

825636

DATE: October 30, 1991  
TO: Dave Heberlein  
COPIES TO: Alex Davidson, Ian Pirie, Chris Nagati  
FROM: Cam Clayton  
RE: October Monthly Report

Rainbow-Tam O'Shanter/Wildrose Properties: Drilling finally began on the Rainbow-Tam O'Shanter property on October 1, 1991. The program began at the northern end of the property testing andesite volcanics north of the contact zone with the porphyry. The program is continuing in a southerly direction across the porphyry system testing both the porphyry and chlorite-magnetite zone, and will finish by testing disseminated and vein type mineralization in the Wildrose property area. Currently drilling is proceeding on hole P-13 in the area of chlorite-magnetite zone and this should be completed today. This will conclude the drilling of the north and central portion of the property and the drill will be moved to the southern portion. Six holes remain to be drilled and completion of the program is expected by November 15, 1991. Drill summaries are attached to this report, as is a plan map of drill holes completed. The following are summaries of the best intersections obtained to date. Only results for seven holes are available so far.

HOLE TM91-2 (P-1): 32.7 metres @ 0.136% Cu  
32.7 metres @ 0.331 g/t AU

includes: 11.4 metres @ 0.213% Cu  
11.4 metres @ 0.186 g/t Au

10.8 metres @ 0.068% Cu  
10.8 metres @ 0.716 g/t Au

<u>Interval</u>	<u>Length</u>	<u>Cu (ppm)</u>	<u>Au (ppb)</u>
39.3-42.3	3 m	2262	183
42.3-44.3	2 m	2814	245
44.3-46.5	2.2 m	2208	244
46.5-47.7	1.2 m	1461	60
47.7-50.7	3 m	1740	157
50.7-53.5	2.8 m	834	364
53.5-54.4	0.9 m	719	4800
54.4-56.4	2.0 m	137	42
56.4-58.6	2.2 m	632	700
58.6-60.7	2.1 m	367	285
60.7-61.5	0.8 m	2414	216
61.5-63.0	1.5 m	958	188
63.0-66.0	3.0 m	1311	100
66.0-69.0	3.0 m	1231	45
69.0-72.0	3.0 m	1255	80

**Comments:** These grades are over the interval from 39.3 metres to 72.0 metres occurring within propylitically altered andesite containing variably altered zones of epidote, carbonate and minor hematite. The highest Au grade of 4800 ppb (719 ppm Cu) over 0.9 metres occurred from 53.5 metres to 54.4 metres and is associated with a shear.

**HOLE TM91-4 (P-3):** 31.5 metres @ 0.116% Cu  
negligible Au

<u>Interval</u>	<u>Length</u>	<u>Cu (ppm)</u>	<u>Au (ppb)</u>
24.0-26.5	2.5 m	1466	19
26.5-29.0	2.5 m	1061	12
29.0-31.5	2.5 m	1088	20
31.5-34.25	2.75 m	1255	3
34.25-37.3	3.05 m	822	18
37.3-40.3	3.0 m	1099	21
40.3-43.3	3.0 m	1104	22
43.3-46.3	3.0 m	1017	16
46.3-49.3	3.0 m	1253	14
49.3-52.0	2.7 m	1411	30
52.0-53.5	1.5 m	1332	39
53.5-55.5	2.0 m	1113	30

**Comments:** The samples are from a zone of chloritically altered andesite overprinted by patchy weak to very intense silicification. Magnetite occurs up to 8% fine grained in disseminations and as stringers and chalcopyrite occurs visibly in trace amounts throughout. Leucoxene may be present.

**HOLE TM91-6 (P-7):** 2.45 metres @ 1.15% Cu  
 2.45 metres @ 0.565 g/t Au  
 2.45 metres @ 5.7 g/t Ag

<u>Interval</u>	<u>Length</u>	<u>Cu (ppm)</u>	<u>Au (ppb)</u>
136.55-139	2.45 m	11547	565

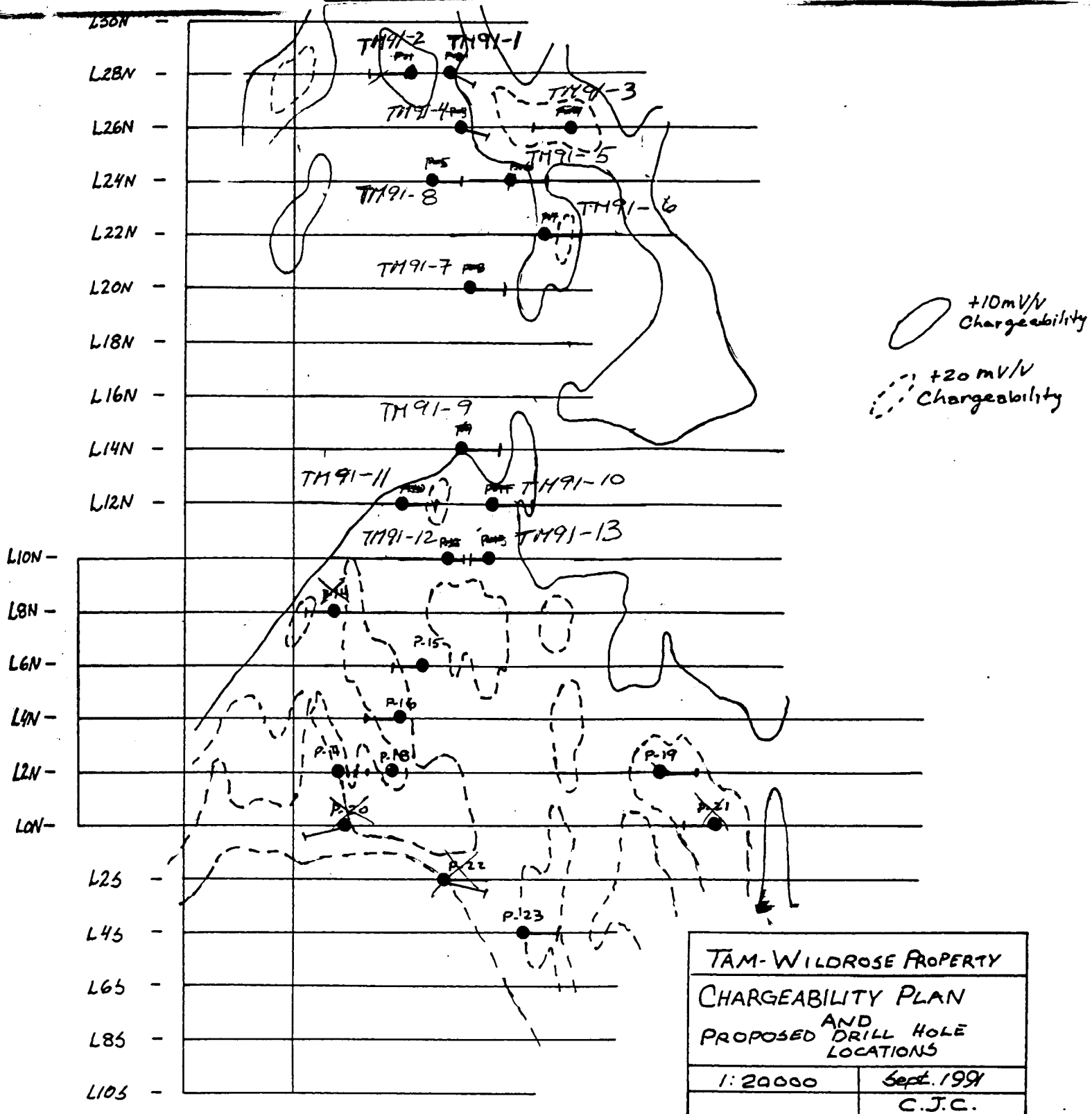
**Comments:** The interval is from a fault zone that is bleached and intensely silicified within a chloritized zone of andesitic volcanics containing patchy zones of weak to moderate magnetism. Unfortunately the hanging wall and footwall of this zone are essentially barren (HW interval 298 ppm Cu, 3 ppb Au; FW interval 645 ppm Cu, 19 ppb Au).

**HOLE TM91-7 (P-8):** 12.0 metres @ 0.114% Cu  
 12.0 metres @ .049 g/t Au

<u>Interval</u>	<u>Length</u>	<u>Cu (ppm)</u>	<u>Au (ppb)</u>
54.2-57.2	3.0 m	1374	47
57.2-60.2	3.0 m	941	39
60.2-63.2	3.0 m	1128	48
63.2-66.2	3.0 m	1129	61

**Comments:** The interval is taken from a fine grained diorite containing chloritized mafics, sulphides, and magnetite comprising 50% of the core. Rare narrow K-spar alteration zones occur with quartz veinlets. Minor chalcopyrite is disseminated throughout.

Copper and gold grades have so far proven sub-economic for a large tonnage deposit. Results from holes associated with the chlorite-magnetite zone and the diorite in areas of highest Cu-Au soil geochemistry have not been obtained as yet and the possibility of higher grades occurring in drill core is still present.



4+00W  
 2+00W  
 B0  
 2+00E  
 4+00E  
 6+00E  
 8+00E  
 10+00E  
 12+00E  
 14+00E  
 16+00E  
 18+00E  
 20+00E  
 22+00E  
 24+00E  
 26+00E  
 28+00E

MINNOVA, INC.

DATE: October 7, 1991

TO: I. PIRIE, D. Heberlein, C. CLAYTON

FROM: C. NAGATI

RE: DRILL HOLE SUMMARY

DRILL HOLE: TM 91-1 (P-2) START DATE: OCT 1 END DATE: OCT 2

NORTHING: 28+00N EASTING: 9+75E ELEVATION: 993m

AZIMUTH: 110 DIP: -60 LENGTH: 122.8m

PURPOSE: To test Cu/Au soil, chargeability, magnetic, and rock sample anomalies in the andesitic volcanics to the north of the diorite.

<u>INTERVAL</u>		<u>DESCRIPTION OF INTERVAL</u>
<u>FROM</u>	<u>TO</u>	
0.0	6.1	CASING
6.1	20.1	ANDESITE: Typical propylitic alteration; core is chlorite altered and contains 5-10% epidote. Intense silicification zone between 15.8-16.8m contains 20% pyrite.
20.1	21.3	BRECCIA ZONE: Andesite, as above, has been fault brecciated.
21.3	23.2	QUARTZ-CARBONATE VEIN: Vein contains shear planes paralleling the vein orientation.
23.2	102.6	SHEARED TO FAULTED ANDESITE: The andesite in this interval has been affected by a broad shear zone which has produced local talc-carbonate alteration and stockworks. Between 28.9-31.0m, 52.2-57.0m, 72.4-72.5m and 100.3-102.6m fine grained magnetite is present in concentrations up to 40%. There is trace to 5% pyrite and trace very fine grained chalcopyrite disseminated throughout the interval.
102.6	104.7	CHLORITIC ASH TUFF: Bedding is contorted; foliation @ 20 degrees to core axis.

DDH TM 91-1 CONT...

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104.7      106.9      SERICITE ALTERED ANDESITE: Massive, green andesite is striated by localized sericitic alteration along foliation. Some K-spar bearing veins occur between 106-106.5m.

106.9      122.8      SILICIFIED ANDESITE: Fine to medium grained andesite has been extensively silicified. This silicified zone contains greater concentrations of sulphides than previously seen in the hole; between 106.9-112.2m there is 10-20% disseminated pyrite and chalcopyrite in a ratio (py:cp) of 7:3. Epidote is disseminated throughout the interval and frequently rims the sulphide disseminations.

\*\*\*\* END OF HOLE \*\*\*\*

DISCUSSION

The broad zone of shearing and faulting seen in the hole is believed to be related to a fault structure mapped on surface to the north. The presence of small intervals containing fairly abundant magnetite within this shear zone may account for magnetic anomalies seen in this area.

The presence of numerous (small) zones bearing chalcopyrite came as something of a surprise. The overall content is quite low but is a further indication that mineralizing fluids are present in the area. Hopefully, correspondingly high gold geochemical results will be obtained.

MINNOVA INC.

DATE: October 7, 1991

TO: I. PIRIE, D. Heberlein, C. CLAYTON

FROM: C. NAGATI

RE: DRILL HOLE SUMMARY

DRILL HOLE: TM 91-2 (P-1) START DATE: OCT 2 END DATE: OCT 4

NORTHING: 28+00N EASTING: 8+25E ELEVATION: 1038m

AZIMUTH: 270 DIP: -45 LENGTH: 129.7m

PURPOSE: To test Cu/Au soil, chargeability, magnetic and rock sample anomalies in andesitic volcanics to the north of the diorite.

<u>INTERVAL</u>		<u>DESCRIPTION OF INTERVAL</u>
<u>FROM</u>	<u>TO</u>	
0.0	9.1	CASING
9.1	94.5	PROPYLITIC ALTERED ANDESITE: Massive green chlorite altered andesitic volcanic rocks have been further altered by variable patchy zones of epidote, carbonate and minor hematite. Zones of intense silicification occur between 26-26.4m, 26.8-28.2m, 60.7-61.5m. The core is weakly magnetic to 28.2m; <1% visible magnetite. The pyrite content varies between 1-15% with a mean concentration of approximately 5%. Narrow zones containing trace to 1% finely disseminated chalcopyrite in andesite, pyritic blebs, quartz-carbonate stringers and silicified intervals occur to 82.3m.
94.5	96.6	SILICIFIED VOLCANICS: Intense silicification destroys original rock textures in what was most likely andesite. Core is non-magnetic. 5% pyrite, .5% chalcopyrite.
96.6	98.6	ANDESITE: Chloritic, non-magnetic andesite.
98.6	102.5	SILICIFIED VOLCANIC: Intense silicification again destroys original textures in what was most likely an andesite. 5% pyrite, <=1% fine grained chalcopyrite.



DEH TM 91-2 CONT...

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- 102.5      104.8      ANDESITE: Typical chloritized andesite.
- 104.8      105.7      SILICIFIED VOLCANIC: Another interval of intensely silicified andesite? which contains <=8% pyrite and <.5% chalcopyrite.
- 105.7      117.0      ALTERED ANDESITE: Chloritized andesite is affected by further alteration of varying types and intensities including silicification, bleaching and sericite alteration, and what appears to be a buff stained aphanitic plagioclase - albite?? Feldspar stain has no visible effect. The interval contains small zones with minor chalcopyrite and/or <= 1% magnetite.
- 117.0      117.8      HORNBLLENDE/PLAGIOCLASE LAMPROPHYRE? DYKE?: 20% phenocrysts of hornblende and 3% plagioclase phenocrysts are supported by an aphanitic matrix.
- 117.8      122.45      ALTERED ANDESITE: This interval is similar to that between 105.7-117.0m. There is 6% pyrite, <1% chalcopyrite present in the interval.
- 122.45      125.3      HORNBLLENDE/PLAGIOCLASE LAMPROPHYRE? DYKE?: The core in this interval is the same as that between 117.0-117.8m.
- 125.3      125.9      BRECCIA: A sericitic matrix supports angular to subrounded clasts of quartz, andesite, and lamprophyre dyke.
- 125.9      129.7      ANDESITE: Typical chlorite altered andesite.

\*\*\*\* END OF HOLE \*\*\*\*

DISCUSSION

Chalcopyrite was once again intersected in small quantities in a number of zones throughout the hole. There seems to be a high correlation between chalcopyrite and silicification/silica in this hole, although this is not an absolute relationship. The intermittent 10m wide zone of very intense silicification carrying chalcopyrite is likely to be the source of some soil geochemical anomalies in the area. The silica in these zones is quite grey and probably carries further microscopic sulphides.

MINNOVA, INC.

DATE: October 8, 1991

TO: I. PIRIE, D. Heberlein, C. CLAYTON

FROM: C. NAGATI

RE: DRILL HOLE SUMMARY

DRILL HOLE: TM 91-3 (P-4) START DATE: OCT 4 END DATE: OCT 6

NORTHING: 26+00N EASTING: 12+75E ELEVATION: 980m

AZIMUTH: 090 DIP: -60 LENGTH: 121.9m

PURPOSE: To test Cu/Au soil, chargeability, magnetic, and rock sample anomalies in andesitic volcanics and diorite.

<u>INTERVAL</u>		<u>DESCRIPTION OF INTERVAL</u>
<u>FROM</u>	<u>TO</u>	
0.0	6.1	CASING
6.1	24.6	HORNFELSE? ANDESITE: Interval consists of massive dark green andesitic volcanics which are quite siliceous without being obviously silica flooded; possibly weakly hornfelse. 3% fine grained pyrite and minor chalcopyrite are present in fine disseminations. Narrow bleached zone between 15.27-15.77m contains 1% cp, 8% py, 1% epidote. A 4mm wide Qtz-feld-epidote veinlet contains 5% molybdenum?? (very fine grained with silvery-grey streak).
24.6	35.2	INTENSE ALBITIZED? ANDESITE: 30% of the interval is typical andesite; the remainder of the interval contains patchy, intensely bleached zones of aphanitic albite?. Feldspar stain has negligible effect.
35.2	37.6	HORNFELSE? ANDESITE: Similar to the interval 6.1-24.6m. The interval contains patchy bleaching.
37.6	38.1	QUARTZ MONZODIORITE: Mafics are chloritized. 4% epidote stringers along fractures.
38.1	66.8	EPIDOTE/ALBITE ALTERED ANDESITE: The interval contains 30% fine grained...

DDH TM 91-3 CONT...

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50% chlorite altered dark green andesite. The andesite is very weakly calcareous except in zones rich in epidote which occurs in a moderately calcareous matrix. Minor chalcopyrite mineralization occurs with pyrite clots and with intense epidote alteration.

66.8          67.8          QUARTZ DIORITE: The diorite contains 2% disseminated fine grained magnetite.

67.8          121.9        EPIDOTE/CARBONATE ALTERED ANDESITE: The unit consists of the typical dark chloritic andesite which is locally moderately epidote and carbonate altered. Between 75.2-76.3m 45% of the interval is qtz diorite; the intrusive/volcanic contact is subparallel to the core axis. There are numerous narrow fault zones located between 77.1-91.45m. Trace chalcopyrite.

\*\*\*\* END OF HOLE \*\*\*\*

#### DISCUSSION

The three small zones of fine grained dioritic rock intersected in the hole were not visibly mineralized outside of a small amount of magnetite. The presence of a larger dioritic body nearby is the probable cause of the albite?, epidote and hornfelsed zones within the andesite. Minor amounts of disseminated chalcopyrite are again associated with these altered zones within the andesite.

MINNOVA, INC.

DATE: October 13, 1991

TO: I. PIRIE, D. Heberlein, C. CLAYTON

FROM: C. NAGATI

RE: DRILL HOLE SUMMARY

DRILL HOLE: TM 91-4 (F-3) START DATE: OCT 6 END DATE: OCT 9

NORTHING: 26+00N EASTING: 10+12E ELEVATION: 1024m

AZIMUTH: 110 DIP: -45 LENGTH: 154.8m

PURPOSE: To test Cu/Au soil, chargeability, magnetic, and rock sample anomalies in andesitic volcanics and diorite.

<u>INTERVAL</u>	<u>DESCRIPTION OF INTERVAL</u>
<u>FROM</u>	<u>TO</u>
0.0	12.2 CASING
12.2	65.53 SILICIFIED ANDESITE: Massive chlorite altered andesites are overprinted by patchy weak to very intense silicification, with weak to moderate sil. being prevalent. The interval contains up to 8% fine grained magnetite disseminations and stringers. Overall, the interval contains minor very fine grained disseminated chalcopyrite; local concentrations can reach 4%. Between 30.1-30.8m there is 3% cp, 1% py and 5% magnetite. Pyrite content ranges between 1-5%. There is a trace amount of a pale brown, very fine grained mineral which may be sphalerite. At 55.5-56.3m there is 20% py, minor cp and sp? (possibly leucoxene).
65.53	73.4 PROPYLITICALLY ALTERED DIORITE: Fine grained diorite comprised of 50% chlorite altered mafics and 50% sausseritized feldspar. The diorite contains disseminated magnetite.
73.4	77.1 QUARTZ VEIN: Finely fractured quartz vein containing up to 20% chlorite altered clasts.
77.1	96.6 ANDESITE: Typical chlorite altered andesitic volcanic rocks are moderately to intensely overprinted by silicification to a depth of

- 90.85m. The interval contains up to 10% disseminated magnetite, 2% pyrite and minor chalcopyrite.
- 96.6        110.55      RECRYSTALLIZED CHERT: The unit consists is monotonous, uniform sugary quartz with minor sericite. Minor cross-cutting grey quartz veinlets.
- 110.55      122.0        DIORITE: The intrusive is comprised of roughly equal proportions of chloritized mafics and plagioclase + quartz. The unit is moderately magnetic.
- 122.0       124.35       ALTERED ANDESITE: Typical green chlorite altered andesitic unit which has patchy brown sericite alteration. The interval is strongly calcareous. Small magnetic zones are present within the unit.
- 124.35      129.2        DIORITE: As in the interval 110.55-122.0m.
- 129.2       154.8        LEUCO-DIORITE: The unit is a very pale dioritic intrusive. Mafics are represented by pale green 'ghosts'; in 10% of the interval the mafics are better preserved - chlorite altered. Core is non-magnetic.

\*\*\*\* END OF HOLE \*\*\*\*

#### DISCUSSION

The variable amounts of magnetite seen throughout the hole serve to explain both the magnetic and the chargeability anomalies seen in the vicinity. The lithologic change to leuco-diorite should be represented by a decrease in both the magnetic and chargeability susceptibility. The presence of minor amounts of fine grained disseminated chalcopyrite to a depth of 65.53m likewise explains the presence of the copper soil anomaly in the area. Presumably the presence of copper mineralization will correspond to that of gold. No massive sulphide veins were intersected in the hole.

MINNOVA, INC.

DATE: October 19, 1991

TO: I. PIRIE, D. Heberlein, C. CLAYTON

FROM: M. MCDOWELL

RE: DRILL HOLE SUMMARY

DRILL HOLE: TM 91-5 (P-6) START DATE: OCT 9 END DATE: OCT 11

NORTHING: 24+00N EASTING: 12+00E ELEVATION: 1017m

AZIMUTH: 090 DIP: -65 LENGTH: 111.8m

PURPOSE: To test silicification, Cu/Au soil, chargeability, magnetic, and rock sample anomalies in andesitic volcanics and diorite.

<u>INTERVAL</u>		<u>DESCRIPTION OF INTERVAL</u>
<u>FROM</u>	<u>TO</u>	
0.0	3.05	CASING
3.05	7.40	SILICIFIED ANDESITE: Typical andesitic volcanic rocks which are weakly to intensely silicified. Between 5.41-7.0m there is a zone of intense silicification. Mafics are intensely chloritized. Core is non-magnetic. <1% chalcopryrite occurs as fine-grained disseminations which tend to be associated with more intensely silicified zones.
7.40	8.22	DIORITE: Medium-grained leucocratic diorite.
8.22	65.8	VARIABLY SILICIFIED ANDESITE: Approximately 60% of the interval consists of intensely silicified andesite which washes out original textures. Other alteration minerals include patchy zones of sericite, epidote, hematite, albite? and pervasive weak to moderate chlorite. Some of the very intensely 'silicified' zones may intervals of recrystallized chert. Patchy weak magnetic zones are present. Trace to 3% chalcopryrite is finely disseminated throughout the interval. Between 59.37-64.95m siliceous breccia clasts are supported by a silicified chloritic matrix. Between 31.35-31.6m there

DDH TM 91-5 CONT...

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- 65.8      68.4      CHERT BRECCIA: Chert clasts are supported by a rehealed siliceous matrix. Local intense recrystallization obscures fragmental textures. <1% pyrite, chalcopyrite present.
- 68.4      83.27      INTENSELY SILICIFIED ANDESITE: Intense silicification generally destroys original textures and gives core a glassy appearance. The intervals 68.4-69.37m and 75.05-75.5m consist of brecciated and rehealed silicified andesite. Some of the intensely silicified andesite may be recrystallized cherts. Trace to minor chalcopyrite is disseminated throughout the interval. Between 77.8-79.2m there is 10% pyrite and 2% chalcopyrite.
- 83.27      83.9      TRACHYTE: Aphanitic K-spar matrix supports 10% plagioclase and 5% biotite phenocrysts. The unit has chilled margins. The unit is similar to the alkali-feldspar trachyte seen in TM 91-6.
- 83.9      111.8      INTENSELY SILICIFIED ANDESITE: The interval is similar to the previous occurrences of silicified andesite seen above. Up to 30% K-spar phenocrysts occur in 1 cm wide quartz veinlets at 84.25m. Up to 1% magnetite is present in the more intensely silicified zones. Minor chalcopyrite is present.

\*\*\*\* END OF HOLE \*\*\*\*

DISCUSSION

The presence of patchy magnetite mineralization in the less silicified andesitic core accounts for the zone of mag high readings obtained in the geophysical survey. The survey also indicates that there is an increase in chargeability towards the east. The cause for this increase is not readily determinable from the core. Concentrations of chalcopyrite up to 3% in narrow intervals of silicified andesite are the probable source of the Cu soil anomalies. It is expected that there will be a positive correlation between the Cu and Au results.

**MINNOVA, INC.**

DATE: October 18, 1991

TO: I. PIRIE, D. Heberlein, C. CLAYTON

FROM: C. NAGATI

RE: DRILL HOLE SUMMARY

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**DRILL HOLE:** TM 91-6 (P-7) **START DATE:** OCT 12 **END DATE:** OCT 13**NORTHING:** 22+00N **EASTING:** 12+87.5E **ELEVATION:** 1010m**AZIMUTH:** 095 **DIP:** -45 **LENGTH:** 153.0m**PURPOSE:** To test silicification, Cu/Au soil, chargeability, magnetic, and rock sample anomalies in andesitic volcanics and diorite.

<u>INTERVAL</u>		<u>DESCRIPTION OF INTERVAL</u>
<u>FROM</u>	<u>TO</u>	
0.0	25.0	CASING
25.0	69.4	ANDESITE: The interval consists of variably altered andesitic volcanics. Alteration minerals present include silica, hematite, epidote, sericite and ubiquitous chlorite. Between 25-31.4m the andesite is moderately to intensely silicified with trace to 1%, very fine grained, disseminated chalcopyrite. A zone of weak hornfels alteration occurs from 57.3-65.2m. This interval contains small patchy zones of coarser grained dioritic and alteration mineral assemblages. The unit is generally non-magnetic.
69.4	75.9	ALKALI FELDSPAR TRACHYTE: A fine grained K-spar matrix supports 10% plagioclase phenocrysts and rosettes, 5% chloritized mafics and 3% quartz. The unit is not far removed compositionally or texturally, from belonging to one of the following rock types: trachyte, alkali feldspar syenite or syenite. The unit is weakly to moderately magnetic. The unit's contacts exhibit a weak chill margin.



MINNOVA, INC.

DATE: October 21, 1991

TO: I. PIRIE, D. HEBERLEIN, C. CLAYTON

FROM: C. NAGATI

RE: DRILL HOLE SUMMARY

DRILL HOLE: TM 91-7 (P-8) START DATE: OCT 14 END DATE: OCT 15

NORTHING: 19+91.5N EASTING: 13+31.5E ELEVATION: 1015m

AZIMUTH: 090 DIP: -60 LENGTH: 126.8m

PURPOSE: To test diorite in an area of high chargeability, Cu/Au soil, magnetic, and rock sample anomalies.

<u>INTERVAL</u>		<u>DESCRIPTION OF INTERVAL</u>
<u>FROM</u>	<u>TO</u>	
0.0	11.0	CASING
11.0	11.2	SILICIFIED VOLCANICS: Intense silicification of volcanics (chert?) destroys original textures. The rock has a greenish tint caused by fine grained chlorite.
11.2	113.6	DIORITE: The interval generally consists of a fine grained dioritic intrusive in which chloritized mafics plus sulphides and magnetite comprise 50% of the core and felsic minerals make up the remainder. The felsic minerals are 44% sausseritized plagioclase, 1% quartz, <5% K-spar. The diorite is weakly to moderately magnetic with up to 3% disseminated magnetite. There are some rare, narrow K-spar alteration zones associated with quartz veinlets present in the unit. The core contains numerous rubbled intervals and brittle fault breccias. Minor amounts of chalcopyrite are disseminated throughout the unit; cp is commonly associated with quartz-carbonate stringers.
113.6	114.55	LEUCO-DIORITE: The interval consists of a fine grained leucocratic diorite intrusive containing 10% chloritized mafics and 3% quartz. The unit is not magnetic.

DDH TM 91-7 CONT...

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114.55      121.4      DIORITE: This unit is very similar to that above (11.2-113.6m).

121.4      123.55      ALKALI FELDSPAR TRACHYTE: 3% chloritized mafic phenocrysts and 3% plagioclase phenocrysts are supported by an aphanitic K-spar matrix. The unit is weakly magnetic. No sulphides were seen.

123.55      126.8      LEUCO-DIORITE: The core in this interval is similar to that between 113.6-114.55m.

\*\*\*\* END OF HOLE \*\*\*\*

DISCUSSION

The presence of disseminated magnetite throughout the diorite intrusive is the source of the high magnetic readings obtained in the geophysical survey. The source of the weak chargeability high is uncertain. There may be a slight overall increase in the amount of magnetite and sulphides at depth, but, in general, the higher sulphide/magnetite concentration zones are very localized. The boundary of the chargeability high may coincide with the contact between diorite and leuco-diorite. The copper soil anomaly is caused by the fine disseminations of chalcopyrite throughout the diorite.

**MINNOVA, INC.**

DATE: October 24, 1991

TO: I. PIRIE, D. HEBERLEIN, C. CLAYTON

FROM: C. NAGATI

RE: DRILL HOLE SUMMARY

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DRILL HOLE: TM 91-8 (P-5) START DATE: OCT 15 END DATE: OCT 17NORTHING: 24+00N EASTING: 12+00E ELEVATION: 1075mAZIMUTH: 096 DIP: -60 LENGTH: 120.4mPURPOSE: To test diorite and andesitic volcanics in an area of high chargeability, Cu/Au soil, magnetic, and rock sample anomalies.

<u>INTERVAL</u>		<u>DESCRIPTION OF INTERVAL</u>
<u>FROM</u>	<u>TO</u>	
0.0	3.05	CASING
3.05	79.0	RECRYSTALLIZED CHERT: The chert is generally highly fractured and rubbled with local brittle fault breccia zones. The chert has a uniform texture comprised of fine grained sugary quartz. There is a minor amount of very fine grained, disseminated chalcopyrite disseminated in the chert and associated with quartz stringers. Between 56.7-57.4m there is 1% cp. Between 3.05-8.0m there is 3% malachite staining which primarily occurs along fracture surfaces. The abundance of malachite is likely the result of supergene enrichment.
79.0	89.8	QUARTZ/CARBONATE/TALC VEINED CHERT: Recrystallized chert (as above) is intermittently cut by veins which, in addition to the above minerals, contain up to 10% pyrite, and 3% chlorite/sericite. The veined intervals comprise 20% of the interval. At 83.5m there is a <1cm wide veinlet containing sphalerite?, chalcopyrite, and a microscopic, soft, grey mineral which could be either galena or molybdenite.

DDH TM 91-8 CONT...

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quartz carbonate vein in chert hosts 30% very coarse grained pyrite (up to 2 cm cubes).

91.0	93.6	RECRYSTALLIZED CHERT: As above. Between 91.2-91.3m there is 30% pyrite.
93.6	96.3	PLAGIOCLASE/SERICITE? ALTERED CHERT: 70% of the interval has been affected by irregular white plagioclase veining and pale brown sericitic? alteration. The plag is altering to carbonate. Up to 3% pyrite clots occur with the plag.
96.3	102.4	RECRYSTALLIZED CHERT: As in the previous intervals except that there are small patches of plagioclase related to the plagioclase occurrences of the overlying unit. Plag alteration comprises 3% of the interval. A quartz vein bearing 20% medium to coarse grained pyrite occurs between 113.77-114m.

\*\*\*\* END OF HOLE \*\*\*\*

#### DISCUSSION

The presence of copper soil anomalies in the area can be attributed to the supergene enriched? malachite zone seen in the uppermost portion of the hole. The main mass of the chert body should cause a marked resistivity anomaly. The pyrite rich vein seen between 89.8-91.0m may be large enough to cause a relative chargeability high. The highest chargeability zone indicated by the geophysical survey is probably caused by underlying andesitic volcanics (not intersected in the hole).

**MINNOVA, INC.**

DATE: October 26, 1991

TO: I. PIRIE, D. HEBERLEIN, C. CLAYTON

FROM: M. MCDOWELL

RE: DRILL HOLE SUMMARY

DRILL HOLE: TM 91-9 (P-9) START DATE: OCT 21 END DATE: OCT 23NORTHING: 14+00N EASTING: 10+25E ELEVATION: 1116mAZIMUTH: 090 DIP: -45 LENGTH: 152.7mPURPOSE: To test the chlorite-magnetite alteration zone.

<u>INTERVAL</u>		<u>DESCRIPTION OF INTERVAL</u>
<u>FROM</u>	<u>TO</u>	
0.0	3.76	CASING
3.76	20.0	SILICIFIED ANDESITE: Massive, fine grained andesite. Weak to moderate silicification is associated with patchy magnetite (to 20%). Chlorite, calcite, and hematite (after Mt) are the main alteration minerals. Minor talc occurs with calcite in veinlets. Rubbled core, strong clay alteration, and limonite staining from 13.95-14.45m indicate a fault zone. Disseminated Py (1%) and Cp (<1%) are associated with the more intensely silicified zones.
20.0	27.64	ANDESITE: Typical fine grained, green andesite. The alteration assemblage consists of chlorite, sericite, and carbonate, with patchy silicification. The unit is mainly non magnetic although Mt occurs locally to 5%. Cp, Py are minor in this interval (<1%).
27.64	60.26	TRACHYTE: This interval consists mainly of a porphyritic trachyte dyke, with chlorite-altered andesite from 34.9-35.8m, 41.3-47.5m, and 55.0-56.0m. The trachyte has a fine grained to aphanitic Kspar matrix and supports up to 25% phenocrysts of plagioclase and biotite. The nature of the phenocrysts

DDH TM 91-9 CONT...

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and it is subdivided on this basis. Mafics are chloritized and carbonate alteration is pervasive.

60.26      94.94      ANDESITE:      Fine-grained, massive green andesite. The core varies from non magnetic to strongly magnetic; Mt is often altered to hematite. Carbonate alteration is pervasive throughout the matrix, and calcite veinlets locally form stockworks and vein breccia zones. Other alteration minerals are chlorite and sericite. Kspar occurs in syenitic dykelets at 84.1m and 79.1m. Less than 10% of the interval is silicified. Py, Cp <1% occur as fine grained disseminations, stringers, and in Q/C veinlets with bleached alteration envelopes. From 72.48-73.93m there is 2% vfg disseminated Py, and 1% Cp.

94.94      152.7      DIORITE: Fine grained, greyish green diorite. The core in this interval is highly fractured and rubbly, especially in the brittle fault zones from 96.93-101.19m and 102.25-103.12m. Propylitic alteration is dominant, although Kspar occurs in veinlets and patchy zones (<1%). Plag is altered to a fine grained mixture of zoisite and calcite, often in patchy bleached zones. Mafics are pervasively chloritized; in places chlorite is well developed and lamellar. The diorite is non magnetic to weakly magnetic. Hematite (after Mt) is abundant. Calcite veining occurs throughout and vein bx occurs from 121.9-122.6m, 124-125.7m, and 143.3-143.5m. 1% Py occurs along fine fractures; Cp is minor (<1%). 3% molybdenite occurs with Py (5%) and Cp (1%) in a 2cm Q/C veinlet at 151.9m.

\*\*\*\* END OF HOLE \*\*\*\*

#### DISCUSSION

The fine grained, disseminated chalcopyrite found within the silicified and quartz veined andesite at the top of the hole is the likely source of the Cu soil anomalies. Magnetite was most abundant at the top of the hole (to 20%) where it is associated with silicification (+/- Cp). The geophysical section present at camp would seem to indicate that magnetism should be greater at depth, where only weak to non-magnetic core was seen.

**MINNOVA, INC.**

DATE: October 29, 1991

TO: I. PIRIE, D. HEBERLEIN, C. CLAYTON

FROM: C. NAGATI

RE: DRILL HOLE SUMMARY

DRILL HOLE: TM 91-10 (P-11) START DATE: OCT 23 END DATE: OCT 24NORTHING: 12+00N EASTING: 11+50E ELEVATION: 1146mAZIMUTH: 090 DIP: -50 LENGTH: 132.28m

PURPOSE: To test chlorite-magnetite alteration, andesitic volcanics, and silicification with coincident chargeability, Cu/Au soil, magnetic, and rock sample anomalies.

<u>INTERVAL</u>		<u>DESCRIPTION OF INTERVAL</u>
<u>FROM</u>	<u>TO</u>	
0.0	3.3	CASING
3.3	74.5	DIORITE: Typical fine grained propylitically altered diorite. Magnetism throughout the interval varies between very weak to intense (very localized occurrences). Sulphide content consists of <= 2% pyrite and <1% very fine grained disseminated chalcopyrite. Between 18.3-70.05m there are small intervals of generally weak K-spar alteration. The K-spar alteration, while locally occurring throughout the dioritic groundmass, is frequently associated with stringers of quartz and/or magnetite. A quartz-magnetite-chlorite-tremolite? vein was intersected between 41.85-42.21m. This vein contains up to 4% chalcopyrite. 4% chalcopyrite also occurs in a quartz vein zone between 58.4-58.6m.
74.5	86.35	TRACHYTE: Aphanitic, K-spar rich matrix supports up to 15% plagioclase phenocrysts and 5% quartz eyes. The unit is weakly magnetic.
86.35	94.7	PROPYLITICALLY ALTERED DIORITE: The unit is non-magnetic.

DDH TM 91-10 CONT...

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- 94.7            105.16        CHLORITE ALTERED TRACHYTE: This rock apparently is derived from, trachytes as described above. Within the interval the typical trachyte textures rapidly grade into an intensely chlorite altered rock wherein the phenocrysts consist of altered mafics (biotite?). Chlorite also occurs as patches and fracture coatings. The matrix contains less K-spar than the previous trachyte unit. A similar rock type was seen in DDH TM91-9.
- 105.16        109.1        DIORITE?: The interval consists of a very fine grained, altered diorite?. Textures are generally washed out. The rock is chlorite altered and moderately calcareous. Black crosscutting chlorite/magnetite stringers comprise 15% of the unit.
- 109.1        117.8        TRACHYTE: The typical trachyte unit consisting of an aphanitic K-spar rich matrix and plagioclase phenocrysts. Between 116.6-117.5m a calcareous andesitic? unit was intersected.
- 117.8        132.28        PROPYLITICALLY ALTERED DIORITE: Fine grained diorite contains patchy weak to moderate hematite, chlorite, epidote alteration.

\*\*\*\* END OF HOLE \*\*\*\*

#### DISCUSSION

The current hole again intersected enough disseminated chalcopyrite within the dioritic intrusive to account for the copper soil anomalies in the area. In the hole chalcopyrite tends to have its highest concentrations where it is associated with quartz and/or magnetite. The K-spar alteration is also commonly concentrated as envelopes around magnetite stringers, which leads me to believe that the K-spar is attributable to alteration rather than protolith mineralogy.