.5 liters	isoamyl alcohol
150 gms.	ammonium citrate
150 gms.	sodium acetate
30 mls.	glacial acetic acid
75 gms.	hydroxylamine hydrochloride
150 mgms.	iron (as $FeCl_3$ of $FeSO_4$)
.20 gms.	copper sulfate (hydrated)
100 mls.	HCl

The above estimates apply when most of the samples are near background contents.

REFERENCES

E.B. Sandell, Colorimetric Determination of Traces of Metals, 1959.
Gives quite a thorough description of the principles and chemistry involved in the above colorimetric procedures.

Ward, Lankin, Canney, USGS Bulletin 1152, Analytical Methods Used in Geochemical Exploration by the USGS.

M.A. Gilbert, Laboratory Methods for Determining Copper, Zinc, and Lead, GSC Paper 59-3.

This information is based on information obtained from Dr. R.E. Delavault, Associate Professor of Geochemistry at the University of British Columbia. Dr. Delavault acted as geochemical consultant for Mayo Silver Mines during the summer, 1964.

Glacial Soil

	Lead	Zinc
Median PPM	20	100
Average PPM	21	95

Range of non-significant variation

Lead PPM - 20 - 150

Zinc PPM - 75 - 450

Threshold value of lead - 350 PPM

The extensive soil sample Grid of the Fisher Gulch group of claims (see overlay) was completed in the first part of the season prior to and during the silt sampling of the streams draining the western part of the property. The main anomaly south of Mel Creek was investigated by means of a detailed soil sample grid, prospecting, and trenching. The prospecting failed to yield any results; trenching was equally discouraging. Mineralization encountered in a 100' wide quartz feldspar porphyry to felsite dyke, consisted of occasional narrow, 6" - 1' long fractures filled with galena, siderite and manganese. Assays of this dyke yielded values not in excess of:

Ag ozs.	Pb%	Zn%	Au ozs.
5.3	3.6	0.24	--

The dyke cuts phyllites and thin bedded quartzites which comprise the major part of the bedrock in this part of the property. Reference to the detailed Fisher Gulch Grid will explain the geology of both the trenching and the anomaly. The anomaly was caused by a concentration of base metal ions in topographic lows. The dyke and the quartzites in which it occurs are considered to be potentially poor hosts for the development of ore bearing veins.

2. GILL GULCH

SOIL - Glacial

BACKGROUND VALUES

	Lead	Zinc
Median PPM	16	75
Average PPM	25	90

Threshold value of lead - 350 PPM

This anomaly was not investigated since it lies on Peso Silver Mines property.

3. HAGGART CREEK

SOIL - Glacial

BACKGROUND VALUE

	Lead	Zinc
Median PPM	26	78
Average PPM	33	118

Range of non-significant variation

Lead - 20 - 150? PPM

Zinc - 75 - 330? PPM

Threshold value of lead - 300 PPM

The area is not considered anomalous and was not investigated further.

4. POTATO HILL NORTH (DOME 118 M.C.) SOIL SAMPLE GRID

SOIL - Residual

BACKGROUND VALUE

	Lead	Zinc
Median PPM	15	120
Average PPM	27	118

Range of non-significant variation

Lead PPM - 10 - 100

Zinc PPM - 110 - 208

Threshold value of lead - 110 PPM

The Potato Hill soil sample grid varies considerably in its range of values from most other soil sample grids on the property. As may be seen it has a considerably lower background value and a greater uniformity of soil sample values in both lead and zinc. This is somewhat peculiar considering that the samples were obtained from residual soil. This peculiarity is best explained by:

a) The lack of silver, lead bearing veins in this area.

b) The relatively flat surface sampled.

c) The lack of circulating ground waters.

Although the soil sample results have eliminated the possibility of finding Silver - Lead - Antimony veins within the grid area, the possibility of extending the gold vein has not decreased since the sampling techniques employed do not apply to auriferous veins.

An assay taken from the vein after the previous trenching was both deepened and extended yielded the following results:

Au ozs.	Ag ozs.	Sb%
.92	3.64	1.56

The vein occurs within a heavily oxidized 3 foot wide shear containing greenish yellow scorodite and arsenopyrite mineralization. It strikes approximately E - W and dips vertically. Its extensions were sought on either end but were not located due to the ineffectiveness of trenching. A thick covering of large blocks of thin bedded quartzite underlain by permafrost, west of the vein and the steep slope east of the vein, block all attempts to cut the vein by means of trenching. Further trenching is not recommended. Future work should consist of shallow diamond drilling.

5. ELSON GULCH GOLD SHOW

The gold prospect east of Elson Gulch (see base map) was not investigated by means of a soil sample grid. The prospect was trenched and prospected, and Elson Gulch was silt sampled as indicated on the overlay.

Two trenches N - E of previous trenching revealed a medium bedded limy grey quartzite containing narrow 2" lenses of buff dolomite along bedding planes. A 2" - 6" wide vein striking 025°, and dipping 35° S - E cuts quartzite bedding striking 090° and dipping 10° N. The vein consists of limonitic quartz containing arsenopyrite, pyrite, and small amounts of oxidized scorodite. A 20' wide rusty weathering zone of blocky one-foot wide quartzite surrounds the vein in the lowest trench. The bottom of the rusty zone is not exposed. Tremolite - actinolite were noted in one or two places within this rusty zone as small blebs associated with the vein and quartz lenses parallel to the bedding. The quartzite becomes increasingly blocky toward the east.

Several assays taken from new trenching yielded the following values in Au: 0.20 ozs., 0.16 ozs., 0.01 ozs., 0.01 ozs.

Disseminated pyrite - arsenopyrite mineralization occurs in small amounts in the host rock revealed by new trenching. Further trenching is not recommended.

6. LYNX #26 M.C.

SOIL - Residual

BACKGROUND VALUE

	Lead	Zinc
Median PPM	50	159
Average PPM	75	182

Range of non-significant variation

Lead PPM - 35 - 250

Zinc PPM - 150 - 350

Threshold Value of lead - 450 PPM

Additional stripping and sampling of the Lynx #26, M.C. revealed additional mineralization (see geology).

Further trenching is not recommended. Instead, the prospect should be explored by means of shallow diamond drilling. (See recommendations)

Assays taken from the mineralized zone exposed by trenching in the quartz chlorite schist host rock, yielded the following results:

Assay No.	Sample Type	Gold	Silver	Lead	Antimony
M-355	Trench - 10'	Trace	-	Trace	Trace
358	"	"	0.7	0.66	0.20
360	"	"	0.4	0.51	0.25
381	"	"	0.1	0.38	0.18
384	"	"	Trace	Trace	0.03
385	"	"	0.7	0.79	0.15
386	"	"	0.7	0.77	0.10
10	"	0.00	60.80	65.60	-
201	"	Trace	11.62	36.80	-
202	"	"	30.60	58.10	-
203	"	"	5.48	27.10	-
204	"	"	2.40	14.00	-
206	"	"	7.50	5.10	-

Various amounts of zinc (up to 5.71%) were also obtained from these assays. For geology and soil sampling results refer to the Lynx No. 26 M.C. detail map.

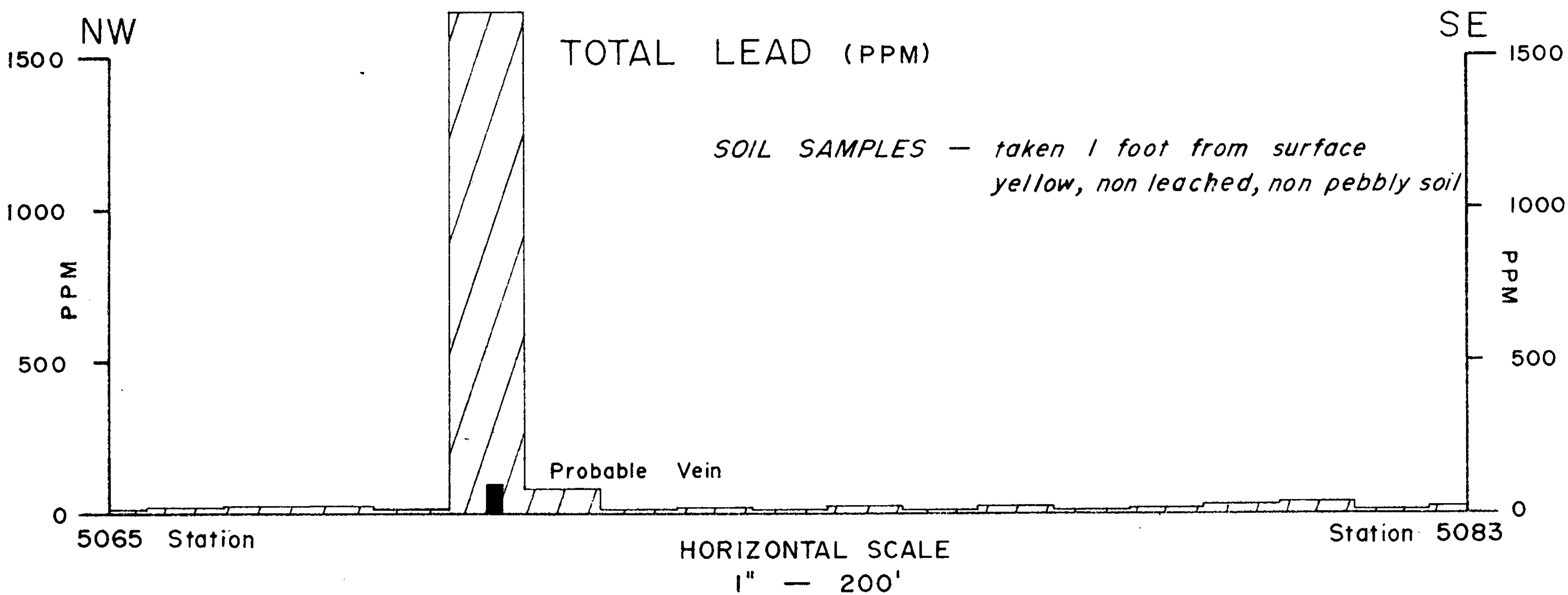
7. GREENSTONE AREA

SOIL - Glacial

BACKGROUND VALUE

	Lead	Zinc
Median PPM	13	95
Average PPM	17	118

GREENSTONE AREA PROFILE B



Range of non-significant variation

Lead PPM - 10 - 140

Zinc PPM - 50 - 320

Threshold value of lead - 360 PPM

The greenstone anomalous zones were not investigated other than by means of silt and soil sampling as shown on the overlay, because the greenstone formation and the anomalies were not discovered until the end of the field season. The anomalies occurring in this area are considered to be the most meaningful and favorable.

8. WALLACE CREEK GRID

SOIL - Residual

BACKGROUND VALUE

	Lead	Zinc	Copper
Median PPM	40	180	16
Average PPM	63	345	21

Range of non-significant variation

Lead PPM - 35 - 450

Zinc PPM - 150 - 650

Copper PPM - 4 - 16

Threshold value of lead - 750 PPM

Additional trenching north and south of the shaft (after completion of the soil sample grid) did not reveal mineralization because the trenching failed to reach bedrock. A 30 foot shear zone striking 240°, and dipping 35° N in quartz chlorite schist occupies the crest of a small fold, which is cut by cross faults east and west of the shaft, and which flattens to the south. Assays taken from new trenching at the shaft yielded the following results:

Assay No.	Sample Type	Gold	Silver	Lead
M 10	Grab	-	60.80	65.60
209	30' trench	trace	trace	trace

The possibility of the vein (18" wide in shear) occurring in repetition of folds is greatest to the north, since cross faults have displaced the shear to the north and since the fold becomes tighter north of the shaft.

9. LUCKY STRIKE

The area is considered to have a very limited potential. A reported silver - lead vein after assaying gave only trace results of gold and silver. A minor amount of scheelite associated with this vein gave similar results.

10. CASCALLEN GULCH

As stated previously, this anomaly was caused by contamination and is not considered worthy of further investigation.

NOTE

A list of station numbers, and analysis results for silts of the various prospects follows.

Station No.	Pb	Zn	Cu
1	30	180	
2	35	180	
3	50	200	
4	35	180	
5	40	200	
6	35	180	
7	55	200	
8	25	320	
9	25	320	
10	70	400	
11	10	100	
12	20	320	
13	55	320	
14	60	320	
15	55	340	
16	55	320	
17	50	360	
18	55	240	
19	50	320	
20	35	220	
21	70	230	
22	35	180	
23	25	230	50
24	20	360	80
25	130	600	100
26	35	500	
27	35	800	
28	30	480	
29	25	480	
30	40	800	
31	30	640	
32	30	650	
557	8	76	
558	8	108	

Station No.	Pb	Zn	Cu
559	9	70	
560	0	188	
566	30	220	
567	59	320	
568	80	208	
569	136	880	
570	84	360	
571	15	100	
572	16	96	
573	94	500	
574	100	480	
575	20	160	
576	40	280	
577	23	100	
578	44	220	
579	96	400	
580	38	190	
581	20	120	
582	35	200	
583	20	90	
584	37	320	
585	30	160	
586	35	180	
587	38	148	
588	43	160	
589	30	160	
590	42	288	
591	37	108	
592	20	150	
593	52	184	
594	16	128	
595	14	116	
596	9	116	
597	16	140	
598	5	57	
599	20	320	
600	11	150	
1191	18	192	
1192	14	124	
1193	20	208	
1303	29	210	
1304	28	200	
1305	30	480	
1306	45	440	
1307	27	88	
1308	16	148	
1309	20	108	
1310	26	208	
1311	25	128	
1321	18	108	
1322	22	180	
1323	3	120	
1335	8	120	
1336	11	100	

Station No.	Pb	Zn	Cu
1337	11	128	
1338	8	96	
1340	11	70	
1341	16	125	
1342	12	75	
1359	13	92	
1380	18	136	
1381	16	100	
1382	16	128	
1383	9	96	
1384	9	100	
1385	52	232	
1386	43	320	
1388	50	240	
1390	26	176	
1391	20	232	
1392	33	288	
1393	34	376	
1395	32	268	70
1396	53	540	40
1397	52	570	40
1398	32	340	35
1399	100	600	25
1400	55	650	40
1801	5	135	
1802	16	160	
1821	35	110	
1822	32	110	
1823	24	90	
1824	80	240	
1825	60	300	
1828	56	360	
1829	48	240	
1830	14	300	
1831	66	480	
1832	38	220	
1833	148	400	
1834	8	20	
1835	60	330	
1836	20	160	
1837	38	176	
1842	50	196	
1843	35	200	
1844	40	240	
1845	30	480	
1846	20	260	
1847	40	175	
1848	170	960	
1849	480	1060	
1850	50	260	
1860	28	148	
1861	19	76	
1862	74	360	
1863	15	200	

Station No.	Pb	Zn	Cu
1864	40	210	
1865	0	165	
1866	15	160	
1867	40	120	
1868	56	120	
1869	600	1600	
1870	40	160	
1872	18	120	
1873	20	168	
1874	20	148	
1875	25	160	
1876	30	100	
1877	30	140	
1878	30	130	
1879	25	90	
1880	25	85	
1881	30	150	
1882	225	800	
1883	20	250	
1884	160	500	
1885	160	750	
1886	40	125	
1887	155	400	
1888	100	250	
1889	120	240	
1890	240	700	
A	50	140	
C	25	120	
D	30	180	
F	25	140	
I	30	220	

Respectfully submitted,

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