As indicated on the interpretative geology plans, where the eastern of two outcropping Gerowie Tuff? sequences is apparently widest, at around 15000N, there appears to be four separate zones of anomalism/mineralisation, though the western-most appears to be more anomalous in silver than gold, as does the eastern most to a lesser extent. These anomalous zones may represent two (or possibly only one) mineralised horizon(s) that are (is) fold repeated.

The "mineralisation" in this 15000N area appears basically strike and dip parallel though further to the south (around 14200N) there is a suggestion on plan view that the trend of the mineralisation slightly cross-cuts the stratigraphy. Lithological data shown on drill sections are generally suggestive of dip-parallel mineralisation.

In terms of geology, geophysics and mineralisation, Tumbling Dice is probably analogous to Moline Dam. The mineralisation style can probably be described as originally stratabound (and possibly syngenetic, exhalative) but with a strong tectonic overprint ("Homestake, USA" style?.)

Because the area is structurally complex and there are extensive zones of surface soil and rock chip anomalies its possible that, ultimately, significant gold mineralisation will be located in a number of different lodes on the prospect. This mineralisation will not all be close to surface, however.

SOUTHERN HERCULES

Exploration drilling in 1988 delineated an in-situ, oxide zone geological resource (measured/indicated category) of 360,000 tonnes grading 2.99 g/t gold over a strike length of 600 metres. The central 250 metre strike length has since been mined to a maximum depth of 35 metres (in the School Pit). While not specifically targetted, the sulphide zone mineralisation was partially tested and a resource of 260,000 tonnes grading 3.88 g/t gold outlined.

The mineralisation is essentially contained in two sub-parallel zones dipping at about 50^{o}-60^{o} to the west with enclosing isoclinally folded (Gerowie Tuff?) chert-shale sequences. The zones were previously tested to average depths of 30 metres (western) and 50 metres (eastern) and the possibility of locating further ore along strike and down-dip from previous intersections in both zones prompted the 1989 drilling programme.

Geological Mapping

During the year the mining division commissioned Mr H. Davies, Principal of Remote Sensing and Geological Services (of Perth, W.A.) to carry out a mapping exercise of the open pits. Davies 1:1,000 map of the School Pit (enclosure 131), shows a south-plunging M structure (two anticlines flanking a central syncline) with "red argillite" exposed in the anticline axial position and "grey argillite" in the synclinal axis. The area is also shown in relationship to the other nearby mineralised areas on Davies 1:5,000 geological plan presented as enclosure 184.

Drilling

The 1989 drilling programme comprised 492 metres of air-trac, 2565 metres of RC and 188 metres of HQ_3 core drilling beneath and to the north, west and south of the School pit. The air-trac drilling was confined to an area 400-900 metres south of the pit.

Drill logs for the RC and HQ_3 drilling are presented as part of appendix 3 while complete drillhole gold analyses are presented as part of appendix 4. (There are no drill logs available for the air-trac drilling which was commissioned and monitored by the mining division).

A drillhole collar summary is presented as table 4, drillhole locations are shown on 1:1,000 scale geological plans submitted as enclosures 89-92, while enclosures 93-129 are 1:250 scale drill sections containing lithological and assay data, interpreted ore blocks and, where available, ore zone boundaries delineated by grade control drilling.

Drillhole intersections (for 1989 drilling) are shown on Table 5 while intersections, RL's of the intersection points and gold factor (gold grade x width) contours are shown on the 1:500 scale longitudinal section presented as enclosure 130.

Discussion

The drill sections and the long section clearly show that there is significant gold mineralisation developed on the eastern lode beneath the present floor of the open pit. There also appears potential for significant low grade (~ 2 g/t) mineralisation to the north, west and south of the pit. The possible presence of a considerable tonnage of additional mineralisation at 14875N on the western lode, suggested by 1988 drilling, has not been confirmed, however, by the drilling completed in 1989.

TABLE 4.
SOUTHERN HERCULES (School Pit)

Surpac - DRILL HOLE COLLAR SUMMARY - \SHX database

HOLEID	NORTHING	EASTING	R.L.	DEPTH	DIP	AZIMUTH
AT092	13850.00	12520.00	142.20	24.00	-60.00	90.00
AT093	13898.90	12528.00	143.20	24.00	-60.00	90.00
AT094	13898.30	12540.10	143.50	18.00	-60.00	90.00
AT095	13898.30	12545.90	144.00	12.00	-60.00	90.00
AT096	13950.40	12527.30	146.50	24.00	-60.00	90.00
AT097	13950.20	12536.40	146.80	12.00	-60.00	90.00
AT098	13975.00	12546.00	150.00	18.00	-60.00	90.00
AT099	13974.50	12531.70	147.60	24.00	-60.00	90.00
AT100	13999.70	12536.40	149.20	24.00	-60.00	90.00
AT101	14000.10	12551.00	152.60	15.00	-60.00	90.00
AT102	14000.40	12557.50	153.20	12.00	-60.00	90.00
AT103	14099.70	12553.80	149.50	15.00	-60.00	90.00
AT104	14099.40	12547.90	147.80	21.00	-60.00	90.00
AT105	14074.90	12552.10	150.40	24.00	-60.00	90.00
AT106	14074.90	12558.10	151.00	18.00	-60.00	90.00
AT107	13849.90	12514.20	142.20	27.00	-60.00	90.00
AT108	13850.00	12527.90	142.30	6.00	-60.00	90.00
AT109	13824.90	12514.20	141.40	24.00	-60.00	90.00
AT110	13875.40	12517.60	142.70	24.00	-60.00	90.00
AT111	14124.60	12554.70	152.50	24.00	-60.00	90.00
AT112	14124.60	12564.70	154.00	18.00	-60.00	90.00
AT113	14150.10	12568.90	151.60	24.00	-60.00	90.00
AT114	14150.40	12578.30	152.70	15.00	-60.00	90.00
AT115	14325.00	12541.40	130.90	15.00	-60.00	90.00
AT116	14325.00	12554.70	131.00	12.00	-60.00	90.00
AT117	14325.10	12573.70	131.40	18.00	-60.00	90.00
MGMRC001	14875.00	12626.80	133.60	102.00	-60.00	90.00
MGMRC002	14899.90	12652.10	135.20	87.00	-60.00	90.00
MGMRC003	14775.00	12625.10	135.80	90.00	-60.00	90.00
MGMRC004	14800.10	12631.40	135.80	90.00	-60.00	90.00
MGMRC005	14849.90	12653.30	135.10	84.00	-60.00	90.00
MGMRC006	14750.10	12635.60	137.20	90.00	-60.00	90.00
MRC640	14725.00	12661.00	142.00	72.00	-60.00	90.00
MRC667	14775.50	12609.00	133.80	108.00	-60.00	90.00
MRC668	14649.90	12603.80	133.60	90.00	-60.00	90.00
MRC669	15070.10	12697.00	135.80	30.00	-60.00	90.00
MRC670	15071.90	12712.10	136.30	60.00	-60.00	90.00
MRC671	15042.30	12675.00	135.80	90.00	-60.00	90.00
MRC672	15044.70	12695.20	136.10	18.00	-60.00	90.00
MRC673	15047.30	12719.80	136.90	36.00	-60.00	90.00
MRC674	15049.50	12739.40	137.20	36.00	-60.00	90.00
MRC675	15096.90	12693.70	134.10	30.00	-60.00	90.00
MRC676	15117.20	12671.40	133.00	30.00	-60.00	90.00
MRC677	15119.80	12691.80	133.70	36.00	-60.00	90.00
MRC678	15146.90	12705.20	132.40	78.00	-60.00	90.00
MRC679	14725.00	12625.00	137.00	48.00	-60.00	90.00
MRC680	14925.00	12635.50	132.50	108.00	-60.00	90.00
MRC682	14849.70	12608.50	132.30	108.00	-59.50	90.00
MRC683	14822.20	12630.90	134.80	102.00	-59.00	90.00
MRC684	14824.90	12604.90	133.00	66.00	-60.00	90.00
MRC685	14750.00	12616.00	134.00	90.00	-60.00	90.00
MRC686	14699.60	12610.70	136.20	90.00	-60.00	90.00
MRC687	14649.50	12625.50	136.10	30.00	-60.00	90.00

TABLE 4. CONTINUED
SOUTHERN HERCULES (School Pit)

Surpac - DRILL HOLE COLLAR SUMMARY - \SHX database

HOLEID	NORTHING	EASTING	R.L.	DEPTH	DIP	AZIMUTH
MRC688	14725.00	12680.00	143.50	54.00	-60.00	90.00
MRC693	14775.00	12595.00	133.00	48.00	-60.00	90.00
MRC699	14700.00	12665.50	140.00	66.00	-60.00	90.00
MRC700	14750.00	12602.00	132.00	48.00	-60.00	90.00
MRC704	14700.00	12597.00	134.00	24.00	-60.00	90.00
MRC705	15104.00	12674.00	133.00	24.00	-60.00	90.00
MRC706	15104.00	12684.00	134.00	84.00	-60.00	90.00
MRC714	14725.00	12610.00	135.00	54.00	-60.00	90.00
MRCD681	14875.00	12594.00	131.00	110.00	-58.00	90.00
MRCD707	14775.00	12643.00	136.00	80.00	-60.00	90.00
MRCD708	14748.00	12665.00	142.00	70.00	-63.00	90.00
MRCD709	14800.00	12662.00	139.00	65.00	-60.00	90.00
MRCD710	14813.00	12652.20	136.00	81.80	-57.00	120.00
MRCD712	14875.00	12695.00	120.00	45.00	-60.00	90.00

Drill Statistics :	26x Airtrac =	492.00 m
	29x RCP =	2565.00 m
	6x Diamond =	187.80 m
	TOTAL =	3244.80 m

NOTE:
Azimuth 90.00 = GRID EAST

TABLE 5.

SOUTHERN HERCULES - 1989 Drillhole Intersections

Data from database SHX MAR-90
Reporting grade = 0.500
Tolerences:-
min grade = 0.500
min lowgrade length = 2.000

HOLE ID	FROM	TO	LENGTH	AU1 GRADE
AIRTRAC DRILLING				
AT092	2.00	18.00	16.00m.@	1.968
AT093	7.00	10.00	3.00m.@	0.553
AT096	13.00	15.00	2.00m.@	0.580
AT097	0.00	4.00	4.00m.@	0.830
AT098	4.00	6.00	2.00m.@	0.665
AT099	16.00	21.00	5.00m.@	1.070
AT103	4.00	9.00	5.00m.@	0.910
AT107	16.00	23.00	7.00m.@	2.003
AT109	0.00	1.00	1.00m.@	1.480
AT110	17.00	19.00	2.00m.@	0.545
AT111	13.00	16.00	3.00m.@	1.190
AT112	1.00	5.00	4.00m.@	1.475
AT112	10.00	15.00	5.00m.@	0.736
AT113	13.00	15.00	2.00m.@	0.840
AT114	0.00	2.00	2.00m.@	0.870
AT115	9.00	12.00	3.00m.@	0.720
AT116	2.00	7.00	5.00m.@	3.896
RC DRILLING				
MGMRC001	25.00	27.00	2.00m.@	1.965
MGMRC001	35.00	36.00	1.00m.@	1.940
MGMRC001	40.00	47.00	7.00m.@	1.446
MGMRC001	52.00	54.00	2.00m.@	2.935
MGMRC001	56.00	57.00	1.00m.@	1.040
MGMRC001	59.00	65.00	6.00m.@	1.767
MGMRC001	78.00	79.00	1.00m.@	1.990
MGMRC001	89.00	91.00	2.00m.@	4.095

TABLE 5. CONTINUED

MGMRC002	0.00	1.00	1.00m.@	1.440
MGMRC002	12.00	14.00	2.00m.@	0.980
MGMRC002	20.00	23.00	3.00m.@	1.113
MGMRC002	27.00	29.00	2.00m.@	0.920
MGMRC002	32.00	40.00	8.00m.@	4.203
MGMRC002	79.00	85.00	6.00m.@	1.462
MGMRC003	6.00	11.00	5.00m.@	1.282
MGMRC003	12.00	15.00	3.00m.@	1.103
MGMRC003	22.00	24.00	2.00m.@	7.740
MGMRC003	27.00	29.00	2.00m.@	0.730
MGMRC003	40.00	42.00	2.00m.@	1.595
MGMRC003	43.00	44.00	1.00m.@	1.400
MGMRC003	48.00	49.00	1.00m.@	1.560
MGMRC003	52.00	54.00	2.00m.@	0.645
MGMRC003	79.00	80.00	1.00m.@	1.210
MGMRC003	82.00	84.00	2.00m.@	2.275
MGMRC004	1.00	6.00	5.00m.@	0.730
MGMRC004	16.00	17.00	1.00m.@	1.630
MGMRC004	43.00	44.00	1.00m.@	0.810
MGMRC004	59.00	60.00	1.00m.@	1.600
MGMRC004	77.00	79.00	2.00m.@	2.510
MGMRC005	0.00	3.00	3.00m.@	1.340
MGMRC005	64.00	68.00	4.00m.@	0.748
MGMRC005	72.00	76.00	4.00m.@	2.693
MGMRC006	25.00	26.00	1.00m.@	1.540
MGMRC006	55.00	56.00	1.00m.@	2.090
MGMRC006	67.00	68.00	1.00m.@	12.250
MRC640	45.00	47.00	2.00m.@	1.915
MRC640	48.00	50.00	2.00m.@	3.345
MRC667	24.00	25.00	1.00m.@	1.320
MRC667	58.00	59.00	1.00m.@	1.140
MRC667	80.00	82.00	2.00m.@	0.760
MRC667	84.00	85.00	1.00m.@	0.670
MRC667	92.00	97.00	5.00m.@	2.476
MRC668	6.00	8.00	2.00m.@	0.665
MRC668	72.00	76.00	4.00m.@	2.763
MRC670	38.00	39.00	1.00m.@	0.990
MRC673	18.00	19.00	1.00m.@	1.600
MRC673	20.00	23.00	3.00m.@	1.953
MRC674	26.00	28.00	2.00m.@	0.645
MRC674	31.00	34.00	3.00m.@	1.097
MRC675	6.00	7.00	1.00m.@	1.290
MRC675	8.00	9.00	1.00m.@	0.970
MRC675	12.00	14.00	2.00m.@	1.340
MRC676	12.00	14.00	2.00m.@	1.010
MRC676	21.00	24.00	3.00m.@	1.547
MRC678	57.00	58.00	1.00m.@	4.660

TABLE 5. CONTINUED

MRC680	55.00	56.00	1.00m.@	1.490
MRC680	71.00	72.00	1.00m.@	2.690
MRC680	95.00	96.00	1.00m.@	1.010
MRC682	26.00	27.00	1.00m.@	0.980
MRC682	28.00	31.00	3.00m.@	0.593
MRC682	38.00	39.00	1.00m.@	1.140
MRC682	45.00	48.00	3.00m.@	1.517
MRC682	98.00	100.00	2.00m.@	11.270
MRC683	0.00	1.00	1.00m.@	5.960
MRC683	21.00	24.00	3.00m.@	1.767
MRC683	25.00	30.00	5.00m.@	1.268
MRC683	35.00	36.00	1.00m.@	1.100
MRC683	74.00	75.00	1.00m.@	1.730
MRC683	77.00	81.00	4.00m.@	1.375
MRC684	50.00	55.00	5.00m.@	2.168
MRC685	3.00	9.00	6.00m.@	1.465
MRC685	10.00	16.00	6.00m.@	2.940
MRC685	19.00	20.00	1.00m.@	2.240
MRC685	38.00	39.00	1.00m.@	1.240
MRC685	44.00	45.00	1.00m.@	1.130
MRC685	82.00	86.00	4.00m.@	9.625
MRC686	3.00	4.00	1.00m.@	2.610
MRC686	73.00	75.00	2.00m.@	3.645
MRC687	5.00	6.00	1.00m.@	1.390
MRC687	7.00	8.00	1.00m.@	1.770
MRC687	11.00	12.00	1.00m.@	3.160
MRC688	30.00	33.00	3.00m.@	3.750
MRC688	50.00	51.00	1.00m.@	4.310
MRC693	35.00	36.00	1.00m.@	2.280
MRC699	18.00	20.00	2.00m.@	1.485
MRC700	21.00	22.00	1.00m.@	2.500
MRC700	32.00	34.00	2.00m.@	0.770
MRC704	14.00	15.00	1.00m.@	3.180
MRC704	21.00	22.00	1.00m.@	1.150
MRC706	33.00	34.00	1.00m.@	3.200
MRC706	64.00	65.00	1.00m.@	4.120
MRC706	72.00	74.00	2.00m.@	0.770
MRC706	77.00	78.00	1.00m.@	2.590
MRC714	8.00	9.00	1.00m.@	1.080

HQ3 DRILLING

MRCD681	66.00	68.00	2.00m.@	1.755
MRCD681	70.00	71.00	1.00m.@	1.430
MRCD681	82.00	85.00	3.00m.@	0.943

TABLE 5. CONTINUED

MRCD707	1.00	2.00	1.00m.@	4.350
MRCD707	30.00	31.00	1.00m.@	1.420
MRCD707	54.00	56.00	2.00m.@	1.055
MRCD707	63.00	65.00	2.00m.@	2.940
MRCD707	67.00	69.00	2.00m.@	2.950
MRCD708	21.00	22.00	1.00m.@	3.320
MRCD708	46.00	47.00	1.00m.@	4.690
MRCD709	27.00	29.00	2.00m.@	0.875
MRCD709	36.00	37.00	1.00m.@	1.550
MRCD709	51.00	52.00	1.00m.@	7.560
MRCD709	55.00	57.00	2.00m.@	0.905
MRCD710	3.00	4.00	1.00m.@	1.850
MRCD710	61.00	62.00	1.00m.@	2.390
MRCD710	65.00	66.00	1.00m.@	1.740
MRCD712	21.00	26.00	5.00m.@	26.304
MRCD712	39.00	41.00	2.00m.@	1.830

The longitudinal section and data collected during open pit grade control operations in 1989 clearly indicate a northerly plunge to eastern zone high grade mineralisation near the centre of the School pit. Narrow high grade mineralisation (e.g. 3 metres at 19.15 g/t gold) beneath the south end of the current pit floor also appears to have a northerly plunge. These plunges may reflect a north dipping cross structure (fault; cross-fold axis?), or a northerly plunge for the fold complex.

Pending work to make the School Pit floor safe and accessible for drillhole collar locations, the balance of the planned 1989 programme to test for depth extensions of the eastern lode should be completed. The southern part of the Southern Hercules area (partially tested by 1988 RC drilling and 1989 air-trac drilling) has potential for low-moderate tonnage mineralisation and should be further assessed in due course.

TRIG

The Trig prospect is immediately south along strike from the Moline Pit, where essentially "stratabound" but tectonically modified quartz-limonite-(sulphide) associated gold mineralisation is being mined from a westerly dipping chert-shale-(greywacke) sequence. The area was originally defined as prospective by the continuity of gold-anomalous sulphidic chert (BIF) horizons southwards from the current pit area. Several RC holes were drilled in 1985-87 and a systematic drill testing programme planned for late 1987 early 1988, but not completed at that time.

Geological Mapping

The area has been previously mapped at 1:1,000 scale, and the data presented (plan 4649 Moline Dam Geology and Mineralisation) in previous reports. This plan is represented here (enclosure 133) with the Moline pit boundary and 1989 drillholes marked on. Additional geological data relevant to the area are shown on enclosure 132 - a 1:1,000 scale plan showing the geology of the southern and eastern faces of the Moline pit.

Trig mineralisation is essentially the same as Moline Dam. It appears "stratabound" in a sulphidic chert/shale sequence but is probably locally tectonically controlled close to an overturned anticline axis. It appears to be on the eastern limb of a locally north plunging fold complex - possibly an M structure as in the School Pit.