GM 59044

COMPTE-RENDU DES TRAVAUX DE TERRAIN, PROJET LAC DUFAULT

Documents complémentaires

Additional Files

Licence

License

Énergie et Ressources naturelles
Québec

METCO

COMPTE - RENDU

DES

TRAVAUX DE TERRAIN

(Travaux de compilation, de planification et de réalisation de levés électromagnétiques de type pulse-EM en forage)

PROJET LAC DUFAULT
Municipalité de Rouyn-Noranda
Province de Québec

pour

LES RESSOURCES METCO INC.

par

Josée Gauthier, ing.

Août 2001

MRN-GÉOINFORMATION 2001

GM 59044

Ressources Metco Inc.
1155, rue University, Bureau 1405, Montréal (Québec) Canada H3B 3A7 Tél. : (514) 875 6279 Fax : (514) 875 9764

TABLE DES MATIÈRES

1. INTRODUCTION

La propriété Lac Dufault est localisée dans le camp minier de Rouyn-Noranda célèbre pour la quantité et la qualité des dépôts de sulfures massifs volcanogènes de type Noranda, qui y ont été exploités. Plus spécifiquement, la propriété se situe à proximité de failles synvolcaniques hôtes des anciennes mines Millenbach et Corbet, à l'intérieur de la troisième séquence volcanique (Spence, 1967 et De Rosen-Spence, 1976) nommée séquence des mines par Gibson et Watkinson (1990) (Annexe 1).

De nombreux forages ont été réalisés à proximité ainsi qu'en périphérie des mines de ce camp minier. Toutefois, à l'époque où la majorité de ces gisements ont été exploités, les méthodes géophysiques disponibles pour repérer de tels dépôts polymétalliques étaient plutôt limitées. Ainsi la plupart des forages de l'époque (1955-1973), généralement de petit calibre (AQ) ne faisait pas l'objet de levé géophysique. Des forages auraient ainsi pu être réalisés à proximité d'importants gisements qui jusqu'à présent sont demeurés non-découverts par manque d'investigation.

Les présents travaux de compilation visent à répertorier les forages existants, à vérifier l'environnement géologique dans lesquels ils se situent, à localiser les forages sur le terrain tout en vérifiant l'état des tubages puis à réaliser des levés électromagnétiques de type pulse-EM à l'intérieur des forages potentiels. Ces levés permettent d'investiguer, dans un rayon de 150 mètres autour du trou de forage, un important volume de roche de forme cylindrique optimisant ainsi les données fournies par les anciens forages afin de tenter d'y détecter un volumineux corps conducteur. Les forages profonds ont été favorisés afin d'investiguer le volume de roche le plus important possible à l'intérieur de la séquence des mines, où des dépôts superposés à différents niveaux stratigraphiques sont présents.

Les travaux de géophysique ont été réalisés durant la période du 3 au 20 juillet 2001 où un total de 16 forages ont été pulsés pour une longueur cumulative de 13 100 mètres de levé. Le présent rapport présente donc les éléments descriptifs de la propriété, la méthodologie employée pour la réalisation des travaux ainsi que l'interprétation des résultats obtenus.

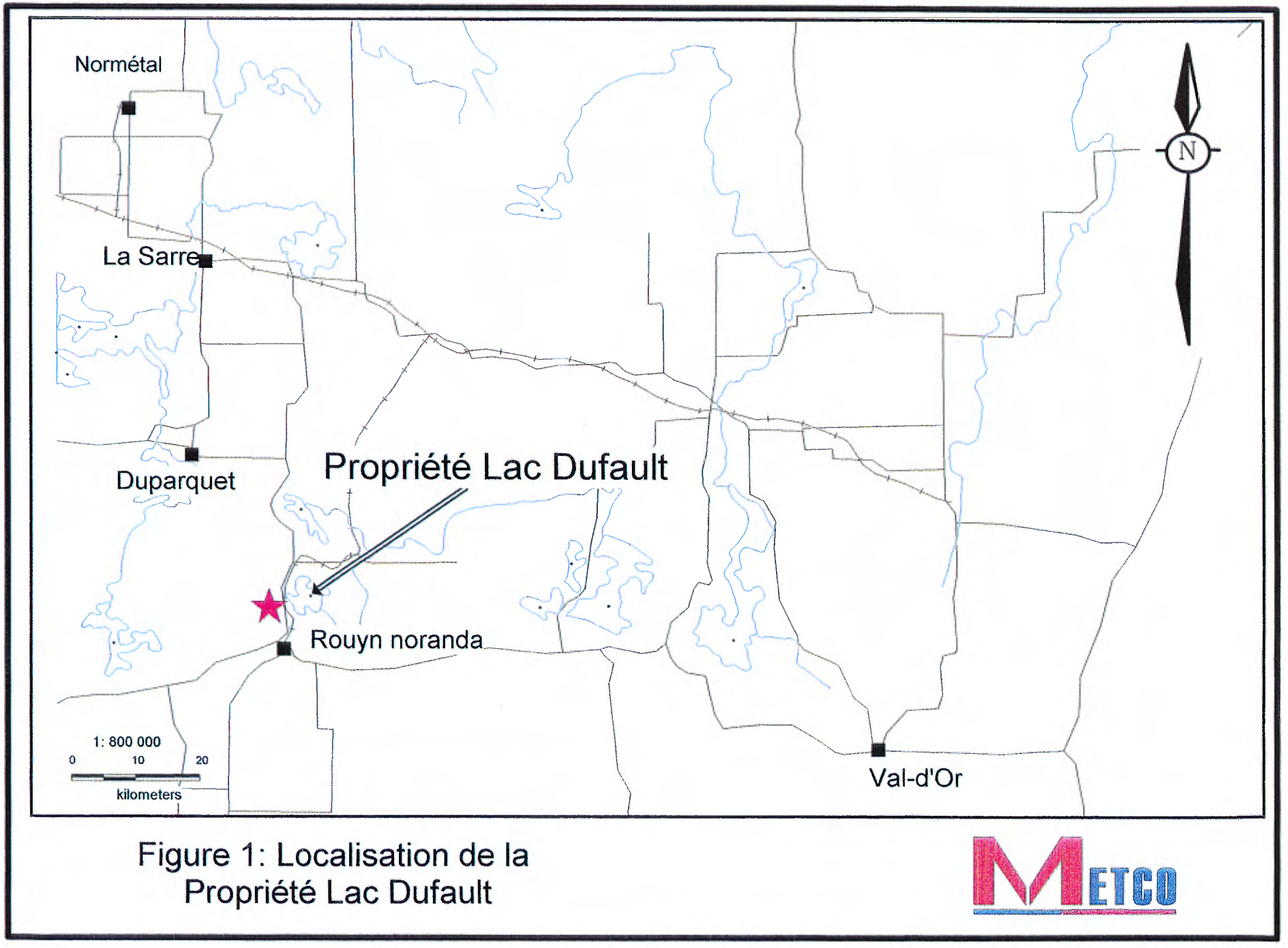


Figure 1: Localisation de la
Propriété Lac Dufault

2. LOCALISATION ET DESCRIPTION DE LA PROPRIÉTÉ

La propriété Lac Dufault, qui est localisée à 8 km au nord de la ville de Rouyn-Noranda (Figure 1), est recoupée par les rangs I et II des cantons de Duprat et de Dufresnoy. L'accès se fait via la route 101N, qui relie la ville de Rouyn-Noranda à la municipalité de D'Alembert. Dans le secteur du Lac Dufault, une route secondaire gravelée menant à l'ancienne mine Millenbach est présente au sommet d'une côte, à gauche, à la sortie de la route double. Les quatre blocs, composant la propriété, sont situés le long de ce chemin entre les kilométrages 0.3 km et 4.3 Km (Figure 2).

Les quatre blocs sont constitués de 18 titres miniers qui totalisent une superficie de 386 hectares (Tableau I, figure 2). Les **RESSOURCES METCO INC.** détiennent 100 % des intérêts de ces claims.

3. TRAVAUX RÉALISÉS

Les forages de la propriété, qui ont fait l'objet des présents travaux d'exploration, sont localisés à la figure 3 et au plan 1.

3.1 Phase I : Compilation géologique

La première étape des travaux d'exploration consistait à compiler l'ensemble des données disponibles sur les forages de la propriété afin de répertorier ceux qui seraient susceptibles d'être investigués par la méthode géophysique de type pulse-Em, soit ceux dont la longueur était supérieure à 300 mètres.

La seconde étape de la compilation visait à identifier les caractéristiques des forages nécessaires à la réalisation de levé électromagnétique en forage (pulse-EM). Ces caractéristiques sont les suivantes :

- caractéristique de base (les forages doivent avoir une longueur minimale de 300 m pour que le volume investigué par le levé pulse-EM soit optimal).
- les forages doivent être distants d'au moins 150 mètres afin d'optimiser le volume investigué par le levé pulse-EM.
- les forages doivent être localisés dans un environnement métallogénique favorable à la découverte de dépôts de sulfures massifs volcanogènes de type Noranda (i.e. localisés aux contacts favorables et de préférence contenir des valeurs anomales en métaux de base) (Figure 4).

L'annexe 2 présente les journaux de forage ainsi qu'une description sommaire des forages répondant à la condition de base, qui ont été sélectionnés à partir de la banque de données de travaux statutaires du MRNQ-Mine.

RESSOURCES METCO INC.
Propriété Lac Dufault
à jour le: 23 mai 2001

No. claim	Ha	Canton	Travaux requis ($)	Date d'expiration	Credit ($)
5215168	27,2	Dufresnoy	1 200	28 octobre 2001	211,37
5215169	26,4	Dufresnoy	1 200	28 octobre 2001	205,15
5215170	0,7	Dufresnoy	500	28 octobre 2001	5,60
5215171	71,6	Dufresnoy	1 800	28 octobre 2001	556,40
5215172	20,0	Dufresnoy	500	28 octobre 2001	155,42
5215173	14,8	Dufresnoy	500	28 octobre 2001	115,01
5215174	7,2	Dufresnoy	500	28 octobre 2001	55,95
5215175	29,2	Duprat	1 200	28 octobre 2001	226,91
5215176	15,2	Duprat	500	28 octobre 2001	118,12
5215177	29,6	Duprat	1 200	28 octobre 2001	230,02
5215178	26,0	Duprat	1 200	28 octobre 2001	202,05
5215179	4,4	Duprat	500	28 octobre 2001	34,19
5215180	11,2	Duprat	500	28 octobre 2001	87,04
5257651	21,6	Dufresnoy	500	28 octobre 2001	167,85
5257652	20,3	Dufresnoy	500	28 octobre 2001	157,75
5257653	22,0	Dufresnoy	500	28 octobre 2001	170,96
5257654	21,0	Dufresnoy	500	28 octobre 2001	163,19
5257655	17,6	Dufresnoy	500	28 octobre 2001	136,77
	386,0		13 800		2 999,8

Total: 18 claims

Note: la date d'échéance du 28 octobre 2001 résulte de la demande d'harmonisation présentée le 8 février 2001

Tableau I

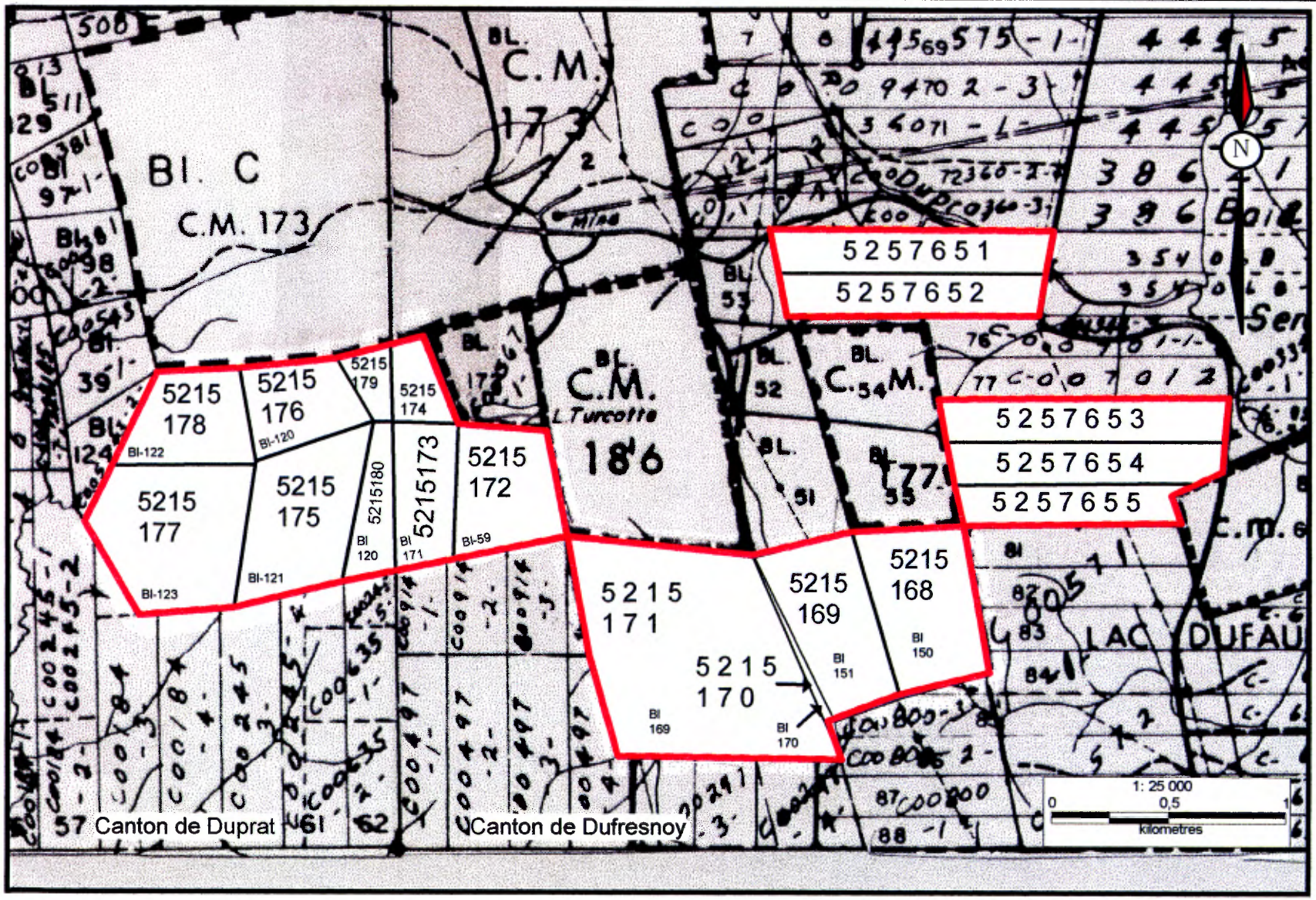


Figure 2: Carte de claims
propriété Lac Dufault

METCO

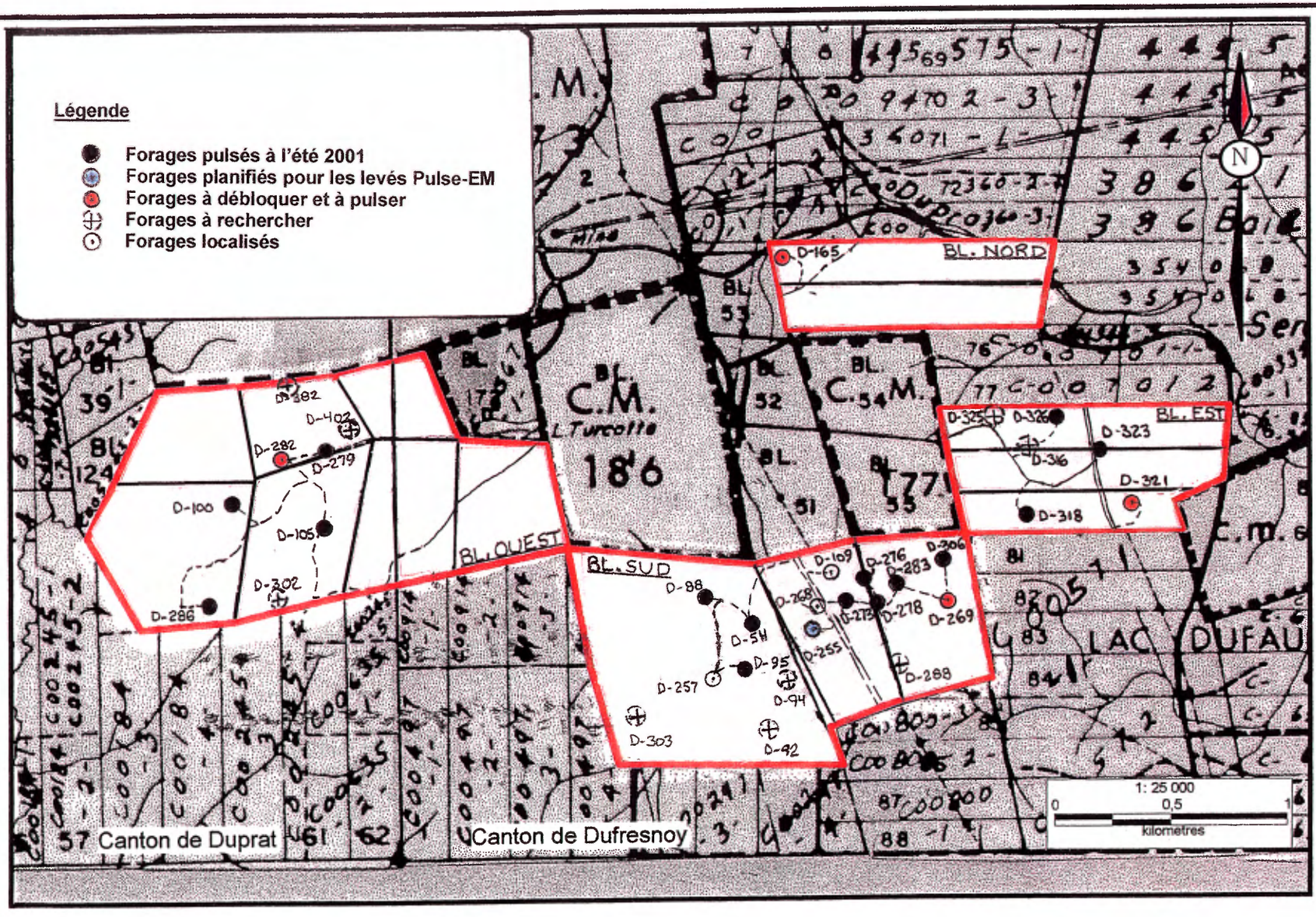


Figure 3: Carte de claims et localisation des forages

METCO

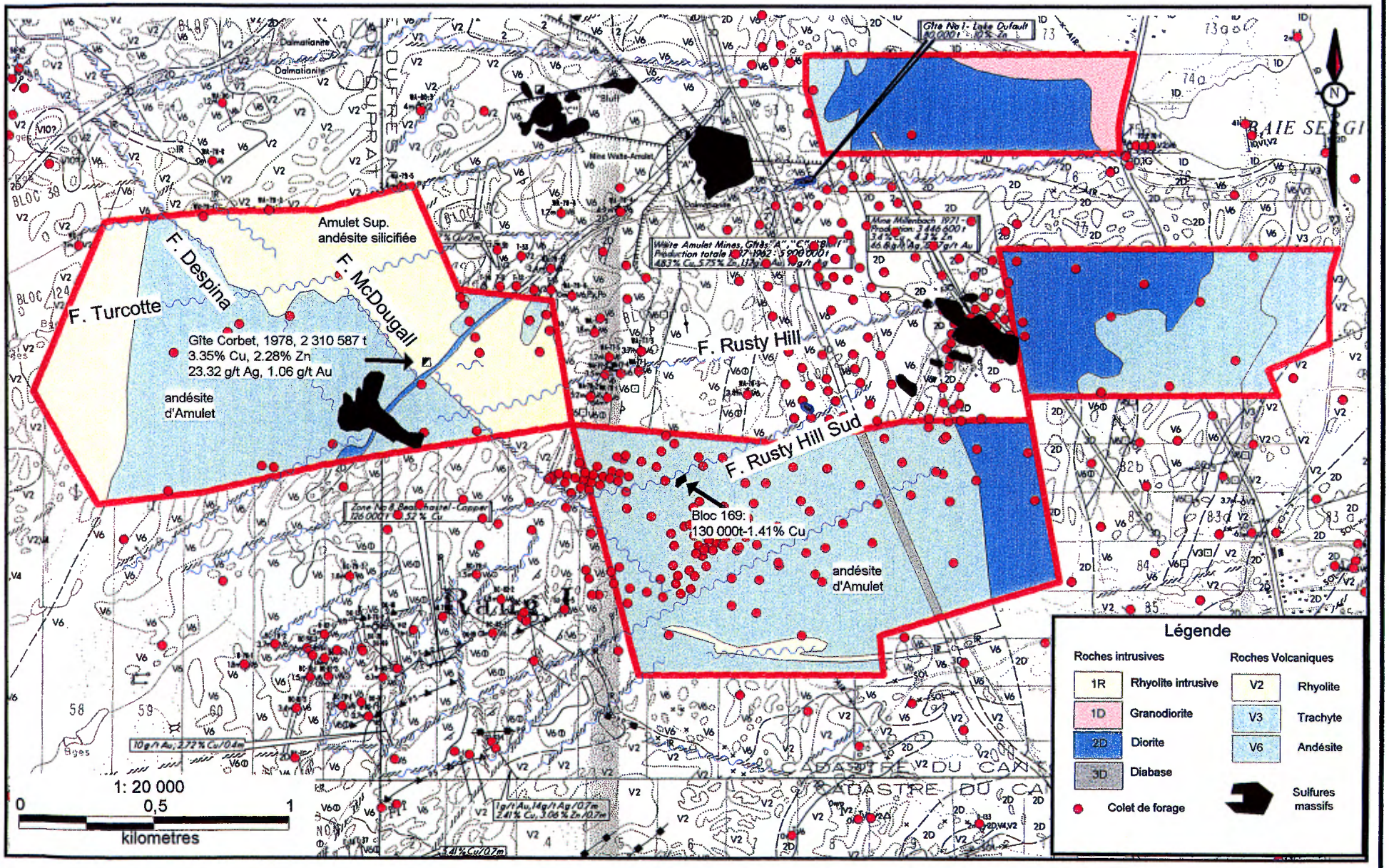


Figure 4: Géologie de la propriété Lac Dufault

METCO

3.2 Phase II : Vérification sur le terrain

Plusieurs des forages sélectionnés pour le levé pulse-EM avaient été localisés sur le terrain au cours de l'automne 2000 par la firme Gestion Aline Leclerc inc. (Leclerc, 2001).

L'accès aux sites de forages de la propriété est relativement facile. Les sentiers de V.T.T., les anciens chemins de foreuse rafraîchis, la ligne électrique localisée sur le bloc Sud, ont été utilisés. Afin de transporter l'équipement de géophysique sur les sites de forages, 2600 mètres d'accès ont dû être rafraîchis, sur une largeur moyenne de 2 mètres (Tableau II, plan 1).

Les demandes de permis d'intervention ont été déposés au MRNQ-Forêt et à la municipalité de Rouyn-Noranda par le Groupe C.A.F., Consultants en Aménagement Forestier. Les deux permis d'intervention qui ont été émis sont présentés à l'annexe 3.

Les travaux de terrain préparatoires aux levés géophysiques ont été réalisés par Josée Gauthier et Raphäel Dallaire, Géophysique TMC inc. . Chacun des anciens sites de forage a d'abord été localisé, puis vérifié à l'aide d'un instrument nommé « dummy ». Cette vérification consistait à s'assurer que le trou de forage était libre, sans aucune obstruction pour la sonde géophysique. La totalité des 21 forages identifiés comme potentiel pour la découverte de sulfures massifs à l'aide de la présente approche ont été retrouvés sur le terrain et vérifés à l'aide du « dummy ». Parmi ceux-ci 5 forages étaient bloqués (D-100, D-165, D-321, D-268 et D-269) (Tableau II). Toutefois, le forage D-100 était bloqué à une profondeur de 441 m et celui-ci a tout de même pu être lu par la sonde géophysique. La majorité des forages lus par le levé sont de type AQ. Dans l'éventualité d'un programme de déblocage de trous de forage, les accès existants devront être élargis à 3.5 mètres en coupant, par endroits, des arbres afin de permettre l'accès à la foreuse.

3.3 Phase III : Levés Pulse-EM

Les levés Pulse EM ont été effectués par la firme Géophysique TMC inc. de Val d'Or durant la période du 3 au 20 juillet 2001. Un total cumulatif de 13 100 m de levé a été réalisé dans 16 trous de forage. M. Gérard Lambert, géophysicien, a réalisé l'interprétation des données de base et des résultats des levés pulse Em, qui est présentée à l'annexe 4.

Les résultats de chacun des forages, qui sont résumés dans le Tableau III, sont présentés ci-bas pour chacun des quatre blocs de la propriété :

Bloc Ouest :

Forage D-105

Ce forage est localisé à environ 200 m au nord-ouest de l'ancienne mine Corbet. Le levé pulse a donné des réponses « in-hole », avec des longueurs d'onde courte à moyenne, aux profondeurs suivantes : 445 m ainsi qu'entre 565 m et 610 m. À 445 m, une anomalie de 14 canaux avec une composante « edge » a été identifiée. Entre 565 m et 610 m, une anomalie « in-hole » qui se présente sur 15 à 20 canaux a été identifiée. Ces réponses témoignent de la présence de minéralisation dans les unités d'andésite à porphyres de feldspath, dans les rhyolites bréchiques ainsi que dans une unité non-identifiée. Ces résultats ne suggèrent aucune anomalie d'importance à proximité.

Forages D-100 et D-279

Les emplacements de ces forages sont situés à 500 m au nord-ouest de l'ancienne mine Corbet pour le D-100 et à 400 m au nord-nord-ouest pour le forage D-279. Les profils des levés pulse-EM de chacun de ces trous sont rectilignes (profils plats) et ceux-ci ne révèlent aucun conducteur.

Forage D-282

Ce forage, localisé à 190 m à l'ouest du trou D-279, a été abandonné lors du levé pulse-EM car le trou était bloqué à une profondeur de 50 m.

Forage D-286

L'emplacement du forage se situe à 700 m à l'ouest de l'ancienne mine Corbet. Les profils du levé pulse-EM sont rectilignes (profils plats) et ne présentent aucune anomalie.

Bloc Est :

Forage D-318

Ce forage est localisé à environ 310 m à l'est-sud-est de l'ancienne mine Millenbach. Le levé pulse a donné une réponse « in-hole » de type « edge » sur 20 canaux mais de courte longueur d'onde à 1190 m de profondeur. Cette réponse correspond à la minéralisation de pyrite et de pyrrhotite en traces rencontrée dans la rhyolite bréchique à une profondeur de 1185 m. Cette anomalie ne suggère aucune extension latérale à la minéralisation.

Forage D-323

L'emplacement du forage se situe à 660 m à l'est de l'ancienne mine Millenbach. Les profils du levé Pulse-EM pour ce forage sont rectilignes et ne présentent aucun conducteur.

Forage D-326
Ce forage se trouve à 530 m à l'est-nord-est de la vieille mine Millenbach. Les profils du levé Pulse-EM sont rectilignes sauf pour une petite réponse « in-hole » localisée à 1090 m. Cette réponse correspond à la présence de sulfures composés de pyrrhotite, de pyrite et de chalcopyrite à l'intérieur d'une coulée felsique à porphyre de quartz.

Bloc Sud :

Forage D-54
L'emplacement de ce forage se trouve sur une montagne à 350 m à l'ouest du corridor de la ligne électrique. Une petite anomalie de type « in-hole » et de courte longueur d'onde a été captée à 560 m. Celle-ci correspond à une intersection de pyrite et de pyrrhotite ainsi que de chalcopyrite en traces à l'intérieur d'un tuf rhyolitique. Cette anomalie est de dimension restreinte et ne suggère aucune extension latérale à cette intersection.

Forage D-88
Ce forage se situe sur le versant ouest de la montagne, à 230 m au nord-ouest du forage D-54. À 390 m dans une unité de roche mafique, une faible anomalie « off-hole » de courte longueur d'onde a été repérée. Celle-ci correspond à des veinules de pyrite et de pyrrhotite ainsi qu'à des traces de chalcopyrite. Cette anomalie ne suggère pas de volume important de minéralisation.

Forage D-95
L'emplacement du forage se trouve à 200 m au sud-sud-ouest du forage D-54. Les profils du levé pulse-EM pour ce forage sont rectilignes et ne présentent aucun conducteur.

Forage D-273
Ce forage est localisé à 85 m à l'est du corridor de la ligne électrique. Le levé pulse-EM a révélé une réponse « off-hole » de très courte longueur d'onde à 785 m de profondeur. Cette réponse témoigne de la présence de sulfures en traces composés de pyrite, de pyrrhotite et de chalcopyrite sous forme d'amas dans une unité de rhyolite bréchique. Cette anomalie ne suggère aucune extension latérale à cette minéralisation.

Forage D-276
Ce forage se trouve à 230 m à l'est du corridor de la ligne électrique. Le levé pulse-EM a donné une réponse de type « edge» à 820 m, correspondant à une intersection de sulfures de faible dimension. Cette réponse témoigne de la présence de sulfures composés de pyrrhotite, de pyrite, de sphalérite et de chalcopyrite à l'intérieur d'une rhyolite bréchique.

Forages D-278 et D-283
Les emplacements respectifs des deux forages sont à 220 m et à 350 m à l'est du corridor de la ligne électrique. Le forage D-278 se trouve à 120 m au sud-ouest du trou D-283. Les résultats des levés Pulse-EM ont révélés deux réponses de type « off-hole » dans chacun des trous. Ces deux anomalies se corrèlent d'un trou à l'autre. Le forage

D-278 présente des anomalies sur 18 canaux qui sont localisées à 865 et à 905 mètres. De plus, le forage D-283 révèlent des anomalies sur 13 canaux à 865 et à 890 mètres. La première zone (865 mètres) représente un dyke acide avec des concentrations en pyrite et en chalcopyrite. La deuxième zone (890 - 905 mètres) se trouve dans une rhyolite (dacite) bréchique, au contact avec la séquence d'andésite, et contient de faible concentration en pyrite et en pyrrhotite. Ces anomalies sont de courtes longueurs d'onde mais représentent une extension latérale et minimale de 120 m (se corrèlent d'un trou à l'autre). Ces résultats justifient de lire par la méthode pulse-Em les forages D-269 et D-288 respectivement localisés à 230 m au sud-est et à 270 m au sud afin d'explorer le potentiel de ce secteur.

De plus, le forage D-283 a relevé une réponse « in-hole » sur 18 canaux à 985 m qui se caractérise par une zone de sulfures de dimension limitée se trouvant dans une rhyolite massive avec présence de pyrite.

Forage D-306

Ce forage est localisé à 220 m au nord-est du trou D-283 et à 300 m au sud-sud-est de l'ancienne mine Millenbach. Le levé pulse-EM a donné une réponse « in-hole » sur 20 canaux à 1025 m. Cette anomalie correspond à une petite zone de sulfures de faible dimension composée de traces de pyrrhotite et de pyrite à l'intérieur d'une unité de rhyolite bréchique. L'anomalie est de courte longueur d'onde et celle-ci ne suggère aucune extension latérale.

Bloc Nord :

Aucun forage n'a été lu à l'intérieur de ce bloc durant les travaux réalisés entre le 3 et le 20 juillet 2001.

DONNÉES SUR L'ÉTAT DES FORAGES					
# FORAGE	**RÉSULTATS DES FORAGES TESTÉS AVEC LE "DUMMY"**		**ACCÈS**		**COMMENTAIRES**
	trous ouverts (prof. forage) (m)	**trous bloqués** (prof. trou bloqué / prof. forage) (m)	**distance rafraîchie**	**accessibilité**	
BLOC OUEST					
D-105	1223* m		nil	très accessible	- *trou approfondit de 601 m - 1223 m
D-100	- - - -	441* m / 507 m	50 m	accessible	- trou pulsé malgré le blocage à 441 m
D-282	509 m	(* 50 m)	170 m	accessible	- *trou bloqué lors du levé Pulse-EM
D-279	1220** m		180 m	certaines difficultés*	- *casing sur le bord du lac, trou** approfondit de 513 m - 1220 m
D-286	389 m		200 m	accessible	
BLOC NORD					
D-165	- - - -	521 m / 781 m	(200 m)	certaines difficultés*	- *contourner l'affleurement pour accéder au forage
BLOC EST					
(D-316)	- - - -	- - - -	nil	accessible	- seulement les tubages d'ancrage du forage ont été localisés
D-318	1280 m		40 m	accessible	
D-321	- - - -	0 m / 1356 m	nil	certaines difficultés*	- *contourner l'affleurement en montant graduellement dessus
(D-325)	- - - -	- - - -	nil	accessible	- seulement les tubages d'ancrage du forage ont été localisés
D-323	1345 m		nil	très accessible	
D-326	1249 m		70 m	certaines difficultés*	- *escalader un gros affleurement
BLOC SUD					
D-54	678 m		240 m	certaines difficultés*	- *monter sur le dessus de la montagne
D-88	562 m		220 m	certaines difficultés*	- *boisé, doit contourner les arbres
D-95	691 m		90 m	certaines difficultés*	- *traverser une épaisse talle d'aulnes aux abords du marécage
(D-109)	- - - -	- - - -**	80 m	certaines difficultés*	- *forage sur du terrain mou, **très difficile d'enlever le casing cap
(D-257)	- - - -	- - - -**	290 m	certaines difficultés*	- *casing sur le bord du marécage, **besoin d'une plate-forme pour le tester
D-255	885 m		120 m	certaines difficultés*	- *longer le bord du marécage dans des talles d'aulnes, beaucoup d'eau
D-268	- - - -	150 m / 760 m	nil	certaines difficultés*	- *forage dans un marécage avec 1 à 2 pi. d'eau
D-273	802 m		40 m	certaines difficultés*	- *casing de ½ pi. trouvé ds le lit d'un ruisseau asséché (toujours mou)
D-278	916 m		90m	accessible	
D-276	870 m		125 m	accessible	
D-283	1008 m		175 m	accessible	
D-269	- - - -	348 m / 1150 m	230 m	accessible	
D-306	1083 m		175 m	accessible	

Tableau II

RÉSULTATS DES LEVÉS PULSE-EM EN FORAGE - PROPRIÉTÉ LAC DUFAULT

# FORAGE	azimut	pendage	prof. (m)	résultats des levés Pulse-EM	commentaires
D-54	---	-90	678	Petite anomalie "in-hole" à 565 m : intersection de sulfures de dimension restreinte.	
D-88	---	-90	562	Petite anomalie "off-hole" à 390 m caractérisée par des veinules de pyrite à cette profondeur.	Conducteur de dimension restreinte.
D-95	---	-90	691	Aucune anomalie : stérile.	
D-100	---	-90	507	Aucune anomalie: stérile.	Forage pulsé jusqu'à 441 m de profondeur.
D-105	---	-90	1223	Anomalies "in-hole" à 445 m, 560 m et 610 m.	
D-273	---	-90	802	Présence d'un "off-hole" à 780 m représentant une petite zone de sulfures.	Sulfures sous forme d'amas en trace: py, po et cp.
D-276	---	-90	870	Petite anomalie "in-hole" à 815 m correspondant à une intersection de sulfures de faible dimension.	
D-278	---	-90	917	Anomalies "off-hole" à 870 m et 905 m : corps conducteurs de dimensions restreintes.	A 865 m: dyke acide avec teneurs en pyrite et chalcopyrite. A 905 m: rhyolite-dacite-bx avec teneurs en py et po.
D-279	---	-90	513	Aucune anomalie : stérile.	
D-282	---	-90	509	Aucuns résultats.	Forage a bloqué à 50 m de profondeur lors du levé.
D-283	---	-90	1008	Petites anomalies "off-hole" à 865 m et 895 m. Zone resteinte de sulfures "in-hole" à 1008 m.	Ces anomalies "off-hole" correspondent aux sulfures rencontrés dans le forage D-278 situé à 120 m au sud-ouest.
D-286	---	-90	389	Aucune anomalie : stérile.	
D-306	---	-90	1075	Anomalie "in-hole" à 1025 m représentant une petite zone de faible dimension.	
D-318	---	-90	1280	Anomalie "in-hole" à 1180 m de dimension restreinte.	
D-323	---	-90	1345	Aucune anomalie : stérile.	
D-326	---	-90	1250	Filonnets de sulfures "in-hole" à 1090 m.	

(modifié de Lambert, 2001)

Tableau III

4. CONCLUSIONS

Les travaux de compilation et d'interprétation géologique et métallogénique des données de la propriété ont permis d'identifier 21 forages jugés potentiels à la découverte de dépôts de sulfures massifs volcanogènes par la méthode préconisée. Parmi ces 21 forages, 5 étaient bloqués et donc impossible à lire lors de la présente campagne de travaux géophysiques. Un trou (forage D-100) a toutefois partiellement été lu car celui-ci était bloqué à 441 m de profondeur. De plus, le budget disponible n'a pas permis de pulser le forage D-255, qui a été vérifié à l'aide du « dummy » et qui n'était pas bloqué. Ainsi, un total de 16 trous de forage ont été investigués par le levé pulse-EM en forage sur une longueur cumulative de 13 100 m de levé.

L'ensemble des données anomales, qui ont été recueillies à l'intérieur des forages par les levés géophysiques, sont issues de profondeur variant entre 390 m et 1345 m. La majorité des levés présentent des anomalies « in-hole » ou encore des anomalies « off-hole » de courte longueur d'onde à faible amplitude (Lambert, 2001). Toutefois, deux anomalies de type « **off-hole** » , de courtes longueurs d'ondes, ont été détectées dans les forages **D-278 et D-283**. Ces deux anomalies semblent se corréler d'un trou à l'autre. Le forage D-278 présente des anomalies **sur 18 canaux** qui sont localisées à 865 et à 905 mètres. De plus, le forage D-283 révèlent des anomalies **sur 13 canaux** à 865 et à 890 mètres. La première zone (865 mètres) est représentée par un dyke acide avec des concentrations en pyrite et en chalcopyrite. La deuxième zone (890 - 905 mètres) se trouve dans une rhyolite (dacite) bréchique, au contact avec la séquence d'andésite, et contient de faibles concentrations en pyrite et en pyrrhotite. Ces anomalies représentent une extension latérale et minimale de 120m (distance entre les deux forages). Ces résultats justifient de réaliser des levés pulse-EM dans les forages **D-269 et D-288** respectivement localisés à 230 m au sud-est et à 270 m au sud afin d'explorer l'extension vers le sud de ces zones minéralisées.

Afin de poursuivre l'exploration de la propriété, suite aux résultats obtenus des levés pulse-EM, un programme de travaux proposés, décrit à la section 5, est recommandé dans le but de repérer et de vérifier avec la sonde d'autres forages potentiels, dans les secteurs non-vérifiés où il reste suffisamment d'espace pour l'emplacement de d'autres gisements non-découverts à ce jour.

5. PROGRAMME DE TRAVAUX PROPOSÉS

Afin d'explorer le secteur anomal, identifié par les travaux réalisés, et de poursuivre l'exploration de la propriété un programme comprenant trois phases est donc présenté ci-bas :

Phase I : Compilation résiduelle des données de la propriété afin d'identifier d'autres forages à pulser. Le budget de la première campagne de travaux ne permettait pas de réaliser la compilation exhaustive des données ainsi que de réaliser la totalité des levés.

Phase II : Recherche et vérification sur le terrain de l'état des tubages de forage et des trous.
En plus des 21 forages vérifiés avec le « dummy », comme étant potentiel à la découverte de dépôts de sulfures massifs, par ces travaux, 9 forages additionnels dont la longueur est supérieure à 300 m ont été considérés comme potentiels. Toutefois 6 de ces 9 forages n'ont pas été retrouvés sur le terrain. Des forages issus de la future compilation s'ajouteront également à ce nombre qui devront être localisés sur le terrain et vérifiés à l'aide du « dummy » afin de s'assurer qu'ils ne sont pas bloqués.

Phase III : Déblocage des trous de forage et réalisation de levés pulse-EM additionnels.

Les **14 forages recommandés** pour les levés Pulse-EM sont les suivants :

- **forages additionnels :** D-316 et D-325 (Bloc Est), D-92, D-94, D-288, et D-303 (Bloc Sud), et D-302, D-382, D-402 (Bloc Ouest).
- **forage vérifié et libre d'obstruction :** D-255
- **forages a débloquer :** D-165 (Bloc Nord), D-321 (Bloc Est), D-269 (Bloc Sud) et D-282 (Bloc Ouest).

Le forage D-165 est le seul forage de plus de 300 m qui a pu être localisé dans *le Bloc Nord.* Ce forage est positionné à environ 320 m au nord-est de l'ancienne mine Waite Amulet. Cette position est stratégique à repérer de nouvelles anomalies. Les 3 forages proposés dans *le Bloc Est* couvrent l'essentiel du Bloc au sud de la faille Rusty Hill, hôte du gisement de l'ancienne mine Millenbach localisé juste à côté du Bloc à l'ouest. Les 4 forages proposés dans *le Bloc Ouest* sont situés à proximité des failles synvolcaniques McDougall, Despina et Rusty Hill hôtes du gisement de l'ancienne mine Corbet. Certains forages proposés dans les Blocs Est et Ouest permettront ainsi de vérifier à proximité de la structure Millenbach-Amulet (Annexe 1 : article de Gibson et de Watkinson, 1990) la possibilité de découvrir d'autres anomalies. Les 5 forages recommandés dans *le Bloc Sud* permettent de balayer les secteurs non-vérifiés, aux levés pulse-EM, dans la portion sud du Bloc. De plus les forages D-288 et D-269,

localisés respectivement à 270 m au sud et 230 m au sud-est des forages D-278 et D-283, sont proposés afin de vérifier les deux zones conductrices interceptées à 865 m et 890 - 905 mètres dans les forages pulsés.

Afin de procéder avec les levés pulse-EM, les forages additionnels devront être recherchés et débloqués au besoin avec la foreuse ainsi que les forages connus a débloquer. De plus, des ponts de bois et des plate-formes de bois seront nécessaires respectivement pour traverser les ruisseaux et pour soutenir la foreuse lors du forage dans les zones marécageuses. Deux nouvelles demandes de permis d'intervention pour la coupe d'arbres devront alors être déposés au Ministère des Ressources Naturelles et à la Municipalité de Rouyn-Noranda.

6. BUDGET PROPOSÉ

PHASE I

Compilation additionnelle de forages potentiels à pulser

(5 jours à 300 $/jour pour les honoraires, et 200 $ pour la documentation et les photocopies)

TOTAL I : **1 700 $**

PHASE II

Recherche de forages additionnels sur le terrain et vérification des forages avec le « dummy »

- Forages à vérifier au « dummy » à ce jour : **D-92, D-94 et D-382** (450 $/jour pour 3 jours). 1 350 $
  Forages à localiser et à vérifier au « dummy » à ce jour : **D-288, D-302, D-303, D-316, D-325 et D-402** (450 $/jour pour 7 jours). 3 150 $
  Estimés : 10 jours à ~450 $/jour
  (technicien en géophysique, V.T.T, câble et « dummy » sont inclus dans les estimés).
  Total : 9 forages à vérifier au dummy, au taux de 450 $/jour, durant 10 jours (estimé) ***4500 $***
- Location: pompe à pression et boyaux. 500 $
- Personnel : un géologue à 300 $/jour pour 12 jours. 3 600 $
  Dépenses : évaluées à ~ 208 $/jour pour 12 jours 2 500 $
  (incluant frais d'hébergement, transport et autres dépenses).

TOTAL II : **11 100$**

PHASE III

Déblocage des forages avec une foreuse
(fait en même temps que les levés pulse-EM)

- Forages connus a débloquer à ce jour : **D-165, D-269, D-282 et D-321** (4 forages à 4400 $/forage). 17 600 $
  Forages additionnels retrouvés qui seront à débloquer : 3 forages (3 forages à 4400 $/forage). 13 200 $
  Estimés : 7 forages à ~4400 $/forage
  (2 foreurs, 1 foreuse, fardier et tracteur à chenille sont inclus dans les estimés).
  Total : 7 forages à débloquer, au taux de ~4400 $/forage, durant 15 jours (estimé) ***30 800 $***
- Mobilisation et démobilisation de la foreuse, de l'équipement et du personnel. 3 000 $

Déblocage des forages avec une foreuse (suite)

•	Remplacement des outils diamantés.	1 700 $
•	Temps d'attente : 75 $/heure à ~4 heures/jour pendant 15 jours.	4 500 $

SOUS-TOTAL A: **40 000$**

Levés Pulse-EM

- Forages qui ont été débloqués (estimé) : 4 forages (4 jours à 1900 $/jour).
  Forages additionnels retrouvés et non-bloqués (estimé) : 3 forages (3 jours à 1900 $/jour).
  Forage planifié à pulser à ce jour : D-255 (1 jour à 1900 $).
  Estimés des coûts pour les levés de pulse-EM :
  8 jours pour pulser 8 forages à 1900 $/jour + 2 jours de frais d'attente à 1900 $/jour (2 Hommes, V.T.T., sonde et câble inclus dans les coûts de pulse-EM)
  Total : 10 forages à pulser, à un taux de 1900 $/jour, durant 10 jours. ***19 000 $***
- Location de « l'Argo » pour 1 semaine. 600 $
- Permis d'intervention en forêt. 600 $
- Rapport de géophysique. 2 800 $

SOUS-TOTAL B: **23 000$**

Vérification technique sur le terrain (incluant les frais de déplacement) **8 600 $**
(géologue : honoraires à 300 $/jour + les dépenses à ~208 $/jour)

Rapports **4 000$**

TOTAL III : **75 600 $**

TOTAL DES PHASES I , II et III : **88 400 $**

Administration et contingences (~12.5 %) : **+ 11 100 $**

COÛT TOTAL DU BUDGET PROPOSÉ : **99 500 $**

7. RÉFÉRENCES

Liste des travaux antérieurs (GM) :

GM 6417A — 1955
Lake Dufault Mines Ltd. Journal de forage D-54.

GM 6417D — 1957
Lake Dufault Mines Ltd. Journaux des forages D-78, D-88 et D-92.

GM 6517F — 1957
Lake Dufault Mines Ltd. Journaux des forages D-94, D-95 et D-98.

GM 7936 — 1958
Lake Dufault Mines Ltd. Journal de forage D-100.

GM 8792E — 1959
Lake Dufault Mines Ltd. Journaux des forages D-105, D-106 et D-109.

GM 11362 — 1960
Lake Dufault Mines Ltd. Journaux des forages D-112 et D-131.

GM 21223 — 1967
Lake Dufault Mines Ltd. Journal de forage D-148.

GM 22415 — 1967
Lake Dufault Mines Ltd. Journaux des forages D-161, D-165 et D-169.

GM 24024 — 1968
Lake Dufault Mines Ltd. Journaux des forages D-182, D-184 et D-186.

GM 24531 — 1969
Lake Dufault Mines Ltd. Journal de forage D-191.

GM 26276 — 1968 – 1969
Lake Dufault Mines Ltd. Journaux des forages LD-37, D-255, D-257 et LD-260.

GM 26733 — 1970
Lake Dufault Mines Ltd. Journaux des forages D-268, D-269, D-276, D-277, D-278, D-279, D-282, D-283 et D-286.

GM 27205 — 1971
Lake Dufault Mines Ltd. Journal de forage D-306.

GM 28134 1972
Lake Dufault Mines Ltd. Journaux des forages D-316 et D-318.

GM 28683 1972
Falconbridge Copper Ltd. Journaux des forages D-321, D-323 et D-325.

GM 29102 1973
Falconbridge Copper Ltd. Journal de forage D-326.

GM 30796 1974
Falconbridge Copper Ltd. Journal de forage D-335.

GM 35715 1979
Noranda Exploration Ltd. Journaux des forages D-380, D-382 et D-388.

Rapport technique :

LECLERC, A., 2001. *Recherche des tubages, Propriétés Rouyn, Lac Dufault et d'Alembert, Cantons Rouyn, Duprat et Dufresnoy.* Gestion Aline Leclerc inc.

Articles scientifiques :

CHARTRAND, F., CATTALANI, S.,1990. *Massive Sulphide Deposits in Northwestern Quebec.* Dans Rive et al, éditeurs, La ceinture polymétallique du nord-ouest québécois. Institut Canadien des Mines et de la Métallurgie. Volume spécial 43, pp. 77 - 91.

GIBSON, H. L., WATKINSON, D.H.,1990. *Volcanogenic Massive Sulphide Deposits of the Noranda Chauldron and Shield Volcano.* Dans Rive et al, éditeurs, La ceinture polymétallique du nord-ouest québécois. Institut Canadien des Mines et de la Métallurgie. Volume spécial 43, pp. 119 -132.

LULIN, J. M.,1990. *Une analyse du développement minier du nord-ouest québécois.* . Dans Rive et al, éditeurs, La ceinture polymétallique du nord-ouest québécois. Institut Canadien des Mines et de la Métallurgie. Volume spécial 43, pp. 17 - 34.

Le 16 août 2001

Certificat

La présente est pour certifier que :

Je suis ingénieure géologue et je réside au 301, 4e rue, Chibougamau, G8P 1R8 ;

Je suis membre en règle de l'Ordre des ingénieurs du Québec ;

Je suis diplômée en génie géologique de l'Université du Québec à Chicoutimi (1992) ainsi qu'en géologie de l'Université de Montréal (1990) ;

Je travaille en tant qu'ingénieure géologue depuis 1992 au sein de diverses sociétés minières ;

Je ne possède et je ne prévois recevoir aucun intérêt direct ou indirect dans Ressources Metco inc. et/ou ses compagnies affiliées ;

Ce présent rapport est basé sur les travaux de terrain que j'ai effectué sur la propriété Lac Dufault, sur les journaux de sondages obtenus au MRNQ-Mine, et sur les documents techniques fournis par Ressources Metco inc., lesquels sont présumés exacts et authentiques.

J.G. 2001/08/16

Josée Gauthier

Josée Gauthier, ing.

Annexe 1

VOLCANOGENIC MASSIVE SULPHIDE DEPOSITS OF THE NORANDA CAULDRON AND SHIELD VOLCANO, QUEBEC

Harold L. Gibson and David H. Watkinson
Falconbridge Ltd., Falconbridge Ont. P0M 1S0
and
Department of Earth Sciences, Carleton University, Ottawa-Carleton Geoscience Centre, Ottawa K1S 5B6

ABSTRACT

Volcanogenic massive sulphide deposits of the Noranda Camp ccur throughout the Noranda Shield Volcano but are concentrated n and along the margins of the Noranda Cauldron. The deposits are calized along synvolcanic faults that also accommodated subsi- ence and controlled the location of eruptive centres. Deposits within he 3 000 m thick Mine Sequence formed during a period of active olcanism and subsidence coinciding with the onset of two cauldron ubsidence cycles. The Noranda Cauldron was a restricted site of nomalously high heat flow and structural permeability that favoured he development of a high-temperature hydrothermal system. Metals ay have been derived from leaching of aquifer rocks by convecting eawater or directly from a shallow underlying magma chamber, now epresented by the Flavrian Pluton, that was at its highest position ithin the crust during cauldron subsidence. The deposits formed hrough a combination of sulphide precipitation from exhaled fluid nd replacement at and below the seafloor in a manner analogous to hose on the modern seafloor.

RÉSUMÉ

Si les dépôts de sulfures massifs volcanogènes du camp minier de ouyn-Noranda sont présents dans les différentes parties du volcan- ouclier de Noranda, ils se trouvent concentrés toutefois, en plus rand nombre, sur le pourtour de la caldeira (cauldron) de Noranda. es dépôts sont localisés le long des failles synvolcaniques qui ont cilité la subsidence et contrôlé la position des centres d'éruption. es dépôts situés dans la séquence des mines (3 000 m d'épaisseur) sont formés durant un épisode d'activité volcanique et de subsiden- e qui coïncide avec l'amorce de deux cycles d'affaissement de la aldera (cauldron) de Noranda. Celle-ci fut le site exclusif d'un flux e chaleur anormalement élevé et d'une perméabilité d'origine ructurale qui ont favorisé le développement d'un système hydro- thermal à haute température. Les métaux proviennent soit directe- ment d'une chambre magmatique située à faible profondeur, soit d'un lessivage des roches de l'aquifère par l'eau de mer circulant par convection. Cette chambre magmatique, représentée maintenant par le pluton de Flavrian, se trouvait à son niveau le plus élevé dans la croûte au moment de l'affaissement de la caldeira (cauldron). Les dépôts se sont constitués par un mécanisme combinant remplacement et précipitation de sulfures à partir des fluides exhalatifs, au niveau ou au-dessous du plancher océanique, de la même manière que se forment de nos jours, les dépôts de sulfures massifs au fond des océans.

INTRODUCTION

The Noranda area is one of Canada's premier base metal and gold camps. To date 22 massive sulphide deposits and 17 gold deposits have been discovered. Volcanogenic massive sulphide deposits (VMS) of the Noranda camp are referred to as Noranda-type and characteristics of these deposits are thought to typify many Archean, Cu-Zn massive sulphide deposits (Franklin et al. 1981). In this paper we describe stratigraphic, structural and volcanological controls on the location of VMS deposits within the Noranda Cauldron and Shield Volcano.

REGIONAL GEOLOGY

A stratigraphic synthesis of the Blake River Group, in Quebec, has been summarized by Péloquin et al. (1990). Volcanic rocks of Noranda area form the youngest Central Volcanic Complex of the 12 to 15 km thick Blake River Group of the Abitibi Greenstone Belt. These complexes, interpreted as large shield volcanoes, are characterized by a concentration of felsic volcanic rocks, rapid facies changes and a marked

variation in the thicknesses of individual units (de Rosen-Spence 1976; Goodwin 1978; Dimroth, et al. 1983). The Noranda Volcanic Complex has an approximate diameter of 35 km and represents 7.5 to 9 km of volcanic strata consisting of rhyolitic, andesitic and basaltic flows, and minor pyroclastic rocks. The first lithostratigraphic subdivision of the Noranda Volcanic Complex was proposed by Spence (1967), who grouped informal rhyolitic and andesitic formations into 5 "Rhyolitic Zones" separated by 4 andesitic inter-zone units.

TABLE 1
Lithostratigraphic Subdivision of the Noranda Volcanic Complex, Blake River Group

SPENCE (1967) DE ROSEN-SPENCE (1976)	THIS STUDY	SEQUENCE
Rhyolite Zone 5	Cycle 5	
Andesite		
Rhyolite Zone 4	Cycle 4	Post Cauldron
Andesite		
Rhyolite Zone 3	**Cycle 3**	**Cauldron**
Andesite	**Mine Sequence**	
Rhyolite Zone 2	Cycle 2	
Andesite		Pre Cauldron
Rhyolite Zone 1	Cycle 1	

Rhyolitic zones of Spence (1967) are referred to as Cycles 1-5 (Gibson 1989; Table 1) where each Cycle consists of an andesitic basal unit (inter zone andesite) and mixed rhyolitic and andesitic upper unit. The 3rd Cycle, or Mine Sequence (Table 2), is a tholeiitic, basalt/andesite -rhyolite bimodal succession that is interpreted to have been erupted during a period of cauldron subsidence within the upper, central part of the Noranda Shield Volcano (Gibson 1989). The 3 000 m thick Mine Sequence hosts most of the VMS deposits within the Noranda camp.

U-Pb zircon dating by Mortensen (1986) has established a preliminary age of 2 698.7 Ma (minimum age) for Cycle 2 rhyolite, 2 697.9 +1.3/-0.7 Ma for Cycle 5 rhyolite and an age of 2 701.5 +/- 1 Ma for the Flavrian Pluton (trondhjemitic phase). If the five Cycles represent a homoclinal succession, the 7-9 km thick Noranda Shield Volcano may have formed in as little as 3.5 Ma. The uncertain stratigraphic position of Cycle 5 and the similar age of the latter to Cycle 2 suggests that Cycle 5 formations may be the folded, stratigraphic equivalent of Cycle 2 or, for that matter, Cycle 3 formations.

THE NORANDA CAULDRON

De Rosen-Spence (1976) first recognized a large area of synvolcanic subsidence between the Hunter Creek and Cranston Faults in the north and Western Quemont Feeder Dyke and Horne Creek Faults to the south. Lichtblau and Dimroth (1980), Dimroth et al.(1982) and Gibson et al. (1984 1986) referred to this subsidence structure as a caldera. The term cauldron is preferred over caldera as the latter, although a subsidence-produced structure, refers to a "circular" topographic depression. "Cauldron" as defined by Smith and Bailey (1968) "includes all volcanic subsidence structures regardless of shape, size, depth of erosion or connection with surface volcanism", a definition which is applicable to the east-tilted and dissected Noranda structure.

Based on measured fault offset and stratigraphic reconstruction the Noranda Cauldron is interpreted to have subsided a minimum of 0.5 km along the northern margin and 1.2 km along the southern margin, during eruption of the Mine Sequence, to produce an asymmetric collapse structure (Gibson 1989; Fig. 1 and 2).

A second smaller, but distinct, area of subsidence in Fig. 2, was named the Despina Cauldron and a third, tentative, smaller area of subsidence along the Horne Fault in the Delbridge Mine area is referred to as the Delbridge Cauldron (Gibson 1989). The west structural margin of the cauldron is interpreted to have been removed by erosion and may now be represented by ring fractures within the Flavrian Pluton (Fig. 1; Goldie 1976; Gibson 1989). The east structural margin of the cauldron is interpreted to have been buried by younger, post-subsidence formations of Cycle 4 and may, therefore, be represented by a wide, poorly defined zone (Fig. 1) delineated by:

a) the northwest-trending, steeply dipping, Dalembert shear zone which contains the Dalembert Pluton,

b) the west body of the Dufault Pluton, that was perhaps emplaced along a primary zone of weakness. The Gallen VMS deposit occurs in a "roof pendant" of Cycle 4 strata within this pluton and may have originally formed along the east margin,

c) massive rhyolitic dykes which occur adjacent and parallel to the Dalembert shear, along the Dufault Pluton's west contact, and as segments around and south of the pluton.

With structural margins as interpreted above (Fig. 1) the Noranda Cauldron has approximate north-south and east-west widths of 15 and 20 km. The Despina and Delbridge Cauldrons, nested within the Noranda Cauldron, have estimated diameters of 5 km and 2 km respectively. The original topographic margin of the cauldron cannot be ascertained but would, undoubtedly, lie outside of the proposed structural margins.

Gibson (1989) subdivided the evolution of the Noranda Cauldron into three cauldron subsidence cycles. Subsidence was piece-meal and is interpreted to have occurred in response to partial evacuation of an underlying magma chamber now represented by the Flavrian Pluton (Goldie 1976; Gibson 1989). Cauldron subsidence commenced with eruption of the Flavrian formation (base of Mine Sequence) and subsidence, during the second cauldron cycle, is interpreted to have ended with extrusion of the Amulet Andesite formation, the uppermost unit of the Mine Seqence (Table 2; Gibson 1989). A third cauldron subsidence cycle, with subsidence localized along the Horne and ancillary faults, is interpreted to have occurred during extrusion of Cycle 4 formations (Gibson 1989). The amount of subsidence during the third cauldron cycle is uncertain.

STRATIGRAPHIC DISTRIBUTION AND METAL ZONING OF VMS WITHIN THE NORANDA SHIELD VOLCANO

The distribution, tonnage and grade of VMS deposits within

TABLE 2. TABLE OF FORMATIONS FOR THE NORANDA AREA

EON (ERA)	CYCLE		FORMATION	MAP SYMBOL	PRINCIPAL LITHOLOGY
PHANEROZOIC					Sand, gravel, alluvium
Unconformity					
PROTEROZOIC					Diabase dikes
Intrusive Contact					
ARCHEAN	INTRUSIONS		Aldermac Syenite		Lamprohyre dikes
			Dufault Pluton		Syenite plugs,dikes
			Dalambert Pluton		Composite granodiorite intrusion
			Newbec Breccia		Granodiorite
				6	Hetrolithic diatreme breccia
			Flavrian Pluton		Diorite,gabbro sills and dikes
			Here Diorite		Diorite,trondjemite,tonalite intrusions
					Diorite,gabbro intrusions
	Intrusive Contact				
	NORANDA VOLCANIC COMPLEX	Cycle 5			Rhyolitic and andesitic flows/breccias
		Cycle 4			Rhyolitic and andesitic flows/breccias
		Cycle 3	HUNTER BLOCK		
			Upper North Duprat Andesite	XI UNDA	Massive and pillowed andesitic flows
			Upper North Duprat Rhyolite	VII-X UNDR	Aphyric, feldspar porphyritic and quartz porphyritic rhyolitic flows
			Lower North Duprat Andesite	VII LNDA	Massive and pillowed andesitic flows
			Lower North Duprat Rhyolite	VI LNDR	Aphyric, feldspar porphyritic and quartz porphyritic rhyolitic flows
			Hunter Andesite	V H	Massive and pillowed andesitic flows
			FLAVRIAN BLOCK		
			Amulet Andesite	XI A	Massive and pillowed andesitic flows, minor tuff
			Waite/Millenbach Rhyolite	X W/M	Feldspar porphyritic and minor quartz porphyritic rhyolitic flows
			Waite/Millenbach Andesite	IX W/M	Massive and pillowed andesitic flows and minor tuff
			Amulet	VIII A	
			Amulet Upper Member	VIII Al	Silicified andesitic flows, minor rhyolite
			Amulet Lower Member	VIII Al	Feldspar and quartz feldspar porphyritic rhyolitic flows and minor breccia (Beecham Breccia) at base of unit
			Rusty Ridge	VII R	Massive and pillowed andesitic flows, minor rhyolitic breccias
			Northwest	VI N	Feldspar phyric rhyolitic flows
			Cranston Member	VI NC	Quartz feldspar porphyritic rhyolitic flow
			Flavrian	V F	Massive and pillowed andesitic flows
			Ansil Member	V FA	Quartz feldspar porphyritic rhyolitic flow
			POWELL BLOCK		
			Powell Andesite	XI P	Massive and pillowed andesitic flows
			Quemont Rhyolite	X Q	Aphyric and quartz-feldspar porphyritic rhyolite
			Joliet Rhyolite	VI J	Feldspar phyric rhyolitic flow
			Brownlee Rhyolite	VI B	Feldspar phyric rhyolitic flow
		Cycle 2			Rhyolitic and andesitic flows/breccias
		Cycle 1			Rhyolitic and andesitic flows/breccias

MINE SEQUENCE

HUNTER BLOCK · FLAVRIAN BLOCK · POWELL BLOCK

Roman numeral prefix indicates order of stratigraphic succession
Cycle 5 may be the stratigraphic equivalent of Cycles 2 or 3

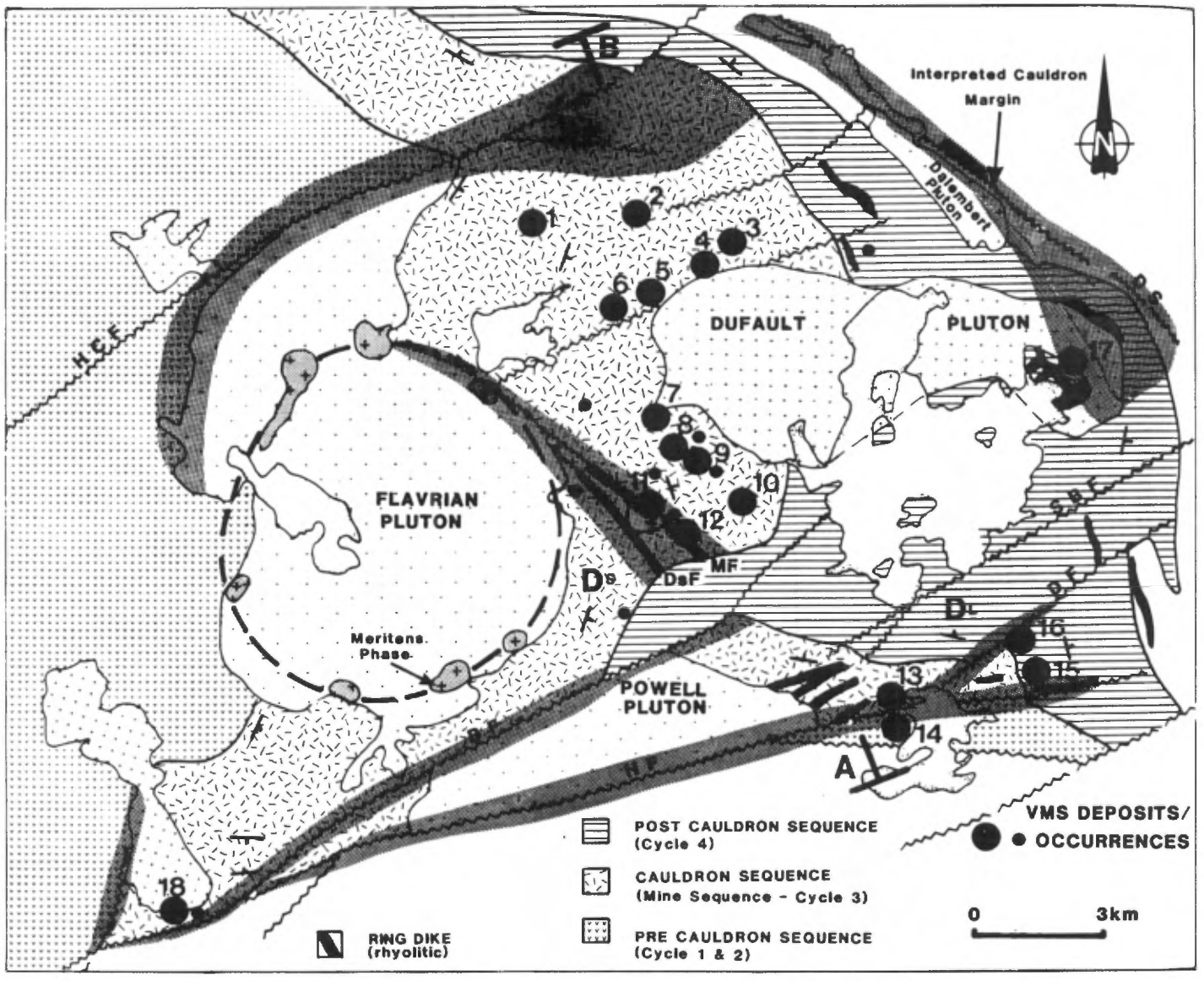


Figure 1: Inferred structural margins of the Noranda Cauldron and smaller Despina (Ds) and Delbridge (DL) cauldrons and location of massive sulphide deposits and occurrences (HCF-Hunter Creek Fault, CF-Cranston Fault, MF-MacDougall Fault, DSF-Despina Fault, BF-Beauchastel Fault, HF-Horne Fault, SBF-Southbay Fault, DF-Deldona Fault and DS-Dalembert Fault). Numbers refer to deposits listed in Table 3.

the Noranda Shield Volcano are illustrated in Fig. 1 and Table 3. The stratigraphic position of these deposits is summarized in Tables 1 and 3. Deposits found in Cycles 1 and 2 are interpreted to have formed during construction of the Noranda Shield Volcano but prior to cauldron development (Gibson 1989). Cycle 3 deposits (Fig. 3) are interpreted to have formed during two periods of cauldron subsidence within the upper, central part of the Noranda Shield volcano whereas deposits in Cycle 4 are interpreted to have formed during a third period of subsidence and volcanism (Gibson 1989). The Magusi River and New Insco deposits, located 15 km north of the Hunter Creek Fault, were interpreted to occur within the Mine Sequence by Spence and de Rosen-Spence (1975) and Boldy (1977), but are of uncertain stratigraphic position. Similarly, the lack of both distinctive marker units and detailed mapping south of the Horne Fault makes uncertain the stratigraphic position of the Horne deposit, the largest deposit in the Noranda camp. Spence and de Rosen-Spence (1975) interpreted the Horne Mine strata to be the equivalent of the Mine Sequence whereas Dimroth et al. (1982) and Gibson (1989) suggested that the Horne Mine strata may be older. Regardless of its stratigraphic position, the long strike length of the Horne Deposit (2.5 km), its multi-lensed character and association with felsic clastic rocks of possible epiclastic or ash-flow origin suggest that the deposit may have formed in a linear, graben-like structure located adjacent to and along the south margin of the Noranda Cauldron (see Kerr and Mason, 1990).

Precauldron Deposits

Cycles 1 and 2 do not contain an economic VMS deposit. Cycle 1 does, however, contain the 4-Corners, Inmont and

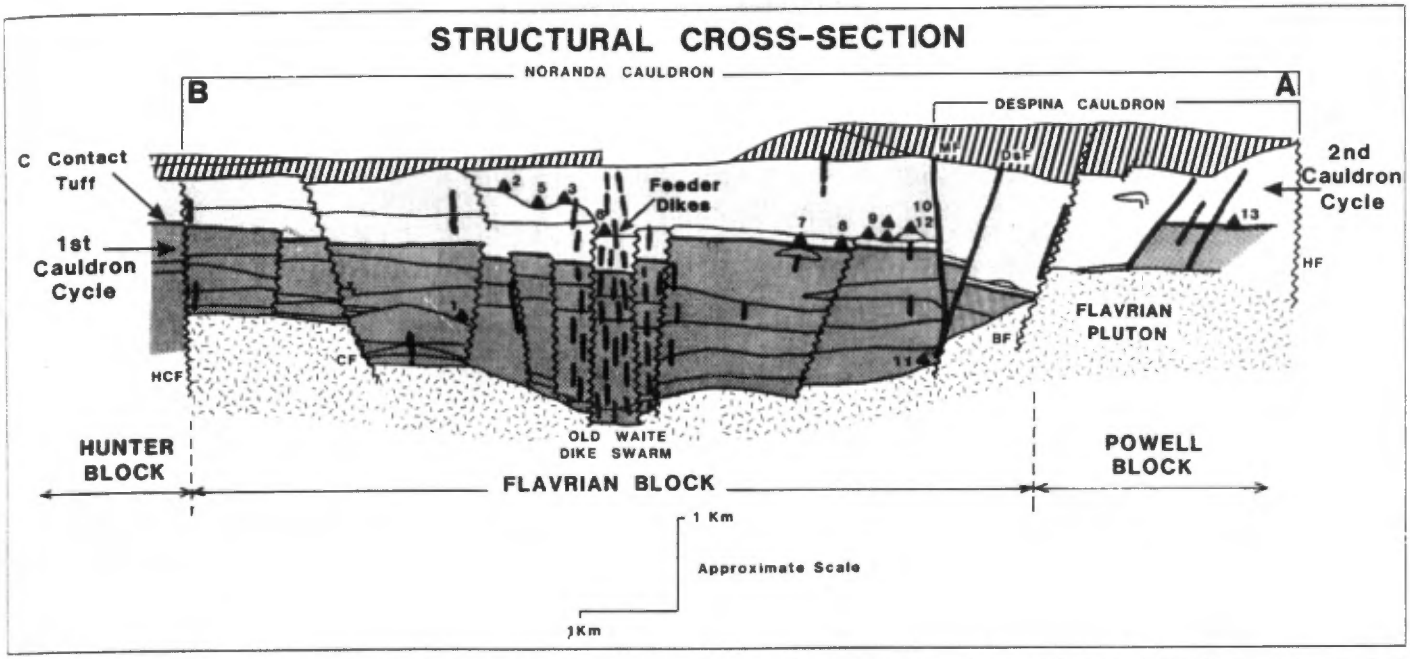


Figure 2: North-south structural cross-section through the Mine Sequence of the Noranda Cauldron after extrusion of the Here Creek Rhyolite formation (Cycle 4) showing the location of VMS deposits and relationship to the two cauldron cycles. Fault abbreviations as in Figure 1. Numbers refer to deposits listed in Table 3 and shown in Figure 1. Location of cross-section shown by line A - B in Figure 1.

Ivanex deposits. The Inmont and 4-Corners deposits are chalcopyrite-pyrrhotite stringer zones and are interpreted as the erosional remnants of former VMS deposits. The Ivanex prospect is a well bedded zinc-rich, pyritic, transported massive sulphide lens without an underlying stringer zone.

Cauldron (Cycle 3) Deposits

By far the most significant cluster of VMS deposits occurs within the cauldron-filling Mine Sequence (Cycle 3) where 20 deposits occur within 3000 m of volcanic strata (Fig. 3). These deposits, described in detail below, occur within and along the margins of the Noranda Cauldron (Gibson 1989).

Post Cauldron Deposits

Eruption of Cycle 4 formations was accompanied by subsidence along the Horne Fault and ancillary Donalda Fault to produce a graben-like structure, the Despina Cauldron. The zinc-rich, pyritic Deldona and Delbridge deposits (Delbridge No.#1 and 2 deposits; Boldy 1968) are located within a rhyolitic vent complex of the Delbridge Rhyolite formation within this structure. The Delbridge deposit is underlain by a Cu-rich stringer zone and chloritic alteration pipe.

The Zn-rich, pyritic Gallen deposit occurs within a pendant of the Cycle 4 strata (South Dufault Rhyolite formation; de Rosen-Spence 1976) within the east body of the Dufault Pluton and along the inferred east margin of the cauldron. The Gallen deposit exhibits soft-sediment features, lacks a distinct stringer/alteration zone and was interpreted by McEwen and Watkinson (1981) as a transported and slumped deposit; much of its brecciated character is reinterpreted as in situ fracturing and veining during mound growth (Watkinson et al. 1990).

Cycle 5 Deposits

Cycle 5 hosts the Zn-rich, pyritic Mobrun deposit which consists of 2 massive sulphide lenses. A second, large massive sulphide deposit was recently discovered along strike and in the stratigraphic footwall to the former deposit. The stratigraphic position of the Mobrun deposits is uncertain; Dimroth et al. (1983) equated Cycle 5 with Cycles 1 and 2 whereas Gélinas et al. (1984) interpreted it to represent the youngest units.

Metal zoning

The Cu/Cu+Zn ratios for VMS deposits within the Noranda Shield Volcano (Table 3) were calculated from average grades which include both massive and stringer ore types and multiple lenses. The data indicate that:

1. The Mine Sequence is characterized by deposits that are distinctly copper-rich relative to those in underlying and overlying cycles. There is no systematic (vertical) variation in the Cu/Cu+Zn ratio of deposits located at different stratigraphic positions within the Mine sequence. Deposits located at the C Contact are, however, distinctly zinc-rich (Fig. 2).
2. Deposits located in post-cauldron cycles are typically zinc-rich and pyritic. Except for Delbridge, these VMS deposits do not have well developed stringer zones.
3. Massive sulphide deposits within pre-cauldron Cycles, such as the Ivanex deposit, are zinc-rich. Stringer zones at Inmont and 4-Corners are Cu-rich; however, the Cu-rich character of these zones does not dictate that they are remnants of Cu-rich deposits. For example, the zinc-rich Delbridge deposit is also underlain by a chalcopyrite-rich stringer zone (Boldy 1968). If an analogy can be made with

TABLE 3. GRADES AND TONNAGES OF VMS DEPOSITS WITHIN THE NORANDA VOLCANIC COMPLEX

Stratigraphic Position	Deposit	Massive Sulphide	Stringer Sulphide	Multiple Lenses	M/Tons	% Cu	% Zn	oz. Ag	oz. Au	Cu-Zn Ratio
1st Cycle	Four Corners		X							-
	Inmont		X							-
	Yvanex	X								Zn-rich
	Amulet									
3rd Cycle	Ansil (1)	X	X		2.1	7.18	0.57	0.80	0.06	92
Mine	Vauze (2)	X	X	X	0.37	2.94	1.00	0.80	0.02	74
Sequence	Norbec (3)	X	X		4.35	2.77	4.50	1.40	0.02	38
	D-Zone (4)	INCLUDED WITH NORBEC (3)								
	East Waite (5)	X	X		1.65	4.10	3.25	0.91	0.05	56
	Old Waite (6)	X	X	X	1.24	4.70	2.98	0.63	0.03	61
	F-Shaft (7)	X	X		0.3	3.40	8.60	1.35	0.01	28
	C Deposits (8)	X	X	X	0.62	2.20	8.50	2.53	0.01	20
	Lower A (9)	X	X		5.17	5.10	5.20	1.29	0.04	49
	Upper A (9)	X	X		0.20	2.30	6.10	1.35	0.06	28
	#11 (9)	X	X		0.49	3.60	2.40	0.63	0.02	60
	Bluff (9)	INCLUDED WITH LOWER A								
	Millenbach (10)	X	X	X	3.92	3.46	4.33	1.64	0.03	44
	Corbet (11)	X	X	X	3.06	3.00	1.96	0.60	0.03	60
	D68 (12)	INCLUDED WITH CORBET								
	Quemont (13)	X	X		16.35	1.20	1.80	0.54	0.12	40
	Aldermac (18)	X	X	X	2.07	1.48	-	0.20	0.01	-
	Newbec		X		0.007	6 to 7				
	Fourcet		X							
	D-62	X								
	Moosehead	X	X							
	Dufault Zinc	X	X		0.50	-	<3.0	-	-	-
	South Rusty Hill		X							
	Bedford		X		0.09	0.89				
	Ribago	RECENT DISCOVERY - TONNAGE/GRADE UNCERTAIN								
	Aldermac	RECENT DISCOVERY - TONNAGE/GRADE UNCERTAIN								
4th Cycle	Deldona (16)	X			0.10	0.30	5.00	0.76	0.12	5
	Delbridge (15)	X	X		0.40	0.55	8.60	2.00	0.07	6
	Gallen (17)	X			3.25	0.07	4.77	0.63	0.02	2
5th Cycle	Mobrun[1]	X	?		3.00	0.62	2.30	0.60	0.50	21
	New Lens	TONNAGE/GRADE UNCERTAIN								
Uncertain	Magusi	X			4.11	1.20	3.60	0.90	0.03	25
	New Insco	X	X		1.15	2.11	-	0.50	0.03	-
	Horne (mined) (14)	X	X		60.26	2.20	-	0.40	0.17	-
	Horne #5[2]	X	X		144	1.0	0.9			52

(2) refers to former or operating mines and "uneconomic deposits" respectively.

[1] Some Cu-rich ore removed during earlier mining.
[2] Tonnage and grade of Horne #5 zone from Sangster (1980) and combined with mined tonnage.

Data from Boldy (1979) and unpublished compilations by D. MacNeil (Corp. Falconbridge Copper) and B. Bancroft (Noranda).

the Norbec deposit and its associated metal-rich tuffs which have similar Cu/Cu+Zn ratios, then the Zn-rich 4-Corners tuffs (Cu/Cu+Zn ratio of 22 for 15 holes averaging 0.38% Cu and 0.93% Zn; personal communication, D. Lefebure, 1983) peripheral to the 4-Corners stringer zone suggest that the eroded massive sulphide lens was probably zinc-rich.

CHARACTERISTICS AND CONTROLS ON THE LOCATION OF VMS DEPOSITS WITHIN THE MINE SEQUENCE AND NORANDA CAULDRON

Deposit characteristics

VMS deposits within the Mine Sequence are proximal deposits and consist of a concordant lens of massive sulphide (more than 50% sulphides) overlying a discordant stockwork zone of sulphide stringer mineralization within a pipe-like envelope of chloritized and sericitized rock. Deposits consist of a either a single massive sulphide lens and stringer zone such as at Ansil, E. Waite and Norbec or of multiple lenses. The best example of the latter is the Millenbach deposit, which contained 15 individual massive sulphide lenses that ranged in size from 4 000 tons to 1.8 Mt tons (Knuckey et al. 1982).

The Massive Sulphide Lens

The steep-sided conical shape of deposits (slopes of more than 45°), their location on steep slopes and within volcanically and seismically active volcanic vent areas, angularity of fragments in transported sulphide breccias and angular sulphide fragments within overlying flows and tuffs indicate that most massive sulphide lenses formed as hard, encrusting sinters as

initially proposed by Boldy (1968). The deposits are interpreted to have formed through a combination of sulphide precipitation from exhaled fluid and replacement at and below the seafloor in a manner analogous to those on the modern seafloor (Gibson 1989). A typical massive sulphide lens has an irregular shape in plan but is more regular in cross section with profiles that range from steep-sided cones with slopes of up to 45° to flat lensoid bodies with slopes of less than 5°. Examples of the former are Millenbach, the Amulet deposits, Quemont and Norbec; examples of the latter are Delbridge, Mobrun, Gallen and Aldermac; E. Waite, Old Waite and Ansil are examples of deposits with intermediate profiles. The irregular outline of the Corbet main lens, in both plan and section, is interpreted to reflect its location within a crater (Gibson 1989). Contacts of massive sulphide with underlying and overlying rocks are sharp.

The textures, structures and mineral zoning within an individual massive sulphide lens have been described by Simmons (1973), Spence (1975) and Knuckey et al. (1982). A typical lens at Millenbach consists of an inner discordant cone or spine that sits directly above the stringer zone and narrows toward the top of the lens. The spine consists of massive, fine- to coarse-grained pyrrhotite with irregular patches and elongate vertical bands of chalcopyrite with minor pyrite and sphalerite. Surrounding the spine is either massive or crudely banded sulphide or a framework-supported sulphide breccia or "in situ" brecciated massive sulphide; matrix is typically massive pyrrhotite, chalcopyrite and pyrite. The flanks of the sulphide lens consist of coarse-grained, crudely bedded and well bedded pyrite and sphalerite that thin toward the top and centre of the sulphide lens. Thinly bedded to laminated pyrite and alternating pyrite-sphalerite beds which range from 1 mm to more than 15 cm in thickness often occur along the flanks of some lenses. Thin beds composed of pyrite framboids (up to 1.5 cm in diameter) with interbeds of tuff occur locally within laminated sulphides along the fringe of the Corbet main lens.

The proportion of brecciated to massive sulphide in many deposits is unknown. In some deposits, such as Vauze, sulphide breccias (Main lens) deposited along the flanks of the Waite Rhyolite dome constituted 75% of the massive sulphide lens (Spence 1975). At Corbet, slumped and transported sulphide breccia also formed a significant part of the ore.

Massive magnetite occurs as discrete zones at the base of the pyrrhotite-chalcopyrite rich core at both Ansil (Riverin et al. 1990) and Corbet (Watkins 1980).

Stringer Sulphide Zone

The stringer zone consists of sulphide veins which form a cross-cutting, discordant, anastomosing network within chloritized and sericitized footwall and occasionally hanging wall rocks. The shape of a stringer zone is governed, in part, by the permeability of the footwall rocks. At Millenbach, where sulphide veins occur within an rhyolitic lava dome, the stringer zone is a regular, narrow pipe-like form of smaller diameter than the overlying massive sulphide lens. In andesitic flows stratigraphically below the rhyolitic dome the stringer zone increases in width by a factor of 2 to 3 by sulphide replacement of pillow margins and deposition within the matrix of pillow and flow breccias. At Corbet, stringer sulphides constitute the matrix of volcaniclastic breccias that underlie sulphide lenses and form an extensive, semi-conformable sulphide zone that underlies much of the deposit.

Contacts between sulphide stringers and overlying massive sulphide are gradational where massive and vertically banded pyrrhotite-chalcopyrite veins ranging from less than 1 cm to 2.0 m in width increase in frequency and size laterally toward the core of the zone and upward toward the massive sulphide lens. Contacts with surrounding host rocks are gradational where stringers are composed predominantly of pyrite and sphalerite grade within 1 to 3 m into host rocks which often contain minor disseminated pyrite and sphalerite.

Stringer sulphide zones often "connect" VMS lenses located at different stratigraphic intervals or are "blind" and end abruptly in overlying units. The Amulet 11 shaft, Lower A and Upper A deposits are connected by a single stringer zone over a stratigraphic interval of 400 m and provide an excellent example of "stacked" deposits. Ore-grade stringers at the Ansil deposit continue above the massive sulphide lens for 300 m and, apparently, are an example of a "blind" stringer zone.

The stringer sulphide core is generally "economic" with grades decreasing with depth. Economic stringers commonly extend as deep as 150 m below massive sulphide lenses and, at Norbec, mineable stringers extended 500m below the main sulphide lens. Stringer sulphides may contribute significantly to the tonnage of a deposit; at Millenbach, 52% of the ore mined was from stringer zones.

Metal zoning

Metal Zoning in a Single Lens

Individual massive sulphide lenses are concentrically zoned from a copper-rich core to an outer zinc- and lead-rich fringe (Boldy 1968, Comba 1975, Knuckey et al. 1982 and Knuckey and Watkins 1982). Precious metals tend to vary systematically within a deposit although the zonal patterns relative to copper and zinc are not uniform. At Millenbach, gold and silver are enriched in the copper-rich areas whereas at Corbet they are enriched in zinc-rich areas (Knuckey et al. 1982; Watkins 1980).

Metal Zoning Between Lenses

In deposits consisting of multiple lenses, such as Millenbach and Amulet, the overall Cu/Cu+Zn ratio of individual massive sulphide lenses defines a crude "concentric" pattern of increasing copper content toward the main discharge areas marked by the Amulet lower A and Millenbach Main lens (Knuckey et al. (1982). Knuckey et al. (1982) interpreted this zoning to reflect a systematic increase in the precipitation of chalcopyrite, relative to sphalerite, within conduits that fed peripheral lenses as a result of a systematic decrease in temperature due to longer pathways and greater degrees of mixing with sea water. There is no systematic stratigraphic variation in the overall Cu/Cu+Zn ratio of deposits within the Mine Sequence.

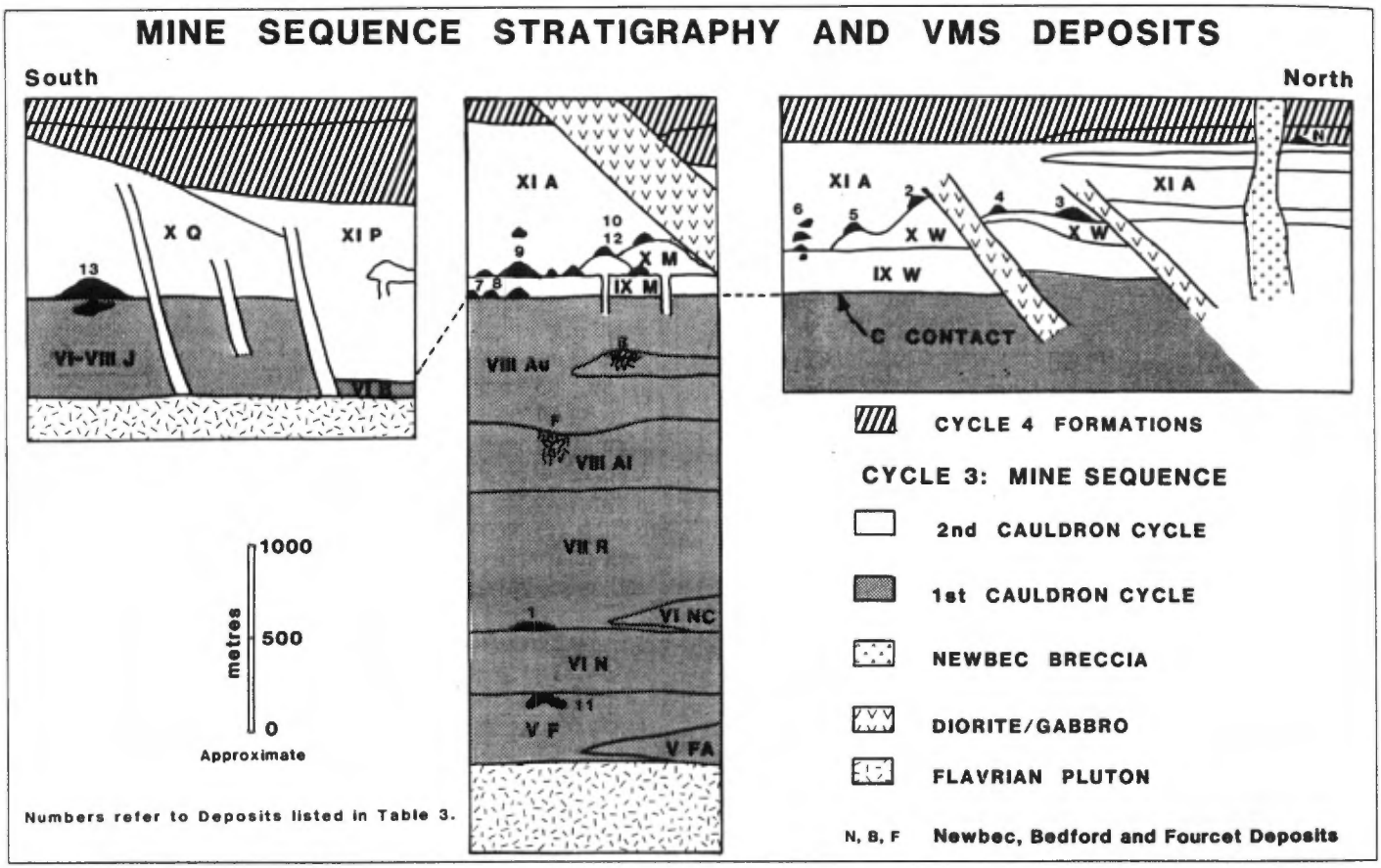


Figure 3: Mine Sequence stratigraphy of the Flavrian and Powell Blocks (Figure 2) showing the location of massive sulphide deposits within the two cauldron cycles. Roman numerals and letters refer to formations listed in Table 2; numbers refers to deposits in Table 3.

CONTROLS ON THE LOCATION OF VMS DEPOSITS WITHIN THE MINE SEQUENCE AND NORANDA CAULDRON

Stratigraphic control

The Mine Sequence may be subdivided into two cauldron subsidence cycles separated by a cauldron-wide hiatus in volcanic activity (Gibson 1989). Each cauldron cycle is characterized by an initial period of tumescence followed by contemporaneous eruptions and collapse. Massive sulphide deposits within the Mine Sequence formed during active volcanism and subsidence at the onset of these two cauldron cycles (Gibson 1989). The Corbet and Ansil deposits formed during a period of volcanism and subsidence that marked the onset of cauldron development during the first cauldron cycle (Fig. 2 and 3). Similarly, the Millenbach-D68, Amulet, Old Waite, East Waite, and Norbec deposits formed during a period of active volcanism and subsidence coinciding with the onset of the second cauldron subsidence cycle (Fig. 2 and 3). Small, Zn-rich deposits at the "C" contact (C, Dufault, Moosehead and F-Shaft deposits) formed during a hiatus in volcanism and subsidence between the two cauldron cycles. Similarly, the small Newbec deposit formed during a hiatus in volcanic activity which followed the second cauldron cycle and infilling of the Noranda Cauldron.

The Quemont deposit, located along the south margin of the Cauldron, formed during an interval that spanned both cauldron cycles. The large size of the Quemont deposit, which almost equals the combined tonnage of deposits within the cauldron, may reflect continued, uninterrupted hydrothermal discharge that, unlike vents forming intra cauldron deposits, was not interrupted and forced to shift by contemporaneous volcanic activity.

Structural control

At the mine scale perhaps the most important and fundamental control on the location of massive sulphide deposits is their spatial association with volcanic vents localized along synvolcanic faults and less well defined paleostructures or lineaments. Figure 4 clearly illustrates the clustering of VMS deposits in 6 eruptive centres that occcur within and along the margins of the Noranda Cauldron where they are localized along major synvolcanic faults (Gibson 1989).

Synvolcanic faults, interpreted to have been generated and reactivated during regional tumescence that preceded volcanism and subsidence, provided cross-stratal permeability for ascending hydrothermal fluids and focused their discharge within the Noranda cauldron (Gibson 1989). Once established,

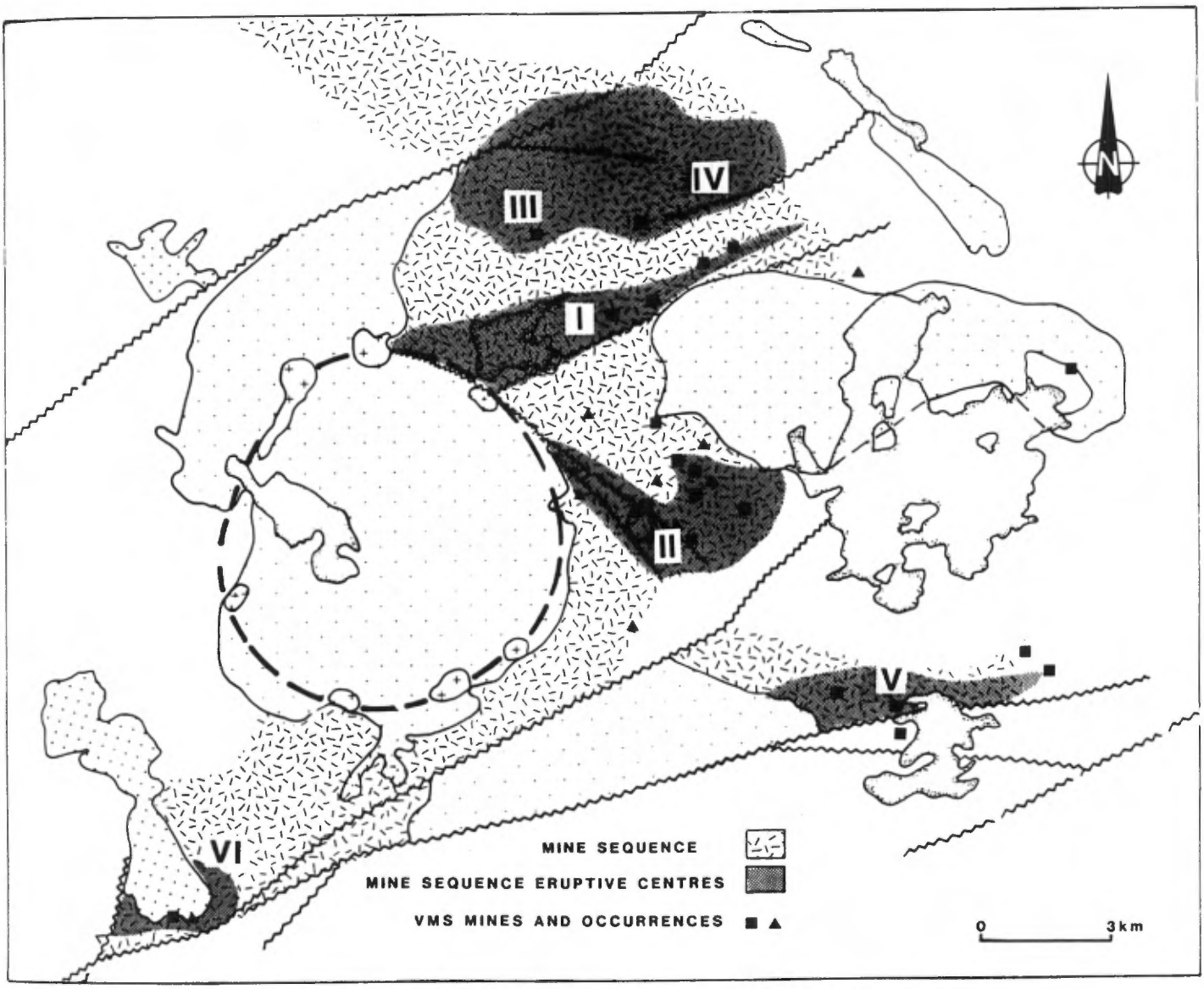


Figure 4: Generalized location of the 6 eruptive centres for the Mine Sequence and massive sulphide deposits and occurrences.

these faults continuously controlled the location of subsequent VMS deposits and volcanic vent areas at different stratigraphic intervals (Fig. 2 and 3).

The diagrammatic reconstruction in Fig. 5 through 7 and the discussion which follows illustrate: a) the pronounced structural control on the location of both VMS deposits and volcanic vent areas, b) formation of deposits during periods of active volcanism , and c) the diverse "environments" in which spatially associated and contemporaneous deposits formed. The Corbet deposit formed in an andesitic vent area at the intersection of the South Rusty Hill Fault and the McDougall-Despina Ring Fault (Gibson 1989). The latter and ancillary, parallel faults define the northern margin of the Despina Cauldron, a smaller subsidence structure within the Noranda cauldron (Gibson 1989). Massive sulphide deposits (Corbet, D-68), sulphide stringer zones (Bedford, Rusty Hill) and areas of anomalous sulphide content and alteration (Watkins 1980; Setterfield 1984), located at different stratigraphic intervals along this fault indicate that ascending hydrothermal fluids were continuously focused along the ring-fault during subsidence and volcanism.

The South Rusty Hill Fault, oriented normal to the McDougall-Despina Fault, is interpreted as a radial fault to the Despina cauldron (Gibson,1989). This fault, traced stratigraphically upward some 1000 m localizes QFP feeder dykes and VMS deposits at Millenbach. Noranda's Ribago deposit is also located within the Despina cauldron.

VMS deposits at Millenbach and D-68 (Fig. 5) formed at the base of, within and on top of a growing rhyolitic ridge. The deposits occur along the length of the 2.0 km northeast trending rhyolitic ridge where they directly overlie the northeast-trending feeder dyke to the lower rhyolitic flow (Fig. 5). The feeder dyke defines the trace of a northeast-striking radial fault (South Rusty Hill Fault) oriented perpendicular to the margin of the

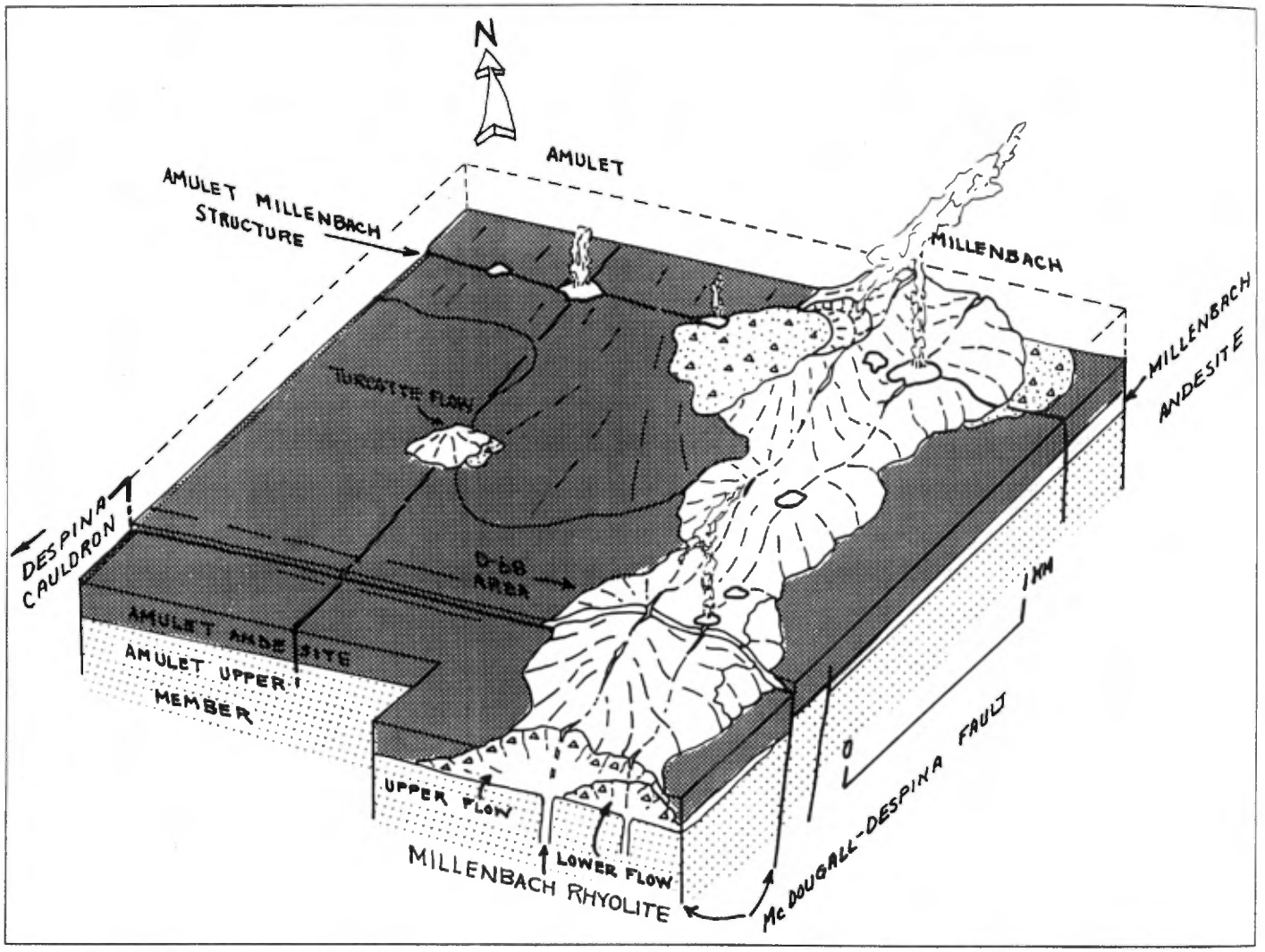


Figure 5: Cartoon illustrating an interpreted volcanological reconstruction of the rhyolitic Millenbach - D68 lava dome/ridge and massive sulphide deposits. Hydrothermal vents for the Amulet deposits were localized along a fissure referred to as the Amulet-Millenbach structure.

Despina cauldron. VMS deposits at D-68 are situated at the southwest end of the rhyolitic ridge and immediately adjacent to the margin of the Despina cauldron.

The alignment of the Amulet C, Bluff, Lower and Upper A, Lac Dufault zinc and D-266 deposits and the Millenbach main lens define a northwest-trending lineament, the Amulet-Millenbach structure, which parallels the McDougall-Despina Fault located 1.5km to the south (Fig. 5). The coincidence of the Amulet-Millenbach structure with a feeding fissure for the Amulet Andesite formation suggests that the former may mark the position of a deep-seated structure. Deposits along this structure occur over a 300 m stratigraphic interval indicating continued ascent of hydrothermal fluids along this structure during volcanism and subsidence. The Amulet F deposit and D-62 lens lie on a northwest-trending line, the F-shaft lineament, which parallels the Amulet-Millenbach lineament and McDougall-Despina Fault. The F-shaft lineament is interpreted to be similar to the Amulet-Millenbach structure and collectively they are interpreted as parallel ring fractures developed along and parallel to the margin of the Despina cauldron.

The pronounced east-northeast alignment of the Old Waite, East Waite, D-Zone, Norbec and Newbec deposits parallels and is coincident with the east-northeast trend of the Old Waite Dyke Swarm and Amulet Andesite feeding fissure, a graben-like fissure and subsidence zone within the core of the Noranda Cauldron (Fig. 1, 2 and 6 ; Cousineau and Dimroth 1982; Gibson 1989). Synvolcanic faults and fissures, now represented by andesitic and rhyolitic feeder-dykes, controlled the location of both volcanic vents and VMS deposits. The Old Waite deposit formed at the base of the Amulet Andesite formation within the core of the dyke swarm and was dissected by numerous feeder dykes to overlying flows. On a mine scale the geological environment of the Old Waite deposit is similar to that of Cyprus-type deposits within the lower Pillow Lavas. In marked contrast the East Waite deposit, located only 0.5 km to the east, formed on top of a rhyolitic lava dome (Waite Rhyolite). The Norbec and D-zone deposits formed along the flank of a large Waite Rhyolite flow and immediately adjacent to the Amulet Andesite feeding fissure. The Vauze deposit

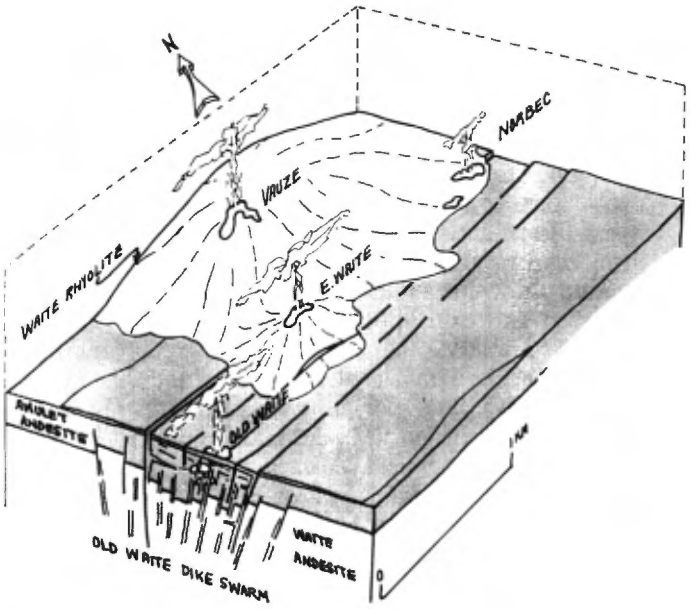


Figure 6: Cartoon illustrating an interpreted volcanological reconstruction of contemporaneous rhyolitic (Waite Rhyolite) and andesitic (Amulet Andesite) volcanism and massive sulphide deposits along the OldWaite Dyke Swarm.

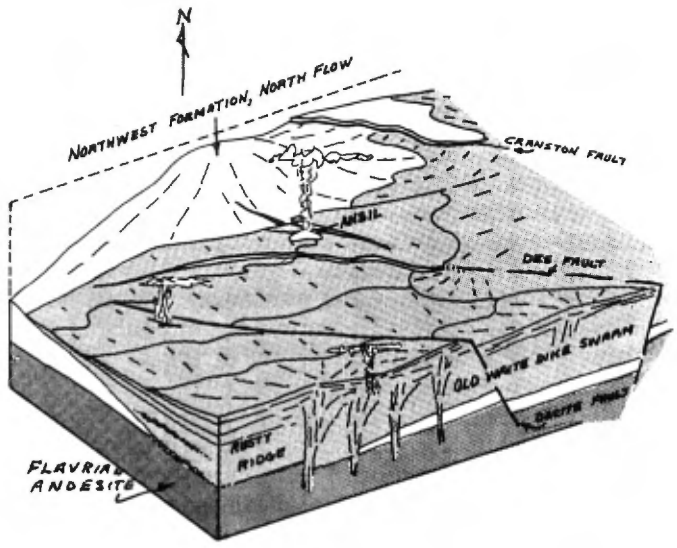


Figure 7: Cartoon illustrating an interpreted volcanological reconstruction of the Northwest and Rusty Ridge formations during formation of the Ansil Deposit. Andesitic flows of the Rusty Ridge formation issued from fissures localized along and adjacent to the Old Waite Dyke Swarm to the south and Cranston Fault to the northeast. The Ansil deposit formed on the flank of the rhyolitic North flow during the onset of andesitic volcanism.

formed along the south flank the Waite Rhyolite flow (Spence 1975) immediately north of the Old Waite Dyke Swarm.

The Ansil deposit is located on the south flank of the North Rhyolite flow of the Northwest formation and north of the Old Waite Dyke Swarm. The deposit, as illustrated in Fig. 7, is in part underlain by flows of the Rusty Ridge formation and is interpreted to have formed along the margin of an actively subsiding fault-bounded basin during andesitic eruptions of the Rusty Ridge formation.

The Quemont deposit lies within a vent area of the Joliet and Quemont Rhyolite formations along the intensely faulted south margin of the Noranda cauldron (Fig. 1, 2 and 3). The deposit formed within a down-faulted block sandwiched between the Horne and Quemont Feeder Dyke Faults along the cauldron margin. The Aldermac deposit and Nuinsco's recent discovery occur along the west margin of the Noranda cauldron and 1500m north of the MacKay Lake Fault, the western continuation of the Horne Creek and Beauchastel Faults.

In summary, during Mine Sequence volcanism, VMS deposits formed within active volcanic vent areas located within and along the inferred west and south margins of the Noranda Cauldron (Fig. 1 and 4), but to date, deposits have not been discovered along the north margin. Areas of alteration and sulphide concentrations do occur along the north margin and the absence of deposits may merely reflect minimal exploration, especially diamond drilling. There are, however, fundamental differences in the structural and volcanic history of the north and south margins that may have favoured the localization of deposits on the south margin. As illustrated in the reconstructed cross-section (Fig. 2) the south margin was more structurally and volcanically active and characterized by greater subsidence, as suggested by the high level of emplacement of the Flavrian Pluton.

CAULDRON SUBSIDENCE AND FORMATION OF VMS DEPOSITS

The pronounced spatial and temporal relationship of VMS deposits to a large cauldron subsidence structure has also been recognized in other massive sulphide camps. A genetic relationship between calderas and VMS deposits has been proposed for Kuroko-type deposits by Hodgson and Lydon (1977), Kouda and Korde (1978), and Ohmoto and Takahashi (1983), and for deposits in the Bathurst-Newcastle district by Harley (1979). Sangster (1980) interpreted the clustering of Archean VMS deposits within mining districts and their occurrence within felsic centres to reflect an association with submarine calderas.

Currently, the most popular hydrodynamic model for the formation of VMS deposits is the convection cell model where the metals are considered to be "leached" from underlying, footwall rocks through interaction with evolved, convecting seawater. Seawater convection is interpreted to be driven by the heat of a high level magma source and cooling flows and intrusions. The fluid is interpreted to leach metals from rocks during its passage through the system and is discharged at the seafloor to form massive sulphide deposits. Cauldron development is particularly favourable for establishing and sustaining sea water convection as maximum heat flow and cross-stratal permeability are focused in a small volume and brief period during the evolution of the Noranda Shield Volcano. During cauldron subsidence both volcanism and subsidence were accommodated along faults that formed directly above a rising, shallow (1-3 km) magma chamber now represented by the Flavrian Pluton (Goldie 1976; Gibson 1989). As a result, the

Noranda Cauldron is interpreted to have been a restricted area of anomalously high heat flow and structural permeability as compared to the larger shield volcano. This may have resulted in the development of a high-temperature hydrothermal system directly above the magma chamber and within the Noranda cauldron. Numerous faults, active during subsidence and volcanism, may have provided access for recharge fluid (seawater) and acted as conduits for cross-stratal fluid flow and ultimately focused discharge to form deposits both within the cauldron and along its margins. Hydrothermal discharge peripheral to the cauldron would, presumably, have been insignificant and of lower temperature than that within the cauldron.

The convection model is appealing because of the: a) existence of hydrothermal convection cells in modern oceanic crust, b) the occurrence of fossil hydrothermal systems in footwall rocks of other VMS camps such as in pillowed rocks of the Troodos Ophiolite, that host Cyprus-type massive sulphide deposits (Spooner 1977: Heaton and Sheppard 1977), and c) the occurrence of semiconformable, hydrothermal alteration zones that define a fossil hydrothermal system within the footwall rocks to deposits at Noranda (Gibson 1989). Of particular significance are areas of epidote-quartz alteration which, based on experimental work and constant volume calculations, can yield significant amounts of Cu and Zn to the fluid (Rosenbauer and Bischoff 1984; Seyfried and Janecky 1985; Harrigan and MacLean 1976; Gibson 1979; 1989; Skirrow 1987). Thus, epidote-quartz alteration, within the deep part of the Mine Sequence hydrothermal system, may represent a possible source of metals for associated massive sulphide deposits.

The copper- or zinc-rich character of deposits is interpreted to be a function of the amount of copper contained within discharging hydrothermal fluids which is, in part, dependant upon temperature (Crerar and Barnes 1976; Styrt et al. 1981). The higher copper content of VMS deposits within the Noranda cauldron is compatible with discharge from a high-temperature hydrothermal system that prevailed during a period of higher heat flow which accompanied cauldron development. Zn-rich VMS deposits of pre- and post-cauldron formations are interpreted as products of a "lower" temperature hydrothermal system. Similarly, Zn-rich massive sulphide lenses at the "C" contact formed during a hiatus that separated the two cauldron subsidence cycles and are interpreted as products of a "lower" temperature system that was operative during a period of decreased heat flow immediately following magma withdrawal and collapse.

The convection model, however, does not explain the following:

a) the preferential location of most and in some cases all deposits at one stratigraphic interval, such as the Mine Sequence at Noranda,
b) alteration pipes that extend for more than a kilometre below the massive sulphide deposits; for example, the Millenbach and Amulet Lower A "pipes" extend to the base of the Mine Sequence. The length of these pipes suggests that the "ore fluid" was not derived from a shallow convection cell but possibly from a deep "stratal aquifer", as proposed by Lydon (1988), or the underlying Flavrian Pluton, and
c) numerous apparently barren subaqueous volcanic successions within greenstone belts that have similar semiconformable alteration assemblages but contain no known deposits. If VMS deposits formed solely by hydrothermal convection then most greenstone belts should contain VMS deposits.

One possible explanation for the selective occurrence of VMS deposits is that the metals and deposits themselves might represent a direct contribution from an underlying magma chamber. A magmatic component to the fluid is appealing as it would allow the periodic expulsion of fluid within a short time span thus explaining the clustering of deposits at one stratigraphic interval, the occurrence of "sporadic", apparently isolated deposits within a volcanic edifice, and the absence of deposits within some submarine volcanic successions. Thus, the location of isolated VMS deposits within Cycles 1, 2 and 4 of the Noranda Shield Volcano may represent periodic tapping of magmatic fluids by deep faults during construction of the edifice. The clustering of deposits within the Noranda Cauldron and Mine Sequence, and specifically at the onset of cauldron subsidence during each cauldron cycle may be a product of continuous tapping, along deep-seated faults, of a magma chamber that was emplaced at its highest level within the crust (1 - 3km) during cauldron development. Penetration of a high level magma chamber by convecting intrastratal fluid would facilitate leaching of metals from a cooling and crystallizing magma. Once tapped by faults, ascending magmatic fluids could mix with the convecting intrastratal fluids, responsible for semiconformable alteration zones (Gibson 1989) and be discharged within and along the margins of the Noranda Cauldron.

ACKNOWLEDGEMENTS

Corp. Falconbridge Copper (now Minnova Inc.) was instrumental in supporting this research by providing access to both properties and data and for financial support to HLG. In particular we thank M.J. Knuckey and D.H. Watkins. Our understanding of Noranda geology and massive sulphide deposits benefitted from discussions with J.M. Franklin, J.W. Lydon, M.B. Lambert, D.H. Watkins, G. Riverin, C.D.A. Comba, J.J. Watkins and the late E. Dimroth to name but a few. Thorough reviews by R. Morton and W. Goodfellow improved the manuscript. Some financial support was provided by Natural Sciences and Engineering Research Council of Canada grant A7874 to DHW.

REFERENCES

Barnes, H.L., 1979. Solubilities of ore minerals; In Barnes, H.L.(ed.), Geochemistry of hydrothermal ore deposits, second edition, Wiley, New York, pp. 404-460.

Boldy, J., 1977. Exploration discoveries, Noranda District, Quebec; In Hood,.P.J.(ed.), Geophysics and Geochemistry in the search for metallic ores. Geological Survey of Canada, Report 31, pp.593-604.

Boldy, J., 1968. Geological observations on the Delbridge massive sulphide deposit. Canadian Institute of Mining and Metallurgy, Bull. 61: 1045-1054.

Comba, C.D.A., 1975. Copper-Zinc zonation in tuffaceous exhalites, Millenbach Mine, Noranda, Quebec. Msc.thesis, Queen's University, Kingston, Ontario (unpubl.).

Cousineau, P., and Dimroth, E., 1982. Interpretation of the relations between massive, pillowed and brecciated facies in an Archean submarine andesite volcano - Amulet Andesite, Rouyn-Noranda, Canada. Journal of Volcanology and Geothermal Research, 13: 83-102.

Crerar, D.A., and Barnes, H.L., 1976. Ore solution chemistry. V. Solubilities of chalcopyrite and chalcocite assemblages in hydrothermal solution at 200o to 300°C. Economic Geology, 71: 772-794.

de Rosen-Spence, A.P., 1976. Stratigraphy, development and petrogenesis of the central Noranda volcanic pile, Noranda, Quebec. Ph.D. thesis, University of Toronto, Toronto, Ont., (unpubl.).

Dimroth, E., Imreh, L., Goulet, N., and Rocheleau, M., 1983. Evolution of the south- central segment of the Archean Abitibi Belt, Quebec. Part 11: Tectonic evolution and geomechanical model. Canadian Journal of Earth Sciences, 20: 1355-1373.

Dimroth, E., Imreh, L., Rocheleau, M. and Goulet, N., 1982. Evolution of the South-Central part of the Archean Abitibi Belt, Quebec. Part I: Stratigraphy and paleogeographic model. Canadian Journal of Earth Sciences, 19: 1729-1758.

Franklin, J.M., Sangster, D.F., and Lydon, J.W., 1981. Volcanic-associated massive sulphide deposits. Economic Geology Anniversary Volume, pp. 485-627.

Gélinas, L., Trudel, P., and Hubert, C., 1984. Chemostratigraphic division of the Blake River Group, Rouyn-Noranda area, Abitibi, Quebec. Canadian Journal of Earth Sciences, 21: 220-231.

Gibson, H.L., 1989. The Mine Sequence of the Central Noranda Volcanic Complex: Geology, Alteration, Massive Sulphide Deposits and Volcanological Reconstruction. PhD. thesis, Carleton University, Ottawa, Ontario, 715 p.(unpubl.).

Gibson, H.L., and Watkinson, D.H., 1986. The Central Mine Sequence, Noranda, Quebec: A caldera-fill sequence. In program with abstracts, Vol.11. GAC, MAC and CGU Annual Meeting, Ottawa, Ontario.

Gibson, H.L., Walker, S.D., and Coad, P.R., 1984. Surface geology and volcanogenic base metal massive sulphide and gold deposits of Noranda and Timmins. Guide Book for Field Trip #14: 124 p., GAC-MAC Annual Meeting, London, Ontario.

Gibson, H.L., 1979. Geology of the Amulet Rhyolite formation, Turcotte Lake Section, Noranda area, Quebec. M.Sc. thesis, Carleton University, Ottawa, Ontario, (unpubl.).

Goldie, R.J., 1976. The Flavrian and Powell Plutons, Noranda Area, Quebec. Phd. thesis, Queen's University, Kingston, Ontario, (unpubl.).

Goodwin, A.M., 1978. Archean volcanic studies in the Timmins-Kirkland Lake- Noranda region of Ontario and Quebec. Geological Survey of Canada Bull 278, 51p.

Harley, D.N., 1979. A mineralized Ordovician resurgent caldera complex in the Bathurst-Newcastle Mining District, New Brunswick, Canada. Economic Geology, 74: 786-796.

Harriagn, D.B., and MacLean, W.H., 1976. Petrography and geochemistry of epidote alteration patches in gabbro dykes at Matagami, Quebec. Canadian Journal of Earth Sciences, 13: 500-511.

Heaton, T.H.E., and Sheppard, S.M.F., 1977. Hydrogen and oxygen isotope evidence for sea-water-hydrothermal alteration and ore deposition, Troodos Complex, Cyprus. In Volcanic Processes and Ore Genesis, Geol. Soc. London, Special Publication 7, pp. 42-57.

Hodgson, C.J., and Lydon, J.W. 1977. The geologic setting of volcanogenic massive sulphide deposits and active hydrothermal systems. Some implications for exploration. Canadian Institute of Mining and Metallurgy Bull., 70: 95-106.

Knuckey, M.S., Comba, C.D.A., and Riverin, G., 1982. The Millenbach deposit, Noranda district, Quebec - an update on structure, metal zoning and wall rock alteration. Geological Association of Canada, Special Paper 25, pp. 297-318.

Knuckey, M.J. and Watkins, J.J., 1982. The geology of the Corbet massive sulphide deposit, Noranda District, Quebec, Canada. Geological Association of Canada Special Paper 25, pp. 255-296.

Lichtblau, A.P., and Dimroth, E., 1980. Stratigraphy and facies at the south margin of the Archean Noranda caldera, Noranda, Quebec. In Current Research, Part 1A, Geological Survey of Canada Paper 80-1A, pp. 69-756.

Lydon, J.W., 1988. Vocanogenic massive sulphide deposits, Part 2. Genetic models. Geoscience Canada, 15: 43-65.

McEwen, J.H., and Watkinson, D.H., 1982. Syngenetic deformation in massive sulphides, Gallen Deposit, Noranda, Quebec; In Current Research, Part A, Geological Survey of Canada, Paper 82-1A, pp.275-280.

Mortensen, J.K., 1987. Preliminary U-Pb zircon ages for volcanic and plutonic rocks of the Noranda-Lac Abitibi area, Abitibi Subprovince, Quebec. In Current Research, Part A, Geological Survey of Canada, Paper 87-1A, pp. 581-590.

Nunes, P.D., and Jensen, L.S., 1980. Geochronology of the Abitibi Metavolcanic belt, Kirkland lake Area - A progress report; in Pye, E.G. (ed.), Summary of Geochronologic Studies, 1971-1979, Ontario Geological Survey, Misc. Paper 92, pp.40-45.

Ohmoto, H., and Takahashi, T., 1983. Part III. Submarine calderas and Kuroko Genesis. In Ohmoto, H., and Skinner, B.J.(eds.), The Kuroko and related volcanogenic massive sulphide deposits, Economic Geology Monograph 5, pp.9-114.

Péloquin, A.S. et al. 1990. The Blake River Group, Rouyn-Noranda, Quebec: a stratigraphic synthesis. *In* The Northwestern Quebec Polymetallic Belt. *Edited by:* M.Rive, et al.. The Canadian Institute of Mining and Metallurgy, Special Volume 43.

Riverin, G., et al. 1990. The geology of the Ansil Deposit, Rouyn-Noranda, Quebec. *In* The Northwestern Quebec Polymetallic Belt. *Edited by:* M.Rive, et al..The Canadian Institute of Mining and Metallurgy, Special Volume 43.

Rosenbauer, R.J. and Bischoff, J.L., 1984. Uptake and transport of heavy metals by heated seawater: A summary of the experimental results. In Rona, P.A., Bostrom, K., Laubier, L. and Smith, K.L.(eds.),Hydrothermal processes at seafloor spreading centres, Plenum, New York.

Sangster, D.F., 1980. Quantitative characteristics of volcanogenic massive sulphide deposits. 1. Metal content and size distribution of massive sulphide deposits in volcanic centres. Canadian Institute of Mining and Metallurgy Bull., 73:74-81.

Setterfield, T., 1984. Nature and significance of the McDougall-Despina fault set, Noranda, Quebec. Msc. thesis, Univ. Western Ontario, London, Ontario (unpubl.).

Seyfried, W.E., and Janecky, D.R., 1985. Heavy metal and sulphur transport during subcritical and supercritical hydrothermal alteration of basalt. Influence of fluid pressure and basalt composition and crystallinity. Geochimica et Cosmochimica Acta, 49: 2545-2560.

Simmons, B.D., and Geological Staff, 1973. geology of the Millenbach massive sulphide deposit, Noranda, Quebec. Canadian Institute of Mining and Metallurgy Bull., 66: 67-78.

Skirrow, R.G., 1987. Silicification in a Semiconformable Alteration Zone below the Chisel Lake massive sulphide deposit, Manitoba. MSc. thesis, Carleton University, Ottawa, Ont., (unpubl.).

Smith, R.L., and Bailey, R.A., 1968. Resurgent Cauldrons. Geological Society of America Mem. 116, pp. 613-662.

Spence, C.D., 1975. Volcanogenic features of the Vauze sulphide deposit, Noranda, Quebec. Economic Geology, 70: 102-114.

Spence, C.D., and de Rosen-Spence, A.F., 1975. The place of sulphide mineralization in the volcanic sequence at Noranda, Quebec. Economic Geology, 70: 90-101.

Spence, C.D., 1967. The Noranda Area. Canadian Insitute of Mining and Metallurgy, Centennial Field Excursion Guidebook, pp. 36-39.

Spooner, E.T.C., 1977. Hydrodynamic model for the origin of the ophiolitic cupriferous pyrite ore deposits of Cyprus. In Volcanic processes in ore genesis, Geological Society of London, Special Publication 7, pp. 58-71.

Styrt, M.M., Brackmann, A.J., Holland, H.D., Clark, B.C., Pistha-Amond, V., Eldridge, C.S., and Ohomoto, H., 1981. The mineralogy and the isotopic composition of sulphur in hydrothermal sulphide/sulphate deposits on the East Pacific Rise, 21oN lattitude. Earth and Planetary Science Letters, 53: 382-390.

Watkins,J.J., 1980. The geology of the Corbet Cu-Zn deposit and the environment of ore deposition in the Central Noranda area. Msc. thesis, Queen's University, Kingston, Ontario (Unpubl.).

Watkinson, D.H., McEwen, J., and Jonasson, I.R., 1990. Mine Gallen: Geology of an Archean massive sulphide mound. *In* The Northwestern Quebec Polymetallic Belt. *Edited by:* M.Rive,et al.. The Canadian Institute of Mining and Metallurgy, Special Volume 43.

Wilson, M.E., 1941. Noranda district Quebec. Geological Survey of Canada Memoir 229, 162p.

Annexe 2

SOMMAIRE DES TROUS DE FORAGE - PROPRIÉTÉ LAC DUFAULT

Trou	Distance (pi.)	Description
Bloc Ouest		
D-105 (-90)	3 - 1772	andesite
	1772 - 1836	brèche (chert)
	1836 - 1973	rhyolite bréchique
	1973 - 4012	INCONNU : trou approfondit
D-100 (-90)	18 - 1360	andesite
	1360 - 1663	rhyolite
* trou bloqué à 450 m		
D-282 (-90)	10 - 643	andesite
	643 - 649	tuf bréchique (chert)
		(contact inf. à 45/a.c.)
	649 - 667	andesite
	667 - 1033	rhyolite (S: tr.)
	1033 - 1043	bx rhyolitique/tuf
	1043 - 1566	rhyolite (S: tr.)
	1566 - 1669	dacite
D-279 (-90)	11 - 592	andesite dioritisée
	592 - 746	rhyolite (S tr.: py, cp, sp)
	746 - 746.5	tuf lité - Py SSM
	746.5 - 804	rhyolite bréchique (py tr.)
	804 - 1304	andesite (py/cp tr.)
	1304 - 1523	rhyolite ou dacite (py tr.)
	1523 - 1552	dyke dioritique
	1552 - 1682	rhyolite (S: nil)

Trou	Distance (pi.)	Description
Bloc Sud		
D-278 (-90)	10 - 96	tuf dacitique (py tr.)
	96 - 2509.5	andesite (S: tr.)
	2509.5 - 2510	tuf lité (S: nil)
	2510 - 2602	andesite (S: tr.-1% py-po)
	2602 - 2613	zone fracturée (5% py diss.)
	2613 - 2819	dacite
	2819 - 2877.4	FP/andesite-dacite
	2877.4 - 2883.4	tuf lité (S: py tr) (litage à 45-70/a.c.)
	2883.4 - 2886.7	tuf ou rhyolite bx (fil. py tr.)
	2886.7 - 2948	Dyke acide/andesite
	2948 - 3007	rhyolite bx (py tr.)
D-276 (-90)	63 - 102.5	andesite (py tr.)
	102.5 - 104	tuf lité (S: nil) (litage 35-45/a.c.)
	104 - 344.5	andesite (S: nil - py/cp tr.)
	344.5 - 346	zone de faille
	346 - 632	andesite/(diorite)
	632 - 670	rhyolite bx ou andesite sil.(S: tr.)
	670 - 791	andesite
	791 - 814	rhyolite? (py tr.)
	814 - 900	andesite
	900 - 918	zone de faille
	918 - 971	andesite (tr. cp-po-py)
	971 - 984.5	zone de faille - Creek
	984.5 - 1826	andesite (py tr. - nil)
	1826 - 1827.3	tuf lité (S: nil, litage 0-45/a.c.)
	1827.3 -2454.5	andesite (S: nil)
	2454.5 - 2457.3	tuf lité (py tr., contact inf. à 80/a.c.)
	2457.3 - 2645	andesite (S: po-py, cp tr.)
		(page suivante)

SOMMAIRE DES TROUS DE FORAGE - PROPRIÉTÉ LAC DUFAULT

Trou	Distance (pi.)	Description	Trou	Distance (pi.)	Description
Bloc Sud			***Bloc Sud***		
D-276 (-90)	2645 - 2855	rhyolite bx	D-269 (-90)	15 - 1127	diorite
(suite)		(2652 - 2667: 7%py-po,1%sp)		1127 - 1173	andesite (S: nil)
		(2820 - 2855: 5%py, sp tr.)		1173 - 1212	diorite
				1212 - 1938	andesite (S nil à tr:py-cp)
				1938 - 1939.5	tuf lité (1-2% py)
D-283 (-90)	0 - 1284	andesite (py-cp tr.ds fractures)/(diorite)		1939.5 - 2136	andesite (py, cp tr.)
	1284 - 1314	zone de faille - Creek (py tr.)		2136 - 2293	QFP/dacite (py tr.)
	1314 - 2800.5	andesite (py-cp tr.ds fractures)		2293 - 3290	andesite (S tr.: py, cp)
	2800.5 - 2808	tuf (chert)(S tr.:py-po, sp)			(2559-2590:1-4% py diss et ds les amyg.)
	2808 - 3151	dacite (S tr.: py, po, cp)		3290 - 3297	tuf frag.et lité (chert)
	3151 - 3155.5	tuf lité bx (2% py)			(2-4% po et 1%cp / 1pi.) (litage à 70/a.c.)
	3155.5 - 3159.5	tuf lité (8 - 10% py)		3297 - 3495.5	andesite - dacite (py-po tr. et cp tr.)
	3159.5 - 3242	rhyolite (py tr.)		3495.5 - 3496.2	tuf lité cherteux
	3242 - 3301	QFP			(3-4 % py et 1-2 % cp) (litage à 65/a.c.)
	3301 - 3306	rhyolite (S: nil)		3496.2 - 3515	andesite (py tr.)
				3515 - 3520.5	tuf lité cherteux
					(3-5 % py-po, cp tr.) (litage à 80/a.c.)
				3520.5 - 3528.2	andesite (fil. py tr.)
				3528.2 - 3528.8	SM: +90% py(po)
				3528.8 - 3723	rhyolite (py tr.)
				3723 - 3773	dyke de dacite porphyrique
			D-306 (-90)	12 - 1170	diorite
				1170 - 1246	andesite (S nil)
				1246 - 1323	dykes acide/diorite
				1323 - 1350	andesite (S nil)
				1350 - 1773	dacite (S nil)
				1773 - 3040	andesite (py tr.)/(dykes acide)
				3040 - 3186	andesite (py tr.)/(dykes QFP)
				3186 - 3187	tuf massif (S nil)
				3187 - 3225	(andesite)/dyke QFP

SOMMAIRE DES TROUS DE FORAGE - PROPRIÉTÉ LAC DUFAULT

Trou	Distance (pi.)	Description	Trou	Distance (pi.)	Description
Bloc Sud			***Bloc Est***		
D-306 (-90)	3225 - 3327.5	dacite - sections de tufs lités	D-323 (-90)	4 - 2630	diorite
(suite)		(3315.5 - 3327.5: 4%S (2.5% po, 1.5%		2630 - 3943	andesite (py tr.)/(QFP)
		cp-py-sp) (litage de 45 -90/a.c.)		3943 - 3945.1	tuf lité et SM (40% po, 10% py
	3327.5 - 3525	rhyolite (py-(po) tr.)			(litage 75/a.c.)
				3945.1 - 4005	rhyolite (py-po 2%(fil. & diss.))
				4005 - 4257.4	dacite - andesite (py diss.tr.)
D-255 (-90)	70 - 448	andesite (py tr.)		4257.4 - 4412	rhyolite bx (1-2% po)
	448 - 469.5	zone de faille - Creek			
	469.5 - 1110	andesite (py tr.)			
	1110 - 1119	zone de faille	D-326 (-90)	4 - 2560	diorite
	1119 - 2271	andesite (S nil - py tr.(cp) localement)		2560 - 3153	andesite (py tr.)
	2271 - 2277	tuf bréchique (4% py cubique)		3153 - 3681	QP/QFP
	2277 - 2592	dacite (py (cp) tr.) /dykes acide		3681 - 3793	dacite/QP/andesite
	2592 - 2629	andesite (1% py)		3793 - 3802	tuf massif (py-po ssm localement)
	2629 - 2645	zone de faille		3802 - 4099	rhyolite (py (cp) tr.)
	2645 - 2773	dacite - andesite (py tr.)			
	2773 - 2782.3	tuf lité (3% py-po, sp et cp tr.)			
		(litage à 60/a.c.)	D-318 (-90)	11- 1822	diorite
	2782.3 - 2905	rhyolite bx (py-po-cp-sp tr. localement)		1822 - 1828	zone de faille
				1828 - 2128	diorite
				2128 - 3826.3	andesite (py tr.ds fract.et
					amyg.)
				3826.3 - 3834.9	tuf lité (%py-cp ds litage,
					sp tr.) (litage à 50-70/a.c.)
				3834.9 - 4199	rhyolite (py diss.& ds fract.tr.)

SOMMAIRE DES TROUS DE FORAGE - PROPRIÉTÉ LAC DUFAULT

Trou	Distance (pi.)	Description	Trou	Distance (pi.)	Description
Bloc Sud			***Bloc Sud***		
D-88 (-90)	0 - 7	tubage	D-257 (-90)	1406 - 1874	andesite amyg.-ma-porph.(%< py, cp tr.)
	7 - 205	(P) U lithic (<% py, cp)	(suite)	1874 - 1900	QFP ou rhyolite porph. (py diss. tr.)
	205 - 279	APL/dyke andesitique (py tr.)		1900 - 1913	rhyolite bx (fil. & amas de py +
	279 - 281.5	Bx (S: nil)			1% de cp de 1901 - 1913)
	281.5 - 1005	APL/dykes andesitique/(AU)(py,cp,sp,po tr.)		1913 - 1922	tuf cherteux lité (5-15% py, sp tr.)
	1005 - 1269	QFP (py tr.)			(litage à 50/a.c.)
	1269 - 1310.5	intrusif/dyke mafique		1922 - 2041	rhyolite bx (fil. & amas de py +
	1310.5 - 1330.6	Bx (1324-1325: 5% sp)			py diss. tr.)
	1330.6 - 1348	rhyolite (% moy. sp, >%py)		2041 - 2069	dyke (andesite - dacite) (py tr.)
	1348 - 1384	dyke? (py tr.)			
	1384 - 1425	Bx (2-3% sp, % moy.py, po-cp tr.)			
	1425 - 1447	Au/PU (py, cp tr.)			
	1447 - 1475	Bx (<% py)			
	1475 - 1527	rhyolite (<% py)			
	1527 - 1643	Bx/Intrusif mafique/(Au)	***Bloc Ouest***		
	1643 - 1775	QP/dyke andésitique (sp ds fract.)	D-286 (-90)	0 - 5	tubage
	1775 - 1843	andesite (<% py, sp)		5 - 949.5	andesite amyg.- ma- porph.- alt.
					(py diss.tr., (cp tr.))
				949.5 - 957.5	tuf lité (litage à 5/a.c.)
D-257 (-90)	0 - 62	tubage			(10% py au sommet, 3 po. d'épaisseur.
	62 - 620	andesite amyg-ma-porph.(py tr.et			Ailleurs 1%)
		cp tr. particulièrement de 607 - 620)		957.5 - 965.5	tuf ma ou dacite ma (py tr.)
	620 - 625	zone de faille		965.5 - 1128	dacite - andesite ma - amyg. - alt. (py tr.)
	625 - 970	andesite dioritisée amyg-ma (py, cp tr.)		1128 - 1277	rhyolite bx - alt - (porph.) (py diss. tr.)
	970 - 1046	micro-diorite cis. (S: nil)			
	1046 - 1106	andesite amyg. (S: nil)			
	1106 - 1126	microdiorite (S: nil)			
	1126 - 1161	andesite fract.(S: nil)			
	1161 - 1170	zone de faille			
	1170 - 1181	micro-diorite (S: nil)			
	1181 - 1402	andesite amyg. (py tr.)			
	1402 - 1406	tuf bx (py tr.)			

SOMMAIRE DES TROUS DE FORAGE - PROPRIÉTÉ LAC DUFAULT

Trou	Distance (pi.)	Description	Trou	Distance (pi.)	Description
Bloc Sud			***Bloc Sud***		
D-95 (-90)	22 - 1665.2	APU/Au/APL/Bx	D-054 (-90)	2045 - 2057.5	dyke acide - QFP
		(192 - 195: Bx (py tr.),	(suite)	2057.5 - 2224	lave amyg. (alt.)(coussinée?)
		498 - 500: Bx coulée,			
		904 - 912: Bx ? (py tr.),			
		1165 - 1176: dyke rhyolitique,	D-273	41 - 1520	andesite ma-amyg / (dykes
		1394 -1405: dyke rhyolitique,			de diorite) (py. tr.)
		1628 - 1632: Bx coulée (chert))		1520 - 1521	tuf lité cherteux (litage 60/
	1665.2 -1674	tuf lithique			a.c.)(py ds plans litage)
		(contact inf. à 42/a.c.)		1521 - 1558	andesite amyg (py tr.)
	1674 - 1789.5	QFP - QP/Au (S: nil)		1558 - 1559	tuf lité-ma (litage 50/a.c.)(py tr.)
	1789.5 - 2056	rhyolite amyg./dyke rhyolitique/(Bx coulée)		1559 - 2056	andesite amyg (Bx)(py tr.)
		(sp tr. Loc. ds Vn Qz, py tr.)			(po ds dykes acides)
	2056 - 2188.6	AU/APU/(dyke andesitique porph.)		2056 - 2364	diabase
	2188.6 - 2192.9	tuf cherteux - frag.		2364 - 2514.5	andesite dioritisée - amyg
		(litage à 35/a.c.)(%py-po, cp tr.)			(2512' et plus po-sp ds amyg)
	2192.9 - 2267	rhyolite Bx (cp tr.)		2514.5 - 2515.6	tuf lité (litage 60-90/a.c.)
					(sp, py-po ds litage et diss.)
				2515.6 - 2520	Bx rhyolitique (%py-po-sp)
D-054 (-90)	4 - 223	rhyolite sil.? lave coussinée		2520 - 2521.6	tuf lité (25/a.c., % py-po, sp-cp tr.)
		epidotisée (%py, tr.cp et sp)		2521.6 - 2631	Bx rhyolitique (py-po-cp tr.)
	223 - 892	lave coussinée - andesite			(à 2522.9/1 pi. SM: 95% py)
		(800-825: Vn Qz avec %py, cp tr.)			
	892 - 903	dyke mafique			
	903 - 1455.5	rhyolite amyg. Fract.(% py)			
	1455.5 - 1638	andesite (py épars)			
	1638 - 1649.5	dyke mafique			
	1649.5 - 1712.5	QFP ou rhyolite sil. ? (py, cp diss.)			
	1712.5 - 1833	andesite amyg. (py, sp tr.)			
	1833 - 1835	tuf rhyolitique (>% py, po et cp tr.)			
	1835 - 1990.5	rhyolite bx (% moy.py)			
		(1838-1839: >%py, po, cp tr.)			
	1990.5 - 2045	lave ou dyke mafique? (py tr.)			

D-54

LAKE DUFAULT MINES LTD.

DIAMOND DRILL RECORD

783' drilled 1955

Hole No. 54 Length 2224 CO-ORDINATES OF COLLAR

Working Place Lupreesnoy Section Lat. 735.33 S

Date Finished Feb 1, 1956 Dip -90 Dep. [illegible],023.10 E.

Bearing Elevation 1011.67

SIGNIFICANT INTERSECTIONS

From	To	C.L.	Cu.	Zn.	Au.	Remarks

From	To	DESCRIPTION	Sample No.	Width	Cu.	Zn.	Au.
0	4	Casing					
4	223.5	Blu-gry. f.g. hi. sil. epidotized p.lav. -epidotized zones look like mud ball inclusions. -scat. py., traces c.p., sph.					
223.5	370	Grn.gry.f.g. hi.sil. epidotized bx'd.p.lav.					
370	646.5	Grn.gry.f.g. hi.sil. unif. andesite p.lav.					
646.5	647	Grn.gry.f.g. qtz.filled fault contact					
647	650	Grn.gry.f.g. hi.sil. greenstone dyke?					
650	823	Grn.gry.f.g. hi.sil. amyg. p.lav. 800-825 pegmatized qtz. stringers with py. - minor c.p.					
823	892	Grn.gry.f.g. hi.sil.amyg. p.lav. - crush fract'd. - mod.py., minor c.p.					
892	903	Grn. f.g. basic dyke					
903	1455.5	Grn.gry. f.g. hi. sil. amyg. rhy. -crush fract'd., mod. py.					
1455.5	1638	Grn.gry. f.g. sil. unif. andesite -scat.py.					
1638	1649.5	Grn.gry.f.g. sil. greenstone dyke					
1649.5	1712.5	Grn.gry. m.g. F.P.P. with diss.c.p., py. & alt. sil. rhy. with qtz. eyes.					
1712.5	1754.5	Grn.gry. f.g. alt. sil. andesite? p.lav? - f. diss. py.					
1754.5	1833	Grn.gry. f.g. sil. amyg. andesite. - - py. spn. in amygs.					
1833	1835	blu.gry. f.g. rhy. tuff - heavy py., pyrr., minor c.p.					

Hole No. 54 Logged By

From	To	DESCRIPTION	Sample No.	Width	Cu.	Zn.	Au.	
1835	1838	Blu.gry. m.g. alt. rhy.bx. - mod.py.						
1838	1839	Blu.gry. f.g. rhy. tuff? heavy py., pyrr. minor c.p.						
1839	1990.5	Blu.gry. m.g. alt. rhy. bx.-mod.py. - purple alt.						
		19( ) look like pil borders!						
		1[illegible] suggestions of qtz. eyes - [illegible].F.P?						
1990.5	2045	Grn.gry. m.g. unif. chl'ic flow? or dyke? - locally shot with py.						
2045	2057.5	Grn.gry. m.g. acid dyke - possibly [illegible].F.P.						
2057.5	2104.5	Grn.gry. m.g. unif.-amyg. flow-strong suggestions of pil. borders						
2104.5	2116.5	Grn.gry. m.g. mot.. hi. alt. flow						
2116.5	2124	Grn.gry.m.g. unif. -amyg.flow. -still suggestions of pil. borders.						
		END OF HOLE						

FORM No. 1

D-88

LAKE DUFAULT MINES LTD.

Drill Hole Record

Hole No. H-88 | Lat. 1003.47 S | Dep. 8414.50 E | Elev. 1056.39 | Dip -90o | Bearing - | Depth 1843

Working Place: Dupresnoy

Area 4-D

Date Started: Nov. 29, 1956

Date Completed: Jan. 8, 1957

Depth Tests (Corrected only):
50' - 90o)
500' - 88½o)
1000' - 88o) Corrected
1500' - 88o)
1843' - 88½o)

SAMPLED SECTIONS

From	To	C.L.	Cu	Zn	Au.	Ag.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
7	Casing							
205	(P) U	Lt-grn 70	m.g.	lithic, weakly to salty porph Ep.	Lam. amyg.	Weak sil'n epid	Minor py, cp repl. calcite amyg	Many qtz. & calcite str's filled bx's & strong chlor & epid 6" cut from each
256	APL	PALE EPID grn.	m.g.	Curdy	strongly amyg	mod. sil'n epid.	minor py.	Bx 'tween pw's. No flow bx @ ctc.
275	Dyke endst.	Dark sea grn	v.f.g. - aphantic	massive	Lam & chilled ctc.			Dips 25o ± 15°
279	APL	pale-grn	mg - aphan	curdy				Same as above dk.
281.5	Bx	purple	fine frags		lam. SiO_2 coating frags.	purple SiO_2	-	frags. c10 mm ∅
411	AU(shr, vent ?)	Dk-sea-grn	f.m.g.	q's tiny plag laths not. porph.	massive, fract. fewer amygs than PL	epid nr. fracts.	No	Fracts dip 45o, intense from 383-395. shr. vent, 410 same rock-type as Pl above
425	APL	med-grn	f.m.g.	weak q, no laths	strong amyg	strong chlor	minor py.	Fault ctc c AU above?
450	APL	med-grn	"	"	"	"	"	Cemented, sand.

Logged by Hugh Greenwood

FORM No. 2

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
465	APL	med-grn	f.m.g.	weak q, no laths	strong amyg	strong chlor	minor py.	Cemented, sand
471	Dyke, f.g. lamprophyre	med-grn	f.m.g.	Sp. lithic, porph. (chlor after bid)	lam against O overlying APL	mod. chlor	No	Qtz.-filled bx @ lower ctc.
479	Dyke, si acid.	Drk blu-gry to blk.	aphan	aphanitic non-porph	Conch fract. lam ctcs	No	Minor dissem. py.	Dips 20o
490	APL	med-grn	f.m.g.	weak q	strongly amyg clear p-bord	strong epid	Minor py, cp	Same as APL above dk.
514	Unif andst dyke (?)	med-grn	aphanitic	weakly porph salty Fp	banded lower ctc	no	no	Dips 20o
545	APL	pale gry--grn	m.g. to aphan	q, lithic to curdy	p-bords, bx tween pw's & pink cht.	Sil'n, bleached mod. epid.	strong py.	Calcite uns @ 526 dip 70 lower ctc absetn.
607	Unif andst dyke	med-grn	m.g. to aphan @ ctcs	Sp, not porph	massave, no amygs. strongly fract.	Weak chlor.	strong py) in mod. cp)fr- mod. sph)acts	Rhy dk - 578 - 579 1½" min'zd shr zone @ 556 dips 70o
635.4	APL	white to pale gry-grn.	v.f.g.	not porph massive	strongly amyg	Intense sil'n. epid, strontest @ most abundant amygs	pyrr) Repl. py)calcite cp) amygs	Alt'n strongest @ 604-610 @ strongest amygs.
637.8	Dyke int-ermediate	Blu-gry	v.f.g.	curdy	lam & chilled ctc's	-	-	Upper ctc dips 3o Lower " " 5o
670	APL	Sl. muddy pale gry-grn	fg-aphan	many tiny plag laths. no phenos.	clear p-bords strongly amyg	strong sil'n blched.	-	No lower ctc.
683	AU	pale gry-grn	m.g.	tiny plag laths. good q	amyg no pw's	Mod sil'n	-	No upper ctc. Unif phase of APL

Hole No. H-88 - page 2

Page Hugh Greenwood

FORM No. 2 (

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
).3	Dyke andst	Med. gry-grn	m.g.	not porph	massive not amyg	-	weak py dissem.	Lower ctc chilled, dips @ 45o
712	AU	Pale grn	m.g.	q. curdy not porph	weakly amyg	-	-	gracles downward at 712 into APL
720	APL	Bleached-grn	f.g.	q, non-porph	clear p-bords	strong sil'n	py-repl. calcite amgs	same rock as AU above
728	Dyke andst	Med-grn	m.g. vfg	∅ q	weakly amyg	Weak chlor	minor dissem. py.	No top ctc. Lower ctc dips ±65o
762	APL	PALE muddy grn-gry	vfg.	dense, no q	very strongly amyg. clear p-bords	strong sil'n	py. repl. calcite cores of amygs. in fracts.	
770	Unif andS dyke??	med-gry	fmg	dense, no q	weakly amyg	strong sil'n	weak py cubes	looks like same rock as APL. indef. ctcs.
823	APL	pale-gry	fmg	no q	strongly amyg clear p-bords	stroug sil'n	minor py, pyr ep. sph.	Some shrs @ 45o & p-bords sil'n 40 whiteness. Poor lower ctc.
1005	AU to 834 (P)U -915 APU to 936 Pu to1005	Med-grn to gry-grn to pale-gry	m.g.	FFp, curdy plag laths. weakly porph to mod porph (K-Fp)(white) salty	Weakly amyg dense strongly amyg 915-936	Weak sil'n. - 890-930-strong chlor, mottled originally more mafic. Last 9 ft in lower strongly silic'd amyg partmod sl shrd.	Minor py, cp. weaker than above in APL dissem. sph c,p, sph-935-940 mod. py-995-1005	grades downward into (P) U (Fp) @ 834 variably porph. No. pw - bbrds.
1049	QFP (gnrâisie	mottled pale-gry-grn 95%	aphan curdy matrix	Porph (Fp) (Qtz)-Qtz.-2-3 mm ∅ Fp-2-6 ∅ Fp's aligned gneissosity.	gneissie weak to mod. streaky, dips 50o	weak chlor weak sil @ 1042 epid fracts dip 40-80, weak	Py-mod, spotty in fracts dipping 65o Few fine Fp-por incls, ovoid, 1" x 2" gray gneissosity	ctc missing from core, ground up @ 1005. Sl. more chlor in top 5 ft. No QFP dykelets into HW.

Hole No. H-88 page 3

Page Hugh Greenwood

FORM No. 2

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1091	QFP (massive)	mottled gry 95%	as above	Porph as prev. 2 sizes of Fp's 4mm 2,3, mm	massive not gneissic	minor epid.	spotty py.	
1093.5	Dyke rhyt	dark-gry 95%	aphan	weakly porph qtz.	chilled ctc's ¼"	none	-	Dip/s 30o (rough)
1109	QFP massive	dark-gry	aphan	porph Q Fp	dense	none	minor py	gradnl lower ctc.
1138	QFR BLEACHED	pale epid grn	"	"	strongly fract.	strong epid.	py, calcite	strong fract. lower ctc missing
1187	QFP massive	dark-gry	mg	"	dense few steep calcite str's	-	-	more m.g. finer Fp. Qtz. same.
1197	QFP bleached	pale epgrn	mg.	"	many fracts, dip 45-90o	strong epid	spotty py.	Py possibly repl. Fp.
1201	QFP massive	drk-gry	fmg	porph Fp, Q	massive	-	-	lower ctc sharp. silkd. May not be true ctc as fit between pieces not perfect. Dip 70o.
1269	QFP complex	pale-gry to drk-gry	aphan to mg	porph Q, & Q - P	massive gneissic bx.	weak epid	minor py lam dip 45o	Gneissic zones dip 70o Bx-frags. irreg. distributed up to 2' ∅ Frags white Q-P 6" lam. lower ctc no phenos, poss tuff.
1279	Grnst	dark-grn	fmg	Lithic weakly ophitic	variably amyg stretched to dip 70o	strong chlor	mod. py. pyrr weak ep.	looks well alt'd just below porphyry for 10 ft. 1279-1280 dyke.
~~1527~~	Rhyt unif.	mod-grn-gry-grn 95	aphan to mg variable	finely speckle weakly porph.	massive, fract. Amygs dip 70o, stretched	strong grid to 1503. amyg & mod. sil to 1527	none to minor py & ep gobs, ?? ½%	no ctc's seen could be dyke, amyg toward base. gradnl lower ctc.

FORM No. 1

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1310.5	dyke andst	drk-grn 40	fmg	lithic	amyg, stretched @ dip 30o	mod chl.	-	chilled bords.
1330.6	Bx	drk-grn	mg.		Bx'd frags 3" ∅ angular	intense chlor	sphal, 1324-25 5%	intense chlor, weak min.
1348	Rhy	gray-grn	aphan	spher	weakly amyg	mod. chlor mod. amyg.	mod sph. strong py	looks lively not ore.
1384	Dyke (?)	drk-grn 95	aphan	massive speckled		-	weak py	
1425	Bx	drk-grn 80	aphan	curdy	amyg stretched, Bx'd frags up to 3" ∅	intense color mod sil'n round frags.	mod py. weak pyrr fair cpy 2-3% sph. istops & 1413	rock same as above, but bx'd & sil'n sulfides coat repl. frags. Lively. Poss. dynamic bx.
1442	Au	drk-grn 40	mg	lithic	mayg fract	strong chlor	py in fracts minor ep.	Upper ctc gradnl, Bx frags. get closer togeaher until they kuit.
1447	PU - salty	gry-grn	fmg	porph - salted 1mm Fps	amyg (qtz)	weak chlor	minor py.	gradnl above.
1475	Fine Bx	drk-grn	mg		5m-1mm ∅ frags. mod. shr. amyg.	strong sil round frags intense chlor	minor py	very highly chlor, frags obscured prob'ly dynamic (see . qygs)
1527	Rhyt unif	med-grn-gry-grn 95	aphan to mg variable	finely speck weakly porph.	massive fracts. Amygs dip 70o, stretched	strong grid to 1503. amyg & mod sil to 1527	none to minor py. & ep gobs ??2%	no ctcs seen. could be dyke, amyg toward base. Gradnl lower ctc.
1559	Lam Bx.	drk-grn 60-90	mg	fine frags, lam look spherulitic	weakly amyg contorted lam.	mod to strong chl & sil. coating frags.	cpy < ep gobs ½%	Bx might be rhyt IBx. Looks spherulitic
1593	Unif grnstn	med-grn	fmg	fmg weak q	mass. to weakly amyg	-	-	ctc' crushed in drilling look. andesitic, poss dk

Hole No. Page 5

Page Hugh Greenwood

FORM No. 2

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1614	I Bx	drk-grn	m.g. frags aphan matrix	fine to 3" ∅ frags	irreg.	strong chlor. ep.	mod. sphal, py ep.	Same as Bx previous Blk "frags" are rhyt matrix seen as irreg. apophy'ses c' chilled ctcs.
1627	Au andst? qtz eyes	med. grn	m.g.	good q porph (Q)	amyg (qtz)	-	cp in amygs c' qtz.	looks like andst but good Q-phenos 1½ mm ∅
1643	Purple Bx	drk-grn to drk mauve	mixed	fine to coarse frags	lam sil	intense chlor, sil.	minor py in fracts.	Intr. or dynamic, perhaps both
1738.5	QP	Gray-grn	aphan to mg	strongly porph Q-only euhedral Q-phenos 1mm-3mm ∅	massive, weakly fract.	minor ep.	minor fg py in fracts. 1727-1728.5 closely spaced. fracts. dip 45o filled repl-sph. plus or minus 8% Zns	more grn than most QP gradnl ctc c' Bx No gneissosity & ctc. d
1739	Dyke andst	Drk-grn 40	m.g.	sparsely porph (Fp)	massive non-amyg	weak chlor	very minor diss. py.	Intrudes QP, sharp ctc chilled sch edge & 1738.5
1775	QP	pale gray-grn	m.g. aphan	porph. Q phenos 1½ mm a few Fp-s	weakly fract, otherwise massive	minor epid.	minor py. sph, in fracts ? sl crushed some	Q-phenos much smaller still highly sil'd, but essentially same rock as QP above dk 3 ft. of excellent flc lam & bas Not tuff. QP does not become gneissic nr. ctc.
1843	Andst	Drk-grn 30	f.m.g.	massive, weak ∅ q	sh. fract. very sparsely amyg.	strong chlor pseudo after Hbld.	minor py. sphal	m.g. & dark grn color suggest andst. Psss. a highly chlor m.g. rhyt? Looks like andst. A few 1° Lamprophyre dks Wk shr zone & 1839 dips 45o, not mineralized, 2" wide.

HOLE ENDS 11:30 A. M., January 8, 1957

Hole No. H-88 page 6

Page H. J. Greenwood

FORM No. 1

D-95

LAKE DUFAULT MINES LTD.

Drill Hole Record

Hole No. H-95 | Lat. 1388.7 S | Dep. 9865.3 E | Elev. 1030.72 | Dip -90 | Bearing -- | Depth 2267

Working Place: DUPRESNOY

Area 4D

Date Started: April 24, 1957

Date Completed: May 25, 1957

Dip Tests (corrected readings):
50' - 87°
500' - 85.5°
1000' - 85.00°
1500' - 83°
2230' - 83°

Depth Read / Corrected

SAMPLED SECTIONS

From	To	C.L.	Cu	Zn	Au.	Ag.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
22	C A S I N G							
25	Bx	Epid-grn	f.g.		Angular & curved frags 2mm-5cm ∅	Intense epid.	Wk py	Possibly a flow - bx, later fractured & altered
37.5	A (P) U	Drk-grn 60	aph	wkly salty por (Fp)	Amyg. Str'ly fractured	Wk chlor.	-	
52	Lampro-phyre	Very drk brn. 20	c.g.	po-ph. (Fp), (biotite)	Gneissic contacts			Dip varies from 80° to vertical
192.5	A (P) U	Med-grn 60	m.g.	Lithic speckled wkly por (Fp)	Amyg (qtz, calcite)	wk. sil.	wkly scat py	One p-bord at 81°
195.0	Bx	Blotchy-grn	m.g.		Angular & curved frags. Amyg.	mod chlor, epid.	wk. py	Either flow -bx or broken pillows.
289.0	AU	Drk-grn spotty	f.g. aph	Porph (?) 1.5 mm sub-angular epid spots 25%-5%	Amyg. qtz-epid wkly fract.	Sections 3 ft apart, 2 ft long, have up to 30% irreg. gry SiO2 spots	wk py	A few 12" ∅ patches of epidosite. Bottom taken as first p-bord.
327.5	A PL	drk-grn 50	aph	sl curdy	Amyg calcite p-bords fair, 5' apart 18-inch Bx base. (¼" ∅ ang. frags).	Irreg zones of spotting as in Rx above. (Basal-bx silicified)	wk py cubes	3 kinds of spots: pink, 3 mm∅, silic-grey, 1-5 mm ∅, sil. epid. -subangular, irreg. distribution poss. alt phenos. (Fp?)

Hole No. H-95

Logged by H. J. Greenwood

FORM No. 2

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
388.3	AU dacite	drk-grn 70	aph	sl curdy finely por- 1.5 mm∅ qtz	Amyg ($CaCO_3$)	10% siliceous spotting, spots are 1-3 mm∅	none	moderately fractured filled with qtz.
392.5	Lampro-phyre Bio-minette	brown	c.g.	Equigran, isotropic	Sharp ctc's steep dip	mod calcite	none	Dip 75° Cut by unminer-alized gouge-filled fault, 2" wide, dipping 70°. Lamp. on both sides.
396.5	Au	drk-grn 70	aph	A S A B	OV E D Y K E		none	Indefinite lower ctc. (± 0.20 ft)
442.5	Ophitic Hblde-qtz diorite	drk-grn 30	c.g.	weakly ophitic Felted.	massive	wk epid mod chlor	none	Qtz. 5% Fp 50% Hblde / chlor 45%
498.7	AU	drk-grn 40	m.g.	FFp very wkly por (plag)	wkly amyg lower ctc sharp, lam, dip 70°	mod chlor	wk scat cp	Possibly same a above Qtz-diorite. but not dacite here. Ctc with qtz-dicrite is gradational
500	Flow-Bx	drk-grn	f.g.	Angular and curved amyg frags.	Matrix is gray-white chalcedonic qtz.	strong chlor	none	
588	APL	drk-grn 60	f.g.	curdy wk q	clear-bx'd p-bords. amygs	mod siln	wk cp in amygs	Pw's have concentric lam Up to 15 ft 'tween p-bords
725.0	A (P) U (dacitic)	drk-grn 70	m.g.	por (1% Fp) (5% 1-mm qtz)	amyg lam fracts.	mod chlor	wk scat py & cp	sharp irreg lower ctc with dyke
762	Rhy dyke	pale-gry 90	f.g.	aquigran?	Up to 10% irreg 2" ∅ chlor frags	weak	wk py cubes	Top ctc sharp, irreg Lower ctc ground.
903.9	A (P) PL	pale-grn 75	m.g.	wkly por (Fp, 1mm x 2 mm 15%) lithic [illegible] mm∅	p-bords clear amyg. p-bords bx'd, filled with lam. chert (argillaceous or tuffaceous)	Mafics chloritized, epid ? p-bords	mod py & wk cp @ p-bords	Pw's hard to see in top 50 ft.
912.0	Frothy breccia	Ep-grn mottled	f.g		Irreg. 2" ∅ amyg bodies grade into highly (70%) amyg frothy andesite with about 20% of ½" angul. frags.	strong epid	wk py	Not a true Bx due to scarcity of frags, but so frothy as to look finely fragmental

Hole No. H-95

FORM No. 2

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1165.0	A (P) U variably por	drk-grn 40	f.g.	Finely curdy F Fp, lithic salt por (Fp, 1mmØ5%)	Wkly amyg p-bords @ 1105, 1123	wk epid	wk py	Also one 2-mm Fp every 0.50 ft. 1125-1150 very coarsely por (4mm Fp) No sharp contact, gradation.
1170.5	Rhy dyke	pale-gry 90	aph	curdy speckled	1 x 3 mm spots of chlor.		mod scat py cubes	Lower ctc sharp [illegible] Dip 42°
1253.6	A PU var. por.	med-grn 50	m.g.	Lithic por (3mm Fp)	wkly lsm amyg	-	scat. py cubes	Pale grn dk cuts dark gray dk, from 1266-1275, and dips 75 degrees.
1338	APU	med-grn 50	m.g.	Lithic por (4mm Fp) wk q				
1352	QFP	pale-grn spotted	f.g.	Strongly por Fp 30% Qtz 10%	massive			Qtz eyes are euhedral to round. ctc's crushed.
1393.9	APU	SAME AS ABOVE			Q.F.P.			
1405.2	Rhy dyke	drk-gry	aph	Dense				
1439	APU	med-grn 40	m.g.	speckled lithic Strongly por (a 5mm Ø Fp every 3 cm)	massive			First pw-bord taken as ctc. No change in rock
1509	APPL	med-grn 40	m.g.	As above	clear pw's			Base taken as lowest p-bord. Slight change rock.
1628	(P) U	pale-grn 60	m.g.	Strongly por (Fp) Lithic Becomes non por below 1550	massive			Paler grn than above, up to 20% phenos.
1632	Flow-Bx	drk-grn	m		Angular frags. in cherty qtz. and andest.	Strong chlor		Probably not a continuous unit.
1665.2	Au	drk-grn	f.m.g.	Lithic	strongly amyg	Strong chlor.		Similar to Rx above bx.
1674.0	Lithic Tuff	drk-grn mottled	Aph frags	Angular frags of amyg grns 1-5mm Ø (90%) in chlor matrix	crudely strat dip 42°	Strong chlor.		Bottom ctc dips 42°
1704.0	QP	drk-gry-grn	aph	15% 2-mm qtz eyes	massive	Strong chlor		Bottom ctc blurred appears gradational.

Hole No. H-95

FORM No. 2

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1748.2	QFP fragmental	drk-gry-grn	aph matrix	30-40% Qtz. & Fp phenos	About 10% chlor'd gnstn frags, up to 2' ø, amyg.	Strong chlor.	none	Lower ctc sharp, chilled, clearly intrus. Dips 80°.
1763.1	AU	drk-grn 70	v.f.g.	Sub-graphic due to irreg areas of qtz & seric. Poss alt'n of Fp	strongly amyg	Strong chlor.	none	2 two-inch dks of QFP. Top of unit is finely fragmental. Siliceous. Rhy?
1789.5	QFP intr. bx.	drk-grn		Strongly por Q-Fp	Up to 60% frags of grnstn.	Chlor	none	Poss. Bx filled with QFP intrusive.
1879.0	Amyg rhy-gs.	drk-grn	v.f.g. aph	wkly por. 15% q	amyg	Mod chlor	wk sphal in qtz.-vn.	Abundant q, probably of rhyolitic comp, not necessarily 'main' rhy.
2018.6	Rhy dk	drk-gry 90	aph	micro por. q curdy	dense	wk chlor	wk py	Top ctc not conclusively intrus. Lower ctc chilled, Dips 67°
2049	Amyg Rhy	pale gry-grn	aph	curdy q	amyg		scat py	Flow-banding at base Not main rhy.
2056	Flow-bx	mottled drk-grn	m.g.		curved amyg frags	strong chlor	none	
2107	AU	med-grn 80	m.g.	wkly por lithic	amyg	none	none	Cut by dk @ base.
2113?	Por Ands. Dk	drk-grn 50	m.g.	wkly por	Upper ctc sharp, lower ctc doubtful	none	none	Dk-rock looks just like wall-rock, lower ctc ground, doubtful, upper ctc sharp.
2186.4	A (P) U	med-grn 60	m.g.	wkly por lithic	Very sparsely amyg	none	wk py	ctc with lam. Rx occurs at slightly ground part of core. Relations not seen.
2192.9	Lam Rx		m.g.-aph	Finely lam	Some layers finely frag	Intense chlor	strong py, mass. in lower 0.3' wk cp mod pyrr	Dip 35° Some layers cherty some finely frag. Tuffaceous chert.
2267.0	Rhyolite Agglom	drk-grn 90	aph		Frags, 1mm to 5 cmø Aphan matrix	Strong chlor.	very wk cp	Looks like 'Main Rhy Bx'
				END OF HOLE				

Hole No. H-95

FORM No. 1 D-100

LAKE DUFAULT MINES LTD.

Drill Hole Record

DUFRAT TWP.

Hole No. Dup. 100 Lat. 1130 N Dep. 2970 E. Elev. 1050' Dip -90° Bearing -- Depth 1663

Working Place: Beaver Meadow

Date Started: Sept. 22, 1958

Date Completed: Oct. 22, 1958

Depth.	Read	Corr.
1300	88½°	87-3/4°
1660	86½°	87-3/4°

Dip Tests

Depth	Read	Corr.
50	89½°	88-3/4°
250	89¼°	88½°
500	89°	88¼°
750	88½°	87-3/4°
1050	88½°	87-3/4

SAMPLED SECTIONS

From	To	C.L.	Cu	Zn	Au.	Ag.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
18								Casing.
87	Andste	Grn.	m.g.	Por. (fds.)		Mild chlorite.		
127	Andste	Grn	m.g.	Finely por.	amyg'l	Bleached.		
138.5	Rhy. Dyke	Blu-gry	f.g.	U	Banded selvages. Spherulatic		Mod. scat. pyrr. minor cp.	
202	Andste	Grn.	m.g.	Finely por.	Amyg'l.	Bleached	Minor pyrr. and cp. in amygs. and fractures.	
220.5	Andste Fault zone	Grn.	m.g.		Fractured brecciated	Bleached	Scat. py. sph.	208-210.5 - Mod. hvy. pyrite. Minor sph. pyrr. cp.
262.3	Andste sil's.	Grn-gry	m.g.	Finely por.	Amyg'l (?) Strongly frac'd and qtz. filled.		Pyrr. cp. filling amygs. (?)	
305	Andste	Grn-gry mottled	m.g.	Por. granular			Scat. py. pyrr. and cp.	
318	Andste siliceous	Blu-gry	m.f.g.	Finely por.			Fine dissem. py.	
370	Greenstone dykes	Grn.	m.g.	U				
413.5	Andste	Gry	m.g.		Flow bx. or pal. lava Mod. fract'd.	Mod. chl. Fractures calcite filled.	Fine veinlets of sph. cp. py.	
445	Andste	Grn-gry	m.g.	U				445- etc. with pyrr. & tr. cp.

Hole No. Dup. 100

Logged by D. H. Brown

FORM No. 2

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
860.8	Andste?	Grn-gry	m.g.	U	Mod. fract'd from 500	682.5-688 - mod. epidote.		Fractures filled by calcite 532.5-qtz. stringers 706.5-small qtz. vein with minor cp. Rock looks almost dioritic from 657 860.8-chilled selvage? above.
920	Andste	Grn-gry	m.g.	por.	pil. lava			
941.5	Andste	Grn-gry	m.g.	por.	pil. lava well sheared	Mod. chl'z'd.		Fault?
951	"	" "	m.g.	Unif.	pil. lava.	Mod. chl'z'd.		
981	"	" "	m.g.	"	pil lava? well sheared	Strongly chl'z'd.		
1001.5	"	Gray	m.g.	"	Minor shear	Mod. chl'z'd		
1002.5	"	"	m.g.		Fault (3"mud)			Slip at 60°
1019	"	"	m.g.	"	Mod. fract.	Spotted (chl.)		
1024	Andste	Gray	m.g.	por (fds.)		Bleached.		
~~1088~~	F.P. dyke							
1088	Andste	Blu-gry	m.g.	Unif.	Mod. fract.	Chl'zd	Minor scat. py. pyrr. cp.	
1098	Andste	Gray	m.g.	por (fds)				
~~1194~~	F.P. dyke							
1194	Andste	Gray	m.g.	Unif.	Minor frac.	Minor chl'zn.		1101.5-strong slip. 1142.5-1142.7-fault. Filled by qtz. & lava incls.
1253	Andste	Gray	m.g.	por (fds)		Strongly sil'z.		Prob. F. P. flow.
1360.5	Rhyolite	Blu-gry mottled	f.g.		Brecciated	Mod. hvy. chl. in part.	Scat. cp. in fracts.	1282.5-1283-banding (dyke?) 1291.5-1296-Mod. cp. qtz. in fracts.
1378.5	F.P. dyke	Blu-gry	m.g	por (fds., qtz.)				Frags. toward base. Intrusive ctc. - base.
1418	Rhyolite	Blu-gry	f.g.		Breccia in part.	Mod. to hvy chl. in part.	Scat. cp. 1397 on - scat. py.	1404-1405-Mod. cp. qtz.
1473.5	Andste	Blu-gry	m.c.g.			Mod. str. chl.	Minor scat. cp. py.	
1497.5	Rhyolite Bx.	Blu-gry to black	m.f.g.			Mod. str. chl.		
1557	Sil's uniform	Blu-gry to black	m.f.g.		bx. in pt.	Mod. str. chl.		

Hole No. Dup. 100

FORM No. 2

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1572	Rhyolite	Blu-gry	f.g.		bx. in pat			
1617.5	Rhy. bx.	Blu-gry	f.g.		bx.			Bedford type.
1618.5	Rhyolite ctc. zone	Grn-gry	f.g.		Fractured zone			
1663	Rhyolite bx.	Grn-gry	f.g.		Breccia	Pseudo-feldspar chlorite X'tals (Typical of Bedford).		
			END	OF	HOLE			

Hole No. Dup. 100

FORM No. 1

D-105

LAKE DUFAULT MINES LTD.

Drill Hole Record

Hole No. Dup-105 Lat. [illegible] Dep. [illegible] Elev. 1140(appr.) Dip -90° Bearing Depth 1973

Working Place: Duprenoy, Beaver Meadow Area

Date Started: Jan. 20, 1959

Date Completed: Feb. 16, 1959

Dip Tests Depth	Bead.	Depth Read Corrected Corr.
[illegible]	[illegible]	
500'	89°	88½°
1000	88	87
1500	88	87
1972	87½	86½

SAMPLED SECTIONS

From	To	C.L.	Cu	Zn	Au.	Ag.

Depth	Rock Type	Color & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3								Casing
17	Andste	Grn-gry	f.g.	U			Scat. cp., sph.	Rusted 80° slip at 17'
137	Andste	" "	m.g.		Amyg. P.L.	Minor chl. Incr. toward 137'	Fine scat. cp., sph. minor pyrr.	Occ. qtz. fillings of slips.
172	Flow bx.	Grn-gry	m.c.g.		Rylonite? in part	Mod. chl'ic.	Scat. cp. pyrr. sph.	169-4" Fault bx. with qtz. & mod. hvy. cp.
176	Fault bx.	Blk & white			Frags. of flow in qutz. matrix.			Cts. at 60° (dip)
204.5	Andste	Grn-gry	m.c.g.	Por. (fds.)	Pil. lava	Minor chl.	Sparse cp., pyrr. sph.	
237.5	Rhyolite? banded dyke	Blu-gry	m.g.	U			218-cp. on slip. Scat. fine py., pyrr.	Dyke - Top ctc. near vert. & banded. Bot. ctc. 45° ± and well banded for 1"
302.5	Andste	Grn-gry	m.g.		Pil. lava Strongly fract'd. Amyg'l.	Gray putty-like (bleached)	Scat. py., sph., cp. esp. in amygs.	
320	Rhy. Dyke Banded	Blu-gry	m.f.g.	U	Banded selvages		Slips show pyrr.	Peppered with fine pyrite.
377.5	Andste	Grn-gry	m.g.		Pil. lava Mod. fract'd amyg'l.			

Hole No. Dup-105

Logged by D.H.B.

FORM No. 2

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
477	Amyg. Andste	Grn-gry	m.g.	f. por.		Minor chl.	Scat. f. py., sph. Cp., sph. in fracts.	
570.3	Weakly Amyg. Andste	Grn-gry	m.g.		Strongly fract'd pil Lava	Epid. in fracts.	Fracts. filled by py., minor sph.	
578	Lamp Bx. Dyke	Grn-gry	m.c.g.					
579.5	Wkly Amyg. Andste	Grn-gry	m.f.g.					
580.5	Fault Zone	Grn-gry	m.g.		Qtz. sheared		Py. in shear	
610	Acid dyke	Blu-gry	f.g.	U				
630.5	Andste? F.P.	Gra-gry	m.g.	F. por (fds.)				
692	insip. Q.P.	Grn-gry	m.g.	Few qtz. phenos sugary tex.		Shot with epid.	Minor scat. py.	630.5, 631.5, 632 - Qtz. filled fault faces
722	Andste F.P.	" "	m.g.	F. por. (fds.) F.P.				
772.5	Andste	Grn-gry	m.f.g.	U				
789.5	Por. Acid Dy.	Lt-grn-gry	f.g.	Por. (fds.)				Bot. cta. 50° + (dip)
930	Sil's Andste	Grn-gry	m.f.g.	Fracts. at 10-30° and 45-60°	Siliceous			793) 2" fault bx's. 794) 860.5 - 861.5 - Qtz. filled fault with py., tr. pyrr., cp. 870 - 2" Fault bx. 980) ½" qtz. stringers 996) 1011 70° slip with mullion at 30° ± Cts. at 70° +
1019	Andste	Grn-gry	m.f.g.	F. por. (fds.)				
1063	Rhyolite	Blu-gry	f.g.	Por. (fds.) Qtz.?				
1157	Dacite (siliceous)	Grn-gry	m.f.g.	F. por. (fds.) occ. qtz. eyes				

Hole No. D-105

FORM No. 2

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1235	Andste	Grn-gry	m.f.g.	F. por.				1190.5) Epidotized 1196) faults at 30°(dip) Bot ctc. at 33° Consid. fract'g. for 5' above.
1342	Andste F.P.	Grn-gry	m.g.	Co. por. (fds.)				Ctc. (top) at 33° 1342 - Fault ctc. at 35° (d). Fine cp. pyrr. on fault
1345	Andste	Grn-gry	m.f.g.	U with few scat. fds. phenos.		Qtz. & epid. in fractures	1342-cp., pyrr.	
1359	Andste F.P.	Grn-gry	m.g.	Co. por. (fds.)				
1369.5	Andste Dyke	Grn-gry	m.f.g.	U			Good scat. pyrr. tr. cp.	Top ctc. - 65° (d) Bot. ctc. - 40° (d) irreg. (chilled)
1448.5	Andste F.P.	Grn-gry	m.g.	Co. por. (fds.)				1391.5-60° veinlet (¼" bearing cp., pyrr. 1409.5 - 60° slip with cp., pyrr. 1448.5 - ctc. at 25° (d)
1482	Sil's Andste	Blu-gry	f.g.					
1483	Flow (?) Bx.	Blu-gry	f.g.		Frags to ½"			
1595	Sil's Andste	Blu-gry	f.g.		Secs. of sil's bx.		Pyrr., cp. in bx. & fractures	
1598	Flow bx.	Grn-gry	m.f.g.		Bx. frags to 2"			
1621	Andg. An	Grn-gry	m.f.g.	Por. (fds.)	P.L	Bleached to 1621		1603 - Fault.
1650.5	Diorite Dyke	Grn.	m.c.g.	dioritic				1634.5 - fault chilled bdrs.
1652.5	Andste Sil's.	Grn-gry	m.f.g.		Str. fract'd	bleached		
1657	Diorite Dyke	Grn.	m.g.	dioritic				Chilled bdrs.

Hole No. Dup-105

FORM No. 2

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1677	Sil's Andste	Grn.	m.f.g.	F. por.(?)	Pil. lava? Fract'd.		1664 - Pyrr. & tr. cp. in fracts.	
1769	Andste Sil's. or Dacite	Grn.	m.f.g.	F. por. (fds.) Occ. qtz. eyes.			Q.F.P. (?)	
1771	Andste Sil's) or dacite	Grn.	f.g.		Amyg'l.			
1772.5	Breccia	Blu-gry	f.g.		Frags. of por. dacite arhy. matrix (cherty)			
1836	Rhyolite Flow bx.	Grn-gry	f.g.			Minor chl.	Pyrr. cp. minor sph., py. in bx. secs.	1834-1836 - Cherty bx.
1879.5	Sil's. Andste or Dacite	Grn.	m.f.g.	f. por. (fds.)	Mod. fract'd.		Pyrr., cp., sph. on fracts.	Slightly banded (at ± 60°) base.
1911	Rhyolite Bx.	Gray	f.g.	Spherulitic			1883-1885 Mod. pyrr. Minor cp., sph. in fracts.	
1944	Rhy. dyke	Blu-gry	f.g.	F. por.			Dissem. pyrr., cp.	Banded top 3" ½" qtz. str. with pyrr. at base
1949.5	Andste Dyke	Grn-gry	m.f.g.	F. por.				
1973	Rhy. Bx.	Blu-gry	f.g.		Amyg. breccia	Epidote carbonate on fractures.		
	End of Hole							

Hole No. Dup-105

D-255

LAKE DUFAULT MINES LTD.

Drill Hole Record

Hole No D-255 Lat. 979.99 S Dep. 10,849.98 Elev. 10,991.32 Dip -90° Bearing Depth 2905'

Working Place: D-68 Zone

Date Started: Feb 2/70

Date Completed: Mar 11, 1970

Acid Tests

Depth	Dip	M.Brng.
100'	87 1/2°	
250'	87°	
500'	87	
750'	87 1/2°	
1000'	88°	
1250'	89°	

Acid Test

Depth	Read	Corr.
1500'		88 1/2°
1750'		89°
1998'		88 1/2°
2250'		88°
2500'		87 3/4°
2750'		85°
2905'		87°

SAMPLED SECTIONS

From	To	C.L.	Cu	Zn	Au	Ag

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
0.0-70.0	Casing							All angles measured are relative to the core axis.
70.0-95.0	Massive Amygduloidal Andesite	Dark grey	Fine grained	Even	3-4 f/ft. Low angle shearing. Amygdules thoughout. Size 1-10mm.	Carbonate-epidote-quartz filled fraactures and amygdules. Some minor leached sections.	Trace 1mm py as filling of amygdules- as disseminated throughout.	Fracturing at 40-60°. Shearing at 0-20°. Very blocky ground.
95.0-144.0	Brecciated Tuffaceous Andesite Flows	Greenish grey	Fine	Uneven Tuffaceous banded and brecciated quartz). Sections sections with very regare changed ular rounded with amygdules(1-10mm) strongly mixed with brecciated undefinite and amygd- pyroclastics. ular sections.	5-6 f/ft. Pyroclastic material 4-20mm(mostly	Chlorite-sericite and carbonate altn around tuffaceous sections. Sericite and qtz-carbonate filling of amygdules. (epidote?)	Trace py throughout.	Near contact sharp at ~~40-60°~~ 45° ~~Shearing at 0-20°. Very blocky ground.~~ Far obscured. Fracturing 40-60°. tuffaceous sections at contact and 104-106'(about 4") 109-111', 128-128.5', 130'.

Hole No. D-255

Logged by I.N. & A.W.B.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
144.0-152.0	Strongly Sheared Brecciated Andesite	Grey	Fine grained	Uneven	Low angle shearing filled with qtz-carbonate. Brecciated. Few qtz-epidote filled clastics or amygdules. 10-30mm	Qtz-carbonate-sericite-epidote altn.	Not observed.	Both contacts are obscure (around qtz filled fracture at 10o) Shearing 0-20°.
152.0-295.0	Massive Amygduloidal Andesite	Grey	Medium	Even	6 f/ft. Amygdules 2-10mm, mostly not very well pronounced rounded throughout, but not often slow down to 207'. Farther sparse. From 260'L little feldspar phenocrysts observed, amounts grows up moderately to end of the sections.	Strong sericite altn in sharp, average 1-6" wide, dyke-like sections throughout (1 per 6-8ft average). Little sericite altn? throughout. Qtz-carbonate filling through fractures. Rock look sometimes like acid dykes. No contact has been observed. From 236': sericite altn mixed up with epidote.	Trace py disseminated throughout.	Near contact indefinite. Fractures at 60-80o, some in opposite directions, lava flows. Sect 242-272': more fractured 8 f/ft, angle slow down at 40°. 295': contact another flow, farther core is finer. From 295': more fractured sometimes sheared(297-306'). Far contact indefinite.
295.0-364.0	As above.							Seperate flow.
364.0-448.0	Fractured Amygduloidal Andesite	Light grey	Fine	Uneven	8-15 f/ft. mostly 2-3mm thick, filled qtz-carbonate. Many amygdules various size	Strong sericite farther sericite-chlorite altn, especially in amygdules. Sericite	Trace py in amygdules, more in near 30'.	Near contact indefinite (lost core). Contacts different lava flows. 367' 368' strong 6" sect. 387'.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
					and rounding (2-25 mm) Small brecciated Sections around lava flows	bleaching throughout Ser-qtz-carb filled fr's.		389-391' 3x 392' 395' 403' 422' 443' 446' Fracturing at 25-60°. 434-435 and 441-blocky ground. 437 lost core 1' Far contact recognized at 70°
448.0-469.5	Fault Zone Creek Fault	Light Grey	Fine	Uneven Soft ground.	Breccia fragments (qtz). No amygdules observed. Very fractured and sheared. 20-25f/ft Intensely sheared throughout.	Chlorite filling fractures. Some sericite-qtz-carbonate altn throughout. (bleaching).	Not observed.	Near contact at 70° From 450' very blocky ground. Lost core-452-453-1' 456-464.5" 8.5' Erratic fractures to shearing roughly 30-80°.
469.5-567.0	Massive Amygduloidal Andesite	Pale Green	Fine	Uneven highly amygduloidal	Massive 7-9f/ft Low angle shearing. 1/8"-1/2" dia amygdules through out.	Carbonate, epidote quartz and chlorite filled amygdules. Carbonate filled fractures.	Trace of scattered py.	Fractures at 60 and 80° Shearing at 0-15° Minor small breccia fragments scattered in sections through out. Highly bleached (carbonate) bottom contact, well defined.

Hole No. D-255

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
567.0-574.0	Massive Lamp. Dyke	Greenish Lead Grey	Fine	Even	Massive 3-4f/ft No shearing observed.	Carbonate filled fractures, and bleached through out.	Trace py through out.	Well defined bottom contact slightly finer grained and brecciated. Fractures at 60 and 80°.
574.0-846.0	Fractured Amygdu-ldal Andesite	Pale Green	Fine	Uneven Scattered amygdules through out. (to far contact very sparse)	Moderate to highly fractured (Last 25 again moderate). Weak low angle shearing 15° Small 1/8"-1/4" dia. amygdules.	Weak sericite speck-ling. Carbonate sericite filled fractures. Some sericite?-epidote? bleached sections. Limonite? altn around sheaed zone. From ±752' rock becomes more acidic.	Trace of py. Trace cp observed sheared zone (747-758') In section 773-778' trace cp (as much as py throughout). 791-830-835'	Flow banding at 60o in sections. Small minor brsccia fragments along the fracture. Fractures at 60° Shearinga t 20°. Possible scattered feldspar phenocrysts Strong sheared zone 740-741' and 744-750'. From 752'- some strongly brecciated sections 0.5-1 wide (752, 764, 771, 775, 795, 801, 811, 816, 824'. Different lava flows? Far contact as another lava flow 0.8' of pyroclastic tuffaceous? material with py mineralization.
846.0-945.0	Massive Andesite Flow	Grey sometimes greenish	Fine Moderate ly to medium (865')	Even ecept section 848-865' (finer grained brecci-ated with some amygdules	6-10 f/ft. Weak low angle shear-ing. Fracturing moderately weakens to 2-3f/ft	Sericite-chlorite altn at 865'. Some qtz-carbonate-epidote and limonite filling fractures. Some qtz stringers Generally weak altn.	Tr of py, cp in near 20'. Farther not observed.	Near contact at 40°. Fractures at 50°, shearing at 25°. Minor fault at 850-851' (loat core 1'). 882-883': small andesite dyke?. Contacts obscured in broken core. 905-906': tuffaceous contact another flow.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
				and phenocrysts observed throughout. Not important for general view.				910-911': andesite dyke, top contact obscured in broken core. Bottom legible at 70°.
945.0-1086.0	Massive Amygduloidal Andesite	Various grey	Fine	Uneven	6-8 f/ft. Narrow modrately thicker qtz-carbonate. Sulphide filling flow banding. Amygdules in clusters, or scattered throughout, well rounded Some breccia fragments (qtz mostly Small tuffaceous sections. Low angle shearring. Some sections porphyritic and almost without amygdules.	Strong sericite dyke- like sections, serchlorite bleaching throughout. Farther some qtz-carbonate stringers.	Trace py throughout.	Top contact obscured, moderately (grain size) 945-951': fracturing at 40-60 shearing 0-10° strong 1005, 1015'. Several lava flows with tuffaceous contacts. 1061': minor fault. Section 1050-1086': similar to 846-945'.
1086.0-1110.0	Sheared Q.F.P.	Dark grey	Fine grained	Uneven	Weakly but often sheared. 6-8 f/ft. Flow banding	Sericite-chlorite-epidote weak altn (qtz-ca) fairly	Not observed .	Top contact obscured. Rock becomes porphyritic moderately 40 and 80° fractures. Shearing 0-15°.

Hole No. D-255

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
					Phenocrysts)1-4mm) of feldspar and quartz. Feldspar phenocrysts. Many times well rounded amygdules?	Acidic Rocks		
1110.0-1119.0	Fault Zone? Boundary Fault	Grey	Fine	Uneven	Both contacts qtz-ca stringers 4"-2.5' resp). Between structure like next section Massive rocks 6-8f/ft.	Not observed except two qtz-carb stringers.	Nil	Selected speculatively both contacts at 45°, only bottom qtz-ca stringer has contacts like weak fault.
1119.0-1254.0	massive Andesite Flow	Greenish grey	Medium to fine	Even	8-10 f/ft. Thin low angle shearing. Some flow banding. Difficult to find amygdules.	Qtz-carbonate-epidote-sericite weakly throughout. Some epidote-sericite dyke like sections Some qtz-carbonate stringers. Fairly acidic rocks.	Not oberved.	Fractures at 40-60°, different directions. 1176-1177': lava flow contact or fault? 1196-1197': small andesite dyke, fine grained, 75° cts. 1223-1229': andesite dyke, fine grained with amygdules(?) Top contact at 40° bottom lost in 1' tuffaceous sections.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1254.0-1260.0	Quartz Feldspar Porphyry Dyke	Grey	Fine	Uneven	2-3f/ft. Very thin, very clear phenocrysts 2mm average. Some breccia fragments thoughout.	Sericite-epidote bleached sections. Qtz-ca-limonite stringers.	Not observed.	Both contacts fairly sharp at 40°. without put down eeceptional similar to 1086-1110'.
1260.0-1318.0	Massive Andesite Flow	Grey	Fine	Even	Continuation of 1119-1254 Finer grained except last 10'	More qtz-carbonate stringers but generally less altered.	Not observed.	Last 10' more fractured 1308 and 1310 fault(?) at 45° and 35° resp.(May be flow cont.) Texture looks like microdioritic.
1318.0-1341.0	Acid Dyke	Dark Grey	Fine	Uneven	8-10f/ft thin low angle shearing. Glassy matrix small feldspar phenocrysts.	Very silicious. Qtz-carbonate-sericite-epidote filling fractures. First 2'-ser altn?	Py, minor cp disseminated throughout.	Both contact difficult(?) at 50° Fractures at 45-60° Shearing at 20-30°
1341.0-1365.0	Massive Andesite Flows	Greenish Grey	Medium	Even	Continuation of 1119-1254 More sheared.	As 1260-1308 Some limonite filling fractures.	NIL	First 2' Microdioritic dyke. Last 2' fault at 50°, very blocky.
1365.0-1370.0	Micro-diorite Dyke	Grey	Medium	Even	3-4f/ft	Qtz-carbonate-limonite filling fractures.	NIL	Top contact lost in fault, bottom gradational.

Hole No. D-355

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1370.0-1466.0	Massive porphyritic Andesite	Grey	Fine Matrix	Uneven	2-4f/ft flow banding feldspar phenocryst(to 4mm) throughout some qtz-epidote amygdules. Several strongly brecciated sections(6"-1' wide).	Epidote-sericite bleaching. Minor qtz-ca-limonite.	Not observed.	1376-1378 And. dyke Fractures at 40 and 80° Last 3' probably andesite dyke; top cont. tuffaceous, , bottom at 60°.
1466.0-1926.0	Massive (Amygdu-loidal) Andesite	(Greenish Grey)	Fine	Even	Sheared in some 2-3' sections/ first 50' and again from 1750 3.5f/ft. thin. Amygdules in first 20', after sparsely or 6' clusters. Flows banding difficult to observe. Some brecciated sections. Some small(to 3") tuffaceous sct. Instead of amygdular sections some porphyritic (little feldspar phenos-especially far 35'-porphyritic andesite from 1790 more fractured 6-10f/ft.	Qtz-carbonate-chlorite-sericite (epidote)throughout. Many qtz-ca stringers (in first 100'). From 1834 more acidic.	Py along fractures-trace throughout. Further minor cp throughout.	Fractures at 30-45° Shearing -0° 1511-1513-Andesite dyke?40° cts. 1516-1518-Small fault at 45° 1581-1584 Strongly brecciated with glassy silicious matrix. 1627-Small 6" fault at 60° 1797-Small fault at 30° 1857-1864- fractured andesite

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1926.0-1951.0	Acid Dyke	Dark Grey	Fine	Even	6-10f/ft Low angle shearing. Last 1' porphyritic.	Chlorite-sericite altn. Qtz-carbonate limonite filling fractures.	Py dissmenated throughout.	Top contact at 70° Bottom contact at 70° but difficult(qtz stringer) Last 4' broken core.
1951.0-2083.0	Massive (Amygdaloidal) Andesite	(Greenish) Grey	Medium	Even	Continuation of 1466-1926		From 2008-More cp in fractures (2035')	2022'-2074'-Microdioritic testure,no contacts, some amygdules.
2083.0-2117.0	Massive Andesite Flows	Grey	Fine	Uneven	2-3f/ft Strong flow banding. Strongly brecciated sections and tuffaceous-like sections. Amygdules-some but not typical.	Epidote-chl-ser altn. Qtz-ca filling fractures. Secundary?Qtz altn throughout.	Py throughout Contact different lavas fairly pyritize.	Top ct at 30° Fractures at 60° Whole section can be called brecciated. Last 3' can be fault.
2117.0-2131.0	Acid Dyke	Dark Grey	Fine	Uneven	2-3f/ft,fine porphyritic (feldspar,qtz? phenos).	Chl altn.	Tr Py, minor cp throughout.	Top ct lost in broken core at 45°? Fractures at 30° Rocks ~~looks~~ looks like rhy bottom ct at 40°.
2131.0-2271.0	Massive Amygdal. Andesite	Grey	Fine	Even	4-8f/ft,fine amygdules very sparcely flow banding difficult ((except last 20')	Epidote-qtz-ca filling fractures weak ser bleaching throughout. Some qtz and epidote stringers.	Tr py,especially in amygdules.	Fractures at 70° and 30°

Hole No. D 255

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
						(especially last 10') Near 5' fairly acidic weakly throughout.		
2271.0-2277.0	Breccia Tuff	Greenish grey	Medium	Uneven	Sheared and fractured throughout.	Sericite-qtz thoughout.	Py cubes throughout. Est. 4%.	Top ct at 70°, bottom at 50°. First 3' composition previous Last 3' composition as following. Shearing or fracturing at 41' and 50°. 2275-2277': rhy?
2277.0-2455.0	Massive Amygd Dacite	Grey	Fine	Uneven	6-15 f/ft. weaken to end. Amygdules very rounded (good). Some breccia fragments and tuff like sections around. Low angle shearing. Flow banding some at 0°.	Qtz-ser-epidote altn. Ser bleaching. Very acid. Some strongly chloritized sections.	First 10' 3% py. estimated. After minor tr py-cp throughout.	Qtz does not form crystals looks like secondary gradationally to more andesitic features. Frs at 30-40° and 70-90°. 2285': 10" breccia tuff. 2338-2339': blocky 2391-2392': "
2455.0-2514.0	Acid Dyke?	Dark grey to light	Fine	Even	Almost glassy. 10-15 f/ft. blocky. moderate to 4-6 f/t. No amygdules phenocrysts and flow banding.	Strong chlorite. Minor ser altn. Acid but qtz nearly not legible.	Py throughout.	Top contact at 60°. Fractures at 40-60°, both directions. 2471': 2" fault. Dyke is not typical, almost the same composition like rocks around. Bottom contact at 45°

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2514.0-2547.0	Acid Dykes	Continuation			5-10 f/ft.	Stronger ser altn.	Py, trace cp (2526')	Difficult to call the rocks. Another contact at 2518, 2526, 2532, at 45°. Part 2526-2532' can be lamprophyre dyke. Bottom contact at 20°.
2547.0-2592.0	Massive Amygdu-loidal Dacite	Greenish grey	Fine to medium	Uneven	To 2567' fractured (10-15f/ft.) After 5-8 f/ft. in near part well rounded amygdules after sparcely but typical. Flow banding difficult. Some shearing.	Ser-qtz-ca altn. Acid to 2567'.	Tr py.	Fractures at 30-60-80° both directions. 2588' to end: sheared at 0-15°.
2592.0-2629.0	Fractured Amygdu-loidal Brecciated Andesite	Grey	Fine	Uneven	10-20f/ft. 6"-2' strong brecciated sections. Amygd-ules throughout. Flow banding.	Qtz-ca filling fractures, qtz filling amygdules. Weak ser altn.	Est 1% py.	Top contact at 45°. Fractures at 30-60°, both directions. Some sections silicious but mostly typical andesite. Strong shearing or faults at 2626', 2628', 2629'. 2618-2629': duplicated core by stucking.
2629.0-2645.0	Fault Zone	Grey	Fine	Uneven	8-15 f/ft. in solid places, but mostly broken throughout. Soft.	Qtz-ca.	Minor py.	Very blocky, from shearing to fracturing (0-70°). Locally solid. andesite-dacite. 3' lost core. No contacts.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2645.0-2698.5	Amygdu-loidal Andesite Dacite	Grey	Medium	Even	5-10 f/ft. Amygdules sparcely not too typical. Flow banding difficult.	Some ser bleaching (weak). Qtz-ca stringers.	Minor py.	Upper part fairly silicious (15'), after more andesitic. Fractures at 30 and 70°.
2698.5-2773.0	Massive Dacite	Pale grey	Fine	Even	Massive. 0-4f/ft. Minor weak shearing.	Qtz-ca filled fractures. Weakly defined chlorite speckling throughout. Dark blue chlorite spots near bottom contact.	Minor scattered diss py.	Andesite dyke at 2712-2712.2' Fracture sets at 60, 30-40°. Minor shearing at 15-30°. Sharply defined "dyke like" top contact, section could be also possibly decribed as an acid? dyke? as it appears very silicious in sections. Poorly defined texture and lack of flow features tend to support acid dyke theory.
2773.0-2782.3	Bedded Tuff	Lead grey	Even Fine	Even	Massive. 1-3f/ft.	Minor scattered brecciated-chlorite fragments. Chlorite and qtz-ca filled fractures.	Banded py-po and traces of scattered sph and cp. .3% sulph. 2" massive py at 2782'.	Bedded at 60°. Weak fracturing at 60°.
2782.3-2850.0	Rhyolite Breccia And Flow	Med grey	Very fine	---	Indurated breccia throughout. Flow banding at 2810'. 1 f/ft. A few shards and amygds Ropy structure at 2521'.	Almost nil	Py lean disseminations. po. 1" stringer at 2822'. Tr cp-sph. at	Contact, upper at 50°. Lower gradational.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2850.0-2900.0	Massive Rhyolite Flow and Breccia	Med grey	aphan- itic	Even or with altered pheno-crysts.	1 f/ft. Amydules especially near top. Local breccia, flow banding in places.	Minor sericite.	Minor py, scattered grains of cp.	Fractures at 50 and 30°.
2900.0-2905.0	Rhyolite Breccia	As above.						
					END OF HOLE 2905'.			

Hole No. D-255

D-269

LAKE DUFAULT MINES LTD.

Drill Hole Record

Hole No. D-269 Lat. 605.34 S Dep. 12,765.73 Elev. 11,093.43 Dip -90° Bearing Depth 3773'

Working Place: South Dupresnoy

Date Started: May 30/70

Date Completed: July 14/70

Compass Tests

Depth	Dip	M.Brng.
2500'	82°	S79°W

Acid Test

Depth	Read	Corr.

SAMPLED SECTIONS

From	To	C.L.	Cu	Zn	Au	Ag

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
					Acid Dip Tests			
	Depth Collar	Corr 90°			Depth Corr		Depth Corr	
	250'	89°			1500' 86 1/2°		3000' 79°	
	500'	89°			1850' 86°		3250' 82°	
	750'	90°			2000' 85 1/2°		3500' 79°	
	1000'	87°			2250' 82°		3750' 77°	
	1250'	87 1/2°			2500' 79°			
					2750' 79°		wedge 2593' 79°	
							2616' 83°	
							wedge 2820' 81°	
0.0-15.0	Casing.							
15.0-449.0	Massive Diorite	Med grey to med green	Med	Even	Massive. up to 2 f/ft.	Ser-carb filled fractures with limonite on some fractures.	Nil	Fractures at random angles. 401.5.-406': lamp dyke with sharp cts.

Hole No. D-269

Logged by H.A.N. & B.G.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
449.0-1127.0	Diorite	Grey	Med	Equigranular.	Massive. avg. 1f/foot at random angles.	Fractures ser-carb filled, generally hairline, but up to 1/2" wide.	Nil	451-452': 10-12 hairline frs at random angles. Bottoms on carb-sericite vein at 70°. 486-487': 50% ser-carbonate due to numerous fr-filling at random angles and thickness. 488-489': acid dyke, grey siliceous, granular? Upper ct grad, lower ct at 35-40°. 497.5-505': moderately bleached 524-525': " " 548-549': " " 549-567.5': microdiorite(?) finer grained, upper ct sharp and chilled over 1', lower ct sharp and chilled over 1', trace of po. 590-593': acid dyke, 3" inclusion of altered diorite. at 591.5'. 602-604': mod bleached. 621-622.5':" " 622.5-629': altered appearance. 675.5-678.5': aqygd andesite? 684-685.5': highly epidotised dyke rock, sharp cts at 45°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
								759.5-764.5': q.F.P. dyke Sharp cts at 20° epid altn of fs.
								821-822': heavy epidotization
								836-844': coarser grained.
								849-863': porphyritic mafic dyke. 20% white feldspar phenocrysts in a fine to very fine grd gn massive black matrix. Contacts grad over 1/2"
							877.5-929': sulphides as noted.	877.5-883.5': up to 10% diss'd po with very minor cp diss'd throughout.
								908-910': 5-10% diss po.
								924.5-925.5': altered 8-10 random carb fracture fillings.
								926-927': 10% po diss.
								929': 1/2" po bleb.
								951-962': darker colour biotite
								1025':from onward, altered appearance.
								1034-1035': very coarse, pegmatitic.
								1067-1067.5': 6" carb-ser vein at 30°.
								1081-1081.5': gouge (fault).
								1081.5-1096.5': blocky 6-7 breaks/ft at average 40-45°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
								1096.5-1097': gouge(fmit) 30°. 1100.0-1106': lamp dyke, sharp contacts at 20-30°. 1125-1127': lamp dyke. Sharp contacts at 20-25°.
1127.0-1173.0	Massive Andesxite	Dark greeny black	Fine to very fine	Even	Massive. 2-3 random fractures per foot, generally hairline epidote-carbonate filled.	Very minor light green alteration massoc with fractures.	AS noted generally barren.	1137.0': 1/2" carbonate vein at 35-40° with 10% fine cp diss.
1173.0-1212.0	Diorite Dyke	Grey	Med g.	Even	Massive.	Chloritised mafic minerals.	Nil	1173-1175': finer grained chilled(?) upper contact gradational over 2-3". Lower contact sharp at 80-85°.
1212.0-1767.0	Amygdu-loidal to Massive Andesite	Dark greeny black	F.g.	Even	Generally massive. A few flow bands in places. 1-2f/ft except where noted.	Ser-carb fracture filling. Saussurite veins irregularly speckled and bleached below 1875'.	Tr py, tr cp at 1762'.	1242-1251': heavily bleached. 1262-1263': granite dyke, grad cts. 1276-1278': altered granite 1285-1286': heavy epidote altn 1476.5-1481': silicified. 1500-1525': blocky, averged 3-4 f/ft at 30-60° 1525-1540': silicified.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
								1557.0-1562': heavily fractured epidotized, weakly brecciated. 1686-1688': acid dyke, grad cts.
1767.0-1803.0	Acid Dyke	Med light grey	Very fine	Even to finely porphyritic.	Massive. 1-4f/ft.	Slight epid altn. Slight sauss at bottom.	Tr py. Tr cp as lean dissemination from 1800-1803'.	Lower contact abrupt. Fractured below 1801'. Lower contact abrupt. Sample 1799-1804'.
1803.0-1818.0	Massive to Sheared Andesite	Med green	Fine	Even to porphyritic.	4-5f/ft. Massive. Bottom 2' sheared.	Weak-moderate carbonate in matrix and as stringers.	Nil	Lower contact sheared over 2' at 55°.
1818.0-1866.0	Altered Acid Dyke	Light brown light grey	Very fine-fine	Even to porphyritic.	4 f/ft .	Intensely grid altered(bleached).	Tr diss py.	Prominant frs at 50°. Lower contact gradational. Fracture zone from 1859-1861'.
1866.0-1938.0	Massive Andesite	Med grey	Fine to med	Even	1-5f/ft. Amygdules at 1893'. Flow banding at 1900'.	Bleached above 1874'. Minor epidote-carbonate.	Tr py.	Coarse grained quartz-calcite veins above 1874, one 6" thick. Fractures at 60, 30o.
1938.0-1939.5	Massive Bedded Tuff	Med grey	Fine			Sauss	1-2% py.	Top 1" thinly bedded and cherty. Remainder speckled siliceous rock.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1939.5-1982.0	Massive Andesite	Dark grey - grey	Fine to very fine	Even	Scattered amygdules and flow banded, sections.	Sauss veins and pods grid altn. Minor chlorite altn of matrix.	Isolated blebs and grains of py.	Prominant fractures at 65°. Siliceous flow banded or amygduloidal sections near top probably result from alteration.
1982.0-2042.0	Flow Banded to Massive Andesite	Dark green	Fine	Even	Numerous flow banded section. A few amygdules. Numerous brecciated sections with quartz and/ or sauss cement.	Sauss sections up to 2' long.	Tr py as diss and amygdules fillings. Tr cp at 2022'.	Flow banding from 0-55°. Lower contact sharp at 60°.
2042.0-2136.0	Massive Andesite	Dark green grey	Fine med	Even to porphyritic.	Massive. Numerous amygd near top and isolated amygd throughout.	Grid altn near top.	Tr py, trcp at 2070 and 2072',	Fractures at 40,60,75°.
2136.0-2206.0	Massive Q.F.P. Dyke	Med grey	Very fine matrix phenos up to 8mm.	40-60% feldspar and quartz phenocrysts.	Massive. 1-3f/ft.	Minor grid altn.	Nil	Top contact at 20°apparently chilled. This unit identical to Q.F.P. intersected at a few hundred feet depth in D-262. Bottom contact sharp at 45° and appears chilled.
2206.0-2293.0	Massive Dacite	Med dark grey	Fine	Even to porphyritic.	Massive. 1-3f/ft. A few poorly formed amygdules.	Minor sauss.	Tr py in amygds.	A hard, tough rock. Fractures at 50, 20o. Lower contact sharp chilled, flow banded.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
					Flow banding & chilled contact at 2293'.			
2293.0-2302.0	Silicified Andesite Breccia	Med dark grey	Fine very fine		Flow(?) breccia. Numerous amygdules.	Silicification. Minor chlorite.-grid altn. Sauss.	Minor py, trcp at 2300'.	Upper contact apparently marks scoraceous flow top.
2302.0-2452.0	Massive Porphyritic Andesite	Dark grey-green	Fine	Even porphyritic.	Amygduloidal sections and scattered amygdules. 3-4f/ft.	Weak grid altn.	Tr py,tr cp in amygdules.	Alternating massive and porphyritic sections. Fractures at 5, 60°. 6" thick banded quartz-carbonate vein at 2350'.
2452.0-2469.0	Amygduloidal Andesite	Dark grey	Fine	Even to slightly porphyritic.	Sauss,quartz and feldspar filled amygdules from less 1mm to 1cm.constitute 20-50% of rock.	Mod sauss.	Minor py as blebs and in amygdules.	Contacts gradational, the upper with intercalation.
2469.0-2508.0	Massive Andesite	Dark grey green	Fine med	Even ophitic texture.	Isolated amygdules. 1-5f/ft.	Weak bleaching at bottom.	Tr py in amygdules.	2" qtz vein at 2507'.
2508.0-2559.0	Acid Dyke or Flow?	Med dark grey to black.	Very fine to fine	Even to porphyritic in middle.	Massive. 2-15f/ft. A few elongate structures up to 8mm long,	Weak grid altn near contacts.	Tr py as dissemination and scattered blebs.	Fractures at 65, 45°. Plagioclase phenocrysts. Contacts abrupt.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
					resemble amygdules. Vague banding at bottom, may be flow banding.			
2559.0-2590.0	Massive Andesite And Andesite Breccia	Med grey to dark green	Fine	Even	Sauss and pyrite filled amygdules. Flow breccia. Scattered irregularly shaped amygdules with grey chert fillings.	Blotches of blue-green chlorite, especially strong from 2585-2590'. Minor sauss.	Abundant py. 1-4% as amygdule fillings, blebs and dissemination.	Numerous fragments or cavity filling of dull grey chert. Fragments have irregular shaped and contacts with andesite are sutured.
2590.0-2654.0	Porphyritic Andesite	Dark green	Fine	Irregularly porphyritic euhedral feldspars up to 3mm 5-15% of rock.	Massive. 3f/ft. Scattered amygdules up to 10mm with feldspars and sauss.	Minor sauss.	Minor py diss and amygdules. Tr cp throughout and in amygdules and qtz-sauss veins.	Top somewhat scoraceous. Lower contact appears chilled.
2654.0-2657.0	Q.F.P.	Dark green matrix grey pale blue phenocrysts.	Fine matrix phenocrysts to 3mm.	50% phenocrysts quartz & feldspar.	Massive to indistinctively foliated.	Chlorite(?) in matrix.	Tr py.	Contacts are either sheared or tuffaceous over 6", Contacts very sharp at 60°. Lower contact appears chilled aglanst andesite although andesite both within 1/2" below and above Q.F.P. appears slightly recrystallized

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
								Q.F.P. is probably extrusive.
2657.0- 2775.5	Porphyritic Andesite	As above between 2590-2654'.					Tr py, tr cp here and there.	A few fractures at 0, 20, 60°.
2775.5- 2806.0	Dacite Dyke	Dark grey black	Fine	Even	Very massive. Few fractures.	Nil	Tr py.	Upper contact chilled, sharp at 60°
2806.0- 2890.0	Massive Andesite with Andesite Dykes.	Dark green to grey	Fine	Even	Massive. Isolated amygdules. Flow bands 1-15f/ft. carb filled.	Weak chlorite altn including spotting at lower contact.	Tr py in and around carb veins.	A very massive uniform rock probably includes much dyke rock, but contacts with flows not apparent. 8" thick andesite dyke with chilled contacts at 2887'. Prominant fract 60-70°.
2890.0- 2928.0	Acid Dyke	Dark grey black	Very fine	Slightly porphyritic.	Massive. Chloritic inclusions near bottom.	Minor chlorite at contacts.	Tr py.	Top contact marked by carbonate vein at 50°. Bottom contact obscured by altn.
2928.0- 2952.0	Massive Andesite	As above.			Isolated amygdules and flow bands.	Minor chlorite altn.	Nil	Flow contacts at 2932-top chilled.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2952.0-3089.0	Porphyritic Amygduloidal Andesite	Dark grey-green	Fine to med	Even or speckled here and there with feldspar phenocrysts.	Numerous irregular sauss and quartz filled amygdules. A few flow bands.	Numerous sauss veins and pods.	Tr py, tr cp in amygdules at 2970' and in sauss vein at 3036 and 3056'.	Stretched amygdules at 50°. Upper contact obscure. Sauss flow breccia at 3016'. Lamprophyre dykes as follows: 2' thick at 3021' 4" thick at 3027'
3089.0-3130.0	Acid Dyke	Med grey	Fine in middle very fine contacts.	Even	Massive. 2-5f/ft.	Nil	Tr py diss'm.	Contacts sharp and unaltered at 45-50° laminated at bottom. Lamprophyre dyke 3120.5-3124'.
3130.0-3208.0	Massive To Amygduloidal Andesite	Dark grey	Fine	Even A few short porphyritic sections.	Scattered amygduloidal sections. Several sections of flow breccia. Flow banding 2-5f/ft.	Sauss pods.	Tr py, tr cp in sauss veins.	Lamprophyre dyke 3162-3166', upper part sheared at 65°. Carb filled fractures at 30, 80°.
3208.0-3266.5	Amygduloidal Flow Banded Andesite	Dark grey	Fine	Even	Scattered large amygdules up to 2cm. Qtz-sauss filled Numerous flow bands. Minor flow breccia.	Weak sauss. Minor silicification, along fractures and flow bands.	Minor py as stringers blebs.	Lower contact abrupt at 60°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3266.5-3290.0	Massive And Brecciated Andesite	Dark green	Fine	Even	Brecciated with quartz cement 3266.5-3273'. A few scattered well formed amygdules.	Nil	Minor py stringers above 2689'.	Lower contact sharp at 80°.
3290.0-3296.0	Fragmental Tuff	Grey brown				Bleaching -sericite.	Tr to minor py especially near bottom.	Contact sharp. Upper ct marked by thin chert bed. Fragments from 2mm-1.5cm.
3296.0-3297.0	Bedded Cherty Tuff	Med light grey	Fine to aphan.		Beds 2mm and 8cm thick.		Layers and veinlets 2-4% po less than 1% cp. Tr sph(?).	Bedding at 70°.
3297.0-3332.0	Amygdu-loidal Andesite	As above.			2mm-2cm chlorite or qtz filled amygdules. Well formed. Numerous flow banded sections. Brecciated with qtz cement about 3309'.	Blotches of chlorite here and there.	Minor po-py as blebs and stringers.	
3332.0-3412.0	Massive Dacite or Dacite Dyke	Med grey green	Fine to med.	Very even	Very massive. A few amygdules near top contact.	Minor grid alteration.	Tr py-po.	Massive and featureless. A few possible amygdules suggest this is a flow rock. Fractures at 40, 60°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3412.0-3495.5	Altered Andesite or DAcite	Mottled med dark grey dark green	Fine to med	Uneven.	1-4f/ft. Few amygdules except near bottom. Flow banding near bottom.	Irregularly bleached (mottled appearance) Silicified?. Irregularly recrystallized (dioritised)	Tr py, tr cp.	2' andesite dyke at 3432'. Fractures at 60, 0, 40°. Quartz present in matrix of rock except near bottom and either primary or an altered product. Sample 3494.5-3495.5'.
3495.5-3496.2	Cherty Bedded Tuff	Med dark grey	Fine to aphan.		Beds 1mm-2cm.	Nil	3-4% py. 1-2% cp as layers and veins.	Bedding at 65°. Cont ct sharp. Sample 3495.5-3496.2'.
3496.2-3515.0	Amygdu-loidal Andesite	Med grey	Fine	Even	Scattered chlorite filled amygdules to 1cm.	Slightly bleached Sericitised.	Tr py in amygds.	Very massive. Sharp contacts at 75°. Sample 3596.2-3598'
3515.0-3520.5	Cherty Bedded Tuff	Med light grey	Fine to aphan.		Beds 1cm to 10cm.	A few pathhes or layer with chlorite altn.	3-5% po-py as layers up to max. of 1cm thick. Tr cp.	Lapilli?bedshere and there Bedding at 80°. Sample 3515-3518' 3518-3520.5'
3520.5-3528.2	Massive Andesite	Med grey	Fine	Even	Flow banding. A few amygdules.	Slightly bleached and sericitised.	Minor py as stringers.	2" thick cherty tuff at 3522'. Similar to andesite from 3496.2-3515'. Sample 3527.2-3528.2'.
3528.2-3528.8	MS		Med to coarse	Uneven			90-95% granular py-po.	Upper contact angular at 50°. and marked by thin tuff. lower ct irregular. Sample 3528.2-3528.8'.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3528.8-3723.0	Altered Rhyolite Breccia And Rhyolite	Med light grey to dark green	Fine	Even in fragments in altered zones.	Flow banded and amygduloidal fragments from 1/2" to 2ft in diameter. Numerous elongate quartz or chlorite filled amygdules.	Matrix and some of fragments almost completely altered to chlorite and sericite. Minor chlorite spotting.	Minor diss py at top ,tr py elsewhere.	Shear at 5, 50° from 3548-3570'. Schistose zones with abundant chlorite-sericite. Lower ct.sharp 4% lampe dyke 3707-3708'. Flow banding 35-90°. Sample 3528.8-3530'.
3723.0-3773.0	Porphyritic Dacite Dyke	Grey	Fine	Asicular feldspar pphenocrysts 5%	Very massive. 2-4f/ft.	Chlorite in matrix. Bleaching around quartz vein.	Minor py as stringers. Sphalerite in quartz vein stockwork.	Upper contact abrupt, and marked by intense chlorite alteration. Stockwork of fine quartz veins with pale brown bleached waggins and 1-3% sphalerite. Sample 3761-3763' 3763-3764.5'
					END OF HOLE			

Hole No. D-269

D-273

LAKE DUFAULT MINES LTD.

Drill Hole Record

Hole No. D-273 Lat. 505.478 Dep. 11,301.04 Elev. 11,004.31 Dip -90° Bearing Depth 2631'

Working Place: South Dupresnoy
Date Started: June 20/70
Date Completed: July 25/70

Redrill from 1900'

Compass Tests

Depth	Dip	M.Brng.
1500'	-60°	S-78°W
1900'	-60°	N-66°W
Before redrill---- 2200'	-80°	N-70°W

Acid Test

Depth	Read	Corr.

SAMPLED SECTIONS

From	To	C.L.	Cu	Zn	Au	Ag

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
					Acid Dip Tests Depth Corr 1250' 86° 1500' 85° 1883' 80 1/2° 2004' 80°		Depth Corr Wedge 2083' 80° 2140' 78° 2250' 75° Wedge 2294' 75° c2315' 75° 2631' 77°	
	Depth Corr Collar 88° 250' 89° 500' 87° 750' 87° 1000' 86°			1750-83° Wedge				
0.0-54.0	Casing.							All angles measured relative to core axis.
54.0-204.0	Massive Flow Banded Amygdaloidal Andesite	Med green grey	Fine	Even	Massive. 3-4f/ft. Strong frothing and churning and flow banding in sections. Mod amygds in sections.	Ser-carb filled fractures and minor sauss.	Minor to mod py in fractures and diss in sections.	Fractures at 25-45°. Flow banding at 60-80°. Shearing at 30°. Bottom ct brecciated.

Hole No. D-273

Logged by R.A.H.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
					Very weak shearing present in sections.			
204.0-247.0	Massive Diorite Dyke	Light green grey	Med to med fine	Even	Massive. 2-3f/ft.	Sauss throughout.	Tr diss po.	Top and bottom cts are brecciated. Fractures at 45 and 80°.
247.0-344.0	Massive Andesite	Med grey	Fine	Feldspar porphyritic in most sections.	Mod fractured near top otherwise massive. Minor shearing. 2-12f/ft. Weak flow banding present. Mod amygds in sections.	Ser-carb filled fractures and carb bleaching in sections. Minor sauss throughout.	Minor diss py in sections.	Fractures at 15-50 and 80°. Shearing at 50°. Flow banding at 30°.
344.0-377.0	Massive Diorite Dyke	Light grey	Med fine	Even.	Massive. 0-8f/ft. No shearing.	Carb filled fractures.	Nil	Fractures at 35-80°. Top and bottom cts sharp. Top at 45o, bottom at 55°.
377.0-479.0	Massive Andesite	Med grey	Fine	Odd section contains feldspar phenos.	Minor fracturing 3-8f/ft. No shearing. Fairly weak frothing and churning present throughout.	Ser-qtz-carb filled fractures.	Minor py diss and filling fractures.	Fractures at 45, 80, abd 20°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
479.0-508.0	Massive Micro-Diorite Dyke	Dark grey	Fine	Even	Massive. 2-3f/ft. with calcite cement.	Minor grid altn at bottom.	Nil	Contacts indistinct and obscured by alteration. Fractures at 5, 60°.
508.0-653.0	Amygduloidal Andesite	Dark green to light grey irregularly mottled.	Fine	Even	Numerous irregular amygdules. Flow breccia. Possible pillow borders here and there. Flow banding here and there. 2-4 f/ft.	Irregularly mottled due to bleaching around amygdules. Minor sauss.	Tr py in amygdules and fractures.	502-523': flow breccia. 602-607': fragmental tuff or flow breccia. Fractures at 85, 5, 40°.
653.0-668.0	Porphyritic Micro-Diorite Dyke	Dark grey	Fine to med.	Even towards contacts. Porphyritic core.	Massive. 3-5f/ft.	Minor sauss.	Nil	Contacts gradational over 1-2'.
668.0-755.0	Massive Andesite	Dark grey	Fine	Slightly porphyritic.	Massive. 2-4f/ft. Amygdules here and there especially near bottom.	Sauss pods and veins. Grid altn. Irregularly mottled and bleached.	Tr py with sauss.	Fractures at 60, 30, 5°. Very massive in places, there may be some dyke material present.

Hole No. D-273

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
755.0-760.0	Feldspar Porphyry or Lamprophyre Dyke	Dark grey to brown	Med matrix phenos to 3mm.	Very porphyritic.	Massive.		Nil	Chilled contacts at 2-5°. About 60-70% anhedral feldspar phenocrysts in a biotite-chlorite matrix.
760.0-783.0	Fractured Bleached Andesite	Light grey	Fine	Even	40 or more f/ft. Amygdules.	Mod-intense bleaching. Numerous qtz veins.	Nil	Broken core 765-768'. probably marks fault zone. 2" thick lamprophyre dyke at 5o at 781'.
783.0-980.0	Altered Amygduloidal Andesite	Dark grey light grey dark grey	Fine	Even. Minor porphyritic section.	5-10f/ft. Amygdules 2-15mm with quartz, chlorite-py. Flow banding here and there.	Irregularly bleached, including some silicification. Numerous calcite and quartz veins. Minor sauss, minor chlorite blotches.	Tr-minor py as blebs, amygdules and stringers.	Contacts fairly abrupt. 869-877': silicified andesite or acid dyke. Prominant fract 50-60o. Fracture zone 932-934'.
980.0-1115.0	Massive Amygduloidal Andesite With Dacite	Dark green grey	Fine	Very even.	Very massive with scattered sauss amygdules few fractures. Weak flow banding here and there.	Minor sauss.	Tr py in amygdules.tr cp.	Lamprophyre dykes parallel to core axis, 994-998' and 1002-1005'. Broken core at 1002-1012'. Dacite sections especially between 1005-1051'. 1' thick carb and silicified shear zone or sheared tuff at 1105'.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1115.0-1249.0	Massive Andesite	Dark green	Fine	Very even	Very massive. 2-4f/ft. Very few amygdules. Flow breccia 1115.-1118'. Weak flow banding near top.	Minor sauss. A few carb veins here and there.	Tr diss and py tr cp 1248'.	Top contact abrupt. A very massive uniform rock, only recognizable as a flow because of a few well formed amygdules. Lower contact marked by 3" thick andesite dyke at 40° to core axis.
1249.0-1332.0	Micro-Diorite Dyke	Med grey	Med to fine	Even	1-3f/ft.	Weak bleaching. 6" calcite-chlorite vein at 1260'.	Tr py.	Lower contact chilled at 55° Chilled dyke- Dyke contact 1321' indicates multiple intrusions.
1332.0-1365.0	Porphyritic Andesite Dyke or Flow	Med grey	Fine matrix phenocrysts to 5mm.	Very porphyritic up to 35% euhedral to subhedral white feldspar	Massive. A few possible amygdules at 1363'.	Slight bleaching or silicification.	Nil	Lower contact chilled and at 30°. Difficult to determine if a dyke or flow.
1365.0-1468.5	Flow Banded Porphyritic Andesite	Med grey	Fine matrix phenocrysts to 5mm.	Up to 35% euhedral to subhedral white feldspar phenocrysts.	Flow banded throughout. Numerous well formed amygdules with quartz, epidote and pyrite filling up to 10mm. Minor flow bx.	Large sauss pods(?) in which structure is preserved. A few calcite-pink feldspar-quartz veins.	Tr minor py.	A very distinctive rock, may be a useful marker. 3" thick massive andesite dyke at 1389'. Bottom contact abrupt and chilled. A few small agates.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1468.5-1512.0	Amygdu-loidal Andesite	Med grey	fine to med	Even. Porphy-ritic in places.	Irregularly dispersed. Chl-orite a nd sauss filled amygdules. Weak flow band-ing here and there.	Irregularly sauss mottling.	Tr py	Andesite dyke(?) with grad-ational contacts 1488-1494'.
1512.0-1520.0	Andesite Dyke (Micro-Diorite)	Dark green grey	Fine to med	Very even	Massive.	Nil	Tr py	Very uniform rock. Contacts chilled at 70°.
1520.0-1521.0	Bedded Cherty Tuff	Med and light grey	Fine to aphan-intic.		Beds 1-30mm.	Nil	Minor py along beds.	Bedding at 60°.
1521.0-1558.0	Flow Banded Amygdu-loidal Andesite	Dark grey	Fine	Even	Numerous flow bands. Scattered sauss-chlorite amygdules from 3-8mm. Short brecciated sect-ions.	Nil	Tr py as diss-eminations in flows and bands in tuffs.	1" thick cherty tuff at 1536 and 1541' in which cherty beds are truncated by an errosional sufface. Indicates "tops" right way up.
1558.0-1559.0	Massive And Beded Tuff	Med to dark grey	Fine to aphan-initic.		Beds 2mm to 20cm thick.	Nil	A few percent py as blebs and layers.	Contacts abrupt. Bedding at 50°. Aout 80% massive material, may be flow.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1559.0-1569.0	Andesite Flow Breccia	Dark grey matrix and light grey fragments and vise versa.	Fine	Even	Angular fragments of siliceous rock in andesite matrix and vise-versa. Flow banding in matrix.	Silicification(?) Minor chlorite at bottom.	Minor py as blebs and diss.	Lower contact graddational.
1569.0-1621.3	Amygduloidal Andesite	Dark grey	Fine	Even	Well formed sauss chlorite amygdules 2-10 mm in diameter. Minor flow bx. 4" diameter diorite inclusion. 1' fracture zone at 1582'8	Nil	Tr py.	A massive, very uniform rock. Prominant fracture at 50°.
1621.3-1649.0	Acid Dyke	Dark grey black.	Fine	Porphyritic 1/16-1/8" white phenos in sil-black matrix.		Occasional epidote veinlet at random angles 1/f.	Trace py-po throughout.	Upper ct sharp at 70°. Lower ct gradational over 2-3".
1649.0-1784.0	Massive Andesite	Dark grey-green	Fine to med.	Even	Nil. 1/f carbonate or epidote veinlet at random angles.	Perhaps somewhat "dioritised".	Nil to trace.	Could possibly be a microdiorite(?)6 1' thick lamprophyre dyke at 1686'6

Depth	Rock Type	Colour & % Foliation	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
								1765-1784': occasional 1/2" fine dark sub-angular inclusions to 5%.
								1783-1784': altered, fractured.
1784.0-1851.0	Q.F.P.	Dark grey green	Fine	Porphyritic 1/8" blue qtz and greenish feldspar	15-20% dark grey inclusion angular occasional (1/3") epid-carbonate veinlet at random angles.		Trace-mainly py in fractures.	1837-1842': lamp dyke. Sharp cts at 10°.
								1842-1851': altered, fractured.
1851.0-1854.5	Massive Andesite	Dark grey green	Fine to med	Even		"Dioritized"?	Trace	As 1649-1784'.
1854.5-1882.0	Acid Dyke	Dark grey	Fine	Even	Nil		Traces py on fr planes.	1864-1864.5': heavy chlor-calcite. possible recemented shear??
								1870-1874': 15% epidote alteration along random frs(2-3f/ft). Lower contact sharp at 25°.
1882.0-1941.0	Amygduloidal Andesite	Dark grey green	Fine to med	Even	1/16-1/8" rounded amygdules to 15%.	Nil	fr py in amygds.	1924-1930': light green alteration 15% epidote calcite masses.

Hole No. D-273

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1941.0-2081.0	Acid Dyke	Dark grey	Fine	Porph to 1990'	5-10% white to green phenocrysts average 1/8"	Nil	Trace	1962-1965': altered diorite or metagabbro. Sharp chilled cts at 40-60°. From 1990': phenocrysts decrease to 5% or less. 1998-2001.5': lamp dyke. Sharp cts at 30°. 2004-2005': lamp dyke 2049-2050.4': lamp dyke. Sharp cts at 30-40°.
2081.0-2109.0	Altered Breccia (andesite)	Matrix is brown grey frags are dark or light grey	Matrix is med frags fine to med.	Is Brecciated 70% frags to several inches in length.		Matrix strongly altered to brownish appearance with 1/8" black grains.	Trace in frags.	Possibly altered andesite or dacite?
2109.0-2237.0	Diabase	Grey-black	Med	Less 5% white feldspar phenocrysts.	Massive in most sections. Mod fracturing in odd section.	Nil	Trace to nil	Magnetic. Upper ct sharp at 75°. First 3-4' slightly chilled.
					Back up and wedge.			
Wedge at	1900'.							

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1900.0-1928.0	Fractured Amygdu-loidal Andesite	Dark to med grey	Fine	Even	Mod fractured. 10-20f/ft. Calcite filled amygdules up to 1/4" abundant through-out. Breccia present in some sections.	Biotite altn mod in sections. Carbonate sericite filled fractures with ser altn.	Tr diss py.	Fractures at 80, 50, and 30°. Bottom ct brecciated over 4'.
1928.0-1987.0	Silicous Amygdular Andesite	Med grey	Fine	Moderately feldspar porphy-ritic.	Minor to mod fracturing present throughout. 10-20 f/ft. Amygdules up to 1/3" abundant through-out.	Ser-carb filled fractures with minor grid. Strongly silicified through-out.	Tr py in amygds.	1960.5-1964': porphyritic diorite to micro-diorite dyke with sharp chilled cts at 40-45°. "are vague pillow border observed. Fractures at 35-50° and 85o.
1987.0-2056.0	Acid Dyke	Med grey	Fine	Even. Odd feldspar pheno-crysts present.	Minor fracturing present. 8f/ft.	Ser-hematite filled fractures.	Tr cp-py in blebs and frac-tures.	Fractures at 10-25, 60 and 90° 2014-2017' 2018-2022': lamp dykes with sharp cts at approx 15-25°. Bottom ct irregular but fairly sharp at approx 15°. Top ct sharp at 55o
2056.0-2384.0	Massive Diabase	Grey black	Med. First few feet are med fine	Abundant feldspar phenos throughout.	Massive for the most part.	Minor sauss.	Virtually nil.	Magnetic throughout. 2271': rock changes from med to fine grained. This rock maymbe the fine grained ct sone with inclusions

Hole No. D-273

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
								of andesite throughout. Bottom ct sharp at 25°.
2304.0-2393.0	Dioritized Flow Banded Andesite	Med grey	fine	Even.	Massive. 2-3f/ft. Flow banding present throughout. Odd large amygdule present.	Ser-carb fractures and minor sauss.	Trace	Flow banding at 70°. Fractures 35°. Rock has been dioritized in most sections. Bottom ct sharp at 80°.
2393.0-2438.5	Dioritized Andesite Flow	Med grey	Fine	Even	Minor fracturing present 10f/ft. Flow banding present in sections.	Strongly dioritized throughout. Minor to mod sauss in vague pods and throughout. Chl specks present in sections.		2438.5-2444'L fractured acid dyke.
2438.5-2444.0	Acid Dyke	Light grey	Fine	Even	Minor fracturing 5f/ft.	Ser-carb-qtz filled frr.	Tr diss py.	Cts sharp at approx 80°.
2444.0-2510.0-	Massive Dacite	Med grey	Fine	Even	Massive. 0 f/ft. Minor flow banding presnet	Chl(?) speckling present throughout.	Minor po in fractures near bottom ct.	Bottom ct abrupt.
2510.0-2514.5	Altered Amygdular Dacite?	Light brownish grey	Fine to very fine	Even	Massive. Mod amygdular. Flow banded in short sections.	Ser altn moderate to strong (very).	Tr to minor po-sph filled amygds Build up in sph after 2512.0'	Bottom ct sharp at 60°. Sample CZAA 2510-2512'. 2512-2514.5

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2514.5 2515.6	Bedded Tuff	Light greyish red	Fine Aphan.	Even.	Banded throughout.	Odd fracture with carb filling.	Minor sph, py-po in bedding and diss. SMS from 2515.5-2515.6'	Reddish colouration due to sph content. Bottom ct abrupt. Banding at 60-90°. Sample Geochem 2514.5-2515.6'.
2515.6- 2520.0	Rhyolite Breccia?	Med grey Light grey breccia fragments	Fine with aphan fragments	Even	Massive. 4f/ft. Breccia fragments about 15% of rock.	Chl altn throughout.	Tr to minor diss py-po-sph.	Matrix appears to be basic and the fragments are cherty. Sample CZAA? 2515.6-2520.0'.
2520.0- 2521.6	Bedded Tuff	Light grey	Aphan.	Even	Bedded bands obscured in places by epigenic sulphides and chl.	Patches of chl.	Mod py-po, tr sph-cp diss throughout in blebs and in banding.	Banding at 25°. Sample Geochem. 2520-2521.6'.
2521.6- 2522.9	Rhyolite Breccia	Same as section 2515.6-2520.0'.						Bottom ct at 25°.
2522.9- 2523.9	Massive Sulphides	Brownish brass yellow	Fine	Even	Massive.		95% py. No other sulphides visible.	Bottom ct sharp at 45°.
2523.9- 2631.0	Rhyolite Breccia	Light grey	Very fine	Even	Massive. 2f/ft. Brecciation weak to mod fragments up to 1" in dia.	Minor chl specks and patches present Cash present in fractures.	Tr py diss and in blebs. Tr diss po-cp in blebs. at 2612'	Fractures at 30° and random angles.

Hole No. D-273

END OF HOLE

D-276

LAKE DUFAULT MINES LTD.

Drill Hole Record

Hole No D-276 Lat. 220.01 S Dep. 11,600.03 Elev. 11,014.86 Dip -90° Bearing Depth 2855'

Working Place: South Dupresnoy

Date Started: July 29/70

Date Completed: Aug 26/70

Compass Tests

Depth	Dip	M.Brng.
1500'		S73°W
2300'		S66°W

Acid Test

Depth	Read	Corr.

SAMPLED SECTIONS

From	To	C.L.	Cu	Zn	Au	Ag

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
					Acid Dip Tests			
		Depth Corr			Depth Corr		Depth Corr	
		69' 86°		Wedge	997' 86 1/2°		2000' 84°	
		240' 85°			1027' 87°		2250' 84°	
	Wedge	260' 85°			1250' 87°		2500' 83°	
		500' 88°			1500' 86°		2800' 82 1/2°	
		750' 86°			1750' 86°			
0.0-63.0	Casing.							
63.0-102.5	Fractured Bleached Andesite	Light to Fine med green grey		Mod feldspar through-out.	Sheared and fractured throughout 20-30 f/ft.	Ser-carb filled fractures. Strong ser and weak carb bleaching throughout. Strongly leached in sections. Limonite abundant in fractures.	r diss py.	Fractures at 35 and random angles. Bottom ct sharp at 35°

Hole No. D-276

Logged by M.A.N.

Depth	Rock Type	Colour & % felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
102.5-104.0	Bedded Tuff Andesite Tuff	Light green grey	Fine to very fine	Even	Bedded throughout at 35 to 45°.	Nil	Nil	Bottom ct sharp at 45°.
104.0-205.0	Porphyritic Andesite	Dark green grey	Fine with small very fine sections.	Strongly feldspar porphyritic.	Minor to mod fracturing 5-15 f/ft. Odd poorly developed amygdule present.	Ser-carb filled fractures. Minor sauss.	Nil	107.5-107.8': bedded tuff as in section 102.5-104'. Bottom ct sharp at 80°.
205.0-252.0	Flow Banded Andesite	Dark to light grey	Fine	Even	Massive. 5 f/ft. Flow banding throughout. Odd amygdule present.	Ser bleaching strong in sections. Sauss present in small pods.	Tr diss cp-py.	Flow bandigg at 25-30°. Fracturing at 10-35°. Bottom ct sharp at 70°.
252.0-344.5	Andesite flow	Med grey	Fine	Even odd feldspar phenocrysts present.	Fairly massive. 7 f/ft. Shearing present. Odd small well developed amygdule present.	Mod sauss in well defined pods. Ser-carb filled fractures with strong grid.	Tr diss cp around 288'.	Fractures at 70 and 15° Shearing at 35° Bottom ct arbitrary.
344.5-346.0	Fault Zone	Med grey	Fine	Even	Sheared and fault brecciated throughout. Slickensides and fault gouge present.	Carbonated through out.	Nil	Shearing at 45°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
346.0-381.0	Andesite Flow	Med grey	Fine	Even	Massive. 2-3f/ft. Odd amygdule present.	Feldspar are altered to ser or kaolinite? Grid altn present.	Tr diss py.	Bottom ct vague. Fractures at 60 and 30°.
381.0-515.0	Andesite Flow	Med grey	Fine	Slightly uneven. Feldspar phenocrysts present in sections	Minor fracturing 8 f/ft. Amygdules moderate in first 25 ft. Therafter only odd amygdule.	Minor sauss in pods. In some sections the feldspars are altered to ser.	Minor diss cp-py	Fractures at 40-50, 0 and 80°. Hematite stains in some fractures.
515.0-628.0	Diorite Dyke	Med green grey	Med fine to med	Dioritic	Massive. 0-6f/ft.	Ser-carb filled fractures and weak sericitisation. In sections.	Nil	Fractures at 20 and 60 75° 549-555': fine grained section or an inclusion of dyke. Rock is fine grained in last 20' of section. Top and bottom cts sharp. Top ct at 35°. Bottom at 50°.
628.0-632.0	Amygduloidal Andesite	Med grey	Fine	Even	Mod fractured 15 f/ft. Strongly amygd throughout.	Ser-carb filled fractures.	Tr po in odd ulehs.	Fractures at 50-90°. Bottom ct sharp at 50°.
632.0-670.0	Rhyolite Breccia or Silicified Andesite	Light grey	Fine to very fine	Feldspar porphyritic in most sections.	Minor fracturing 5-10f/ft. Brecciated and frothy throughout. Angular to well	Strong chl altn overtaking core in "patches". Minor sauss. Ser-carb filled fractures.	Nil	Andesite inclusions(?) up to 1' present throughout. Fractures at 40-50°. Andesite inclusions become larger and more abundant

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
					rounded bx frag-ments up to approx 1". Amygdules abundant.			with depth. Bottom ct arbitrary.
670.0-791.5	Siliceous Flow Banded Andesite	Med grey	Fine	Even to slightly uneven. Feldspar phenos sparse in odd section.	Minor fracturing 8 f/ft. Flow banding present in most sections. Odd small amygd present. Minor frothing and churning present.	Ser-carb filled fractures.	tr cp in blebs around 726.5'.	Fractures at 45 and 80°. Flow banding at 35-45°. Rock is either a dacite or silicified andesite. Bottom ct sharp at approx 80°
791.5-814.5	Amygdu-loidal Rhyolite (?)	Light grey	Very fine	Even	Minor fracturing 5 f/ft. Strongly amygdular through-out. Very irregular and often elon-gated amygdules.	Ser altn around amygdules.	Weak tr diss py.	797-798': microdiorite dyke-lete with sharp cts at 80 and 45°. Fractures at 25-40° Bottom ct sharp at 80°.
814.5-890.0	Porphy-ritic Andesite	Med grey	Fine	Porphy-ritic feldspar pheno-crysts mod through-out.	Minor to mod-erate fracturing 5-15f/ft. Flow banding present in sections. Odd amygdule.	Ser-carb filled fractures. Sauss in odd well defined pod.	Nil	Fractures at 20-40°. Flow banding at 30°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
890.0-900.5	Micro-Diorite Dyke	Med grey	Fine	Dioritic	Minor fracturing 5 f/ft.	Strong epid. Ser filled fractures.	Nil	Top ct sharp, but irregular, bottom ct obscured by broken core. Fractures at 45 and 20°.
900.5-918.0	Shear Zone 134 Fault (?)	Med grey green	Fine	Even	Sheared throughout. Slickensides and fault gouge presnet. Fault breccia present in sections.	Strongly carbonated. Strong chlorite.	Nil	Shearing at 30°. Rock appears to be a featureless andesite. Bottom ct arbitrary.
918.0-971.0	Flow Banded Andesite	Med to light grey	Fine	Even for the most part. Some sections are slightly feldspar porphyritic.	Mod fractured 15-20f/ft. Flow banding throughout. Amygdules abundant in top 5' of section.	Strong sauss in pods and throughout. Ser-carb filled fractures.	Tr cp-po-py in sections. Mod cp-po in sauss pod over 1" at 960.5'	Flow banding at 30-80°. Fractures at 20-40° 90 and random angles. Bottom ct sharp at 50° with 1" intermediate tuff.
971.0-984.5	Fault Zone Creek Fault	Earthy grey	Fine		Sheared throughout.	Carbonated throughout.	Nil	Shearing at 40-50°. Bottom ct sharp at 50°.

Hole No. 276

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
984.5-1118.5	Bleached Flow Banded Andesite	Med grey	Fine	Even	Minor to mod fracturing 5-15 f/ft. Flow banding in sections. Amygdules abundant in sections. Some shearing present in short sections.	Ser(?) bleaching present in most sections. Ser-carb-chl filled fractures.	Tr py in odd bleb.	Fractures at 10,25, and 80° Flow banding at 5-80° Shearing at 35°. Bottom ct arbitrary.
1118.5-1196.5	Andesite Flow or Dyke	Light green grey	Fine	Even for the most part.	Mod fractured 15 f/ft. Amygdules very rare.	Dioritized in sections. Ser bleaching in most sections. Minor grid.	Nil	No dyke contacts are observed but rock is too featureless to be definitely called a flow. Fractures at 15 and 45°. Bottom ct gradational.
1196.5-1212.0	Porphyritic Andesite	Med grey	Fine	Very feldspar porphyritic throughout.	Massive. 2-3f/ft.	Ser filled frs.	Nil	No flow features present. Bottom ct appears to be a dyke. Ct irregular at approx 80° and chilled.
1212.0-1325.6	Massive Andesite Flow	Med grey	Fine	Uneven. Tiny feldspar phenos throughout.	Massive. 5f/ft. Odd amygdule. Minor flow banding.	Chl-ser and carb filled fractures. Weak sauss.	Nil	Flow banding at 80°. Fractures at 45 and 15°. Bottom ct sharp at 60°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1325.6-1420.0	Feature-less Andesite Flow	Med grey	Fine	Even	Massive. 2-4f/ft. Odd short section contains mod amygdules.	Minor sauss. Ser-carb filled fractures. First 20' is ser bleached.	Tr diss py-cp.	Fractures at 5-20 and 80°. 1413.5-1420': andesite dyke.
1420.0-1428.0	Massive L.F.P. Dyke	Light grey	Fine	Porphy-ritic qtz and feldspar pheno-crysts abundant throughout.	Massive.		Nil	Cts sharp. Top at 45°. Bottom at 80°.
1428.0-1524.5	Flow Banded Andesite	Med grey	Fine	Feldspar porphy-ritic in sections	Massive. 5 f/ft. Flow banding in most sections.	Ser filled fractures.	Nil	1428-1450': small andesite to intermediate dykelets up to 3' present. Fractures at 25 and 55°.
1524.5-1540.0	Porphy-ritic Acid Dyke	Light grey	Very fine	Feldspar porphy-ritic through-out.	Massive. 0-4f/ft.	Minor ser.	Nil	Fractures at 10-30°. Both cts brecciated. Top at 80°. Bottom at 45°.
1540.0-1602.0	Flow Banded Andesite	Med grey	Fine	Feldspar porphy-ritic in some sections. ~~in sections.~~	Massive, up to 5 f/ft. Flow banded through-out. Mod amygd	Carb filled fractures.	Nil	Fractures at 50 and 30-15° Flow banding at 25-20°.

Depth		Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1602.0-1653.0	Fractured Acid Dyke	Light Grey	Fine	Even	Mod fractured. throughout 20f/ft.	Carb and ser filled fractures with grid.	Nil	Fractures at 40-50 and 70° bBoth contacts sharp. Top at 50°, bottom at 20°.
1653.0-1678.0	Andesite Flow	Med grey	Fine	Odd feldspar phenocrysts presnet	Minor fracturing 2-3 f/ft. Flow banding present.	Ser-carb filled fractures.	Nil	Flow banding at 35°.
1678.0-1705.0	Acid Dyke	Light grey	Fine	Even	Minor to mod fracturing. 10-15 f/ft. Minor shearing.	Ser-carb filled fractures with grid.	Tr py in blebs.	Both cts sharp at 50-60°.
1705.0-1755.0	Flow Banded Andesite	Med grey	Fine	Even Odd.	Mod fractured 10-20f/ft. Flow banding present in most sections. Odd amygdule present.	Ser-carb-chl filled fractures. Limonite in fractures.	Nil	Fractures at 45 and 25°. 1717-1727': acid dyke similar to section above. Bottom ct sharp at 85°.
1755.0-1790.0	Amygdu-loidal Pillowed Andesite	Med grey	Fine	Even	Minor fracturing 5 f/ft. Strongly amygdular through-out. Pillows throughout.	Ser bleaching pre-sent in patches. Ser-carb filled fractures.	Nil	Bottom ct gradational.

Hole No. D-276

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1290.0-1826.0	Micro-Diorite Dyke or Feature-less Andesite flow	Med grey	Fine to med fine	Even, Slightly dioritic	Minor fracturing 5 f/ft.	Ser-chl filled fractures.	⅛r diss py.	Fractures at 30 and 70°. Top ct appears to be gradational. Bottom ct chilled at 85°.
1826.0-1827.3	Bedded Inter-mediate Tuff	Light grey	Very fine	Even	Bedded throughout.	Ser altn present.	Nil	Bedding at 0-45°. Bottom ct sharp at 45°.
1827.-3 1960.0	Dioritized Andesite flow	Med grey	Fine to med fine	Mod feldspar porphy-ritic up to 1848' and dioritic there-after.	Massive for the most part. Minor fracturing in sections 2-6f/ft. Frothing and churning strong in first 6'. Amygdules mod up to 1848'. Thereafter featureless.	Minor sauss. Ser filled fractures.	Tr finely diss py.	Rock appears to be a large flow with amygdules at the top. Fractures at 35 and 80°.
1960.0-1970.0	Q.F.P. Dyke	Light grey	Fine	Porphy-ritic feldspar and qtz phenos crysts	Massive.	Nil	Nil	Top ct sharp and chilled at 40°. Bottom ct sharp and chilled at 30°.

Hole No. D-276

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
				up to 1/5" abundant throughout.				
1970.0-2008.5	Dioritized Andesite	As above.						
2008.5-2046.0	Acid Dyke	Light grey	Fine	Porphyritic Minor small feldspar phenocrysts present.	Massive. 2f/ft.	Ser-carb-limonite filled fractures. Minor grid.	Nil	Fractures at 35 and 70°. Top and bottom obscure but appear to be short at approx 80°.
2046.0-2192.0	Amygduloidal Andesite	Med green grey	Fine	Even. Odd large feldspar phenocrysts present near bottom of unit.	Minor fracturing 5f/ft. Mod amygduloidal throughout.	Minor ser bleaching in sections. Carb-ser filled fractures. Appears to be slightly silicified in sections. Minor sauss.	Nil	Fractures at 30-45°. Bottom ct sharp at 25°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2192.0-2220.5	Q.F.P. Dyke	Light grey	Fine	Porphyritic Qtz and feldspar phenocrysts up to 1/4" abundant throughout.	Massive. 2 f/ft.	Minor sauss. Qtz-ser filled fractures.	Nil	Top and bottom cts sharp at 35° and chilled. Inclusions of andesite above and below caught up in first and last 6" of unit.
2220.5-2454.5	Andesite Flow	Med grey	Fine	Even Odd feldspar phenocryts present.	Minor to mod fractured. 4-20 f/ft. Odd amygdule throughout. Flow banding present in sections. Odd pillow visible.	Ser-carb filled fractures. Carb bleaching in sections.	Minor py in blebs and fractures.	Fractures at 70-90° and 35-45°. Flow banding at 45°. 2261-2266': intermediate to acid dyke with sharp 50° contacts. Rock has only a few amygdules and almost no flow banding after 2266'. 2325-2329': lamp dyke with cts at 20°. 2357-2365.5': feldspar porphyritic acid dyke with sharp 70-80° cts. Bottom ct sharp at 25°.
2454.5-2457.3	Brecciated Bedded Tuff	Light grey	Fine	Even	Appears to be a banded tuff that has been brecciated. Bx fragments upp to 1 1/2".	Carb throughout.	Tr to minor py in bedding.	2456.3-2456.8': andesite. 2456.8-2457.3': bedded tuff Tuff is very siliceous. Bottom ct sharp at 80°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
					Siliceous fragments with a mafic matrix.			
2457.3-2558.5	Flow Banded Andesite	Med grey	Fine	Even	Minor fracturing 5 f/ft. Breccia in sections. Odd well developed amygdule present.	Strongly carbonated fractures. Ser filled fractures and bleaching in patches. Qtz filled amygdules Silicified in sections.	Tr cp-ppy in small blebs.	Flow banding at 30-50°. Fractures at 70°. Bottom ct sharp at 45°.
2558.5-2583.5	Amygduloidal Flow Banded Siliceous Andesite	Light to med grey	Fine	Even	Massive. 2-3f/ft. Strongly amygd uloidal. Flow banded throughout.	Ser-carb filled fractures. Rock is silicifed except for short sections.	Tr py-po in amygds and blebs.	Flow banding at 0-45° Bottom ct sharp at 40° and with 2" of andesite-chert breccia.
2583.5-2645.0	Q.F.P.	Light grey	Fine	Porphyritic feldspar and qtz phenocrysts abundant throughout.	Massive. 0-3 f/ft.	Odd short section is ser alt'd. Ser filled fractures.	Tr po in blebs throughout. Tr cp-py near bottom 3st. 2639.5-2645' 3-4% sulph.	6" lamp dyke with sharp contacts at 2593.5'. 6" andesite dykelet at 2632'. Bottom ct sharp at 30°. Sample CZAA 2639.5-2642.5' 2642.5-2645'.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2650.0-2717.0	Rhyolite Breccia	Light grey	Very fine	Even	Massive. 0-5fft Abundant semi-angular siliceous breccia fragments up to 2" and averaging 3/4".	Chl and biotite altn strong throughout. Minor epid and ser present.	Minor to mod py in blebs and diss po esp. near top. Tr diss cp-po-sph throughout. Est. 2652-2667' 8% sulph, 7% py-po 1% sph.	Fractures at 30 and 80°. Sample CZAA 2650-2652' 2652-2654'.
2717.0-2820.0	Acid Dyke	Light grey	Fine to very fine	Even. Feldpsar pheno-crsts present after 2780'.	Minor to mod fracturing presnet 5-15 f/ft.	Ser-carb-chl filled fractures with ser grid altn.	Tr py finely diss and in blebs.	Fractures at 50 and 80°. Top and bottom contacts sharp at 45°. Breccia fragments present near bottom contact.
2820.0-2855.0	Rhyolite breccia	Light grey	Very fine	Even	Massive. Brecciated throughout, abundant fragments up to 2" and averaging 1/4".	Mod chl altn in matrix.	Mod py finely diss and in blebs and fractures. Est. 5% throughout. Tr sph in blebs.	
					END OF HOLE			

D-278

LAKE DUFAULT MINES LTD.

Drill Hole Record

Hole No D-278 Lat. 596.30S Dep. 11,765.64 Elev. 11,044.47 Dip -90° Bearing Depth 3002'

Working Place: South Dupresnoy

Date Started: Aug 31/70

Date Completed: Oct 5/70

Compass Tests: Depth | Dip | M.Brng.

Acid Test: Depth | Read | Corr.

SAMPLED SECTIONS

From	To	C.L.	Cu	Zn	Au	Ag

Acid Dip Tests

Ftge	Corr
100'	88°
250'	89°
500'	90°
750'	88°
1000'	87°
1250'	86°
1500'	86°
1750'	86°
Wedge Footage?	
2000'	84°
2250'	84°
2500'	82°
2750'	81°
3000'	84°

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
0.0-10.0	Casing.							All angles relative to core axis.
10.0-51.0	Dacite? Tuff	Med light grey	Fine	Even	Minor to mod fracturing 5-15 f/ft. Strongly amygduloidal in short sections throughout. Small elongated amygdules.	Strong ser filled fractures. Small sauss pods present. Limonite filled fractures.	Tr py in amygdules.	Fractures at 40 and 70°. Bottom ct abrupt, but obscured by broken core. Rock appears to be a dacite tuff with sections of dacite flow present between some bands.

Hole No. D-278

Logged by H.A.N.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
					Tuff banding present in sections throughout.			
51.0- 96.0	Tuff Dacite Breccia	Light med grey	Fine	Weakly feldspar porphy- ritic.	Brecciated in most sections. Very angular breccia fragments averaging 3/4 to 1" but up to 6". Minor fracturing present. 5-10f/ft. Flow banding? present in bx fragments.	Matrix is mod sauss altered. Ser-carb filled fractures.	Nil	Rock consists of dacite fragments in a tuff matrix.
96.0- 411.0	Andesite Flow:	Med grey	Fine	Odd feldspar pheno present.	Minor flow features such as flow banding and odd amygdule. Minor fracturing 5 f/ft.	Mod sauss in pods. Chl specks present. Minor ser altn throughout.	Tr cp-py-sph in odd fracture.	Odd small section of intermediate (bedded) tuff present. 172-177': zone of ser spotting. 210-222': strong section of bedded intermediate tuff. After 283', frothing and churning are quite strong. 323-329' 355-364': section of intermediate tuff.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
411.0-462.0	Dioritized Andesite	Med grey	Fine	Feldspar porphyritic in sections. Slightly dioritic texture.	Minor to mod fracturing present. 5-15f/ft. Minor bleaching present.	Ser-carb-chl filled fractures and minor ser bleaching.	Nil	Fractures at 40, 60 and 80°. Shearing at 40-50°.
462.0-522.0	Diorite Dyke (Fault Zone)	Med grey	Med to med fine	Dioritic	Fracturing and shearing mod throughout. 10-20 f/ft.	Ser-carb filled fractures and ser bleaching.	Tr diss py.	490-493': zone of strongest shearing, probably a fault zone. Shearing at 50°. Fracturing at 45-70°. Top and bottom cts sharp and fine grained at 30 and 45o respectively.
522.0-702.0	Andesite Flows	Med grey green	Fine	Even. Odd section contains scattered feldspar phenocrysts.	Mod fractured 10-15f/ft. Amygdules sparsely scattered throughout. Minor shearing present. Flow banding present but rare.	Ser-carb-chl filled fractures. Odd slightly silicified section present. Amygdules filled with chl and epid. Minor sauss.	Tr cp-po in amygds. and fractures. 297-298': minor cp-po assoc with chl altn.	Fractures at 30-40, 70-80°. Shearing at 30-45°. Sample CZAA 596.2-597.2' 597.2-598.2' 598.2-599.2'. Bottom ct sharp at 70°.
702.0-732.5	Amygdaloidal Dacite	Med light grey	Fine	even	Minor fracturing 3 f/ft. Tiny amygdules abundant throughout.	Ser filled fractures and amygdules.	Tr finely diss py.	Fractures at 45 and 20°.

Hole No. D-278

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
732.5-754.0	Micro-Diorite Dyke	Greenish gry	Med ~~xxx~~ fine	Dioritic.	Massive. 0-5f/ft.	Ser filled fractures.	Nil	Fractures at 40-50°. Both cts sharp and chilled at 40°.
754.0-876.0	Andesite Dacite Lava	Med grey	Fine	Even	Minor fracturing. 8f/ft. Odd poorly developed amygdule present.	Ser-carb filled fractures and minor ser bleaching. Minor sauss in odd large pod.	Tr py dids and in blebs. Tr cp.	Fractures at 45 and 90° and random angles. Bottom ct abrupt. Rock appears to be and andesitic dacite.
876.0-928.0	Andesite Breccia	Matrix is dark grey green. Fragments are light grey	Fine with very fine fragments	Even fot the most part. Some sections are feldspar porphyritic.	Mod fracturing present. 10-15f/ft. Brecciated throughout. Mafic matrix with rhyolite fragments. Angular fragments very irregular in size. Odd amygdules present.	Matrix contains strong sauss and chl altn. Ser filled fractures. Minor carb present.	Nil	Fracturing at 40-50 and 90°. Bottom ct sharp at 35°.
928.0-1108.0	Andesite Flows	Med grey	Fine	Even	Massive. 3-8f/ft. Amygdules rare. Minor flow banding present.	Sauss present in odd pod. Ser filled fractures and bleaching. Rock appears to be slightly silic'fied in sections especially near top of unit.	Tr cp-py in blebs assoc with sauss pods.	Fractures at 0-15 and 45°. Flow banding at 45°. 1024-1031.5': lamp dyke with sharp 80° contacts. Bottom ct sharp at 55°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1108.0-1123.0	Sheared Zone	Greenish grey	Fine	Even	Intensely sheared throughout.	Strong carb-chl-ser throughout.	Tr py on some shearing planes.	Shearing at 40-50°. Rock appears to be an andesite Bottom ct sharp at 50°.
1123.0-1255.0	Flow Banded Andesite	Med grey	Fine	Even	Minor fracturing present. 3-10f/ft. Minor flow banding throughout. Odd amygdule present.	Mod sauss in ppods and ser and qtz filled fractures.	Tr cp-py here and there in blebs.	Fractures at 55° and random angles. Flow banding at 5 to 80°.
1255.0-1375.0	Altered Andesite	Dark green	Fine	Even to fine dioritic	Massive. Isolated amygdules. 5-10 f/ft.	Sections with bleaching and numerous carb veins. Abundant sauss pods and veins. A few dioritized sections.	Minor py as stringers and in carb veins. A few blebs of cp in calcite vein at 1365'.	Contacts gradational. Fractures at 55°.
1375.0-1655.0	Massive Andesite	Med grey	Fine	Even	Massive. 1-5f/ft.	Mod sauss.	Tr cp and blebs at 1389' and in amygdules at 1399'.	Rock becomes weakly flow banded and f feldspar porphyritic at 1645'.
1655.0-1681.0	Acid Dyke	Med grey	Fine	Even. Odd feldspar phenocrysts present.	Massive. 3-4f/ft.	Ser filled fractures with grid altn.	Tr disc py.	Top contact sharp at 50°. Bottom ct is obscure. Fractures at 60-90°.

Hole No. D-278

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1681.0-1753.5	Amygdu-loidal Flow Banded Andesite	Med grey green	Fine	Even. Odd feldspar pheno-crysts present.	Minor fracturing 5-10f/ft. Small well developed amygdules. Mod throughout. Flow banding strong throughout.	Mod sauss, minor ser in fractures. Minor chl altn.	Nil	Flow banding at 45-70°. Fractures at 30-45°.
1753.5-1794.5	Dacite Dyke	Med grey	Fine	Even	Minor fracturing 5-10f/ft.	Grid altn on some fractures.	Tr diss py.	Top and bottom ct sharp at 45 to 50°. Fractures at 35 and 70°.
1794.5-1836.0	Flow Banded Amygdu-loidal Andesite	As above.						Bottom ct gradational.
1836.0-1864.0	Amygdu-loidal Por phy-ritic Andesite	Dark grey green	Fine	Porphy-ritic feldspar pheno-crysts mod through-out.	Minor fracturing. 5-10 f/ft. Well developed amygd-ules scattered throughout. Weak flow banding present in odd short section.	Ser-carb filled fractures.	Nil	Fractures at 20°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1864.0-1963.0	Amygdu-loidal Pillowed Andesite	Dark grey green	Fine	Even	Minor fracturing 5-8f/ft. Pillowing present near top of unit. Odd section contain flow banding. Anygdules scattered throughout.	Ser-carb filled fractures.	Nil	Rock becomes fairly massive and featureless towards end of unit. Fractures at 15 and 70°.
1963.0-1985.0	Acid Dyke	Fine	Even. Odd feldspar pheno-crysts present.		Minor fracturing 5 f/ft.	Ser filled fractures.	Tr diss py.	Fractures at 35-50°. Top and bottom cts sharp at 70°.
1985.0-2067.0	Amygdu-loidal Andesite	Dark grey green	Fine	Even.	Minor fracturing 5-10f/ft. Amygdules scattered throughout. Minor frotning and churning present.	Ser-carb-chl filled fractures and amygdules.	Tr py in blebs.	Fractures at 40-50°.
2067.0-2113.0	Acid Dyke	Light grey	Very fine	Even. Odd feldspar pheno-crysts present.	Massive. 0-2f/ft.	Nil	Nil	Top and bottom contacts sharp at 50°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2113.0-2319.0	Amygdaloidal Andesite	Med green-grey	Fine	Even	Minor fracturing 0-8 f/ft. Amygdules scattered throughout.	Ser-carb filled fractures.	Tr py in small blebs.	Fractures at 45°. 2308-2311': lamp dyke with sharp contacts at 30°. Bottom ct sharp.
2319.0-2396.5	Pillowed Andesite	Med grey	Fine	Weakly porphyritic large feldspar phenocrysts scattered throughout.	Minor to mod fracturing present 5-15 f/ft. Pillowing present throughout. Amygdules abundant in some sections.	Minor chl altn. Mod ser throughout in patches.	Tr py in blebs.	Fractures at 45°. Bottom ct sharp at 50°.
2396.5-2432.0	Amygdaloidal Andesite	Med grey	Fine	Amygdaloidal.	8-12% feldspathic amygdules throughout.	Minor bleaching assoc with sericite filled frs at 70°.	Nil	Lower contact grad over 6"-1'. 2424-2429': blocky 6-7 breaks per foot. Sericite lined frs at shallow angles.
2432.0-2509.5	Massive Andesite	Dark grey	Fine	Even	Massive, fairly uniform. Rare amygdules and pillow borders.	Short sections slightly bleached. Bleaching assoc'd with fractures. Some patches of heavy sericite.	1% pyrite particularly assoc'd with pillow borders.	

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2509.5-2510.0	Bedded Tuff	Dark grey	Fine	Even	Bedded at 70-75°. Minor lapilli.		Nil	Contacts somewhat irregular at 70°, sharp.
2510.0-2602.0	Amygdaloidal Andesite	Dark grey	Fine	Even	Massive and uniform. 5% large amygdules filled with chlorite or qtz 1/8-1/4".	Nil	tr-1% py-po as replacements of amygdules.	2524.0-2528.5': feldspar porpphyry acid dyke. Sharp upper ct, broken at 80-90°.
2602.0-2613.0	Fracture Zone	Green	Fine	Uneven.	4 to 12f/ft. Numerous qtz-carbonate veins at random angles. No gouge or definite fault.	Moderately bleached.	5% diss py.	2602.0-2606.5': could be a sheared tuff. 2605.5-2613.0': probable amygd dacite as below.
2613.0-2819.0	Massive Dacite	Med green	Fine	Fairly even	Weakly amygd'd. for first 15'. Weakly pillowed and possibly variolitic throughout.	Chloritic variolites? Slightly bleached.	trace in fracture filling.	2642.5': 1.5" white qtz at 30-40°. 2715.5-2716.5': f.g. basic massive tuff. Barren. From 2740.0', weakly amygdaloidal.
2819.0-2856.0	Porphyritic Acid Dyke	Light grey	Fine	Feldspar porphyritic throughout.	Massive. 2-4f/ft.	Ser-carb filled fractures.	Nil	Fractures at 60 and 25°. Top ct sharp at 70° and altered. Bottom ct obscure due to jumbled and missing core.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2856.0-2877.4	Andesite-Dacite	Med grey	Fine	Even.	Massive to moderately fractured 0-25 f/ft. Abundant tiny amygdules? throughout.	Ser-carb-qtz filled fractures with some grid. Minor weak ser bleaching present.	Minor py as blebs and disseminations throughout.	Fractures at 45 and 80°. Bottom contact sharp at 50°. Sample CZAA 2874.5-2877.4'.
2877.4-2883.4	Bedded Tuff	Light to med grey	Fine	Even	Bedded in most sections. Minor fracturing. 5-8 f/ft.	Ser-carb-chl filled fractures.	Minor to mod py in bedding. Disseminated and in large blebs.	Bedding at 45-70o. Fractures at 45-80°. Bottom ct sharp at 45°. Sample geochem 2877.4-2879.5' 2879.5-2883.4'
2883.4-2886.7	Rhyolite Breccia?	Light grey	Fine	Even.	Brecciated throughout. Very small breccia fragments.	Minor chl in matrix.	Minor py diss and in stgrs throughout.	Sample CZAA 2883.4-2886.7' Rock could possibly be a fragmental tuff.
2886.7-2937.0	Acid Dyke	Light grey	Fine	Even	Massive to moderately fractured 0-25 f/ft.	Ser-chl filled fractures. Strong ser grid altn present.	Nil	Fractures at 40 and 80°. Top and bottom contacts sharp at 45-50°. 2921-2937': rock changes to sugary acid rock with no grid altn. No contact is visible.
2937.0-2948.0	Andesite flow	Dark green grey	Fine	Even	Massive. 0-2f/ft. Small amygdules scattered throughout.	Weak biotite in patches. Carbonated throughout.	Tr to minor py-tr cp in amygdules and disseminated.	Bottom contact sharp at 45°.

Hole No. D-278

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2946.0-2972.0	Rhyolite Breccia	Red grey	Fine	Even	Massive. 0-3ff/ft. Small well rounded breccia fragments abund ant throughout.	Weak chl alth in matrix. very weak biotite alth preserd.	Minor py in cubes especially near top of unit.	Bottom ct arbitrary.
2972.0-3007.0	Chlorite Altered Rhyolite Breccia	Light to dark grey	Fine	Even	Massive. 0-5ff/ft. Brecciated in most sections. well rounded fragments.	Strong chl altering matrixm, and over-tailing core in short sections. Qtz filled fractures.	py in blebs and disseminated.	2996-2997.5': andesite dykelet with sharp contacts. fractures at 45°.
					END OF HOLE			

Hole No. D-276

D-279

LAKE DUFAULT MINES LTD.

Drill Hole Record

Hole No. D-279 | Lat. 1884.69 | Dep. 3946.14 | Elev. 11094.39 | Dip 90° | Bearing ------ | Depth 1742'

Working Place: Turcotte Lake Beaver Meadow

Date Started: Sept 16-70

Date Completed: Sept 29-70

Compass Tests

Depth	Dip	M.Brng.
1000	83°	S70W
1742'	77°	S11W

Acid Test

Depth	Read	Corr.		
250		89°	1250'	78 1/2°
[illegible]		89°	1500'	76°
750'		87°		
1000'		83°		

SAMPLED SECTIONS

From	To	C.L.	Cu	Zn	Au	Ag
				FOOTAGE	NORTHING	EASTING
				0'	1884.69	3946.14
				875'	1862.95	1943.48
				1371'	1784.04	3933.83
				1742'	1698.04	3917.14

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
0.0-11.0	Casing.							
11.0-27.0	Porphyritic Acid Dyke	Med Grey	Fine	30-40% anhedral feldspar phenocrysts	Massive. 5-10f/ft.	NIL	Minor diss'd Py	Limonite along fractures.
27.0-239.0	Massive Dioritised Andesite	Med Grey	Fine to med.	Even	Massive. Amygduloidal sections here and there.5f/ft.	Weak bleaching. Weak moderate carbonate alt'n in section. Sauss. Discontinuous dioritization Sericite?	Tr minor py diss'n and in carb veins.	Massive section from 132-148 may be dacite or altered acid dyke, contacts not apparent. Fractures at 45°

Hole No. D-279

Logged by A.W.B.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
239.0-245.0	Fault Zone	Light Grey	Fine Med		Schistose. Fractures containing up to 1/2" of light grey gauge.	Intense ~~sericil~~ alt'n along shears.	NIL	Shearing (schistosity) at 20°
245.0-417.0	Massive Dioritized Andesite	Med Grey Dark Grey	Fine Med	Even with porphyritic sections	A few amygdules in sections. Very massive. 2-5f/ft calcite filled.	Discontinuous dioritization.	Tr Py as dissemination and stringers. Tr cp diss and in fractures here and there.	Fract at 40-0° 6" thick, sericite-altered shear zone at 264 at 45° to core. Bottom ct sharp at 35°
417.0-426.5	Acid Breccia	Light to Dark Grey	Fine	Even	Acid breccia with chloritized andesite fragments in a silicious matrix. Mod fractured. 8f/ft.	Chl alt'd fragments. Ser? alt'd matrix.	NIL	It is known whether the breccia is dynamic or flow feature. Bottom ct obscure. Fractures at 0,40° and random angled.
426.5-592.0	Quartz Diorite (Micro Diorite?) or Dioritized Andesite?	Med Grey	Med Fine	Dioritic	Massive.	Minor chl and ser alt'n present.	NIL	Top and bottom contact obscure.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
592.0-624.0	Rhyolite or Rhyo-Dacite	Light Grey	Fine	Even. Odd small sections is feldspar porphyritic.	Massive. 2f/ft	Chl alt'n present in small patches throughout. Minor ser alt'n present.	Tr sph, Minor py in blebs, here and there.	This rock may be a chlorite alt'd rhyolite or a rhyolite dacite. Bottom ct arbitary.
624.0-669.0	Rhyolite Breccia	Light Grey	Fine	Even	Massive. 0-2f/ft. Brecciated throughout. Chl alt'd fragments up to 3/4" in a less alt'd matrix.	Chl alt'n mod in fragments.	Tr cp, py, sph in blebs and diss.	Bottom ct sharp at 40°
669.0-682.0	Massive Rhyolite	Med Grey	Very fine.	Even	Massive. 1f/ft.	NIL	NIL	Bottom ct sharp at 40°
682.0-692.0	Massive Andesite	Dark Grey Green	Fine	Even	Odd small amygdule present. Minor fracturing 3-8f/ft.	Ser-carb filled fractures.	Tr py in blebs.	Fractures at random angles. Bottom ct sharp at 40°
692.0-746.0	Massive Rhyolite	Med Grey	Very fine.	Even for the most part. Some sections are feldspar porphyritic.	Massive in most sections. 0-5f/ft Odd short brecciated section.	Ser-ca filled fractures.	Tr py in small cubes.	Fractures at 35° Bottom ct sharp at 80° 745-746

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
746.0-746.5	Bedded Tuff and Semi massive pyrite	Light Grey and bronze.	Fine to aphanitic.	Even	Bedded.	------	Semi massive py in sections.	Sample CZAA 746-746.5
746.5-804.0	Rhyolite Breccia	Light Grey	Very fine.	Even	Massive.0-2f/ft. Brecciated throughout. Silicious fragments in silicious matrix.Fragments up to 2".	Some fragments have minor chl alt'n.	Tr py in blebs and disseminated.	Sample CZAA 746.5-747.5 Bottom ct sharp at 30°
804.0-984.5	Andesite Flow	Dark Grey Green	Fine	Even	Minor fracturing. 0-8f/ft. Small sections are flow banded. Brecciation present in short sections throughout. Odd small amygdule present.	Mod sauss esp around sections of brecciation. Ser-carb epid-filled fractures.	Tr py in blebs.	Some small sections are composed of rhyolite. 839-846-Lamp dyke with sharp cts at 50° Bottom ct sharp at 45°
984.5-1086.0	Andesite Breccia	Med to Dark Grey Green	Fine	Even	Minor fracturing. 5-10f/ft.Brecciated in most sections. Amygduloidal throughout.	Strong chl alt'n. Ser alt'n strong in sections.	Tr py/cp in blebs. and diss.	Fractures at 45° Bottom contact gradational.

Hole No. D-279

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1086.0-1279.0	Featureless Andesite	Dark Grey Green	Fine	Even	Massive. 0-2f/ft Odd amyg and weak flow banding present in sections.	Mod chl alt'n throughout.	Tr cp-py in blebs.	Bottom contact sharp at 45° 1250-1257 Qtz and feldspar porphyritic dyke(?). Main rock appear andesitic but qtz and feldspar content make it a rhyolite.
1279.0-1304.0	Pillowed Andesite	Med Grey	Fine	Even	Massive. 0-2f/ft Vague pillow borders present throughout. Amygdules scattered throughout.	Strong chl alt'n assoc with pillow borders. Minor ser and chl alt'n throughout.	Tr diss py.	Bottom ct sharp at 45°
1304.0-1523.0	Altered Rhyolite ? or Dacite?	Dark to Light Grey	Fine	Bluish qtz eyes visible in relatively unaltered sections.	Massive. 0-3f/ft Mod amygduloidal in sections. Flow banding? strong here and there. Brecciated in sections.	Qtz filled amygdules. Mod chl alt'n in sections. Rock is softer than normal rhyolite probably due to ser alt'n.	Tr py finely diss and in blebs.	Flow banding at 30 to 50° In relatively unaltered sections rock has the appearance and hardness of a rhyolite.
1523.0-1552.0	Micro Diorite Dyke	Med Grey	Med to med fine	Dioritic	Massive. 0-5f/ft.	Ser-carb-qtz filled fractures.	Tr finely diss py.	Fractures at 45° Top and bottom contacts obscured by alteration.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1552.0-1682.0	Altered Rhyolite Breccia	Med Grey	Fiine	Even. Odd qtz "eye" observed.	Massive to 1640'. After 1640' mod fractured 10-20f/ft. Small sub angular breccia fragments present in sections. Odd section contains abundant small elongated amygdules.	Very stong ser and chl alt'n throughout. Ser also "speckling" the core in some sections.	NIL	1589-1591.5' Strongly carbonated dykelet. Possibly of andesitic nature Fracturing at 15-40°
1682.0-1692.0	Andesite Dyke	Dark Grey	Fine	Even	Massive. 0-3f/ft	Ser-carb filled fractures.	Tr diss py.	Fractures at 50° Top and bottom contacts chilled at 45°
1692.0-1742.0	Massive Rhyolite	Med Grey	Fine	Odd qtz eye present.	Massive. 0-2f/ft Odd amygdules scattered throughout.	Chl-ser alt'n around amygdules.	NIL	Fractures at 50°
					END OF HOLE			

D-282

LAKE DUFAULT MINES LTD.

Drill Hole Record

Hole No. D-282 Lat. 1800.07N Dep. 3357.29E Elev. 11,086.98 Dip -90° Bearing Depth 1669'

Working Place: Turcotte Lake

Date Started: Oct 4/70

Date Completed: Oct 25/70

Compass Tests

Depth	Dip	M.Brng.
700'	6°	S23°E
1100'	4°	S50°E

Acid Test

Depth	Read	Corr.
50'		90°
250'		87°
500'		84°
718'	WEDGE	81 1/2°

Acid Test

740'	83°
1000'	82°
1250'	77°
1500'	77°
1669'	77°

SAMPLED SECTIONS

From	To	C.L.	Cu	Zn	Au	Ag

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
0.0-10.0	Casing.							
10.0-51.0	Andesite breccia	Med grey	Fine	Even	Massive. 0-5f/ft. Brecciated in most sections. Angular to sub-angular fragments averaging 1/4-3/4" in dia.	Minor ser bleaching of the matrix. Ser-carb filled fractures.	Minor py-po diss and in blebs throughout.	Bottom contact sharp at 35°.
51.0-234.0	Andesite Flow	Med grey	Fine	Even. Uneven in some sections where rock in feldspar porphyritic.	Minor fracturing 2-10f/ft. Odd sections contain flow breccia. Flow banding and amygdules.	Minor ser bleaching and ser-carb filled fractures. Minor chl altn masking core in sections.	Tr to minor py-po in blebs, fractures and disseminated throughout. Tr cp here and there with minor cp in fractures from 109-111'.	Fractures at 30-40 and 60°. Bottom contact sharp at 30°.

Hole No. D-282

Logged by N.A.N.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
234.0-273.0	Fractured Andesite	Light greenish grey	Fine	Mostly even. Some sections are feldspar porphyritic.	Intensely fractured and sheared throughout. Over 25 f/ft.	Ser-carb-chl filled fractures. Mod carb bleaching in mod sections.	Tr cp, tr to minor py here and there in fractures and disseminated.	Fractures and shearing at 0 to 50° with preferred angle at 20°. Rock is almost completely obscure by shearing and fracturing.
273.0-404.0	Fractured And Sheared Acid Dyke	Light grey	Fine	Qtz and feldspar phenocrysts present.	Intensely sheared and fractured throughout.	Ser-carb-chl filled fractures.	Tr fracture filling and disseminated py-cp.	Fracturing and shearing at all angles but preferred direction around 45°. Top contact sharp at 50° Bottom ct sharp at 70°.
404.0-422.0	Lamp Dyke	Earthy grey 40-50% carbonate	Fine to med	Porphyritic samll biotite phenocrysts present.	Minor fracturing 3-8f/ft.	40-50% carb throughput.	Nil	Top and bottom contacts sharp at 70 and 45° respectively. Fractures at 30 and 70°.
422.0-544.0	Sheared And Fractured Andesite	Dark grey	Fine	Even	Intensely sheared and fractured throughout.	Strong chl throughout.	Tr diss py.	Prefered angle of shearing and fracturing at 35-45° but in all directions as well.

Hole No. D282

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
544.0-565.5	Bleached Andesite Dyke	Light grey green	Fine	Even	Strongly sheared and fractured throughout 25/ft.	Strong carbonate bleaching throughout. Carb filled fractures.	Tr py in tiny cubes.	Fractures at 0 and 30-50°. Top and bottom contacts chilled at 30 and 45° respectively.
565.5-606.0	Sheared And Fractured Andesite	As above.						
606.0-611.5	Bleached Andesite Dyke	Greenish grey	Fine	Even	Mod fractured 15 f/ft.	Strong carb bleaching	Nil	Fractures at 50°, both cts chilled at 40-45°.
611.5-643.5	Andesite Flow	Dark grey green	Fine	Even	Mod fractured 15f/ft. Odd amygdule present. Frothing and churning present in sections.	Minor ser bleaching. Chl present in vague patches.	Tr py-cp in fractures and amygdules.	Fractures at 30 and 50°. Bottom contact graddational over 1". Sample CZAA 639-643.5'.
643.5-649.5	Siliceous? Tuff? Breccia	Light grey black fragments	Very fine	Even	Brecciated throughout. Angular chloritic fragments in a very fine grained siliceous altered matrix.	Strong ser altn of matrix.	Tr cp diss.	Bottom contact sharp at 45°. Because of strong altn rock cannot be definitely distinguished as being siliceous throughout although there are siliceous sections which have a cherty appearance. Sample Geochem. 643.5-649.5'.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
649.5-667.5	Andesite Flow	Dark grey	Fine	Even	Minor fracturing 5-10 f/ft. Odd amygdules present.	Mod chl altn present. Carb-qtz filled fractures.	Virtually nil	Sample CZAA 649.5-654' Fractures at 30-50°. Bottom contact sharp at 50°.
667.5-806.5	Altered rhyolite	Light grey	Fine	Even	Minor fracturing 3-12f/ft.	Strong chl or ser altn present in patches and throughout. Carb-qtz-chl filled fractures.	Tr cp diss and fracture filling.	Fractures at 45 and 60°. Of moderate hardness only recognizable as a rhyolite because of scattered quartz eyes and short hard unaltered sections.
806.5-838.0	Massive rhyolite	Med grey	Fine	Weakly to moderately porphyritic.	Massive. 1-2f/ft.	Sericite in sections	About 1% diss py.	Vague discontinuous banding (flow banding?) fractures at 30,50, 90° Porphyritic section near top may be a dyke.
838.0-894.5	Altered rhyolite	As above	between 667.5-806.5'				Tr diss'd py.	A few possible amygdules.
894.5-861.0	Massive rhyolite	Med grey	Fine	Even	Scattered chlorite amygdules. Flow banding	Minor chlorite.	Tr diss'd py.	Contact grdational over 1'.
861.0-945.0	Altered rhyolite	Med grey	Fine to med	Even	Numerous chlorite amygdules.	Moderate to strong sericite? and minor chlorite from 861-923'. Med grained	Tr diss'd py.	Vitrious luster similar to unaltered rhyolite but relatively soft. Lower contact poorly defined. A

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
						and apparently recrystallized from 923-945'.		few thin quartz stringers.
945.0q 955.0	Altered Massive Andesite? Flow or Dyke	Dull grey green	Fine	Even	Massive.	Mod chlorite.	Tr diss'd py.	Contacts gradational. This unit may be an intensely altered rhyolite.
955.0- 961.0	Altered Rhyolite	As above.						
961.0- 971.0	Altered Massive Andesite? Flow or Dyke	As above between 945 and 955'.						
971.0- 995.0	Altered Rhyolite		Med fine	As above.			Tr diss'd py. 982-984' cp diss'n and blebs in quartz veins at 30o to core. BST. 2% Cu	Contacts gradational. Sample CZAA 981-982' 982-984' 984-985'

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
995.0-1012.0	Massive Rhyolite	Med grey	Fine	Even	Massive. 5-10 f/ft carb filled.	Hard, only slightly altered.	Tr py.	
1012.0-1033.0	Porphyritic Rhyolite	Med grey	Fine matrix	20-30% feldspar phenocrysts.	Massive.	Nil	Tr py diss'n and stringers.	Contacts gradational.
1033.0-1042.0	Rhyolite breccia or Fragmental Tuff	Finely mottled light and dark grey	Fine	Even	Rounded light grey fragments 3-5mm in diameter in dark grey matrix. Few fractures.	Nil	Tr py.	2' massive section at bottom.
1042.0-1043.5	Sheared Bedded Tuff?	Med grey	Fine		Beds? a few mm thick. Numerous parallel shear planes.	Nil	Nil	Contacts abrupt.
1043.5-1072.0	Massive Rhyolite	"	"	Porphyritic sections.	Massive. A few irregular amygdules near bottom.	Mostly hard and unaltered, sections soft with sericite A few blotches of chlorite.	Tr diss'd py.	Lower contact gradational.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1072.0-1096.5	Amygdu-loidal Porphy-ritic rhyolite	Med grey	Fine	20% anhedral feldspar	Massive. Elongate quartz filled amygdules.	Hard and only slightly altered.	Tr diss'd py.	
1096.5-1123.0	Massive rhyolite		As above.			Hard only slightly altered.	Tr diss'd py.	
1123.0-1135.0	Porphy-ritic rhyolite	As above.			Isolated amygdules.	Hard and unaltered.	Tr py in stringers.	
1135.0-1154.0	Amygdu-loidal Andesite And Andesite Breccia	dull grey green	Fine	Even	Chlorite filled amygdules.	Strong silicification in breccia matrix. Minor chlorite. Minor sauss.	1-2% diss'd py.	Contacts abrupt at 70°.
1154.0-1247.5	Amygdu-loidal to Massive rhyolite (Dacite)	Med grey	Fine to very fine	Even	Amygdules in upper half, massive towards bottom.	Blotches of blue-green chloritized at 1190'.	Tr py diss'd. and in amygds. Tr cp here and there in amygdules. Blebs cp in qtz vein at 1166'.	Porphyritic section 1154-1160'. Amygdules filled with chlorite, quartz, pyrite. Grades to dacitic composition in places. Bedded acid tuff sections 1169-1172'(tuff?) 1236.4-1237.5' rhyolite from 1137.5 to 1247.5 has finely mottled

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
								(brecciated?) appearance and may be a pyroclastic rock.
1247.5-1263.0	Diorite Dyke	Dark grey	Med	Even Ophitic	Massive.	Nil	Tr diss'd ppy.	Chilled and slightly bleached contacts at 45°.
1263.0-1303.0	Massive Rhyolite And Rhyolite Breccia	Med grey	Fine		Most is finely mottled or brecciated grading downward to a 'fish roe') texture.	Nil	Tr py.	1263-1296': massive rhyolite to rhyolite bx. 1296-1302': fish-roe' rhyolite or fine agglomerate lower contact gradational. 1302-1303': bedded siliceous tuff.
1303.0-1351.0	Massive Porphyritic Rhyolite Or Trachyte Flow or Dyke	Med grey	Fine	10-20% anhedral feldspar phenocrysts.	Massive.	6" thick calcite vein at 1304'.	Tr diss'd py.	Of only moderate hardness No quartz phenocrysts. Vitreous lustre, typical of rhyolite.
1351.0-1460.0	Massive Rhyolite Or Trachyte Flow or Dyke	Med light grey	Fine	Slightly porphyritic in sections feldspar phenos.	Massive. 2-3 ft.	Only slightly	Tr diss'd py.	Fractures at 10, 70°. Contacts gradational over a few inches.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1460.0-1464.0	Altered rhyolite? or Dacite	Med grey	Fine	Even	Massive.	Strong sericite(?) or chlorite.		A relatively soft rock, but with lustre and colour of a rhyolite.
1464.0-1474.5	Andesite Breccia	Dull grey	Fine		A breccia with dark grey angular fragments from 2mm to 1cm in diameter in light grey matrix of similar composition.	Chlorite especially in fragments.		Top contact marked by thinly banded section either a tuff or flow banded base of overlying flow.
1474.5-1566.0	Massive Altered rhyolite or Dacite	Med grey	Fine	Even Porphyritic variable distribution of quartz eyes 1mm or less in diameter.	Most is massive. Altered bx zone at 1493-1496'.	Strong ser and chlorite patches at 1495'	Tr diss'd py Minor po with tr cp diss'd from 1502-1514'. Tr cp diss'd here and there throughout.	A uniform massive rock, of only moderate hardness, but with a vitruous lustre typical of rhyolites. No definite flow features. Samples Cu, Zn, Ag, Au, 1501-1504' 1504-1507' 1507-1510' 1510-1514'.
1566.0-1669.0	Altered Dacite	Med grey	Appears m.g. on cut surface but fine on broken surface.	Weakly pporphyritic scattered feldspar laths.	Massive. Possible amygdules and flow bands here and there.	Appears to be completely recrystallized.	Tr py diss'd, tr po here and there in stringers. Tr sph, cp at 1665' in calcite stringer.	Lustre similar to rhyolite, Med hardness. @ 4" calcite vein at 1665.5'.

Hole No. D-282

END OF HOLE

D-283

LAKE DUFAULT MINES LTD.

Drill Hole Record

Hole No. D-283 | Lat. 340.23S | Dep. 12071.72 | Elev. 11051.29 | Dip 90° | Bearing --- | Depth 3306

Working Place: South Dupresnoy

Date Started: Oct 9-70

Date Completed: Nov 19-70

Compass Tests

Depth	Dip	M.Bmg.
2000	5°	N-77-W
3000	4°	N-62-W

Acid Test

Depth	Read	Corr.	
50'		90°	1250-85
250'		90°	1500-85
500'		88°	1750-84
750'		88°	2000-87
1000'		87°	2159-85

SAMPLED SECTIONS

DEPTH	To	Cu	FOOTAGE	NORTHING	EASTING
2250		84	0	-340.23	12071.72
2500		84	1125	-333.24	12061.91
2646		84	2500	-305.79	11922.65
2750		87	3306	-267.05	11849.81
3000		83			
3306		83			

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
0.0-102.5	Diabasic Diorite	Dark Grey	Med Fine	Abundant lath shape feldspar phano-crysts throughout. Diabasic texture.	Massive. 0f/ft.	NIL	NIL	Bottom contact sharp at 50° Rock it has all the characteristics of a diabase but because of its location on Diorite sil it is being called diabasic. diorite.
102.5-155.5	Amygdu-loidal Andesite	Med Grey Green	Fine	Even	Massive.0-3f/ft Abundant amygdules present.	Minor ser and chl alt'n present. Biotite alt'n masking core in sections.	Tr diss cp-py.	Fractures at 70°. Odd small section of intermediate tuff present.

Hole No. D-283

Logged by R.N.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
155.5-240.0	Porphyritic Acid Dyke	Med Grey	Fine	Porphyritic Scattered feldspar phenocrysts throughout.	Minor fracturing. 5-10f/ft.	Ser filled fr'ts.	Tr cp in odd fracture.	Fractures at 20 and 50° Top and bottom contacts sharp at approx. 45°
240.0-329.0	Silicious Andesite	Dark Grey	Fine	Even. Odd feldspar phenocrysts present.	Minor fracturing. 5-10f/ft. Odd amygdule present. Minor frothing and churning present in some sections.	Mod sauss in pods. Silicified throughout. Ser filled fr'ts.	Tr py in blebs.	Fractures at 70 and 40°
329.0-346.5	Diorite Dyke	Med Grey	Med Fine	Diorite	Minor fracturing. 5-10f/ft.	Minor sauss. Ser-carb filled fractures.	NIL	Fractures at 70° Top and bottom contacts sharp at 60°
346.5-415.0	Silicious Andesite flow.	As above.						Odd short section of intermediate bedded tuff present. Bottom ct arbitrary.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
415.0-563.0	Porphyritic Andesite	Med Grey Green	Fine	Porphyritic Abundant feldspar phenocrysts present.	Minor fracturing 3-8f/ft Odd amygdule present. Odd section of brecciation and frothing.	Mod sauss in pods. Ser-carb filled fractures. Rock is slightly silicified in sections.	Tr diss py.	Fractures at 70-90° 455-460.5 Bedded intermediate tuff at 40° Bottom contact sharp at 60°
563.0-621.0	Andesite Flow	Med Grey	Fine	Odd feldspar phenocrysts	Minor fracturing. 3-10f/ft. Odd amygdale present. Minor flow banding. in sections.	Minor sauss.	Tr py, cp in belbs.	Fractures at 25 and 70° Flow banding at 50°
621.0-645.0	Micro Diorite Dyke	Med Grey	Med Fine	Dioritic	Minor fracturing. 3-8f/ft Sheared in sections.	Ser-carb filled fractures.	NIL	Top and bottom contact sharp at 50-60° Fractures at 45 and 70° 635-640
645.0-778.5	Andesite Flow	As above.			Mod fractured. 10-20f/ft.			

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
778.5-805.0	Massive Micro-Diorite Dyke	Light Grey	Fine	Dioritic	Massive. Fracturing weak to moderate, locally strong 1-20f/ft. Featureless.	Quartz-carbonate in fractures, with some chlorite.	Trace cp in fractures.	Fractures at 70-75,45-50,15,5° to parallel to core axis. Upper limit abrupt, contact not discerned. Lower limit arbitrary, material grading into underlying andesite.
805.0-984.0	Massive Andesite (?)Dyke	Grey	Fine	Even to weakly dioritic at top of unit.	Massive.Fracturing moderate, locally weak, locally strong, 2-40f/ft. Featureless save for one section of brecciated material at 884-889.	Quartz-carbonate and sericite in fractures. Occasional saussurite/ epidote pods up to 15".	Trace py cp in fractures.	Fractures at 60-70,50,15-25,5° to parallel to core axis. Lower limit abrupt, contact not discerned.
984.0-1043.5	Massive Amygdu-loidal Andesite	Grey	Fine	Even.	Massive.Fracturing weak to moderate, locally strong, 2-20f/ft. Amygdules varying from locally dense to sparse,fairly well developed, up to 8mm. Occasional patches of flow breccia and some very weak flow banding.	Quartz-carbonate and sericite in fractures.Silica and chlorite filled amygdules. Occasional saussurite-epidote pods up to 10". Local weak ~~hintnk~~ biotite alteration.	Trace py associated with saussurite-epidote alteration. Trace cp in amygdules.	Fractures at 65-70,50,35-40, 15-20, 5° to parallel to core axis.

Hole No. D-283

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1043.5-1180.0	Fractured Q.F.P. Dyke	Light Grey to Grey	Fine	Uneven Sericitised feldspar phenocrysts up to 4mm, varying from abundant to locally poor. Well developed quartz "eyes" up to 5mm, dense in spots.	Fracturing moderate to strong, locally intense, locally weak, 2f/ft. Some possible rare(?)fragments, otherwise featureless. heterogeneous.	Quartz-carbonate chlorite, sericite and epidote in fractures. Locally bleached.	Trace cp in fractures.	Fractures at 80,45-55,10° to parallel to core axis, and irregular. Well defined@ approx. 25° upper contact. Section with well developed phenocrysts terminated by distinct 25° contact at 1065 and underlain by section with poorly developed phenocrysts. Inclusion or intrusion of dacitic material at 1086-1093 overlain by 18" 20° shear zone. Bleached section at 1110-1130 Section with well developed phenocryst 1133-1146 Chloritic 80° shear zone ((?) may represent sheared altered lamprophyse) at 1152-1153.5 Indistinct lower contact.
1180.0-1284.0	Massive Andesite Dlow	Grey	Fine	Even to weakly dioritic in places.	Massive. Fracturing weak to moderate, locally strong, 2-20f/ft. A few scattered weak amygdules apparent.	Locally weakly dioritised. Quartz-carbonate, chlorite and sericite in fractures.	Trace py cp in fractures.	Fractures at 70,55-60,30, 5-15°

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1284.0-1314.0	Fault Zone Creek Fault	Light Greyish to Grey	Fine	Even.	Fracturing strong to intense, 20f/ft. Locally strongly sheared. Some fault gauge evident in places.	Quartz-carbonate in fractures. Bleached. Local weak carbonate alteration.	Trace py in fractures.	Fractures at 80,60-65,45,15-20° and irregular. Shearing at 60° and irregular.
1314.0-1348.5	Fractured (?)Silicified (?)Amygdaloidal (?)Andesite	Grey	Fine	Even	Fracturing moderate to strong, locally weak, 5-20f/ft. (?)Amygdules abundant up to 8mm.	Possible(?) silicification. Silica in (?) amygdules. Quartz-carbonate in fractures.	Trace py disseminated and in fractures.	Fractures at 80,70,50-60, 20,5° and irregular. Fractured rhyolite quartz feldspar porphyry dyke with indistinct upper contact and sharp approx 25° lower contact at 1340-1348 Unit may be (?) altered rhyolite quartz feldspar porphyry.
1348.5-1412.0	Fractured Andesite Flow	Grey	Fine	Even.	Fracturing moderate to strong, locally weak, 7-20f/ft. Rare weak amygdules and narrow patches of flow breccia.	Quartz-carbonate and sericite in fractures. Some weak "grid" alteration.	Trace py disseminated and in fractures.	Fractures at 70-80,55, 20-30, 5-10° Material in rather acid.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1412.0-1434.0	Massive Dacite Feldspar Porphyry Dyke	Grey	Fine	Uneven, moderate development of sericitised feldspar phenocrysts up to 2mm.	Massive. Fracturing weak to moderate, locally strong 4-20f/ft. Featureless.	Quartz-carbonate in fractures.	NIL	Fractures at 55-60, 35, 15°. Upper contact poor, 75°. Lower contact not discerned.
1434.0-1496.0	Massive Andesite Flow	Grey	Fine	Even.	Massive. Fracturing weak to moderate, locally strong, 1-25f/ft. A few scattered weak amygdules apparent. Local weak developement of flow breccia.	Quartz-carbonate and sericite in fractures. Chlorite in amygdules and interstitially in occasional patch of breccia.	Trace py in fractures and amygdules Trace, locally minor py interstitially in occasional patch of breccia.	Fractures at 70, 40-50, 15-25° and irregular. Grey dacitic feldspar porphyry dyke similar to unit described above with some (?) inclusions of andesite and irregular approx. 35° upper contact, obscured lower contact at 1443-1456 Slight fracture zone 1455-1457
1496.0-1516.0	Acid Dyke	Light Grey	Fine	Even	Minor fracturing. 5-10f/ft.	Minor sauss near top of unit.	NIL	Fractures at 25-40° Contacts chilled at 80°
1516.0-1565.5	Massive Andesite Flow	As above.						

Hole No. D-283

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1565.5-1606.5	Acid Dyke	Blue Grey	Fine	Even	Minor fracturing. 5-15f/ft.	Grid alt'n fairly strong throughout. Weak ser bleaching Minor chl speckles present.	Tr diss py.	Fractures at 30 and 70° Top and bottom contacts sharp at 40-45°
1606.5-1883.0	Porphyritic Andesite	Dark Grey	Fine	Porphyritic Minor small feldspar pheno-crysts present.	Minor fracturing. 2-8f/ft. Moderately amygduloidal after 1806.	Ser filled fractures and minor sauss.	Minor cp in odd short section here and there.	Fractures at 70 and 45°
1883.0-1930.0	Acid Dyke	Blue Grey	Fine	Even	Massive.	NIL	NIL	Contacts sharp at approx 60°
1930.0-2243.0	Porphyritic Andesite	Med Grey	Fine	Porphyritic feldspar pheno-crysts present throughout.	Minor fracturing. 5-10f/ft. Minor amygdules present throughout.	Ser-carb filled fractures. Minor sauss.	Tr cp-py in odd fracture and blebs.	2069.5-2071 2076-2076.5 Lamp dykelets with sharp contacts. Bottom at masked by flow top breccia, with minor py-cp over two inches.
2243.0-2307.0	Pillowed Andesite?	Med grey	Fine	Even. Odd feldspar phenos present throughout.	Massive. 0-10f/ft. Flow breccia here and there. Vague pillow borders?	Minor sauss.	Tr py around breccia zones.	Fractures at 25 and 45°. Bottom ct sharp at 80°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2307.0+ 2453.0	Porphyritic Amygduloidal Andesite	Med Grey	Fine	Porphyritic feldspar phenocrysts up to 8mm scattered throughout.	Massive. 0-5f/ft Frothing and churning and flow breccia here, and there. Odd faint pillow ∮border and traces of flow banding present. Strongly amygduloidal throughout.	Minor sauss epp around breccia zone.	Minor py tr cp in blebs assoc with breccia zone.	Flow ~~banding~~ banding at 45-70° 2435-2439 Carbonated lamp dyke with biotite phenocrysts. Contacts sharp at 30 and 45° resepect. 3753-3753.5 Lamp dykelet 2753.5-2754.5 Acid dykelet.
2453.0+ 2498.0	Acid Dyke	Blue Grey	Fine	Slightly feldspar porphyritic.	Massive.	-------	Tr cp-py in blebs.	Top ct sharp at 45°. Bottom ct sharp at 25°
2498.0+ 2530.0	Massive Andesite	Med Grey Green	Fine	Even. Odd feldspar pheno present.	Massive. Odd fracture.	Ser bleaching.	Tr py diss and in blebs.	Bottom ct arbitary.
2530.0+ 2610.0	Pillowed Andesite	Grey	Fine	Even	Massive. Fracturing very weak to weak, 0-5f/ft. Weak, infrequent pillow borders. A few poorly developed amygdules apparent. Local weak flow breccia.	Quartz-carbonate and epidote-sericite in fractures. Epidote-sericite filled amygdules.	Trace py disseminated and in amygdules.	Fractures at 50-60, 40°

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2610.0-2693.5	Massive Amygdu-loidal Flow Banded Andesite	Grey	Fine	Even.	Massive.Fracturing moderate,locally weak,locally strong, 1-35f/ft. Sparse amygdules, moderately well developed, up to 1cm. Flow banding very weak, absent in parts. Local weak development of flow breccia.	Quartz-carbonate sericite-epidote and chlorite in fractures. Sericite epidote,chlorite and ~~pale~~ silica filled amygdules. Some very weak biotite alteration evident at base of unit.	Trace py in flow breccia.	Fractures at 60-65,25-35°
2693.5-2736.0	Acid Dyke	Grey	Fine	Even	Massive.Fracturing moderate,locally weak,locally strong, 5-20f/ft. Featureless.	Silica and chlorite filled fractures.	NIL	Fractures at 70-80,30-40,15°. Upper contact marked by 4 in. 55-60° shear. Lower contact fractured.
2736.0-2800.5	Andesite Flow	Grey	Fine	Even	Fracturing moderate to strong,locally intense,locally weak. 5f/ft. A few scattered amygdules and local very weak flow banding apparent.	Quartz-carbonate, chlorite, and epidote-sericite in fractures.	Trace disseminated py and rarely , cp. Trace po,py in fractures.	Fractures at 75-80,50,25-35, 10-15°. Massive lamprophyre dyke with abundant biotite phenocrysts up to 3mm and indistinct upper, fractured lower contacts 2764.5-2766.5 Slight fracture zone 2766-.5-2767.5 Small(?)mi crodiorite dykes at 2767.5-2768.5 2769.5-2770.5

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2800.5-2808.0	Tuff Band	Greyish	Fine	Cherty to even.	Fracturing moderate, locally weak, 5-15f/ft Structure variable.	Sericite and quartz in fractures.	Trace disseminated py po in fragmental and massive tuff. Trace, locally minor po with trace py in bedded tuff. Trace disseminated po and trace py po sph in fractures in basic(?) tuff.	Fractures at 75-80, 65, 35-45, 5° Unit comprised: with small (generally less than 2mm.) fairly well defined fragments and undefined upper contact at 2800.5-2802.2 Cherty, finely bedded tuff. 2802.2-2802.6 Massive cherty tuff 2802.6-2803.4 Possible(?) basic tuff (rare possible weak(?) amygdules suggest may be andesitic flow) with sharp, rather irregular approx. 70° contacts at 2803.4-2806.9 Massive cherty tuff with undefined lower contact at 2806.9-2808.0
2808.0-2820.0	Dacitic Flow Breccia	Greyish	Fine	Even.	Fracturing weak to moderate 2-13f/ft Some "frothing and churning and fragments apparent. Locally weakly flow banded. Occasional amygdules.	Quartz and carbonate in fractures.	Trace py in fractures. Local minor interstitial Po	Fractures at 45-55, 25° Sections of dacite-(?)tuff breccia with well defined angular fragments in(?) tuff matrix at 2815.3-2816.0 2819.0-2820.0

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2820.0-2830.3	Flow Banded Amygdu-loidal Dacite	Greyish	Fine	Even.	Fracturing moderate, locally weak, locally strong, 5-20f/ft Fine flow banding apparent. Sparse fairly well defined amygdules up to 4mm.	Quartz-carbonate and chlorite in fractures. Silica and chlorite filled amygdules.	Trace disseminated PY.	Fractures at 55-65, 20-25, 5°
2830.3-2884.0	Acid dyke	Grey	Fine	Even.	Massive. Fracturing weak, locally very weak or moderate 0-15f/ft. Featureless.	Quartz-carbonate and sericite in fractures.	Trace cp and py in fractures.	Fractures at 60-65, 45, 25° Upper contact sharp, rather irregular, approx 50° Lower contact not observed.
2884.0-2906.5	Dacite Flow	Grey	Fine	Even.	Fracturing very weak to weak, locally moderate, 0-10f/ft. A few amygdules up to 1cm evident. Some weak flow banding and fragments apparent.	Chlorite and silica in amygdules. Quartz-carbonate in fractures.	Trace py in amygdules and interstitially.	Fractures at 75, 55-60, 40°. Material is generally dacitic with section of rhyolitic banded material at 2889.5-2892.0

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2906.5-2945.0	Amygdu-loidal Dacite Flow Breccia	Greyish rather mottled appearance	Fine	Even.	Fracturing weak, 1-5f/ft Amygdules moderately abundant to locally absent, well developed, up to 2cm. Fragments generally angular, rarely rounded suggesting lapilli. Local flow banding.	Quartz-carbonate fractures. Silica-filled amygdules.	Trace po disseminated and in amygdules.	Fractures at 50-60,40,20°
2945.0-3053.0	Dacite Flow	Grey	Fine	Even	Fracturing very weak to weak, locally moderate, locally strong. 0-20f/ft. Moderately amygduloidal here and there Flow banding at odd flow bottom and here and there.	Quartz-carbonate and sericite in fractures.	Trace py in fractures, diss. and in blebs.	Fractures at 90,80,50-60, 30-40,20° Speckled appearance of material may be result of alteration. Bottom contact obscure due to the similarity of the two materials.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3053.0-3090.5	Massive acid dyke	Bluish Grey	Fine	Even	Very massive.	NIL	NIL	Top contact obscure. Bottom contact sharp at 45° Slight "flow" banding preseth within 2' of top and bottom contacts.
3090.5-3106.0	Rhyo-Dacite	Light Grey Very light brown in places	Fine	Even	Massive. 0-4f/ft Odd amygdule.	Weak speckled appearance here and there as in section of dacite above. light brown colouration here and there may be biotite altn.	Minor dissemination and blebs of py.	Bottom ct sharp and irregular at 45°
3106.0-3151.0	Q.F.P. (Breccia)	Speckled White with blue grey-light brownish grey matrix.	Fine	Very porphyritic 60-70% feldspar and qtz phenocrysts up to 5mm.	Weak fracturing. 0-6f/ft Odd rhyolitic fragment up to 2 inches here and there.	Light brown appearance here and there. Probably biotite alt'n.	Tr py in fractures and diss.	Fractures at 80 and 30° Bottom ct sharp at 40° Sample CZAA 3148-3151
3151.0-3155.5	Bedded and Brecciated Tuff	Light to Med Light Grey	Fine to aphanitic	Even.	Bedded and with brecciated remnants of beds. Some small amygdule like structures present.	Minor chl in matrix.	Minor bleb, fracture filling and diss py. Est 2% py.	Sample Geochem 3151-3153.5 3153.3-3155.5

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3155.5-3159.5	Bedded Tuff	Light Grey and Brownish Yellow	Aphanitic	Even.	Bedded.	NIL	Mod py in beds. Bst 8-10% py No other sulphides visible.	Sample Geochem 3155.5-3157.5 3157.5-3159.5 Bedding at 30-55°
3159.5-3184.0	Rhyolite Breccia	Light to Med Grey	Fine	Even	Massive. 0-4f/ft Minor brecciation in most sections. Abundant small elongated amygdules present in numerous short sections.	Strong chl in matrix in most places. Weak biotite in matrix here and there.	Mod py in first 3' of unit. Otherwise trace to minor py in blebs and amygdules.	Fractures at 70 and 35° Sample CZAA 3159.5-3162.5 Bottom ct arbitrary. Gradation between brecciated and massive rhyolite.
3184.0-3242.0	Massive Rhyolite	Bluish Grey	Fine	Even. Odd small qtz and feldspar pheno-crysts.	Massive. 0-3f/ft Odd breccia fragment.	NIL	Tr py in small blebs and diss.	Bottom ct sharp at 45°
3242.0-3301.0	Massive Q.F.P. Dyke(?)	Speckled blue and white in a blue grey matrix.	Fine	Very porph lamp qtz and feldspar phenocrysts up to 3/4cm. 45-65% phenocrysts.	Massive. 0-2f/ft	Strong chl altn within 2 feet of contacts. Ser-qtz fractures. Weak chl in patches throughout.	Very weak trace py diss.	Contacts chilled sharp at 40°

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3301.0-3306.0	Massive Rhyolite	Light Grey	Fine	Even	Massiv e. Odd bx fragments.	Minor ser weak chl in specks.	NIL	
					END OF HOLE			

D-286

LAKE DUFAULT MINES LTD.

Drill Hole Record

Hole No. D-286 Lat. 262.12 Dep. 2506.93 Elev. 11,094.41 Dip -90° Bearing Depth 1277'

Working Place: Beaver Meadow Area

Date Started: Nov 23/70

Date Completed: Dec 2/70

Compass Tests

Depth	Dip	M.Bmg.
505'	89°	S52°E
1000'	88°	N89°W

Acid Test

Depth	Read	Corr.
33'	89	89°
250'	89	89
500'	89	89°
750'	89	89°
1277'	87	86°

SAMPLED SECTIONS

From	To	C.L.	Cu	Zn	Au	Ag

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
0.0-5.0	Casing.							
5.0-85.5	Flow Banded Andesite	Dark Blue green to grey	Fine	Even	Flow banded sections throughout, with short massive sections. 5-10°/ft.	Moderate to intense carb'n below 62'.	Tr py in quartz veins.	Lower ct abrupt and marked by carb vein at 60°. 1/2" vuggy gossen at 83'.
85.5-176.0	Porphyritic Andesite	Med grey	Fine matrix phenos to 4mm.	30% anhedral feldspar phenos.	Massive. Well pillowed and flow banded below 164'. Amygdules from middle downward.	Minor sauss, esp. in amygdules.	tr-1% diss'd py.	Lower contact abrupt and irregular.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
176.0-222.0	Massive Altered Andesite	Dark green blue green	Fine		Massive.	Soft and chloritized throughout. Blotchs of blue-grey chlorite.	Tr diss'd py & cp at 215'.	Lower ct at 15°. Flow banded.
222.0-254.0	Porphyritic Andesite	As above.			Flow bands here and there.	Nil	Nil	Lower ct obscure.
254.0-271.0	Massive to Flow Banded Andesite	As above.					Scattered grained of py.	Lower ct at 30°.
271.0-287.5	Andesite Breccia	Light grey matrix	Fine		Angular to rounded fragments of andesite.	Matrix intensely silicified.	Tr diss'd py.	Probably an altered flow breccia. Lower ct at
287.5-358.0	Flow Banded Andesite	As above.			Flow bands every 1/2" to 6". Scattered amygdules.	Soft-chloritised.	Tr py.	Flow banding at 45°. Gradational lower ct.
358.0-397.0	Bleached Andesite	Med light grey	Fine med	Even to slightly porph?	Massive. Isolated amygdules with sauss. Flow banding?	Moderate bleaching.	Tr diss'd py.	Lower contact abrupt and irregular at 50°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
397.0-488.0	Andesite Flows	Dark green	Fine	Even	Pillowed at top, flow banded top and bottom. Sparse amygdules 2-5f/ft.	A few sauss pods.	Tr py bleb fine py at 433'.	Lamp dyke at 438-443'.
488.0-652.0	Amygdu-loidal to massive Andesite	Med dark green	Fine	Even	Scoraceous top sparse amygdules.	Top silicified. Minor sauss.	Minor conc'n diss'd py at top. A few blebs of cp in qtz parallel a to core at 618'.	
652.0-667.0	Q.P. Dyke	Med grey	Fine matrix	30% large clear qtz eyes.	Massive.	Top 8 feet intensely chloritised and recognizable only because of quartz eyes.	Tr py.	Lower ct sheared at 45°.
667.0-729.0	Massive Andesite	Med dark grey	Fine med	Speckled with small altered feldspar pheno	Massive. Small chlorite filled amygdules at 705'	Minor fine chlorite here and there.	Tr diss'd py.	667-675': med grained and dyke like. Lower ct gradational over 1 ft.
729.0-949.5	Massive Dacite Andesite	Med grey	Med grained	Even. Appears myrmekitic	Very massive. Possible amygdules at 767'.	Recrystallized? throughout. Minor sauss.	Tr diss'd py. Tr cp at 1765'.	Med to hard, some quartz present. No diagnostic flow features. A distinctive speckled appearance due to

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
								to small dark amphiboles(?) Becomes gradually finer grained in bottom 10' (chilled?).
949.5-957.5	Bedded And Massive Tuff	Med light grey	Fine		Most beds 1mm or less thick.	Sericite(?) speckling and selectively in beds.	10% pyrite in top 3", elsewhere 1%.	Massive tuff section 949.5-951.5'. Cherty throughout. Bedding at 15°. Cts abrupt.
957.5-965.5	Massive Dacite or Massive Tuff	Med light grey	Fine		Finely fragmental. Some fragments selectively chloritised.		Tr py.	Lower ct abrupt at 45°.
965.5-1008.0	Amygduloidal to Massive Dacite	Med grey	Fine	Even	Massive. Amygduloidal sections and some flow breccia above 1010'. Amygdules elongated 5f/ft.	Minor chlorite.	Tr disseminated py.	Calcite filled fractures at 50, 300. Med to hard.
1008.0-1128.0	Altered Massive Dacite Andesite	Med grey to green	Fine	Even	5 f/ft.	Chlorite blotches and intense chlorite alteration of matrix in sections. Some chlorite spotting.	Tr py.	Cts gradational. Medium to hard. Dull to vitreous lustre.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1128.0-1197.5	Altered Rhyolite Breccia or Dacite)	Med grey	Fine not aphanitic	Even	About 50% angular fragments from a few mm to a few cm in diameter. Some massive section.	Intense chlorite spotting in most places spotting appears too be selective. Chlorite of fragments. Local biotite?	Tr diss'd py.	Fragments rimmed . Matrix very siliceous in places and difficult to tell in which fragments are altered or dacite with silicifed matrix. Med to hard rock.
1197.5-1206.0	Porphyritic Rhyolite Flow or Dyke	Med grey	Aphan. matrix	15% white euhedral feldspar phenos.	Flow banding well developed at top and bottom.	Nil	Tr diss'd py.	A hard unaltered rock with concoidal fracture contrasts with bx above and below.
1206.0-1226.0	Altered Rhyolite Breccia or (Dacite)	Identical to section from 1197.5-1206'.						
1226.0-1277.0	Altered Massive Dacite or Altered Rhyolite	Med grey	Fine not aphanitic	Even	Massive.	Scattered rounded chlorite spots or possible amygdules.	Tr diss'd py.	Med hardness.
				END OF HOLE 1277'				

D-306

LAKE DUFAULT MINES LTD.

Drill Hole Record

Hole No. D-306 Lct. -051.42 Dep. 12,739.97 Elev. 11,076.28 Dip -90° Bearing Depth 3525'

Working Place: South Dupresnoy

Date Started: 18/5/71

Date Completed: 22/6/71

Compass Tests

Depth	Dip	M.Brng.
750'	88°	25[illegible]°
1500'	87°	276°
2000'	87°	309°
2500'	87°	295°
3480'	86°	286°

Acid Test

Depth	Read	Corr.

SAMPLED SECTIONS

From	To	C.L.	Cu	Zn	Au	Ag

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks

Acid Dip Tests

Depth	Corr
250'	90°
500'	89°
750'	89°
1000'	89°
1248'	88° (W)
1290'	89°
1500'	87°
1625'	84° (W)
1680'	89°
1750'	87.5°
1822'	87° (W)
2000'	88°
2250'	88°
2500'	87°
2750'	86°
3000'	88.5°
3250'	86°
3520'	87°

Footage	Northing	Easting
1125'	-45.9	12728.1
1750'	-42.7	12697.5
2250'	-30.1	12681.9
2990'	-13.2	12645.8
3525'	-.46	12615.7

0.0-12.0	Casing.							
12.0-361.0	Diorite	Med speckled grey	Med	Dioritic	Massive. 0-5f/ft.	Weathered fractures near top of unit.	Nil	

Hole No. D-306

Logged by R.A.N.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
361.0-412.0	Coarse Grained Quartz Diorite	Dark with light feldspars	Coarse	Dioritic	Massive. 0-5f/ft.	Sauss here and there in patches	Tr diss py	Bottom ct abrupt.
412.0-1170.0	Massive Diorite	Med grey speckled	Med	Dioritic	Massive to minor fracturing. 2-10 f/ft.	Ser-carb in fractures.	Nil	Fractures at 45°. Bottom ct fine grained and chilled at 45°.
1170.0-1246.0	Fractured Andesite	Med grey	Fine	Even	Mod fracturing. 10-15f/ft.	Ser-carb-sauss in fractures.	Nil	Fractures at 60° and random angles. Bottom ct sharp.
1246.0-1255.0	Fractured Acid Dyke	Med grey to reddish brown	Fine	Porphyritic. Odd qtz and feldspar phenocrysts.	Intensely fractured. 15-30f/ft.	Strong hematite staining. Carb-ser epid filling frs.	Tr py in some fractures.	Top and bottom contacts sharp at 35 and 70° respectively. Fractures at 25 and 60°.
1255.0-1286.0	Micro-Diorite Dyke	Med grey	Fine to med fine	Dioritic	Mod fracturing. 5-15 f/ft.	Carb in fractures and bleaching. Ser in fractures	Nil	Contacts sharp at 70°. Fractures at 45 and 80-90°.
1286.0-1323.0	Fractured Acid Dyke	As above.						Bottom ct sharp at 45°.

Hole No. D-306

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1323.0-1350.0	Andesite Dyke or Flow	Med grey	Fine	Even to porphyritic. Small feldspars in places.	Minor fracturing. 5-10f/ft.	Ser in fractures.	Nil	Fractures at 70°. Bottom ct sharp at 45°.
1350.0-1520.0	Fractured Rhyo-Dacite?	Dark grey	é Fine	Even. Odd feldspar phenocrysts	Mod fractured. 10-20f/ft. Odd small amygdule present.	Ser-cart filling fractures. Weak grid in places.	Tr diss and py here and there.	Fractures at 45-80°. 1415-1419': lamp dyke at 55° Bottom ct gradational.
1520.0-1773.0	Dacite	Med grey	Fine	Even	Minor to mod fracturing 3-15f/ft. Odd small section of flow banding. Odd small elongated amygdule.	Sauss in rare pod and speckling in numerous places from 1520-1620'. Ser-sauss filling fractures.	Nil	Rock appears more mafic than above unit but may be just an altered version of the same. Fractures at 40 and 60°. 1643-1648': fault zone. Shearing at 35-50° Bottom ct gradational.
1773.0-1897.0	Fractured Siliceous Andesite	Med grey	Fine	Even	Mod fractured. 10-25f/ft. Flow banding in places. Scattered amygdules.	Sauss-ser-cart filled fractures.	Tr diss py.	Fracturing strongest at 70-80° Flow banding at 50°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1897.0-1919.0	Acid Dyke	Dark Siliceous	Fine	Scattered feldspar phenocrysts	Massive.	Nil	Nil	Contacts at 45°.
1919.0-1991.0	Massive Siliceous Andesite	As above.						
1991.0-2041.0	Porphyritic Acid Dyke	Light	Fine	Feldspar porphyritic throughout.	Massive.	Nil	Nil	Top and bottom contacts sharp at 65°
2041.0-2467.0	Massive Andesite	Med grey	Fine	Even. with small frequent feldspar porphyritic sections.	Minor fracturing Mod amygduloidal in places.	Ser-carb filled fractures.	Tr py-cp as odd small bleb.	Fractures at 70°.
2467.0-2534.0	Acid Dyke	Light to blue grey	Fine	Even	Minor to mod fracturing.	Ser filled fractures with grid in places.	Nil	Brecciated for 1 ft at top contact. Bottom ct sharp at 70°.

Hole No. D-306

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2534.0-2636.0	Massive Andesite	Med grey	Fine	Even Odd section is feldspar porphyritic	Massive. Odd fracture. Scattered amygdules.	Sauss in fractures.	Odd small bleb of py.	2547-2549' 2555-2557': lamp dykes at 25°.
2636.0-2670.0	Porphyritic Acid Dyke	Bluish grey	Fine	Feldspar porphyritic especially near contacts.	Massive.	Nil	Nil	Contacts sharp at 80°.
2670.0-2815.0	Massive Andesite	Med grey	Fine	Even	Massive. Odd fracture. Odd amygdule.	Sauss as fracture fillings and odd vague pods	Tr diss py	Fractures at 80° and random angles. 2758-2776': acid dyke. Bottom contact appears gradational.
2815.0-3040.0	Andesite Flow	Med greenish grey	Fine	Even. Odd large feldspar phenocrysts	Odd pillow, border near top of unit. Scattered amygdules. Flow banding here and there near top. Massive. Odd fracture.	Weak bleaching. Sauss in fractures.	Tr py as blebs and disseminations.	Flow banding at 45° 2883.5-2986': lamp dykes

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3040.0-3097.0	L.F.P. Dyke	Med grey speckled	Very porphyritic Abundant feldspar and mod quarta phenocrysts up to 5mm.		Massive.	Sauss in odd fracture.	Nil	Top and bottom ct sharp at 45 and 25° respectively.
3097.0-3147.0	Porphyritic Andesite	Med grey	Fine	Porphyritic. Mod feldspar phenocryts.	Minor fracturing. Odd amygdule?	Minor ser in fractures.	Nil	3129-3130.5': lamp dyke. Bottom ct sharp at 50° and assoc with amount of py.
3147.0-3151.0	L.F.P. Dyke or Flow	Light med grey	Fine	Quartz and feldspar porphyritic throughout.	Massive.	Ser in odd fracture.	Minor diss py.	Bottom ct irregular.
3151.0-3186.0	Andesite	Med grey	Fine	Even	Massive with local shearing.	Ser-carb-qtz assoc with shearing.	Tr py fracture filling and in odd blebs. Tr cp in fractures and toward bottom.	Shear zone from 3172-3177'. at 60°. Bottom ct sharp at 55°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3186.0-3187.0	Massive Tuff	Dark	Aphan.	Even	Massive.	Nil	Nil	Bottom ct sharp at 45°.
3187.0-3188.0	Andesite	As above.						
3188.0-3225.0	Q.F.P. Dyke	Light grey speckled	Fine	Strongly porphyritic quarts and feldspar up to 1cm.	Massive. Odd fracture.	Sauss in fracture.	Tr py in frs.	Top ct obscured by chl altn Bottom ct sharp at 25°.
3225.0-3315.5	Massive Dacite with Bedded Tuff Sections	Med dark	Fine	Even	Massive. Odd fracture. Odd amygdules.	Nil	Minor po-tr py-cp as blebs, in amygdules and fracture and in bedded tuff sections.	Odd small section of cherty bedded tuff up to 1'. Bottom ct sharp at 50°.
3315.5-3327.5	Bedded Tuff	Cherty light grey to med	Aphan.	Even	Bedded throughout.	Nil	Minor po-tr cp-py-sph. Est. 4% sulpn. 2.5% po. 3" of SM po at bottom.	Bedding at 45-90°. Bottom ct sharp and irregular. 3315.5-3319.5' 3319.5-3323.5' 3323.5-3327.5'

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3327.5-3442.0	rhyolite rhyolite breccia	Dark grey	Fine	Even	Brecciated in some places. massive in others. Minor fracturing near bottom.	Qtz-ser in fractures. weak chl and sauss near bottom of unit.	Tr diss py and po here and there.	Fractures at 30 and 60°. bottom ct arbitrary.
3442.0-3529.0	massive rhyolite	Dark	Fine	Weakly porphyritic Odd qtz eye.	massive. Odd fractures. Odd breccia fragment.	Ser in fractures. Chl masking core locally.	Tr diss py here and there.	Fractures at random angles.
					END OF HOLE			

Hole No. D-306

D-318

LAKE DUFAULT MINES LTD.

Drill Hole Record

Hole No. D-318 Lat. 976.5E Dep. 13,619.09 Elev. 11,089.03 Dip -90° Bearing Depth 4199'. Core

Working Place: East Duncansby

Date Started: Apr 4/72

Date Completed: May 10/72

Compass Tests

Mag. Declination

Depth	Dip	T. Azim.
1000'	89°	059°
2000'	88°	809°
4000'	89°	046°

Acid Test

Depth	Dip	Depth	Dip

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks

Acid Dip Tests

Depth	Corr	Depth	Corr	Depth	Corr	Depth	Corr
70'	90°	1100'	89°	2200'	88°	3300'	89°
100'	90°	1200'	89°	2300'	88°	3400'	89°
200'	90°	1300'	89°	2400'	88°	3500'	88°
300'	90°	1400'	89°	2500'	88.5°	3600'	89°
400'	90°	1500'	89°	2600'	89°	3700'	89°
500'	90°	1600'	89°	2700'	88°	3800'	89°
600'	88°	1700'	89°	2800'	89.5°	3900'	89°
700'	89°	1800'	89°	2900'	89°	4140'	89°
800'	89°	1900'	89°	3000'	89°		
900'	89°	2000'	88°	3100'	89°		
1000'	89°	2100'	88°	3200'	89°		

Depth	Northing	Easting	Elevation
Collar	976.5E	13,619.09	11,089.03
500'	8976.6	13,619.1	10,589.0
1500'	986.0	13,634.8	9,589.2
3000'	1022.0	13,640.5	8,089.7
4199'	1038.0	13,656.E	6,890.2

Hole No. D-318

Logged by T.J.H.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
0.0-11.0	Casing.							
11.0-674.0	Massive Diorite	Greenish grey	Medium locally fine, locally coarse.	Dioritic	Massive. Fracturing very weak to weak, locally moderate. Featureless. Heterogeneous.	Quartz-carbonate and chlorite in fractures. Locally some leaching and limonite staining in fractures over upper 100' of unit. Rare limonite and hematite staining elsewhere. Occasional patches of sericite and epidote alteration.	Rare trace py in fractures.	Fractures at 70, 55-60, 40, 25, 5° to parallel to core axis. Andesite dyke-let with sharp 20° upper, 55° lower contacts at 308-312'. Bleached section with weak carbonate alteration at 440-445'. Andesite dyke with fractured upper contact, sharp 55° lower contact at 455-462'. Porphyritic andesite dyke-let with sharp 70° upper, fractured lower contacts at 524-525.5'.
674.0-735.0	Fractured Diorite	Grey	Medium to fine	Dioritic	Fracturing moderate, locally weak, locally strong. Featureless Heterogeneous.	Quartz-carbonate-epidote and sericite in fractures. Local carbonate alteration.	Rare trace py-po in fractures.	Fractures at 50-60, 30, 15-20, 50 to parallel to core axis. Zone of stronger fracturing with carbonate alterat' 674-678'. Fault zone with and some fa 711-716'

Hole No. D-318

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
735.0-899.0	Massive Diorite	Grey	Medium locally fine locally coarse	Dioritic	Massive. Fracturing very weak to weak, locally moderate. Featureless. Rather heterogeneous.	Sericite and quartz carbonate in frs.	Trace py in fractures.	Fractures at 80, 50, 30, 15-20, 5° to parallel to core axis. Carbonate rich lamprophyre dyke with blebs of carbonate up to 4mm and sharp 10° upper 5° lower contacts at 777-782'. Andesite dykelets at 805-807, 880-882'.
899.0-930.0	Fractured Andesite Dyke	Grey	Fine	Even. A few scattered sericitised feldspar phenocrysts unto 2mm.	Fracturing moderate to strong, locally weak.	quartz-carbonate and chlorite in fractures. Fairly strong carbonate alteration over more strongly fractured basal 7'.	Trace disseminated py.	Fractures at 70-80, 45-55, 30, 20°. Upper contact sharp at 10° Lower contact marked by 1", 45° granodiorite stringer. Inclusion of granodioritic material 912-913'.
930.0-1420.0	Massive Diorite	Grey	Medium locally fine, locally coarse	Dioritic	Massive. Fracturing very weak, locally moderate. Featureless. Rather heterogeneous.	Quarts-carbonate sericite and chlorite in fractures. Occasional bleaching and carbonate alteration around fractures.	Nil	Fractures at 70, 55-60, 45, 15-25, 5° to parallel to core axis. Andesite dykelet with sharp 30° upper, irregular 20° lower contacts at 941-943'. Section of bleaching and carbonate alteration at 1335-1340'. Fractured andesite dyke with fractured contacts at 1349.5-1355.5'. Similar andesite dykes at 1387.5-1389', 1390-1391'.

Hole No. D-318

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1420.0-1460.0	Fractured Diorite	Grey	Medium locally fine, locally coarse	Dioritic	Fracturing moderate to strong, locally weak. Featureless. Heterogeneous.	Quartz-carbonate, sericite and epidote and chlorite in fractures.	Nil	Fractures at 75-80, 65, 25, 5° to parallel to core axis.
1460.0-1622.0	Massive Diorite	Grey	Medium locally fine, locally coarse.	Dioritic	Massive. Fracturing weak to moderate, locally strong. Featureless. Rather heterogeneous.	Quartz-carbonate and chlorite in fractures.	Trace py and rarely cp in fractures.	Fractures at 70-75, 50-55, 20-30, 10° to parallel to core axis. Bleached section at 1604-1610'. Dark brown carbonate rich lamprophyre dyke with distinct 25° upper, 15° lower contacts at 1642-1646'. Fracture zone with some 70° shearing at 1708-1717'.
1622.0-1828.0	Fault Zone	Light grey	Fine	Dioritic to even.	Fracturing strong to intense. Some shearing and local fault gouge.	Red epidote and quartz-carbonate in fractures.	Nil	Fractures at 70, 35, 45, 15° and irregular. Shearing at approx. 40°.
1828.0-1855.0	Fractured Acid Dyke	Grey	Fine	Even	Fracturing moderate to strong. Featureless.	Quartz-carbonate and epidote in fractures. Local development of epidote.	Trace disseminated py. Trace cp in fractures.	Fractures at 80, 65, 55-60, 15-20, 5° to parallel to core axis. Upper contact not defined. Lower contact rather irregular approx. 45°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1855.0-2128.0	Massive Diorite	Grey	Medium locally fine, locally coarse	Dioritic	Massive. Fracturing very weak to weak, locally moderate. Featureless. Rather heterogeneous.	Quartz-carbonate and chlorite in fractures. Some bleaching and carbonate alteration in fracture zones.	Trace py in frs.	Fractures at 50-60, 20-25, 5° to parallel to core axis. Slight fracture zones at 1973-1975, 2010-2019', 2062-2065'. Brown lamprophyre dyke with fractured contacts at 2040.5-2042.5'. Aplite dyke with distinct 45° upper, irregular approx. 25° lower contacts at 2054-2057.5'. Lower contact not defined but transition to underlying andesite is abrupt.
2128.0-2295.0	Fractured Andesite Flow?	Grey	Fine	Even	Fracturing moderate to strong locally weak. Featureless save for rare amygdules and possible weak flow banding.	Quartz-carbonate sericite and epidote in fractures. Some weak grid alteration. Rare weak saussurite epidote mods up to 18".	Trace py in fractures and associated with epidote.	Fractures at 75-85, 50-60, 40, 25, 5° to parallel to core axis. Andesite is siliceous or silicified. Featureless nature suggests unit may include some intrusive material but not dyke contacts observed.
2295.0-2465.0	Fractured Andesite	Grey to light grey	Fine	Even	Fracturing strong to intense, locally moderate. Character of andesite is obscured by strong fracturing.	Red epidote, sericite quartz-carbonate, chlorite and some hematite staining in fractures.	Trace py in fractures.	Fractures at 80-90, 50-60, 40, 20-30, 10° to parallel to core axis. Andesite is very siliceous. Occasional sections of rhyolitic material probably

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
								represent remnants of former acid dykes but unit is so disturbed by fracturing that no definite subdivision can be effectively made. Zone of weak 50° shearing at 2424-2432'. and similar smaller zones elsewhere.
2465.0-2540.0	Massive Andesite Flow	Dark grey	Fine	Even	Massive. Fracturing weak to moderate, locally strong. Featureless save for some flow breccia in places and rare possible amygdules.	Sericite-epidote and some quartz-carbonate in fxrd fractures.	Trace interstitial cp and trace cp in possible amygdules.	Fractures at 65-70, 45-55, 10° to parallel to core axis.
2540.0-2570.0-	Massive Dacite Quartz Feldspar Porphyry Flow?	Dark grey	Fine	Uneven. Well developed sericitised Feldspar phenocrysts up to 4mm. varying from locally dense to coarse.	Massive Fracturing weak to moderate, locally strong. Featureless save for rare possible amygdules.	Epidote, sericite and some quartz carbonate in frs.	Trace cp in possible amygds.	Fractures at 70-75, 50-60, 10-15. Gradational contacts.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
				Pale Bluish violet quartz "eyes" up to 4mm showing similar distribution to feldspar phenocrysts				
2570.0-2699.0	Massive Amygdaloidal Porphyritic Andesite	Dark grey	Fine	Uneven Scattered sericitised feldspar phenocrysts up to 3mm.	Massive. Fracturing weak to moderate, locally strong. Amygdules sparse, well developed up to 1.5cm. Local development of flow breccia.	Sericite, epidote, quartz-carbonate in fractures. Infrequent fairly strong saussurite-epidote nods up to 1ft. Silica and sericite in amygdules.	Trace cp in amygdules and interstitially.	Fractures at 65, 45-55, 35, 20, 10° to parallel to core axis.
2699.0-2720.0	Fractured Acid Dyke	Light grey	Fine	Even	Fracturing moderate to strong locally weak. Features ess.	Quartz-carbonate and sericite in fractures.	Trace disseminated py.	Fractures at 80-90, 65-70, 50-55, 15°. Contacts observed. Rock has a speckled appearance.

Hole No. D-318

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2720.0-2758.0	Fractured Amygdaloidal Andesite	Grey	Fine	Even. A few scattered sericitised feldspar phenocrysts apparent.	Fracturing moderate to strong Clustered amygdules up to 1cm. fairly well developed, interspersed with sections of more massive material. Rare patches of flow breccia.	Quartz-carbonate-sericite-epidote and chlorite in fractures. Sericite and silica filled amygdules. Some weak grid alteration.	Trace interstitial cp.	Fractures at 60, 40-50, 25, 10-15 Andesite is very siliceous.
2758.0-2882.0	Fractured Amygdaloidal Porphyritic Andesite	Dark grey	Abundant sericitised feldspar phenocrysts up to 3mm.	Uneven. Abundant sericitised feldspar phenocrysts up to 3mm.	Fracturing moderate to strong, locally weak. Amygdules weakly clustered, fairly well developed, occasionally large, up to 2cm. Rare weak patches of flow breccia	Sericite, epidote and occasionally quarts-carbonate in fractures. Note sericite and silica filled amygdules. Infrequent fairly strong saussurite-epidote nods up to 6".	Trace cp in amygdules and interstitially.	Fractures at 55-65, 40-45, 20-30, 10° to parallel to core axis. Andesite is very siliceous. Dacite dykelets at 2774-2775.5 2778.5-2779.5 2785-2788.5'
2882.0-2930.0	Fractured Acid Dyke	Grey	Fine	Even. Locally a few sericitised feldspar phenocrysts.	Fracturing moderate to strong Featureless.	quarts-carbonate, chlorite and sericite in fractures.	Nil	Fractures at 75, 50-55, 35-40, 20, 5° to parallel to core axis. Contacts not defined. Inclusion of andesite at 2895.5-2896.5'.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2930.0-3030.0	Fractured Amygdaloidal Andesite	Grey	Fine	Even	Fracturing moderate to strong, locally intense. Amygdules sparse, poorly developed up to 4mm. Rare flow breccia	Quartz-carbonate, epidote, sericite and chlorite in fractures. Amygdules predominantly sericite filled. Locally some very weak biotite alteration.	Trace py disseminated in fractures and amygdules	Fractures at 75, 55-60, 45, 35, 20-25, 5° to parallel to core axis. Andesite is extremely acid, virtually dacitic. Zone of slight bleaching with local weak 50° shearing at 2956-2961'. Broken ground and 3' core loss at 2961-2968'.
3030.0-3075.0	Fracture Zone	Grey	Fine	Even	Fracturing moderate to strong, locally intense. A few weak amygdules evident in places.	Quartz-carbonate chlorite and sericite in fractures.	Trace py in fractures.	Fractures at 65-70, 55, 35-45, 20-25, 5° to parallel to core axis, and irregular. Material is predominantly very siliceous andesite but includes some acid (dyke) rock and locally some lamprophyre, the whole being very disturbed. Locally a little fault breccia.
3075.0-3114.0	Fractured Amygdaloidal Andesite	Grey	Fine	Even	Fracturing moderate to strong. Amygdules moderately abundant, rather poorly developed, occasionally fairly large up to 2cm. Locally some flow breccia and flow banding.	Sericite and some quartz-carbonate in fractures. Amygdules predominantly sericite filled.	Trace py in amygdules.	Fractures at 55-65, 40-45, 30, 5-10°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3114.0-3137.0	Fractured Andesite Feldspar Porphyry Dyke(?)	Grey	Fine	Uneven. Moderate development of sericitised Feldspar phenocrysts up to 3mm. Quartz "eyes" not abundant up to 4mm.	Fracturing moderate to strong. Featureless.	Sericite and some quartz-carbonate in fractures.	Nil	Fractures at 70, 40-50, 25-30, 15, 5° to parallel to core axis. Contacts not defined.
3137.0-3169.0	Fractured Andesite Flow?	Grey	Fine	Even	Fracturing moderate to strong. Featureless save for rare possible amygdules.	Sericite, epidote and quartz-carbonate in fractures.	Trace py in fractures.	Fractures at 70, 55-60, 20-25, 10° to parallel to core axis.
3169.0-3182.0	Fractured Andesite Quartz Feldspar Porphyry Dyke	Grey	Fine	Uneven. Moderate development of sericitised Feldspar phenocrysts up to 3mm.	Fracturing moderate to strong. Featureless.	Sericite-epidote, quartz-carbonate and some hematite staining in fractures.	Nil	Fractures at 65-70, 50-55, 15-20°. Upper contact not defined. Lower contact distinct, 15°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3182.0-3235.0	Fractured Andesite Flow?	Grey	Fine	Even	Fracturing moderate to strong. Featureless save for rare possible amygdules.	Quartz-carbonate, sericite and epidote in fractures. Local carbonate alteration.	Trace py in fractures.	Fractures at 70-75, 55-60, 45, 10-20°. Grey-brown carbonate-rich lamprophyre dyke with fractured contacts at 3202.5-3212'.
3235.0-3285.0	Fractured Amygdaloidal Andesite	Grey	fine	Even. A few scattered locally weak, sericitised feldspar phenocrysts apparent.	Fracturing moderate to strong, locally weak. Amygdules not well developed, occasionally fairly large up to 1cm, moderately abundant weakly clustered Not infrequent small patches of flow breccia.	Quartz-carbonate, sericite, epidote, and some hematite staining in fractures. Amygdules predominantly sericited and epidote filled. Moderate development of sericite and epidote in patches of flow breccia.	Trace py associated mtx with epidote.	Fractures at 80, 60-70, 50, 25-35o.
3285.0-3306.0	Fractured Amygdaloidal Andesite	Similar to overlying andesite but bleached and sericitised and more strongly fractured.						
3306.0-3361.0	Fractured Altered Acid Dyke	Light grey	Fine	Even	Fracturing strong to intense, locally moderate. Local shearing Featureless.	Fairly strongly bleached and sericitised. Sericite chlorite and quartz-carbonate in fractures.	Nil	Fractures at 60, 40, 20° and irregular. Small 60° shears at 3346-3347'. Much of unit reduced to fault breccia. Fractured contacts.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3361.0-3496.0	Fractured Amygdaloidal Andesite	Grey	Fine	Even	Fracturing moderate to strong, locally intense. Amygdules poorly developed, not abundant, up to 5mm. Occasional narrow patches of flow breccia.	Quartz-carbonate, chlorite, sericite, epidote and some hematite staining in fractures. Sericite and epidote in amygdules. Some development of epidote in flow breccia.	Trace py in fractures, interstitially and in amygdules.	Fractures at 75, 55-65, 20-25, 5° to parallel to core axis. Grey lamprophyre dyke with fairly distinct contacts at 3374-3383'. Acid feldspar porphyry dykelet with dense sericitised feldspar phenocrysts up to 2mm and irregular approximately 25° upper, fairly sharp 50° lower contacts at 3417-3419'.
3496.0-3546.5	Fractured Acid Dyke	Grey	Fine	Even	Fracturing moderate to strong, Featureless.	Quartz-carbonate-sericite and chlorite in fractures.	Trace py in fractures.	Fractures at 60-70, 45-50, 20°. Fractured upper contact. Undefined lower contact.
3546.5-3612.0	Fractured Amygdaloidal Andesite	Grey	Fine	Even	Fracturing moderate to strong, locally weak. Amygdules sparse, poorly developed, occasionally fairly large, up to 1cm. Rare possible (?) pillow borders.	Quartz-carbonate and some sericite and chlorite in fractures. Sericite and silica in amygdules.	Trace py in amygdules.	Fractures at 60-65, 50, 30-40, 20, 5° to parallel to core axis. Andesite is rather siliceous in places.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3834.9-3891.0	Rhyolite Flow Breccia	Light grey	Fine	Even	Fracturing weak to moderate, locally strong. Abundant "frothing and churning" and fine fragments interspersed with narrow sections of more massive material with rare amygdules.	Quartz-carbonate sericite and chlorite in fractures. Fairly widespread sericitisation.	Trace disseminated py-mb with trace py in fractures.	Fractures at 65-70, 45-50, 20-30°.
3891.0-3905.0	Massive Quartz Feldspar Porphyry Dyke	Dark grey	Fine	Uneven. Poorly developed sericitised feldspar phenocrysts up to 2mm. Fairly abundant pale blue-violet quartz "eyes" up to 4mm.	Massive. Fracturing weak to moderate, locally strong. Featureless.	Quartz-carbonate and chlorite in fractures. Some biotite alteration Slight development of chlorite at lower contact.	Trace disseminated py.	Fractures at 60-70, 15-25,° Fractured upper contact. Irregular lower contact. Brown-grey carbonate rich lamprophyre dyke with abundant biotite phenocrysts up to 3mm and sharp 60° upper contact fractured lower contact at 3895.5-3897.5'.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3905.0-3964.0	Altered Rhyolite Flow Breccia with Dalmatianite Alteration	Grey to brown grey	Fine	Even	Fracturing weak to moderate, locally strong. Some fragments and ratio (?) laminii apparent in parts but generally flow features are masked by alteration.	Quartz-carbonate and chlorite in fractures. Development of dalmatianite of varying intensity throughout virtually entire unit.	Trace disseminated py.	Fractures at 65, 45-55, 15-25, 5° to parallel to core axis. Lightgrey micro-diorite dyke with indistinct contacts at 3936-3943'.
3964.0-3976.0	Fractured Acid Dyke	Dark grey	Fine	Even	Fracturing moderate, locally strong. Featureless.	Quartz-carbonate and chlorite in fractures	Trace disseminated py.	Fractures at 65-70, 40-50, 25° Upper contact, sharp, 65° Lower contact not defined.
3976.0-4102.0	Rhyolite Flow Breccia	Greyish	Fine	Even	Fracturing weak to moderate, locally strong. Abundant well developed "frothing and churning" with some amygdules and fragments interspersed with occasional sections of more massive material.	Quartz-carbonate with some sericite, epidote and chlorite in fractures. Sporadic development of epidote and sericite. Some chloritisation in places.	Trace py in fractures. Trace interstitial py-cp.	Fractures at 75, 65, 45-50, 30, 15-20, 5° to parallel to core axis. Pronounced scoriaceous appearance.

Hole No. D-318

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
4102.0-4199.0	Rhyolite Flow Breccia	Grey	Fine	Even	Fracturing weak to moderate, locally strong. "Frothing and churning", fragments and some weak amygdules apparent, interspersed with sections of more massive material.	Quartz-carbonate and chlorite in fractures. Local biotite and "grid alteration with incipient dalmatianite. Some development of sericite and epidote in places, notably at 4160-4180'.	Trace, mainly disseminated in fractures and interstitially.	Fractures at 75, 55-65, 40-45, 20-30, 10° to parallel to core axis. Brown-grey carbonate rich lamprophyre dyke with 10° upper, obscured lower contacts at 4129-4139'. Similar lamprophyre dykes with 25° contacts at 4140.5-4142' 4191-4192'.
					"END OF HOLE"			

D-323

LAKE DUFAULT MINES LTD.

Drill Hole Record

Hole No. D-323 Lat. 1844.22 Dep. 14,686.46 Elev. 11,047.48 Dip -90° Bearing Depth 4412' Core AQ

Working Place: X East Dupreanoy

Date Started: July 16/72

Date Completed: Aug 31/72

Compass Tests — Mag. Declination

Depth	Dip	T. Azim.
1000'	1°	212°
1500'	3°	262°
1815'	3°	277°
2500'	3°	352°
3000'	2°	342°
4300'	2°	24°

Acid Test

Depth	Dip	Depth	Dip

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
Wedge	581½'	87°	Wedge					
	600½'	88°						
	721'	87°						
	800'	88.5°						
	900'	88°						
	1000'	88°						
	1100'	87.5°						
	1200'	87°						
	1300'	89°						
	1400'	89°						

Acid Dip Tests:

Ftge	Corr	Depth	Corr	Depth	Corr
100'	89°	1500'	87.5°	2920'	87°
200'	88.5°	1600'	87.5°	3000'	88°
300'	87.5°	1700'	88°	3100'	88°
400'	87.5°	1800'	89°	3200'	88°
500'	86.5°	1900'	88°	3300'	87.5°
1925'	87°	2000'	88°	3400'	88°
		2100'	88°	3500'	88°
		2200'	88°	3600'	88°
		2300'	88°	3700'	89°
		2400'	88°	3800'	89°
		2500'	88°	3900'	88°
		2600'	87°	4000'	88/5°
		2700'	88°	4100'	88°
		2800'	88°	4200'	87.5°
				4300'	87/5°

Down Hole deflection

Depth	Northing	Easting	Elevation
Collar	1844.22	14,684.66	11,047.48
500'	1830.5	14,675.9	10,547.8
1250'	1803.7	14,659.1	9798.5
1657.5'	1801.9	14,646.8	9,391.2
2151.5'	1803.9	14,630.3	8,891.5
2750/1	1826.2	14,627.2	8,299.4
3650.10	1858.5	14,616.7	7,400.1
4412'	1880.9	14,626.6	6,638.5

Hole No. D-323

Logged by P.J.H. & R.L.B.

FALCONBRIDGE COPPER LIMITED
LAKE DUFAULT DIVISION

DRILL HOLE DATA

D. H. No. D. 323					
LOCATION	Development Licence Mining Concession 701 - C	Claim No. R - 30045.	Lot No. 79	Range No. MACAMIC OUEST	Township DUFRESNOY

DRILLED From	To	Footage	Total Footage	Final Depth	Size
0	4412	4412	4412	44·2	AQ

Drilling Contractor	Logger Name & Qualification	Signature
BRADLEY BROS. LTD.	P. J. HOPE B.Sc.	
Overburden	R. L. BENNISON	" P.9.16.4
NOT RECOVERED		
Core Storage		
LAKE DUFAULT NO. 1		

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
0.0-4.0	Casing							
4.0-270.0	Massive Diorite	Dark green-grey	Fine to medium	Dioritic	Massive. Fracturing weak to moderate, locally strong, 1-30f/ft. Heterogeneous.	Sericite, epidote, with some quartz-carbonate, and chlorite and occasionally limonite and hematite staining in fractures. Local leaching.	Trace py in frs.	Fractures at 70, 55-60, 40, 15-25, 5° to parallel to core axis. Occasional stringers of granodiorite material. Slight fracture zone 105-115'.
270.0-960.0	Massive Diorite	Dark green-grey to light grey	Medium locally fine, locally coarse.	Dioritic.	Massive. Fracturing very weak, to weak, locally moderate. Featureless. Rather heterogeneous.	Quartz-carbonate, chlorite, sericite and epidote in fractures. Local development of epidote. Occasional patches of bleaching.	Trace py disseminated and in fractures.	Fractures at 70,40-45, 15-20°. Brown-grey, carbonate rich lamprophyre dykelets and stringers with distinct steep contacts (generally 0-20°) at 295-296' 325-326' 327.5-328' 365.5-366.5' Slight fracture zones at 630-635. 669-670'. Lamprophyre dyke at 723-728'. Fractured andesite dykes at 776-777'. 793-801.5' 858-862. Brown-grey.

Hole No. D-323

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
960.0-1090.0	Fractured Diorite	Grey to green grey	Medium locally fine or coarse.	Dioritic	Fracturing moderate, to strong, locally weak. 1-26f/ft. Featureless.	Quartz-carbonate, sericite epidote and chlorite in fractures.	Trace py-po-cp in fractures.	Fractures at 80, 65, 55, 20-30, 10° to parallel to core axis. Brown-grey carbonate-rich lamprophyre dykelets and stringers at 970.5-971' 974.5-981.5' 1001.5-1002' 1027.5-1028'. Contacts generally steep, around 10°, distinct. Bleached lamprophyre dyke with irregular contacts at 1040-1041'. Two 3-4" stringers of granodiorite material between 1037-1038'.
1090.0-1415.0	Massive Diorite	Grey	Medium, locally fine or coarse.	Dioritic	Massive. Fracturing very weak, to weak, locally moderate, 1-15f/ft. Heterogeneous.	Silica, sericite, chlorite and some carbonate and epidote in fractures. Local dveldpment of epidote.	Trace disseminated py.	Fractures at 75-80, 45-55, 35, 15-25, 5° to parallel to core axis. Light grey, porphyritic andesite dyke with sericitised feldspar phenocrysts and distinct 30° upper, 25° lower contacts at 1119-1120.5'. Slight fracture/ shear zone with weak 30° shearing at 1255-1260'. Possible fractured andesite dyke (no contacts observed) at 1333-1338'.
1415.0-1445.0	Fractred Diorite	Grey	Medium locally fine or coarse.	Dioritic	Fracturing moderate strong, locally weak 1-30f/ft. Featureless. Rather heterogeneous.	to Quartz-carbonate, chlorite and sericite in fractures.	Nil	Fractures at 75, 45-55. 20-25, 5° to parallel to core axis.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
1445.0-1856.0	Massive Diorite	Grey	Medium, locally fine or coarse	Dioritic	Massive. Fracturing weak, locally very weak or moderate, 0-15f/ft. Featureless. Rath er heterogenous.	Sericite, quartz-carbonate, chlorite and rarely epidote in frs.	Rare trace disseminated py. Rare trace py and cp in fractures.	Fractures at 80, 65, 50-55, 35-40, 15-25°. Light grey weakly porphyritic andesite dyke with distinct fractured 45° contacts at 1446-1451.'. 1735.7-1752.8': and 1762.6-1774.8' acid looking dyke with extreme carbonate alteration. Top and bt cts are gradational.
1856.0-1902.5	Acid Dyke	Med light grey	Fine	Even	The first 20 feet of the unit is very sheared. The rest of the unit is very massive. Minor to mod fracturing.	The top part of the unit is very altered by carbonate.	Trace py.	The top part of the dyke contains large fragments of the overlying diorite. Bt ct gradational.
1902.5-2630.5	Massive Diorite	Med grey with white specks.	Fine-med.	Even	The diorite grades back and forth between fine and med grained. Med fracturing.	Local patches of bleaching.	Trace py	2012.2-2026.0': a very massive andesite dyke. Top and bt cts sharp. 2433-2442': a diabase dyke with very sharp cts. Bt ct gradational.
2630.5-3028.5	Massive Andesite or Dacite	Med to dark grey	Fine	Even	The unit is mostly very massive with the odd scattered amygdules.	Short sections of sauss alteration and bleaching.	Trace disseminated py. Trace py in fractures.	The unit is very hard and acidy. Bt ct is sharp.

Hole No. D-323

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3028.5-3043.1	Quartz Feldspar Porphyry Q.F.P.	Med grey with white and bluish specks.	Fine	Porphyritic	Abundant feldspar phenocrysts up to 3mm in diameter. Abundant quartz eyes up to 2mm i diam.	A very small amount of carbonate altoration in fractures.	Trace disseminated py.	Bt ct sharp.
3043.1-3052.3	Massive Andesite Dyke	Med greenish grey	Fine	Even	Very massive. Minor fracturing,	Very minor carbonate alteration.	Nil	Bt ct sharp.
3052.3-3066.3	Quartz Feldspar Porphyry Q.F.P.	Med grey with white and bluish specks.	F.g.	Porphyritic	Abundant feldspar phenocrsyts up to 2mm in size. Abundant 3mm diameter bluish quartz eyes. Moderate fractuing.	A 2 foot section containing a quartz vein and some carbonate alteration.	Trace py.	Bt ct indistinct.
3066.3-3419.7	Amygdular Andesite Dacite	Medium to dark grey	F.g.	Even	The odd well rounded feldspar and sauss filled amygdules up to 3mm in diameter. Tiny feldspar phenocrysts scattered throughout. Minor moderate fracturing.	Abundant sauss pods up to 4 inches in length.	Trace py in sauss pods. Trace cp in a chert bed.	The andesite is very siliceous. From 3231.2-3241.2'L is a diorite looking dyke. Bt ct is sharp and top ct is rather uncertain. The odd 1" long chert vein. From 3364.1-3376': and acid dyke with sharp contacts. Bt ct sharp with a small 1" seam containing carbonate and pyrite.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3419.7-3443.0	Quartz Feldspar Porphyry Dyke Q.F.P. Dyke	Medium grey with white and bluish specks.	Fine	Porphyritic	Abundant feldspar phenocrsts up to 2mm in diameter. Abundant quartz eyes up to 2mm in size.	A small amount of local bleaching and a little saussurite in fracture.	Trace disseminated py.	Bt ct quite sharp a with a little bleaching and alteration.
3443.0-3453.4	Lamp Dyke	Dark greyish green	Fine	Even	Massive with a bit of shearing in places at 80° to core axis. Minor-moderate fracturing.	Extreme carbonate alteration. Large amount of biotite.	Trace disseminated py. Trace cp in quartz vein.	Between the Q.F.P. dyke and the lamp dyke there is a 0.8' section of massive andesite. Bt ct sharp.
3453.4-3518.6	Massive to Amygduloidal Andesite	Med greyish grey	Fine	Even	The top part of the unit is very massive. In the lower part of the unit tiny well-rounded amygdules become very abundant locally. Minor-mod fracturing.	Short sections are strongly carbonate altered Small pods of sauss alteration.	Trace dissminated py.	Bt ct sharp.
3518.6-3538.4	Q.F.P. Dyke	Med grey with white and bluish specks.	Fine	Porphyritic	Abundant feldspar phenocrsts up to 2mm in size. Abundant quartz eyes up to 2mm in size. Minor fracturing.	Minor carbonate in frs. Local bleaching.	Trace disseminated py.	From 3519.9-3520.4': is an andesite dyke contacining 2% disseminated py. Top and btct very sharp. From 3520.8-3524.2': is a lamp dyke

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3538.6-3609.2	Massive Andesite	Med grey	Fine	Even	Moderately abundant tiny feldspar phenocrysts. Moderate fracturing.	Local bleaching. A few saussurite, chlorite filled pods up to 2" in size. Bleaching along frs.	Trac cpy disseminated and in sauss-chlorite pods. Cp in fractures.	Bt ct indistinct.
3609.2-3634.2	Q.F.P. Dyke	Med grey with white and bluish specks.	Fine	Porphyritic	Very abundant feldspar phenocrysts up to 4mm in dia. Abundant quartz eyes up to 4mm in size.	Minor sauss alteration in fractures.	Trace py dissemination	The top 2.5' of the unit appears to be chilled due to the decreasing freqences of feldspar phenocrysts and quartz eyes.
3634.2-3923.0	Amygd Andesite	Med grey	Fine	Even	Moderate occurence of well rounded amygdules.	A large number of sauss pods up to 4" in size.	Trace py in blebs fractures and disseminated.	From 3665.5-3670.2': a quartz vein containing py. From 3765.2-3768.6': a Q.F.P. dyke or flow. Bt ct sharp.
3923.0-3927.0	Q.F.P. Dyke or Flow	Med grey with white specks.	Fine	Porphyritic	Very frequent occurence of feldspr° phenocrysts up to 2mm in size with frequency of occurence of quartz eyes.	Minor carbonate in veins.	Trace py diss'n.	Bt ct sharp.
3927.0-3943.0	Massive Andesite	Med grey	Fine	Even	Very abundant tiny feldspar phenocrysts.	Local bleaching.	Trace py disseminated and in frs.	Bt ct sharp.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3943.0–3945.1	Massive Sulphide with Bedded Tuff	Brassy bronze to black.	Fine	Uneven	In the middle of the unit is a section of very poorly bedded tuff. The beds are 1/16" thick at 75° to core axis. The rest of the unit contains fragments of tuff up to 3" in size.	Nil	About 50% total sulphide. 40% po 10% py.	Bt ct indistinct.
3945.1–4005.0	Rhyolite	Med grey	Fine	Even	The unit is quite massive except for the top part which contains the odd white fragment up to 3mm in size.	A fair amount of chlorite in little frag and in sections. A few scattered pods of sauss alteration. A bit of bleaching along fractures.	The upper five feet contains stringers of py and po up to ½" thick. The rest of the unit contains 2% disseminated py and po.	Bt ct sharp. The rock looks very glassy and acidic but seems a bit to soft for rhyolite.
4005.0–4179.3	Dacite Andesite Flow	Med to dark	Fine	Even	Minor occurence of well formed round amygdules. Quite a large abundane of tiny feldspar phenocrysts insections.	Small scattered sections containing frgments of chlorite up to 1" in size. Minor bleaching along fractures.	Trace disseminated py. Trace py in amygdules. A bit of cp mixed into a po bleb.	The unit is a bit siliceous but has a felsic appear like andesite. Bt ct is gradational.
4179.3–4184.3	Altered Dacite Andesite	Greenish grey with black spots.	Fine	Even	Very massive except for a couple of elongated amygdules. Minor fracturing.	Very abundant dalmatianite like chlorite spots up to 3mm in size.	Trace disseminated py.	Bt ct is gradational. There are sections where the chlorite spots are quite elongated with flow bands quite plainly evident.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
4184.3-4257.4	Dacite Andesite	Med grey	Fine	Even	A few scattered well rounded amygdules.	A large amount of chlorite alteration in the form of dalmatianite like spots 2mm in size. and large splotches.	Trace disseminated py and in amygdules.	From 4220-4222.3': is a lamp dyke It doesn't react with HCl but is soft and contains a bit of biotite chlorite etc. Bt ct is sharp.
4257.4-4412.0	Rhyolite Bx	Med grey to dirty white	Fine	Even	Minor occurence of angular white coloured fragments up to 3/4" in size.	A bit of chlorite alteration in splotches. Abundant tiny chlorite specks.	About 1-2% oo disseminated and in frs.	The rock is very hard and siliceous but contains patches a darker mafic material. From 4272-4286.8': amd acid dyke. Top ct indistinct and bt ct very sharp. In the bt of the unit is a coarse grained diorite unit 1.8' in length.
					END OF HOLE			

Hole No. B-323

D-326

LAKE DUFAULT MINES LTD.

Drill Hole Record

Hole No. D-326 Lat. 2281.92 Dep. 14118.49 Elev. 11,131.59 Dip -90° Bearing Depth 4099.0'

Working Place: East Dupressoy

Date Started: Apr 13/73

Date Completed: May 29/73

Compass Tests

Depth	Dip	M.Brng.
1000'	87°	316°
1500'	86°	342°
2800'	86°	334°
3500'	85°	345°

Acid Test

Depth	Read	Corr.

SAMPLED SECTIONS

From	To	C.L.	Cu	Zn	Au	Ag

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks

Acid Dip Tests

Depth	Corr
25'	90°
150'	90°
250'	90°
325'	90°
400'	90°
500'	90°
600'	89°
700'	89°
800'	89°
900'	89°
1000'	89°
1100'	89°
1200'	88°
1300'	88°

Wedge

Depth	Corr
1400'	87°
1500'	87°
1605'	89°
1700'	89°
1800'	89°
1900'	89°
2000'	89°
2100'	89°
2200'	89°
2300'	88.5°
2400'	88°
2500'	89°
2600'	89°
2700'	88°

Depth	Corr
2800°	88°
2900'	88°
3000'	88°
3100'	88°
3200'	87°
3300'	86°
3400'	85°
3500'	85°
Wedge 3524'	86°
3600'	87°
3700'	88°
3800'	88°
3900'	89°
4000'	89°
4099'	89°

Depth Collar
500'
1250'
2150'
3150'
4099'

Down Hole Deflection

Northing	Easting	Elev.
2281.92	14,118.49	11,131.59
2281.9	14,118.5	10,631.6
2292.0	14,108.8	9,881.7
2314.0	14,091.5	8,982.3
2341.5	14,078.2	7,982.8
2385.7	14,066.3	7,035.2

Hole No. D-326

Logged by P.J.H.

-82 pages

FALCONBRIDGE COPPER LIMITED
LAKE DUFAULT DIVISION

DRILL HOLE DATA

D. H. No. D326						
LOCATION	Development Licence Mining Concession 701-C	Claim No. R-30044	Lot No. 78	Range No. MIRAMIC QUEST	Township DUFRESNOY	
DRILLED	From 0	To 4099	Footage 4099	Total Footage 4099	Final Depth 4099	Size AQ
Drilling Contractor BRADLEY BROS. LTD	Logger Name & Qualification P. J. HOPE B.Sc.	Signature				
Overburden NOT RECOVERED						
Core Storage LAKE DUFAULT No. 1						

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
0.0–4.0	Casing							
4.0–400.0	Massive Diorite	Dark green-grey	Medium locally coarse or fine	Dioritic	Massive. Fracturing weak, locally moderate. Featureless. Heterogeneous.	Quartz-carbonate, chlorite, epidote and sericite in fractures. Some limonite staining in fractures and leaching down to 200'.	Rare trace py disseminated and in fractures.	Fractures at 75–80, 55–60, 20–30° Fractured acid dykelet with indistinct contacts at 298–299.5'.
400.0–583.0	Massive Diorite	Grey	Medium locally fine, rarely coarse	Dioritic	Massive. Fracturing very weak, to weak, locally moderate. Featureless. Fairly homogeneous.	Chlorite, quartz-carbonate and sericite in fractures.	Rare trace disseminated py.	Fractures at 70–75, 60, 40–45, 20–25°. Small fracture zone at 522–523'. Weakly porphyritic micro-diorite dyke at 551.5–553.5'.
583.0–760.0	Massive Diorite	Grey	Medium to fine	Dioritic	Massive. Fracturing weak, locally very weak or moderate. Featureless. Rather heterogeneous.	Chlorite, sericite and quartz carbonate in fractures.	Nil	Fractures at 60–70, 45, 15–25°. Possible(?) inclusion of dioritised andesite at 583–597'. Section with (?) plate-like xenoliths of andesitic material showing weak orientation at 597–598'.
760.0–860.0	Fractured Diorite	Grey	Medium locally fine	Dioritic	Fracturing moderate to strong, locally weak. Featureless. Fairly homogeneous.	Chlorite, sericite, and quartz-carbonate in fractures.	Rare trace py in fractures.	Fractures at 60–65, 40, 15–25, 5° to parallel to core axis. Occasional small 1/4" shears.

Hole No. D-326

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
860.0–1090.0	Massive Diorite	Grey	Medium to fine	Dioritic	Massive. Fracturing weak to moderate, locally very weak or strong. Featureless. Heterogeneous.	Sericite, chlorite, and quartz–carbonate in fractures.	Trace py in fractures.	Fractures at 70, 50, 20–30, 5° to parallel to core axis. Fractured andesite dyke with irregular upper, fractured lower contacts at 887–890'.
1090.0–1245.0	Fractured Diorite	Grey	Medium to fine. locally coarse.	Dioritic	Fracturing. Moderate to strong, locally weak. Featureless. Rather heterogeneous.	Quartz–carbonate, chlorite and sericite and rarely some hematite staining in fractures.	Trace py disseminated and in fractures.	Fractures at 65–70°, 35–45, 20–25, 10°. Occasional small weak sheer zones, notably at 1130–1131, 1145–1146'. and 1159–1162'. Zone of stronger fracturing with bleaching, sericitisation and some quartz–carbonate stringers at 1227–1239'.
1245.0–1873.0	Massive Diorite	Grey	Medium to fine rarely coarse	Dioritic	Massive. Fracturing weak, locally moderate to strong. Featureless. Rather heterogeneous.	Quartz–carbonate, chlorite andsericite in frs.	Trace, rarely minor py and rae trace cp. in fractures.	Fractures at 70, 55–60, 45, 25–30° Section with grey carbonate alteration at 1270–1274'. Section (?) possible dyke)with abundant sub–angular xenoliths of andesitic material in dioritic matrix at 1321–1333'. Quartz–carbonate veinlet at 1375–1376' Slight fracture zone with carbonate alteration at 1434–1438'. Weak sheer zone with slight sericitisation and carbonate alteration at 1566–1573'. Zone of slight bleaching and carbonate alteartion at 1593–1600'.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
								Fractured andesite dyke with sharp dyke 40° upper and lower contacts at 1712-1721.5' Similar fractured andesite dykelet with sharp 55° upper contacts and undefined lower contact at 1744-1746'. Fractured andesite dykelet with sharp 60° contacts at 1822-1823'.
1873.0-1890.0	Fracture Zone	Grey to light grey	Medium to fine	Dioritic	Fracturing strong, locally moderate. Featureless.	Quartz-carbonate and some chlorite and sericite in fractures.	Trace py and rarely cp in fractures.	Fractures at 65-75, 45-50, 20° and irregular. Some quartz-carbonate stringers up to 3".
1890.0-2560.0	Massive Diorite	Grey	Medium to fine, locally coarse	Dioritic	Massive. Fracturing weak, to weak, locally moderate. Featureless. Rather heterogeneous to fairly homogeneous parts.	Very quartz carbonate in fractures. Infrequent patches of sericitisation.	Sericite chlorite and Rare minor interstitial po-py-cp. Rare minor cp in fractures.	Fractures at 65-75, 55, 35-40° 20-25° and parallel to core axis. Fractured andesite dykelet with sharp 50° contacts at 1905-1907'. Small fracture zone at 2161-2162'. Fractured andesite dykelet with fractured upper, irregular approx. 80° lower contact, at 2162-2163.5'. Similar fractured andesite dykelet with sharp 60° upper, fractured lowe contacts at 2167-2169'. Small fracture zone at 2524-2526'. Lower contact not defined.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
2560.0–2575.0	Fractured Amygdu-loidal Andesite	Grey	Fine	Even.	Fracturing moderate, Scattered poorly developed amygdules up to 1cm.	Quartz-carbonate, chlorite Nil and epidote in fractures. Amygdules predominantly chlorite and silica filled.		Fractures at 65, 55, 40, 30, 15° Andesite is locally rather acid.
2575.0–2605.0	Fractured Acid Feldspar Porphyry (?) Dyke	Light grey	Fine	Uneven. Abundant sericitised feldspar phenocrysts up to 3mm.	Fracturing moderate to strong, locally weak. Fairly homogeneous.	Quartz-carbonate, chlorite and sericite in fractures.	Trace py disseminated and in fractures.	Fractures at 70, 45–50, 35, 20°. Contacts not defined. Some possible (?) inclusions of andesitic material.
2605.0–2900.0	Fractured Andesite Flow	Grey	Fine	Even rarely weakly porphyritic. ly amygduloidal.	Fracturing moderate, to strong, locally weak. Locally weak- Rare narrow patches flow breccia and weak possible flow banding.	Sericite-epidote, chlorite and quartz-carbonate fractures. Some weak grid alteration. Local of bleaching.	Trace py disseminated in in fractures and amygdules and interstitially. Rare trace interstitial cp.	Fractures at 75–80, 50–60, 35, 25, 5° to parallel to core axis. Andesite is locally rather siliceous.
2900.0–3072.5	Fractured Andesite Flow	Grey	Fine	Even	Fracturing moderte, to strong, rarely weak. A few clusters of poorly developed amygdules in places and rare patches of flow breccia. otherwise featureless.	Sericite, chlorite and quartz-carbonate in fractures. Fairly com frequent moderately strong saussurite pods up to 15". Local weak biotite alteration. Some weak grid alteartion	Trace disseminated py.	Fractures at 70, 55–60, 35–45, 25, 10°. parallel to core axis. Apart from abundance of saussurite pods unit is indistinguishable from overlying andesite. Andesite is rather siliceous. Porphyritic diorite dykelets, usually with fairly sharp contacts at 2945–2945.5,

Hole No. D-326

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
								2950-2951 2959-2965' 2982.5-2983' 2985-2987'
3072.5-3110.0	Fractured Acid Quartz Feldspar Porphyry Dyke	Grey	Fine	Uneven. Sericitised feldspar phenocrysts up to 3mm. mainly confined to upper and lower parts of unit. Abundant pale blue violet quartz eyes up to 3mm.	Fracturing moderate, locally strong or weak. Featureless.	Quartz-carbonate sericite and chlorite in frs.	Nil	Fractures at 70-75, 60, 45, 20° and 5-10°. Upper contact sharp, irregular approx. 45°. Fractured andesite dykelet with sharp 85° contacts at 3079-3080.5'. Lower contact sharp, approx 85°
3110.0-3153.0	Fractured Porphyritic Amygdaloidal Andesite.	Grey	Fine	Uneven. Scattered sericitised feldspar phenocrysts up to 2mm.	Fracturing moderate to strong. Rather weak development of scattered amygdules, rarely large, up to 1.5cm. Local weak flow breccia.	Sericite, epidote, chlorite and quartz-carbonate in fractures. Epidote, chlorite and sericite in amygdules.	Trace py disseminated and in amygdules, and interstitially.	Fractures at 70-75, 50-60, 35-40, 25 and 15°. Carbonate rich lamprophyre dyke with fractured contacts at 3116-3125.5'

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3153.0-3370.0	Massive Acid Quartz Feldspar porphyry Flow	Grey	Fine	Uneven. Rather sporadic development of sericitised feldspar phenocrysts up to 2mm. Fairly abundant quartz eyes up to 2mm.	Massive. Fracturing weak to moderate, locally strong. Generally rather featureless, save for some weak flow breccia and vague possible fragments.	Quartz-carbonate and some chlorite in fractures. Locally some very weak biotite alteration and sericitisation.	Trace disseminated py-po. Rare minor interstitial cp.	Fractures at 55-60, 45, 10-20° Possible(?) inclusion of andesitic material or (?) tuff at 3165.5-3166.5'. Fractured andesite dykes at 3203-3210' 3263-3265'.
3370.0-~~3636.0~~	Massive Acid Quartz Porphyry Flow	Grey	Fine	Uneven. Moderate development of quartz eyes up to 3mm.	Massive. Fracturing weak to moderate, locally strong. Featureless, save for local weak flow breccia.	Quartz-carbonate and chlorite in frs.	Trace py in fractures and interstitially	Fractures at 70-75, 55-60, 30-35 and 20°. Rare stringers of granodioritic material.
~~3636.0~~-3570.0	Fractured Acid Quartz Porphyry Flow	Grey	Fine	Uneven. Abundant ~~smoky~~ bluish quartz eyes up to 2mm.	Fracturing moderate to strong, locally weak, Local development of flow breccia and occasional vague possible fragments but generally rather featureless.	Quartz-carbonate, sericite and chlorite in fractures. Flecked with chlorite.	Occasional minor interstital po-py and trace cp.	Fractures at 65, 55, 40-45, 20-30, 5° to parallel to core axis. Possible fragmental tuff (andesitic) at 3536-3539'.

Hole No. D-326

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
				Locally some sericitised feldspar phenocrysts.				
3570.0-3681.3	Massive Acid Quartz Porphyry Flow	Grey	Fine	Uneven. Abundant faintly bluish quartz eyes up to 3mm. Local fairly strong development of sericitised feldspar phenocrysts up to 3mm.	Massive. Fracturing weak to moderate, locally strong. Local development of weak flow breccia and fragments.	Quartz-carbonate, sericite and chlorite in fractures. Some chlorite fleaking.	Local minor interstitial po-py with trace sp. Local minor disseminated po-py.	Fractures at 65-70, 45-55, 10-15° and parallel to core axis. Possible tuff band with weak possible bedding and sharp approx. 55° contacts at 3618.6-3619.8'. Granodioritic dykelet with ill-defined contacts at 3659-3660.5'.
3681.3-3702.5	Fractured Dacite Dyke	Grey	Fine		Fracturing moderate to strong, locally weak. Featureless.	Quartz-carbonate and chlorite in fractures.	Trace diss py.	Fractures at 75-80, 55, 45, 25, 5-15°. Fractured contacts. Dykelets of granodiorite material at 3699-3699.7' and a few stringers of similar material elsewhere.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3702.5–3745.0	Fractured Altered Acid Quartz Porphyry Flow?	Greenish grey	Fine	Uneven. Abundant quartz eyes up to 3mm. Locally some sericitised feldspar phenocrysts.	Fracturing moderate to strong, locally weak. Featureless save for rare possible flow? breccia.	Sericite, chlorite and some quartz–carbonate in fractures. Widespread strong epidotisation.	Trace diss py.	Fractures at 80, 65, 55, 40, 25 and 15°. Upper 10' of unit is relatively unaltered with abrupt transition to lower, altered section. Granodioritic dykelet with gradational contacts at 3741–3742'. Flow ? could be? dyke.
3745.0–3764.5	Fractured Andesitic Flow	Grey	Fine	Even.	Fracturing moderate to strong. Rare amygdules and weak flow breccia, otherwise featureless.	Quartz–carbonate, sericite and chlorite in fractures.	Tarce py disseminated interstitially and in amygdules.	Fractures at 50–60, 35, 20–25°. Fractured upper contact.
3764.5–3786.0	Fractured Acid Dyke	Grey	Fine	Even.	Fracturing moderate to strong, locally weak. Featureless.	Quartz–carbonate, sericite and chlorite in fractures.	Trace disseminated py.	Fractures at 70–80, 55–60, 30, 5°. Fractured 45° upper, undefined lower contacts.
3784.0–3793.0	Fractured Dacite Flow	Grey	Fine	Even. A few scattered possible sericitised feldspar phenocrysts apparent.	Fracturing moderate. Featureless save for a few weak amygdules.	Trace sericite and epidote in fractures.	Trace py disseminated and infractures.	Fractures at 60, 45–50, 30, 20°.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3793.0-3802.0	Massive Tuff?	Grey	Fine	Even.	Massive. Fracturing weak to moderate. Featureless apart from local weak bedding.	Sericite and quartz-carbonate in fractures.	Locally some banded semi-massive py-po. Trace diss py.	Fractures at 65, 45-50, 20-25°. Three inches banded py-po at 3799.5-3799.8' and a few smaller bands elsewhere. Undefined upper and lower contacts.
3802.0-3955.0	Fractured Rhyolite Flow	Dark grey	Fine	Even.	Fracturing moderate, to strong, locally weak. Local strong development of flow breccia and occasional weak amygdules.	Quartz-carbonate, sericite and chlorite in fractures. Local development of sericite and some weak grid altn.	Trace interstitial py.	Fractures at 70-75, 45-50, and 20-30°. Unit is identified as rhyolite solely on basis of its stratigraphic position. It is compositionally a dacite. Lamprophyre dyke with fractured contacts at 3824.5-3830'.
3955.0-3968.0	Massive Quartz Feldspar Porphyry Dyke?	Grey	Fine	Uneven. abundant sericitised feldspar phenocrysts up to 5mm. Fairly abundant quartz eyes up to 5mm.	Massive. Fracturing weak to moderate, locally strong. Generally featureless.	Sericite and chlorite in fractures.	Rare trace cp in frs.	Fractures at 70, 55, 35, 15-25° and irregular. Undefined upper and lower contacts. Local irregular chlorite-filled fractures reminiscent of breccia suggests unit may possibly not be intrusive.

Depth	Rock Type	Colour & % Felsic	Grain Size	Texture	Structure	Alteration	Sulphides	Remarks
3968.0–4040.0	Fractured Rhyolite Flow	Dark grey	Fine	Even. Locally a few sericitised feldspar phenocrysts.	Fracturing moderate to strong, locally weak. A few weak amygdules and local flow breccia. Some? chloriteised frags.	Quartz-carbonate, chlorite and sericite in fractures amygdules. Local sericitisation.	Trace py-cp in	Fractures at 85, 60–70, 50, 30, 10–15°. Unit is similar to rhyolite above overlying Q.F.P., compositionally very heterogeneous, locally almost andesitic. Light grey lamprophyre dyke with fractured contacts at 4024.5–4026.5'.
4040.0–4099.0	Rhyolite Flow Breccia	Grey	Fine	Even	Fracturing weak to moderate, locally strong. Fairly well developed flow breccia.	Quartz-carbonate, sericite and chlorite in fractures. Slight sericitation.	Trace interstitial py.	Fractures at 70–75, 60, 35, 40, 25, 15°. Rhyolite is not very acid.
					END OF HOLE			

Annexe 3

le groupe
Conseil en
Aménagement
Forestier

Rouyn-Noranda, le 03 juillet 2001

Madame Simone Paquin
Forêt Québec,
Unité de gestion de Rouyn,
70, Boulevard Québec,
Rouyn-Noranda, Québec,
J9X 6R1.

Objet : Permis autres fins

Madame

Ressources Metco inc., a fait appel à nos services afin de préparer et de vous présenter une demande de permis pour la saison 2001-2002.

Cette demande a pour objet, le débroussaillage de 2 kilomètres par 2 mètres d'accès existant dans le canton de Dufresnoy dans le but de prendre des relevés géophysiques. La superficie des travaux de 0,40 hectare.

Vous trouverez ci-joint, les des documents requis:

Demande de permis
Carte Écoforestière 1 : 20 000
Carte des claims
Formulaire SOPFeu

Une autorisation de débuter les travaux dans les plus brefs délais serait grandement appréciée, Josée Gauthier est le contacte en région. Cellulaire 514-248-0790

Espérant, le tout à votre entière satisfaction, recevez, Madame, nos salutations distinguées.

Lavergne Marc

Marc Lavergne

c.c. Monsieur Florent Gauthier

162, rue de l'Énergie - C.P. 819
Amos (Québec) J9T 3X4
Tél.: (819) 727-9127 - Téléc.: (819) 727-9565

48, 19e Rue - C.P. 996
Rouyn-Noranda (Québec) J9X 2M3
Tél.: (819) 764-9127 - Téléc.: (819) 764-6706

Québec
Ministère des Ressources naturelles

DEMANDE DE PERMIS D'INTERVENTION

AUTRES FINS QUE L'APPROVISIONNEMENT D'UNE USINE DE TRANSFORMATION DU BOIS

Catégories : ① Activités minières ② Faunique-récréatif ③ Utilité publique ④ Chauffage commercial ⑤ Ponctuel de recherche ⑥ Énergétique ou métallurgique

Référence permis

Exercice : 2001 - 2002 Catégorie n° : 1

☑ Création [exercice/région/UG/catégorie] Création

☐ Modification n° :

Réf. permis n° : 0 8 2 - 0 0 1

Identification du demandeur

Titulaire : Ressources Metco inc.
Adresse : 1155, rue University, bureau 1405
Ville : Montréal
Province : Québec Code postal : H3B 3A7
Contact: Florent Gauthier
Téléphone : 514 - 875 - 6279
Région Josée Gauthier
Téléphone : 514 - 248 - 0790 cellulaire

Localisation des travaux

Région : 08
Unité administrative : 082
N° feuillet : 32 / D 06 S.E.
Parcelles [±] : 1202,4 et 1212,2
Superficie [±] en hectare : 0,4 ha

Aires communes : Nil
MRC : 860
Cantons : de Dufresnoy

Volume [±] [±] m³ solide	Essence Appellation	Code	Diamètre (cm) DHP	DMU	Qualité	Zone Tarifaire	Taux ($/m³)	Droits ($)	Destination des bois (Essence / diamètre / qualité / zone tarifaire)
0,00	Cèdre	080	10	10	C	819	1,10 $		Usages Domestiques
0,00	Cèdre	080	10	10	C	819	1,10 $		Usages Domestiques
0,00	Cèdre	080	10	10	C	819	1,10 $		Usages Domestiques
0,00	Cèdre	080	10	10	C	819	1,10 $		Usages Domestiques
	0,00								0,00 $
0,00	Bouleau Blanc	105	10	10	D	819	1,50 $		Usages Domestiques
0,00	Bouleau Blanc	105	10	10	D	819	1,50 $		Usages Domestiques
0,00	Bouleau Blanc	105	10	10	D	819	1,50 $		Usages Domestiques
0,00	Bouleau Blanc	105	10	10	D	819	1,50 $		Usages Domestiques
	0,00								0,00 $
0,00	Peupliers	190	10	10	B	819	4,10 $		Usages Domestiques
0,00	Peupliers	190	10	10	B	819	4,10 $		Usages Domestiques
0,00	Peupliers	190	10	10	B	819	4,10 $		Usages Domestiques
0,00	Peupliers	190	10	10	B	819	4,10 $		Usages Domestiques
	0,00								0,00 $
0,00	SEPM	370	10	10	B	819	14,25 $		Usages Domestiques
0,00	SEPM	370	10	10	B	819	14,25 $		Usages Domestiques
0,00	SEPM	370	10	10	B	819	14,25 $		Usages Domestiques
0,00	SEPM	370	10	10	B	819	14,25 $		Usages Domestiques
	0,00								0,00 $
0,00	0,00						Total des droits à facturer ($) :	0,00 $	0,00 $

Divers

Description sommaire des travaux :
Relevé géophysique
2 kilomètres d'accès existant à débroussailler

Claim : Voir carte ci-jointe

Paiement reçu (MRN)

☐ Chèque ☐ Mandat ☐ Argent comptant

Montant : _____

Paiement reçu le : _____

Date du chèque ou mandat : _____

Signature du demandeur : Paul Bouvier Pour Florent Gauthier Date : 03 juillet 2001

Analyse conforme (MRN) : _____ (initiales)

Québec
Ministère des
Ressources naturelles

1 9 -07- 2001

Rouyn-Noranda, le 17 juillet 2001

Monsieur Florent Gauthier
Ressources Metco inc.
1155, rue University
Montréal (Québec)
H3B 3A7

OBJET : Permis annuel d'intervention 2001-2002

Monsieur,

Vous trouverez ci-joint votre permis annuel d'intervention pour l'année 2001-2002.

Veuillez noter que si vous désirez effectuer des changements à ce permis, vous vous devez d'apporter une modification à celui-ci et ce, avant le début des opérations.

Pour des informations supplémentaires, n'hésitez pas à communiquer avec nous.

Recevez, Monsieur, nos salutations distinguées.

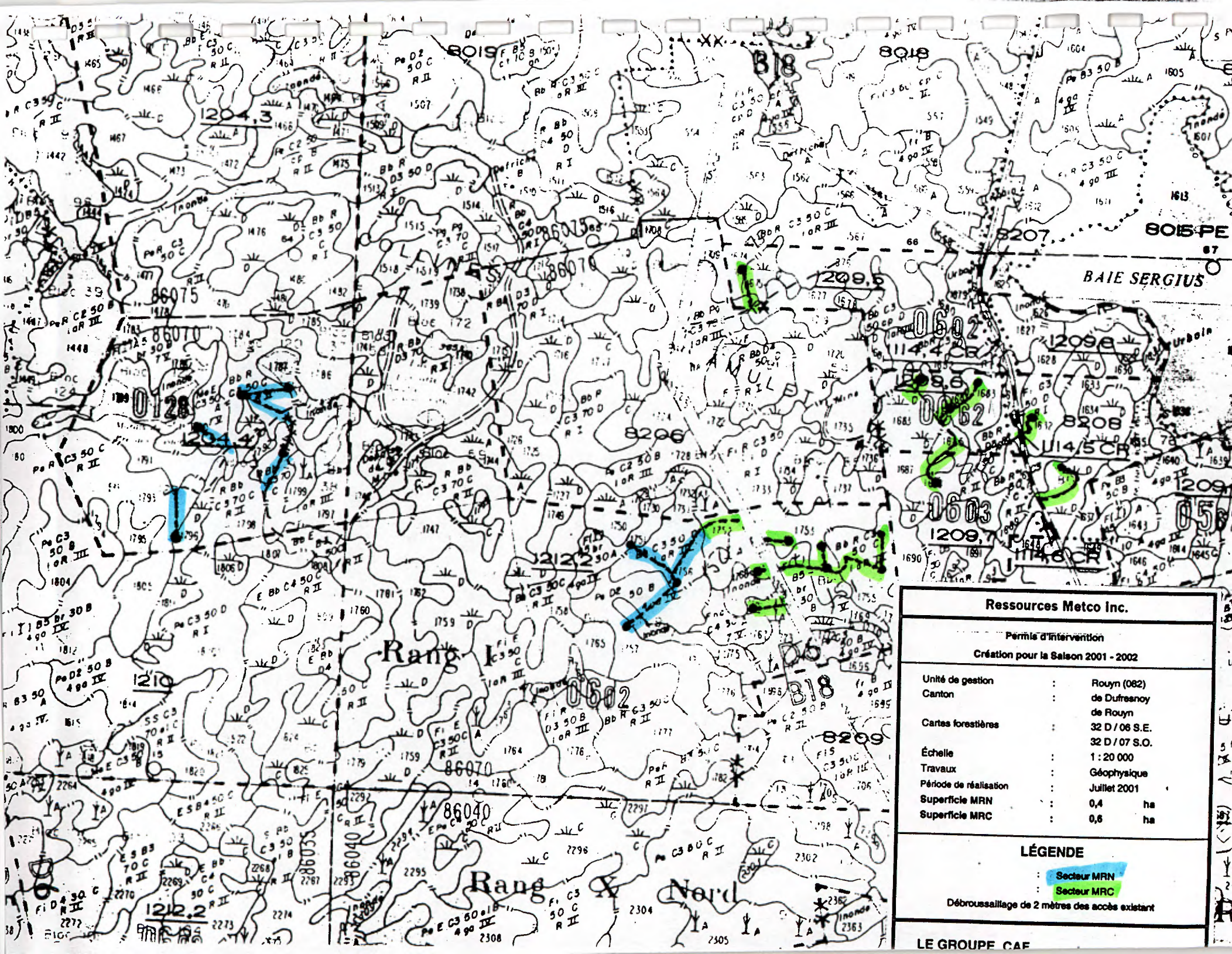
GD/mlm

Gérald Drolet, tech. f.
Unité de gestion de
Rouyn-Noranda

p.j.

Forêt Québec
Unité de gestion Rouyn-Noranda

70, boulevard Québec
Rouyn-Noranda (Québec) J9X 6R1
Téléphone : (819) 763-3388
Télécopieur : (819) 763-3216


BAIE SERGIUS
Rang I
Rang X Nord
Ressources Metco Inc.
Permis d'intervention
Création pour la Saison 2001 - 2002
Unité de gestion : Rouyn (082)
Canton : de Dufresnoy
de Rouyn
Cartes forestières : 32 D / 06 S.E.
32 D / 07 S.O.
Échelle : 1 : 20 000
Travaux : Géophysique
Période de réalisation : Juillet 2001
Superficie MRN : 0,4 ha
Superficie MRC : 0,6 ha
LÉGENDE
Secteur MRN
Secteur MRC
Débroussaillage de 2 mètres des accès existant
LE GROUPE CAE

SOCIÉTÉ DE PROTECTION DES FORÊTS CONTRE LE FEU
BASE PRINCIPALE DE VAL D'OR
C.P. 608- VAL D'OR (QUÉBEC) J9P 4P6
Tél.: (819) 824-4100 Télécopieur: (819) 824-4133

TRAVAUX EN FORÊT

L'article de la "Loi sur les forêts" oblige toute personne qui exécute ou fait exécuter des travaux en forêt, à aviser l'organisme de protection opérant sur le territoire concerner, de son intention, et obtenir de cet organisme un plan de protection qui est obligatoire, et les coûts engendrés par les activités de surveillance qui y sont prévues, sont assumés par la personne qui exécute les travux en forêt. Les dépenses d'extinction d'un incendie déclaré à l'occasion de l'exécution des travaux en forêt sont entièrement à la charge de la personne qui les exécute, à moins qu'elle ne prouve que l'incendie n'est pas dû à sa faute ou à celle de ses employés.

Date : 3 juillet 2001

Personne faisant exécuter les travaux		Personne exécutant les travaux
Ressources Metco inc	Nom	Ressources Metco inc
1155, rue de l'université bureau 1405	Adresse	**1155, rue de l'université** bureau 1405
Montréal, Québec **H3B 3A7**		**Montréal, Québec** H3B 3A7
M. Florent Gauthier	Personne à contacter	**M. Florent Gauthier**
(514) 875 - 6279	Téléphone	**(514) 875 - 6279**
	Télécopieur	

DESCRIPTION DES TRAVAUX

Date de début des travaux: 4 juillet 2001 Durée: 4 semaines

Nature des travaux: Relevée géophysique débroussaillage d'accès existant 5KmX2m

Superficie: 1,00Ha Nb de personnes au travail: 2 à 6

Équipements utilisés: Scie à chaîne, VTT,

Brûlage: oui____ non__X__

U.G. du MRN: Rouyn (082) Canton: de Rouyn & Dufresnoy

Signature du responsable du projet: Daveyne Drave pour Florent Gauthier

À L'USAGE DE LA SOCIÉTÉ DE PROTECTION SEULEMENT

____ Les travaux ne nécessitent pas un plan de surveillance.

____ Les travaux nécessitent un plan de surveillance, et un contrat a été signé entre les parties le: _____.

_____ Date: _____

Signature du responsable de la Société de protection

Annexe 4

GÉRARD LAMBERT
GÉOSCIENCES
Consultation et génie-conseil en géophysique.

le 29 Juillet, 2001

MEMORANDUM

À: **Josée Gauthier,** Ressources Metco Inc., Chibougamau, Qué.

De: **Gérard Lambert**, Géophysicien consultant, Val Senneville, Qué.

Re: **Propriété Dufault, Levés Pulse E.M. en forage**

Suite aux levés Pulse E.M. en forage effectués récemment par **Géophysique TMC** dans plusieurs anciens trous de forage sur la propriété Dufault, voici un compte-rendu des résultats obtenus et de leur interprétation.

On peut se rappeler que ces forages ont été lus entre le 3 Juillet et le 20 Juillet 2001 avec le système Pulse E.M., dans le but de localiser et caractériser des zones conductrices potentiellement nouvelles, dans un rayon de 125 à 150 mètres autour de chaque trou investigué. L'identification d'anomalies électromagnétiques jusque-là inconnues pourrait mener potentiellement à définir des nouvelles zones de sulfures massifs sur cette propriété.

• Méthode utilisée (Système Pulse E.M. de Crone Geophysics):

Les levés Pulse E.M. en forage visaient principalement à détecter, ainsi que déterminer selon l'éventualité, la position de la bordure de la ou des lentilles sulfurées conductrices (si présentes) et ce, en-dedans d'un rayon de détection nominal de 100m à 150m autour des trous sondés (dépendant des dimensions de la zone conductrice). Ces forages testaient des horizons stratigraphiques minéralisés et considérés comme favorables, dans les extensions de zones de sulfures massifs déjà connues.

135, du Rivage, Val Senneville (Québec) Canada J0Y 2P0
Tél. : (819) 874-0635 Fax : (819) 874-0635 E-mail : geophysics@sympatico.ca

La technique Pulse E.M. en forages utilise deux composantes principales: **Le transmetteur**, consistant en une génératrice AC de 5 kW, fournissant la puissance à un générateur de signal dont la forme d'onde est rectangulaire, et envoyée sous forme d'impulsions à tous les 16.6 millisecondes.

Ce signal, une fois amplifié par le transmetteur, est injecté dans une boucle de fil #10 AWG de forme carrée ou rectangulaire, étendue sur le terrain autour du collet des trou à lire et dont les dimensions étaient fonction de la profondeur d'investigation désirée. Un courant de 12 à 20 ampères circulait dans les boucles de transmission, dépendant de leurs dimensions.

La coupure soudaine du courant dans la boucle pendant 1.5 millisecondes et ce à tous les 16.6 msec, dans la boucle de transmission, cause l'induction de courants de Foucault dans tout conducteur métallique soumis à l'influence du champ primaire de cette boucle émettrice.

La partie réceptrice du système Pulse E.M. consiste en une **sonde** qui est introduite dans le trou de forage et qui capte les champs magnétiques associés aux courants de Foucault induits dans un conducteur, s'il y en existe un dans le voisinage du trou.

La sonde est reliée au **récepteur** par un fil gainé et renforci avec du kevlar. L'amplitude des champs magnétiques secondaires est mesurée par le récepteur. Cette amplitude dépend de la proximité du conducteur par rapport à la sonde, sa conductance et ses dimensions.

Le récepteur analyse l'amplitude des champs secondaires à des intervalles (fenêtres) de temps distribués de façon géométrique à l'intérieur d'une durée de quelques millisecondes après la coupure du champ primaire transmis.

Plus le conducteur est "mauvais", c'est-à-dire de faible conductance, plus l'amplitude des courants décroît rapidement avec le temps. La réponse anomalique ne sera alors visible que sur les premiers canaux. A l'inverse, une décroissance lente de l'amplitude des canaux indique un "bon" conducteur, i.e. de forte conductance. On observera alors la réponse anomalique sur presque tous les 20 canaux.

La figure 1. ci-bas montre la géométrie du champ primaire produit par une boucle de transmission typique, et la relation qui existe entre les lignes de flux de ce champ avec les horizons conducteurs investigués.

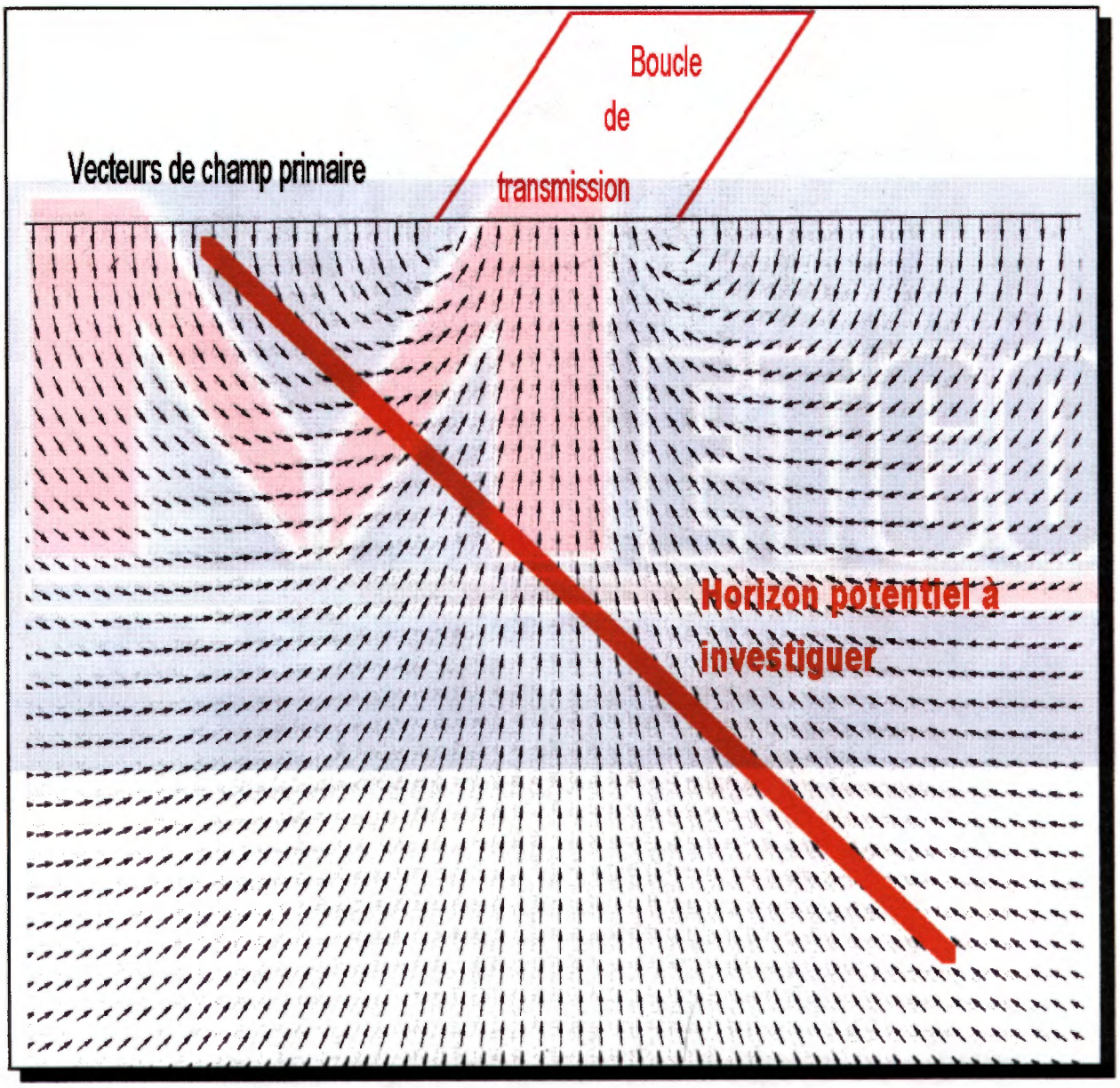


Figure 1.

La carte à l'échelle 1:5,000 annexée au présent rapport montre un plan de surface indiquant la localisation des boucles de courant (dessinées en vert) utilisées pour les 16 forages qui ont été lus avec succès sur cette propriété (noms des forages tracées en rouge et surlignés en jaune). Les boucles de transmission ont été positionnées de façon à activer adéquatement des horizons conducteurs de pendage est à sud-est faible, entre 30° et 40° (voir figure 1. ci-dessus).

En forage, on effectue normalement les lectures à tous les 20m et 10m, avec détail aux 5m s'il y a une anomalie. Les résultats sont présentés sous forme de profils de l'amplitude des canaux 1 à 20 de la composante axiale (composante "Z") en fonction de la profondeur.

Des mesures de détail avec une sonde mesurant les composantes orthogonales (X et Y) sont effectuées quand des anomalies sont observées sur la composante Z dans les trous sondés et que ces anomalies sont potentiellement intéressantes. La lecture des composantes X et Y du champ secondaire permet en principe de situer le centre électrique ou la bordure électrique d'un conducteur par rapport au forage investigué et diminue ainsi (mais n'élimine pas nécessairement) le besoin de faire des mesures directionnelles avec des boucles multiples. La composante X est surtout diagnostique de la position haut-bas, alors que la composante Y permet de situer le conducteur latéralement (gauche-droite) par rapport au trou.

L'amplitude des canaux, leur taux de décroissance ainsi que la longueur d'onde des réponses Z, X et Y sont trois éléments essentiels dans l'évaluation de l'importance d'une anomalie Pulse E.M. en forage.

Une sonde factice ("dummy probe") est toujours envoyée dans chaque trou avant de le lire, pour s'assurer qu'il n'est pas bloqué ou qu'il ne représente pas de risques de blocage potentiels. Si le trou est bloqué ou que le risque est jugé trop grand par les techniciens, le trou n'est pas lu.

Le tableau présenté en annexe provient de Géophysique TMC et énumère tous les forages sur lesquel une tentative de levé a été faite ainsi que les résultats obtenus.

Le tableau ci-bas énumère les principales caractéristiques des trous qui ont été sondés avec succès:

TROU	Longueur lue avec Pulse E.M.	Boucle P.E.M.
D-54	685m	#255, 500m x 500m
D-88	565m	#255, 500m x 500m
D-95	620m	#255, 500m x 500m
D-100	450m	#100, 250m x 250m
D-105	1220m	#105, 600m x 600m
D-273	810m	#278, 500m x 500m
D-276	880m	#278, 500m x 500m
D-278	915m	#278, 500m x 500m
D-279	1200m	#105, 600m x 600m
D-282	50m	#100, 250m x 250m
D-283	1000m	#278, 500m x 500m
D-286	390m	#286, 200m x 200m
D-306	1070m	#278, 500m x 500m
D-318	1250m	#318326, 600m x 600m
D-323	1180m	#318326, 600m x 600m
D-326	1290m	#318326, 600m x 600m

• Résultats et Interprétation:

Les profils Pulse E.M. (Échelle 1:2,000) obtenus pour chaque forage sont en appendice du présent rapport. Dans le présent contexte, il importe de rappeler que le but principal des travaux géophysiques était de réussir à identifier des anomalies qui indiquent ou qui suggèrent que des masses importantes de sulfures massifs conducteurs auraient été soit "manquées" ou bien encore recoupées par les forages en question. Il est évident que si un forage avait recoupé des sulfures massifs sur des épaisseurs appréciables, les gens concernés auraient poursuivi avec d'autre trous autour.

Cependant dans le cas d'une intersection relativement minime de sulfures et qui n'aurait pas suscité d'intérêt additionnel, la méthode Pulse E.M. en forage permet d'établir (à partir de l'anomalie "In-Hole" produite par les sulfure recoupés) si l'intersection en question fait partie d'une masse plus importante dont le centre serait situé plus loin du trou mais en-dedans du rayon de recherche de la technique.

Dans le cas d'un trou qui n'aurait pas recoupé de sulfures au contact stratigraphique jugé "favorable", la méthode Pulse E.M. en forage permet d'établir si de tels sulfures existent en-dedans du rayon de recherche de la technique. L'anomalie "Off-Hole" ainsi produite devrait normalement être diagnostique des caractéristiques physiques (dimensions, géométrie, distance, conductivité) de la masse de sulfures détectée, si elle existe.

À ces profondeurs (500m à 1000m sous la surface), la détermination ou l'estimation des dimensions des conducteurs détectés est particulièrement importante car on ne serait sûrement pas intéressé à "pourchasser" un corps conducteur dont les dimensions seraient, disons 50m par 50m. Heureusement la technique Pulse E.M. en forage est particulièrement sensible aux effets des dimensions et de la continuité électrique de la minéralisation en sulfures métalliques et permet donc d'estimer l'étendue et le volume occupé par les courants induits.

Voici donc une brève discussion les résultats obtenus dans les 16 forages qui ont été sondé avec le système Pulse E.M.

Trou D-54: 1- Effets de courants induits en surface au début du trou ("smoke ring currents")
2- À 560m: petite anomalie "In-hole" (positive) de courte longueur d'onde et correspondant à la présence localisée de pyrite. L'anomalie ne suggère pas d'extensions latérales à cette minéralisation. Aucune recommandation de suivi n'est proposée.

Trou D-88: 1- À 390m: petite anomalie "Off-hole" (négative) de très courte longueur d'onde probablement causée par une petite veinule de sulfures. L'anomalie ne suggère pas de dimensions appréciables à cette minéralisation. Aucune recommandation de suivi n'est proposée.

Trou D-95: 1- Effets de courants induits en surface au début du trou ("smoke ring currents"). Aucune autre anomalie; profils plats.

Trou D-100: 1- Effets de courants induits en surface au début du trou ("smoke ring currents"). Aucune autre anomalie; profils plats.

Trou D-105: 1- Effets de courants induits en surface au début du trou ("smoke ring currents")
2- À 450m: anomalie "In-hole" (positive) de 14 canaux avec une composante "edge", de longueur d'onde courte à moyenne et correspondant probablement à un recoupement de sulfures semi-massifs (possiblement ceux associés au gîte Corbet situé tout près). L'anomalie ne suggère cependant pas des extensions latérales importantes pour cette minéralisation. Aucune recommandation de suivi n'est proposée.
3- Entre 565m et 610m: Trois réponses formant dans leur ensemble une anomalie "In-hole" de 15 à 20 canaux, de longueur d'onde courte à moyenne et correspondant probablement d'autres recoupements de sulfures semi-massifs ou massifs, possiblement eux aussi associés au gîte Corbet. L'anomalie dans son ensemble ne suggère cependant pas des extensions latérales très importantes pour cette minéralisation, compte tenu de la profondeur à laquelle elle se trouve. Aucune recommandation de suivi n'est proposée à moins que des ingrédients géologiques ou géochimiques exceptionnels soient présents.

Le reste du trou est calme, sans aucune autre anomalie.

Trou D-273: 1- Effets de bruits au début du trou causé par la ligne électrique située près du collet.
2- À 785m: toute petite réponse "In-hole" de très courte longueur d'onde et correspondant à la présence localisée d'une veinule de pyrite. L'anomalie ne suggère pas d'extensions latérales à cette minéralisation. Aucune recommandation de suivi n'est proposée.

Trou D-276: 1- Vers 820m: anomalie "edge" (positive sur les premiers canaux et négative sur les canaux tardifs) de courte longueur d'onde et probablement causée par les sulfures (Py + Po) recoupés dans cet intervalle (811m - 865m). L'anomalie ne suggère pas de dimensions appréciables à cette minéralisation. Aucune recommandation de suivi n'est proposée.

Trou D-278: 1- Vers 865m et 905m: 2 anomalies "Off-hole" de 18 canaux, de courte longueur d'onde et probablement causée par les sulfures (Py + Po) recoupés dans les trous D-276 et D-283. Aucune indication de grandes dimensions cependant et donc peu de potentiel économique, même si la conductivité semble grande (probablement à cause de la pyrrhotine).

Trou D-279: 1- Effets de courants induits en surface au début du trou ("smoke ring currents"). Aucune autre anomalie; profils plats.

Trou D-282: Profils trop courts. Trou bloqué à 50m.

Trou D-283: 1- À 890m: petite anomalie "Off-hole" de 13 canaux, de courte longueur d'onde et probablement associés aux veinules de sulfures (Py + Po) recoupés dans cet intervalle.
2- À 990m: toute petite réponse "In-hole" de 18 canaux, de très courte longueur d'onde et correspondant à la présence localisée de veinules de pyrite-pyrrhotine. L'anomalie ne suggère pas d'extensions latérales à cette minéralisation.
Dans les deux cas, aucune indication de grandes dimensions n'est suggérée cependant et donc peu de potentiel économique, même si la conductivité semble grande (probablement à cause de la pyrrhotine).

Trou D-286: Aucune autre anomalie; profils plats.

Trou D-306: 1- À 1025m: toute petite réponse "In-hole" de 20 canaux, de très courte longueur d'onde et correspondant à la présence localisée de veinules de pyrite-pyrrhotine-chalcopyrite extrêmement conductrices. L'anomalie ne suggère pas d'extensions latérales à cette minéralisation, cependant.

Trou D-318: 1- Effets de bruits au début du trou causés probablement par une ligne électrique ou des fils qui ont rapport avec la tour de communications située tout près. Le résultat donne une demi-anomalie off-hole de très grande longueur d'onde.
2- À 1190m: toute petite réponse "In-hole"/"Edge" de 20 canaux, de très courte longueur d'onde et correspondant à la présence localisée de veinules de pyrite-pyrrhotine-chalcopyrite extrêmement conductrices. L'anomalie ne suggère cependant pas d'extensions latérales à cette minéralisation.

Trou D-323: Aucune autre anomalie; profils plats.

Trou D-326: 1- Comme pour le D-318: Effets de bruits au début du trou causés probablement par une ligne électrique ou des fils qui ont rapport avec la tour de communications située tout près. Le résultat donne une demi-anomalie off-hole de grande longueur d'onde.
Aucune autre anomalie; profils plats pour le reste du trou, sauf peut-être pour quelques veinules de Py-Po vers 1090m.

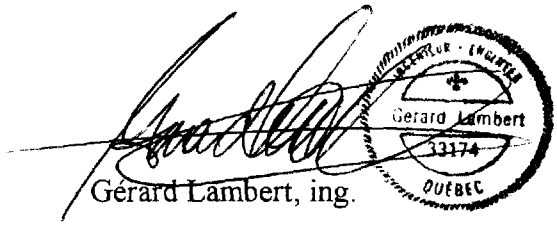
• Conclusion et recommandations

Les levés géophysiques de type Pulse E.M. en forage qui ont été complétés dans seize anciens trous de forage en Juillet 2001 sur la propriété **Dufault** n'ont pas vraiment réussi à détecter ou définir la présence de zones sulfurées conductrices pouvant être considérées comme nouvelles ou pouvant justifier des efforts d'exploration additionnels, du moins dans un rayon de 200 mètres autour de chaque trou sondé. En d'autres termes, les résultats géophysiques obtenus n'ont pas vraiment permis de détecter des réponses anomaliques pouvant provenir de nouvelles lentilles minéralisées de dimensions économiquement intéressantes dans le voisinage immédiat (150m ou moins) de chacun de ces trous sondés.

Sur la base de ces résultats, il est difficile de recommander de tester, dans un rayon de 300 mètres ou moins des points de percée de chacun de ces forages, les horizons investigués par ces derniers.

À titre informatif, j'ai inclus avec le présent rapport des profils considérés comme des "classiques" et qui proviennent de la découverte de la lentille 97 à la Mine Langlois (Breakwater) du temps que Serem-Québec explorait dans le secteur de Grevet en 1990. Cette lentille, située en profondeur et pratiquement invisible à partir de la surface, a été découverte suite à la définition et à l'interprétation d'une anomalie "Off-hole" dans le trou 95 vers 800m. Le trou 97, qui fut localisé afin d'investiguer cette anomalie, a recoupé 8 mètres de sulfures massifs et demeure un des meilleurs trous sur cette lentille de 8 M.T. de sulfures massifs zincifères qui fait environ 250m par 300m, telle que vue en longitudinale. Ces profils sont à la même échelle (1:2,000) que ceux du présent travail, afin rendre les comparaisons plus aisées. C'est ce genre de profils Pulse E.M. (surtout en termes de longueur d'onde et de qualité de définition) qui est hautement désirable sur un projet et qui indique sans l'ombre d'un doute la présence de minéralisation conductrice d'intérêt franchement économique.

En conclusion, il est recommandé de faire des efforts afin de débloquer certains autres trous afin d'y appliquer la méthode Pulse E.M., ou bien encore de lire possiblement certains autres forages considérés comme stratégiques, s'il en demeure.



Gérard Lambert, ing.
Géophysicien consultant
Lambert Géosciences Ltée.

GÉOPHYSIQUE TMC
RAPPORT JOURNALIER "DUMMY" BOREHOLE

NOM DU PROJET : LAC DUFAULT

# TROU	PROFONDEUR "DUMMY"	PROFONDEUR "LEVÉ"	COMPOSANTE	COMMENTAIRES
D-54	685 M	685 M	"Z"	
D-88	565 M	565 M	"Z"	
D-95	620 M	620 M	"Z"	
D-100	450 M	450 M	"Z"	
D-105	1220 M	1220 M	"Z-X-Y"	
D-109	2 CRIC HYDRAULIQUES EN LOCATION N'ONT PAS SUFFIT À ENLEVER LE BOUCHON DU CASING (beaucoup d'eau)			
D-165	525 M	N/A	N/A	BLOQUÉ
D-255	900M	N/A	N/A	Dernier trou; abandonné faute de budget
D-257	2 CRIC HYDRAULIQUES EN LOCATION N'ONT PAS SUFFIT À ENLEVER LE BOUCHON DU CASING (beaucoup d'eau)			
D-268	150 M	N/A	N/A	BLOQUÉ À 150 M + INONDÉ
D-269	345 M	N/A	N/A	BLOQUÉ À 345 M ABANDONNÉ
D-273	810 M	810 M	"Z"	
D-276	880 M	880 M	"Z"	
D-278	915 M	915 M	"Z"	
D-279	1200 M	1200 M	"Z"	
D-282	526 M	50 M	"Z"	"DUMMY" O.K. BLOQUÉ AVEC SONDE "Z" À 50 M
D-283	1000 M	1000 M	"Z-X-Y"	X-Y LEVÉ DE 700M À 1000 M
D-286	390 M	390 M	"Z"	
D-306	1070 M	1070 M	"Z"	
D-316	N/A	N/A	N/A	Pas de casing. Le roc a besoin d'être laver pour trouver le trou (pompe).
D-318	1250 M	1250 M	"Z"	
D-321	1 M	N/A	N/A	Pas de casing, trou dans bedrock
D-323	1280 M	1180 M	"Z"	Bloqué avec sonde "Z" à 1180 m
D-325	N/A	N/A	N/A	Pas de casing. Le roc a besoin d'être laver pour trouver le trou (pompe).
D-326	1290 M	1290 M	"Z"	

Plan en pochette

Québec
Ministère des Ressources naturelles

Permis d'intervention

Activités minières

Original...

08201013-001

Identification du titulaire	Localisation des travaux	Permis
Titulaire : **Ressources Metco inc.** Adresse : **1155, rue University** Ville : **Montréal** Province : **Québec** Code postal : **H3B 3A7** Contact : **Florent Gauthier** Téléphone : **514-875-6279 cell 514-248-0790** Télécopieur : Courriel :	Région : **08** Aire commune : **999-99** Unité administrative : **082** MRC : **860** Canton : **Dufresnoy** Superficie [±] : **+ 0,40 ha** [Cumulatif] : **0,40 ha** Parcelles [±] : **[+] 1212,2, [+] 1202,4** [Cumulatif] : **1212,2, 1202,4**	**CRÉATION** Numéro de permis : **08201013-001** Exercice : **2001-2002** Date d'émission : **2001.07.09** Date d'échéance : **2002.03.31** *Imprimé le 2001.07.09, 16h26 - Page 1 de 1*

Volume [±]		Diamètre (cm)			Zone	Taux	Droits	Cumulatif du permis				Destination des bois
[±] (m^3 solide)	Ess.	DHP	DMJ	Qualité	tarif.	($/$m^3$)	($)	Essence (code, appellation)	Qualité	Volume (m^3)	Droits ($)	
						Total des droits à facturer ($) :	—			Total des droits cumulés ($) :	—	

Divers

Date de présentation de la demande de permis : **2001.07.09**

N° feuillet : **32 D/6 S.E.**

N° demande mesurage :

Description sommaire des travaux **Relevé géophysique, 2 km d'accès à débrouissailler**

Notes / Remarques : **Le Règlement sur les normes d'intervention (F-4.1, r 1.001.1) s'applique.**

Pas de facture (aucun volume modifié)

MRN-GÉOINFORMATION 2001

GM 59044

par _____ 16/07/01

Claude Beauchesne, chef de l'unité de gestion Date

Direction de l'assistance technique
MRN-3260-18 (99-12)

AUTORISATION D'INTERVENTION

AUTRES FINS QUE L'APPROVISIONNEMENT D'UNE USINE DE TRANSFORMATION DU BOIS

Catégorie: Faunique-Récréatif

Numéro de l'autorisation: 82-86043-105

IDENTIFICATION DU DEMANDEUR	LOCALISATION DES TRAVAUX	VALIDITÉ DU PERMIS
Nom : Ressource Metco inc. Adresse : 1155, rue University, bureau 1405 Ville: Montréal, Qc H3B 3A7 Responsable : Florent Gauthier Téléphone : (514) 875-6279 Télécopieur : (819)	Région: 008 Unité de gestion : 082 MRC : 860 Aire commune: Lots intra Zone de tarification :818 Superficie (±) : 0.6 ha Municipalité: Rouyn Canton (s): Dufresnoy; Rouyn Rang (s): 1; 10 Lot(s):; 75, 77, 78 Bloc 150 à 151; 28 à 34 Parcelle(s) (±): Feuillet n°: 32 D / 06 S.E. et 32 D / 07 S.O.	Exercice : 2001-2002 Modification no: Date d'émission: 13/07/01 Date d'échéance: 31/03/02

±	VOLUME m^3 solide	ESSENCE		DIAMÈTRE MINIMAL (cm)		QUALITÉ	DROITS ($)			DESTINATION Essence/Qualité
		Appellation	Code	DHP	DHU		Taux $/$m^3$	±	Montant	
+	0	Cèdre	080	10	10	C	1.10	+	$	MRN-GÉOINFORMATION 2001
+	0	Bouleau	105	10	10	D	0.85	+	&	
+	0	Peuplier	190	10	10	B	1.50	+	$	GM 59044
+	0	SEPM	370	10	10	B	4.70	+	$	

AUTRES PARTICULARITÉS	DESCRIPTION DES TRAVAUX	FACTURE ACQUITTÉE
Réf. demande du Claim no: Autorisation de mesurage : Remarque: Carte en annexe fait partie intégrante du permis. Le règlement sur les normes d'intervention dans les forêts du domaine public doit être appliqué intégralement. En cas de non respect des normes, le demandeur assumera les frais et réclamations encourus par la ou les municipalités lors de poursuite.	Travaux de débroussaillage pour un sentier pour prendre des relevés géophysiques. Aucun volume de coupe de bois.	Montant : nil Paiement reçu le : nil Autorisé par: Marie-Josée Blais, ing. f.