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SUMMARY

DDH 16 at Murray's Leward Prospect was successfully completed at a depth of 111.25 metres.

A thick zone of copper mineralization was intersected between 54.87 and 96.16 metres, this interval containing an average of 9500 ppm Cu over an estimated true thickness of 38.0 metres. This mineralised zone may be subdivided into three sub-zones, one of which (the central sub-zone) is potentially economic. The sub-zones are:

- a) 54.87 to 63.39 metres: Mean grade 3250 ppm Cu. Chalcopyrite occurs in quartz veins within carbonaceous sediments.
- b) 63.39 to 84.13 metres: Mean grade 1.44 ppm Cu. Chalcopyrite occurs within quartz and dolomite.
- c) 84.13 to 96.16 metres: Mean grade 5075 ppm Cu. Chalcopyrite occurs in quartz and dolomite veins and bands within chloritic slates and sediments.

The bulk of the copper occurs in the interval 75.11 to 84.13 metres, this interval containing an average of 2.49 per cent Cu over an estimated true thickness of 8.1 metres. Within this zone chalcopyrite occurs as disseminated blebs and irregular stringers within pyritic quartz, dolomite and quartz-dolomite.

The copper occurs almost exclusively in the form of chalcopyrite which is invariably associated with quartz and dolomite.

Core recovery averaged 97 per cent and leaching of sulphides has been negligible.

It is tentatively suggested that the locally anomalous thickness and grade of this mineralised zone may be due to:

- a) concentration of sulphides and dolomite along a fault zone,
or
- b) repeated intersection of a thin tightly folded mineralised zone.

Drilling costs directly attributable to DDH 16 totalled \$2,238 at an average cost of \$20.10 per metre.

D.D.H. 16 - MURRAY'S LEWARD PROSPECT

Grid reference	435530 N 319345 E
Elevation	196.6 metres
Angle	60°
Bearing	055° true
Date drilled	6.12.71 to 9.12.71
Drilling rate	15.9 metres per shift.

1. OPERATIONAL DETAILS

1.1 Drilling details

DDH 16 was commenced on December 6, 1971 and HW casing was seated at 3.05 metres. The hole advanced to 62.48 metres with the air mast attachment of the Longyear 38 drillrig. At this depth traces of chalcopyrite quartz in the cuttings prompted a reduction to diamond coring equipment. The hole was cased off with 62.48 metres of HW casing and continued with HWL coring equipment.

All diamond coring was carried out with the use of an HQ triple tube core barrel.

The drillhole was completed on December 9, 1971 at a depth of 111.25 metres and all casing was recovered.

1.2 Drilling conditions

Drill runs and core recovery are tabulated in Appendix A.

A faulty non-return valve in the hammer occasionally hampered the progress of the air drilling.

High water pressure slowed progress below about 55 metres.

Diamond drilling was completed without incident. Core recovery was almost invariably 100 per cent and averaged greater than 97 per cent. Leaching of the sulphides and dolomite was negligible and several 3.05 metre (10 feet) drill runs were recorded.

1.3 Drillhole deviation

The results of the acid etch inclination surveys were as follows:

Collar	60°
30.5 metres	57°
61.0 "	48°
91.4 "	45°
106.7 "	41°

1.4 Drilling costs

Drilling costs directly attributable to DDH16 totalled \$2,238.29 and were made up as follows:

Air drilling	\$ 771.10
Diamond drilling	1365.66
Casing	113.53
Surveys	48.00
Total	\$ 2238.29

2. GEOLOGY

The complete drill log is presented in Appendix B and may be summarised as follows:

AIR DRILLING

0 to 62.48 metres

Carbonaceous slate and sediments containing traces of chalcopyritic quartz over the basal 7.5 metres.

DIAMOND DRILLING

62.48 to 63.39 metres

Carbonaceous slate containing numerous quartz veins and rare dolomite veins. Many of the veins are slightly to moderately chalcopyritic.

63.39 to 65.07 metres

Quartz dolomite and chloritic sediments containing minor chalcopyrite.

65.07 to 70.86 metres

Chloritic sediments containing numerous quartz, dolomite and quartz-dolomite veins and stringers. Minor pyrite and chalcopyrite is associated with the vein material.

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70.86 to 73.61 metres

Massive white quartz containing a few bands of chloritic material and sporadic veins and blebs of dolomite. Minor pyrite and chalcopyrite.

73.61 to 75.11 metres
Chloritic slate

75.11 to 84.13 metres - QUARTZ-DOLOMITE-SULPHIDE ZONE

Quartz, dolomite and minor amounts of altered chloritic sediments containing abundant pyrite and chalcopyrite.

84.13 to 88.08 metres
Chloritic slate.

88.08 to 89.07 metres

Fragmentary and cavernous pyritic quartz-dolomite containing minor chalcopyrite.

89.07 to 89.61 metres
Chloritic slate.

89.61 to 90.60 metres

Cavernous, pyritic quartz-dolomite containing rare chalcopyrite.

90.60 to 91.90 metres
Chloritic slate.

91.90 to 92.58 metres

Chloritic slate and quartz-dolomite containing common pyrite and chalcopyrite.

92.58 to 93.06 metres

Chloritic slate containing minor chalcopyrite in quartz and quartz-dolomite veinlets.

93.06 to 96.16 metres

Quartz-dolomite and chloritic slaty sediment containing common pyrite and chalcopyrite.

96.16 to 98.60 metres

Mottled dark green (chloritic sediment) and grey-brown (dolomite) breccia or pseudo-breccia.

98.60 to 101.72 metres

Chloritic and graphitic slate.

101.72 to 105.61 metres

Graphitic and chloritic slate.

105.61 to 106.70 metres

Massive quartz and dolomite.

106.70 to 111.25 metres

Chloritic slate.

The mineralised zone is estimated to dip about 35° towards the west.

3. SAMPLED AND ASSAYS

Percussion samples and core samples were assayed for copper with the following results:

- a) Percussion samples
Percussion samples were collected over intervals of 1.52 metres and those samples collected from between 48.77 and 62.48 metres yielded the following assay values:

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Intersection Metres	Sample No. BAL	Assay Value ppm Cu
48.77 to 50.29	1474	100
50.29 " 51.82	1475	153
51.82 " 53.34	1476	123
53.34 " 54.87	1477	525
54.87 " 56.39	1478	1340
56.39 " 57.92	1479	2350
57.92 " 59.44	1480	2320
59.44 " 60.96	1481	3650
60.96 " 62.48	1482	5200

Inspection of the assay values reveals a significant increase in copper content below about 54.87 metres and this depth has been selected as an upper assay boundary for the overall mineralised zone.

b) Core samples

Twenty five core samples collected from between 62.48 and 106.81 metres were assayed with the following results:

Intersection Metres	Interval Metres	Sample No. BAL	Assay Value per cent Cu
62.48 to 63.39	0.91	1483	0.56
63.39 " 65.07	1.68	1484	0.74
65.07 " 67.92	2.85	1485	0.78
67.92 " 70.86	2.94	1486	0.29
70.86 " 72.18	1.32	1487	0.56
72.18 " 73.61	1.43	1488	1.62
73.61 " 75.11	1.50	1489	0.056
75.11 " 77.04	1.93	1490	4.78
77.04 " 79.27	2.23	1491	2.53
79.27 " 81.13	1.86	1492	3.22
81.13 " 84.13	3.00	1493	0.55
84.13 " 88.08	3.95	1494	0.038
88.08 " 89.07	0.99	1495	0.050
89.07 " 89.61	0.54	1496	0.051
89.61 " 90.60	0.99	1497	NOT RECEIVED
90.60 " 91.90	1.30	1498	0.049
91.90 " 92.58	0.68	1499	2.80
92.58 " 93.06	0.48	1500	0.25
93.06 " 94.72	1.66	1501	1.57
94.72 " 96.16	1.44	1502	0.46
96.16 " 98.60	2.44	1503	0.027
98.60 " 101.72	3.12	1504	0.021
101.72 " 105.61	3.89	1505	0.021
105.61 " 106.70	1.09	1506	0.038
106.70 " 108.81	2.11	1507	0.018

The percussion and core sample assay values define a thick zone of anomalous copper mineralisation between 54.87 and 96.16 metres, this interval containing an average of 9300 ppm Cu over an estimated thickness of 38.0 metres.

This thick zone can be readily subdivided, on the basis of lithology and copper distribution, into three sub-zones, one of which (the central sub-zone) is potentially economic. The three sub-zones are:

- a) 54.87 to 63.39 metres: Mean grade of 3250 ppm Cu, the copper occurring as chalcopyrite in quartz veins within carbonaceous sediments.
- b) 63.39 to 84.13 metres: Mean grade of 1.44 per cent Cu over an estimated true thickness of about 19.3 metres. Pyrite and chalcopyrite are common and occur almost invariably within quartz,

dolomite or quartz-dolomite.

This sub-zone is of economic interest although the bulk of the copper occurs between 75.11 and 84.13 metres, this interval containing an average of 2.49 per cent Cu over an estimated true thickness of 8.1 metres.

- c) 84.13 to 96.16 metres: Mean grade of 5075 ppm Cu. Chalcopyrite is associated with quartz and dolomite veins within chloritic slate.

Fire assays for gold and silver were carried out on those samples returning copper values greater than 1.0 per cent Cu. The results were:

Sample No. SAL	Intersection Metres	Interval Metres	Assay Value		
			Cu*	Ag**	Au**
1488	72.18 to 73.61	1.43	1.62	<0.1	<0.5
1490	75.11 " 77.04	1.93	4.78	<0.1	<0.5
1491	77.04 " 79.27	2.23	2.53	<0.1	<0.5
1492	79.27 " 81.13	1.86	3.22	<0.1	<0.5
1499	91.90 " 92.58	0.68	2.80	<0.1	<0.5
1501	93.06 " 94.72	1.65	1.57	4.0	<0.5

* per cent; ** dwt per long ton.

Only negligible amounts of gold and silver are associated with the copper.

4. CONCLUSION

DDH 16 at Murray's Reward Prospect intersected a thick and potentially economic zone of chalcopyritic mineralisation.

The locally anomalous thickness and grade of this mineralised zone suggests that the copper and dolomite may have been remobilised and preferentially concentrated along a fault zone or that the drillhole made a repetitive intersection of a thin but tightly folded mineralized zone.

Dr. H. H. J. J. J.

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APPENDIX B

DDH. 16 MURRAY'S REWARD PROSPECT

DRILL LOG

Grid reference 435528N, 319345E
 Elevation 196.6 metres
 Angle 60°
 Direction N55°E (true)
 Date drilled 6/12/71 to 9/12/71
 Drilling rate 15.89 metres per shift

INTERSECTION (METRES)	DESCRIPTION
0 to 62.48	<p><u>AIR DRILLING</u></p> <p>Carbonaceous and graphitic slate and shale containing minor traces ($\leq 0.5\%$ Cu) of chalcopyrite and pyrite in quartz over the basal 7.5 metres.</p>
62.48 to 63.39	<p><u>DIAMOND DRILLING</u></p> <p>Soft but solid, dark blue-grey, with slight greenish (chloritic) tinge, carbonaceous sediment (siltstone?) containing numerous thin (generally $\leq 3\text{mm}$) irregular and discontinuous quartz veins which commonly have diffuse boundaries. Also a few thicker quartz veins and lenses ($\leq 5\text{cm}$).</p> <p>Many of the quartz veins contain small ($\leq 5\text{mm}$) irregular blebs of chalcopyrite and minor pyrite which are, in parts, with traces of cream carbonate, particularly in the thicker quartz veins.</p> <p>Bedding and cleavage obliterated but many veins dip 50° to 80°.</p> <p>Rare cream to pale brown carbonate veins and veinlets.</p> <p>Total copper estimated 0.5 to 1.0% Cu.</p>
63.39 to approx. 65.07	<p>Mottled grey and white (quartz), cream, brown and orange (carbonate) and green (chloritic sediments) sulphide zone containing 8 to 10% sulphides (2% chalcopyrite; 6 to 8% pyrite). The relative proportions of the carbonate and chloritic material varies throughout the sequence.</p> <p>The quartz and carbonate are intimately intermixed in the top 80 cm, occurring as irregular masses and poorly defined bands or veins. The chloritic material becomes more common towards the base and the basal 15 cm consists dominantly of quartz.</p> <p>Chalcopyrite occurs as disseminated irregular blebs ($\leq 10\text{mm}$) and is almost invariably associated with pyrite.</p>
65.07 to 70.86	<p>Dark green chloritic sediment, soft but solid, containing numerous irregular and discontinuous quartz, carbonate and quartz-carbonate veins, veinlets, and masses. Minor pyrite and chalcopyrite is associated with quartz and carbonate.</p>

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Several thick (≤ 25 cm) cream-white, pyritic bands occur, particularly at 67.5m, 67.8m and 68.3m.

The dominant feature of this unit is the extreme irregularity of the vein material which commonly have diffuse boundaries, and the breccia-like characteristics of the green chloritic material which commonly occurs as irregular fragments and stringers.

Rare traces of red hematitic quartz occurs in the carbonate at about 67.8 metres.

The carbonate is fresh, unaltered and only very rarely even slightly cavernous.

Copper content estimated at 1% Cu.

70.86 to 73.61

Massive white quartz containing a few thin (≤ 8 cm) bands of dark green chloritic material (slate?), sporadic yellow-brown, pale brown and orange-brown carbonate occurring as irregular and discontinuous veins, veinlets, stringers and blebs. The carbonate is slightly cavernous in parts.

Rare traces of red-pink (hematitic) material occurs in the quartz at about 71.8 metres. The quartz contains relatively common pyrite and chalcopyrite occurring as irregular blebs (chalcopyrite), disseminated euhedra (pyrite) and irregular vein or lens-like aggregates (pyrite + chalcopyrite). The pyrite and chalcopyrite are commonly intimately intermixed and also occur as discrete blebs in otherwise barren quartz or as stringers along incipient fractures in the quartz. S planes in the quartz dip 35° to 40° .

Copper content estimated $< 2\%$ Cu.

73.61 to 75.11

Medium green chloritic slate. Original bedding poorly preserved but cleavage relatively well developed. Bedding defined by pale grey-green and darker green layering which dips 5° to 20° , the cleavage dipping 60° in opposite direction. Microfaulting (cleavage slip?) occurs in parts.

A 15mm quartz-carbonate vein containing sporadic pyrite and chalcopyrite extends along the core from 74.69 to 75.10 metres.

Minor disseminated euhedral (≤ 5 mm) pyrite.

75.11 to approx. 81.13

CARBONATE-QUARTZ-SULPHIDE ZONE

Cream, pale brown and orange-brown carbonate, white quartz and minor altered chloritic slaty sediments containing abundant pyrite and chalcopyrite including a 6 to 7cm band of massive chalcopyrite at about 76.3 metres.

The chalcopyrite occurs as irregular disseminated blebs (≤ 2 cm), irregular veins and stringers (commonly with pyrite) and in intimate association with pyrite. The pyrite is commonly euhedral (≤ 15 mm). The chalcopyrite is most common in the upper part of the unit.

81.13 to 84.13

Below about 77.05 metres, the carbonate becomes dominantly grey with little traces of orange-brown carbonate remaining except in the basal 50cm.

The basal interval 79.27 to the 81.13 metres contains several dark green chloritic bands (dipping 40°) and the carbonate in this interval is slightly cavernous and friable.

Total copper estimated $\leq 5\%$ Cu.

81.13 to 84.13

Hard, massive white quartz with lesser amounts of yellow-brown and orange-brown irregular carbonate veins, veinlets and other irregular masses. Minor chloritic stringers occur along incipient fractures and a 46 cm band of dark green chloritic slate containing a few irregular and discontinuous quartz, carbonate and quartz-carbonate veins occurs between about 82.30 and 82.76 metres.

The sequence contains sporadic pyrite and chalcopyrite. The pyrite is generally euhedral and the chalcopyrite occurs as irregular blebs.

Total copper estimated 0.5 to 0.75% Cu.

84.13 to 88.08

Pale to dark green chloritic slate. The original bedding is poorly preserved, and a cleavage is defined by thin (generally $\leq 1\text{mm}$) pyritic quartz veins and by dark green (chlorite?) "veinlets".

A few dragfolds are defined by cleavage plane slip of darker chloritic bands.

Minor cavernous quartz-carbonate veins.

88.08 to 89.07

Fragmentary, cavernous and slightly friable pyritic quartz-carbonate containing rare chalcopyrite and chalcocite. Pyrite is common (5%) and euhedral. Carbonate is orange-brown in parts.

Minor dark green chloritic partings.

Copper estimated $< 0.1\%$ Cu.

89.07 to approx.
89.61

Dark green, fragmentary pyritic, chloritic slate containing few pyritic quartz and quartz-carbonate veins.

89.61 to approx.
90.60

Cavernous, friable, pyritic, cream-brown carbonate-quartz containing rare chalcopyrite. Few irregular chloritic bands and stringers. Euhedral ($\leq 1\text{mm}$) pyrite is common (5%).

90.60 to approx.
91.90

Pale to medium green chloritic slate. Minor disseminated euhedral pyrite. Few irregular and discontinuous quartz veins ($\leq 3\text{mm}$).

91.90 to approx.
92.58

The top 0.23 metres consists of dark green chloritic slate containing about 50% white quartz and quartz-carbonate containing sporadic pyrite and chalcopyrite in disseminated blebs and irregular stringers.

The basal 0.45 metres consists of white to pale grey carbonate and quartz containing abundant pyrite and chalcopyrite. The quartz and carbonate occur in extremely irregular "blebs" and bands and the sulphides occur as disseminated blebs and stringers.

Total copper estimated 2 to 3% Cu.

- 92.58 to 93.06 Dark green chloritic slate, completely defoliated with numerous small ($\leq 2\text{mm}$) grey-white quartz-carbonate porphyroblasts and veinlets.
- 37 151 Minor chalcopyrite blebs are associated with quartz and quartz-carbonate veinlets.
- Total copper estimated $\leq 0.5\%$ Cu.
- 93.06 to 96.16 Quartz, carbonate and dark green chloritic slaty sediment bands. The quartz and carbonate contain common pyrite and chalcopyrite.
- Carbonate is dominant between 93.06 and 93.57 metres and between 95.40 and 95.70 metres. The carbonate is grey/white and very pale yellow and contains common quartz and sulphides. The carbonate and included sulphide bands ($\leq 5\text{mm}$) dip 55° .
- The interval 93.57 to 94.72 metres consists dominantly of grey and white quartz containing sporadic irregular pale yellow carbonate inclusions, sporadic sulphides and rare dark green chloritic sediment fragments.
- The sulphides occur as disseminated blebs and thin irregular and discontinuous stringers which appear to have a crude preferred orientation in parts. The sulphides and carbonate appear to be concentrated along incipient fractures in the quartz.
- The interval 94.72 to 95.02 metres consists dominantly of dark green pyritic chloritic sediments containing a few thick ($\leq 5\text{ cm}$) quartz veins containing minor pyrite and chalcopyrite.
- The interval 95.02 to 96.16 metres consists of quartz and carbonate with minor sulphides except for a thin ($\leq 8\text{cm}$) band of dark red hematitic quartz at 95.6 metres. This hematitic band contains abundant chalcopyrite which is crudely banded (dip of chalcopyrite and hematitic quartz is about 70°).
- Total copper $\leq 1\%$ Cu.
- 96.16 to 98.60 Mottled dark green (chloritic sediment) and grey-brown (carbonate) breccia (or pseudo-breccia) containing minor pyrite. The chloritic sediments occur as sub-angular to sub-rounded fragments, irregular elongate fragments and massive slightly pyritic bands. The carbonate contains minor disseminated euhedral pyrite.
- 98.60 to 101.72 Medium to dark green chloritic and graphitic slate containing a few extremely irregular, sinuous and discontinuous white quartz veins. Minor disseminated pyrite in slate. Original bedding (dipping about 65°) generally poorly preserved.
- 101.72 to 105.61 Dark grey to black and dark grey-green graphitic and chloritic slate. The original bedding is generally well preserved but the unit is apparently massive in the basal 1.06 metres. Graded bedding and deformed worm burrows occur in parts.

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Few, thin ($\leq 2\text{mm}$) irregular and discontinuous quartz veins with one quartz-carbonate vein (g.l.c.) at base of unit containing minor chalcopyrite.

Minor microfaulting. Bedding dips 35° .

105.61 to 106.70

Hard, massive, white quartz and pale yellow-brown carbonate in intimate association. Sporadic disseminated cubedral pyrite.

106.70 to 111.25

Pale to medium grey-green chloritic slate containing a few quartz veins. Original bedding locally preserved.

DDH.16 COMPLETED AT 111.25 METRES.