1.0 INTRODUCTION

In January 1990, Moline Management Pty Ltd assumed responsibility for the management of the gold mining operations at Moline and the exploration of the Moline Joint Venture Tenements. This report was prepared by Moline Management Pty Ltd for the Northern Territory Department of Mines and Energy and details the results of exploration carried out on the Joint Venture Tenements (Section 2) during the period 15th January to the 31st January 1991.

The Moline Joint Venture Tenements are an agglomeration of exploration licences, exploration retention licences, mining leases and mineral claims centred on the Moline C.I.P. Gold Treatment Plant. During 1990, with the expiry or reduction of area of a number of tenements and the acquisition for others, the tenement area varied from approximately 14,500 hectares to approximately 10,300 hectares in January of 1991. The various mineral and mining tenements at Moline form a single exploration area. The exploration information on the entire exploration area is reported annually in a single exploration report. Estimated exploration expenditure has been assigned to each of the main tenement areas. As a number of tenements expired or were surrendered during 1990, several reports on exploration of these areas have already been submitted to the Northern Territory Department of Mines and Energy and the information will not be repeated in this report (see Section 3).

In addition to exploration, the Moline Joint Venture Tenements were producing ore to be processed in the Moline Gold Plant. Approximately 450,000 tonnes of ore was mined during 1990 from five main pits and several smaller pits. The location of the plant and the main production pits are shown in Figure 1.

This report is a record of Moline Project exploration results for the Northern Territory Department of Mines & Energy. No attempt has been made to interpret the results or quantify gold resource estimates.

2.0 LOCATION, ACCESS, CLIMATE AND TOPOGRAPHY

The Moline Project is located 50 kms east of Pine Creek in the Northern Territory on the bitumen all weather Kakadu Highway (Figure 1). Access from Darwin is either via the Stuart Highway to Pine Creek or by air to the Evelyn Airstrip north of the minesite. Within the tenement area access is restricted to the mine haulage roads and the Wandie Road during the wet season. The major creeks : O'Neil, Eureka and Evelyn are impassable from December to May. During the "Dry" season (May - November), most areas are accessible by 4 wheel drive vehicle.

Topography is undulating over the bulk of the tenement area. Several mineral prospects are on isolated individual steep sided ridges (e.g. Moline and Waterhole). However, the High Chinese Area (MCN's 1908 - 1909; 1913; 1930; 2944 - 2947; 2954 - 2957; 2985 - 2986 and 3042 - 3043 : Figure 2) is very steep and accessible only by foot in most places.

The climate is tropical with a distinct wet and dry season. Table 1 below shows the maximum and minimum temperatures and the 1990 rainfall and the average annual rainfall.

TABLE 1 1990 RAINFALL AND TEMPERATURE STATISTICS

MONTH	1990 TEMPERATURES MAX°C	MIN°C	1990 RAINFALL (mm)	AVE. ANNUAL RAINFALL (mm)
January	43	22	198.2	269
February	43	22	156.5	244
March	41	22	111.2	208
April	39	17	11.7	47
May	38	11	41.7	7
June	35	13	8.75	3
July	38	10	0	1
August	39	11	0	1
September	39	15	0	8
October	46	22	0.75	42
November	47	23	136.3	113
December	46	23	352.8	204
TOTAL			1017.9	1147

3.0 TENEMENTS

From the 29th December 1989, the participants in the Moline Joint Venture changed from Cyprus Gold Australia Corporation (25%); Hudspeth and Company Pty Ltd (25%) and Zinnanda Pty Ltd (50%). At that time Cyprus's interest in the Moline Joint Venture tenements was transferred to Hudspeth and Company Pty. Ltd. Figure 2 shows the mining tenements at Moline, and Appendix I the current status of all tenements.

3.1 Exploration Licences

During the reporting period a number of exploration licences included in the previous Annual Moline Project Report dated March 1990 have expired and only the results of exploration on EL 4894 are included in this report.

3.1.1 EL 4492 - Expired 15/3/90

Two reports were written for the Northern Territory Department of Mines and Energy on this licence :

"Final Report EL 4492 - On areas retained by Other Tenements". Dated July 1990.

"Final Report EL 4492 - Relinquished Area". Dated July 1990.

All exploration work carried out by the Moline Joint Venture on EL 4492 is recorded in these reports and no attempt will be made to repeat the data in this report.

3.1.2 EL 4508 - Expired 24/5/90

A report entitled :

"Moline Project - Exploration Licence 4508 Final Report". Dated August 1990

covering exploration carried out on this tenement has been presented to the Northern Territory Department of Mines and Energy. Exploration results from this tenement are not included in this report.

3.1.3 EL 5674 - Surrendered January 1991

During April and July 1990, both annual and relinquished area reports for EL 5674 were submitted to the N. T. Department of Mines & Energy. The results of exploration in these areas was disappointing and application to surrender the tenement was made in January 1991.

3.1.4 EL 4894 - Current

This licence was granted 28/5/86 and expires 27/5/92. During year 4 of the licence its area was reduced to one graticular block (Figure 2).

3.1.5 EL 6537 - Expired 30/10/90

A separate report "EL 6537 - Final Report" dated January 1991 was submitted to the Northern Territory Department of Mines & Energy in January 1991. Exploration results from this tenement will not be included in this report.

3.1.6 EL 6599 - Expired 6/11/90

This tenement was granted for 12 months from the 7th November 1989. It covered 575 hectares and was located approximately 4kms west of Moline. A separate report "EL 6599 First and Final Annual Report" dated 23rd January 1991 details exploration results from this tenement. These results will not be repeated in this report.

3.1.7 EL 7028 - Current

This licence covering four graticular blocks or approximately 1,296 hectares was granted on the 9th November 1990 for four years. As exploration of this tenement is still at a preliminary stage, exploration results for this licence have not been included in this report.

3.1.8 EL 6121 - Current

This licence was granted on the 29th August 1988 for a period of 4 years. A separate report on this tenement area was prepared for the Northern Territory Department of Mines and Energy in September 1990 and the information will not be repeated in this report.

3.2 Mining Leases and Exploration Retention Leases

On the 16th August, MLN 1059 covering 3,960 hectares was granted for a period of 25 years and simultaneously MLN's 748 - 750 and ERL's 75 and 76 were surrendered. MLN 1059 and the surrendered tenements before it, covered the bulk of the major gold mineralisation at Moline and consequently was the focus of most of the exploration work.

3.3 Mineral Claims

During the period covered by this report a number of mineral claims were granted :

TABLE 2 MINERAL CLAIMS GRANTED 1990

Mineral Claims	Date Granted	Expiry Date
MCN's 2332 - 2335	16/5/90	16/5/2000
MCN's 2338 - 2345	16/5/90	16/5/2000
MCN's 2360 - 2364	16/5/90	16/5/2000
MCN's 2345 - 2461	16/5/90	16/5/2000
MCN's 2526 - 2529	16/5/90	16/5/2000
MCN's 2958 - 2975	16/5/90	16/5/2000
MCN's 2978 - 2995	16/5/90	16/5/2000
MCN's 3630 - 3631	23/3/90	Surrendered Jan 91
MCN's 3872 - 3887	27/11/90	27/11/2000

Mineral claims : 2332 - 2335; 2338 - 2345; 2360 - 2364; 2439 - 2440 and 3077 - 3081 were surrendered on the 17th December 1990

Mineral claims : 2441; 2458 - 2460; 3057 - 3061 and 3094 - 3095 were relinquished in January 1990.

A list of all tenements included in the Moline Joint Venture and their status as at the 31st January 1991 is included in Appendix 1.

As separate reports will be prepared for the relinquished mineral claims, the results of exploration on the claims relinquished in December 1990 and January 1991 are not included in this report.

4.0 GEOLOGY

4.1 STRATIGRAPHY

Attempts to fit the Moline Early Proterozoic stratigraphic sequence into the stratigraphic subdivisions of the Pine Creek Geosyncline have been made in previous annual reports, (e.g. G.C. Miller, May 1987, Cyprus Gold March 1990 Section 5.2).

The Finniss River Group, Burrell Creek Formation characteristically consists of brown silts, mudstones and shales in the Moline area. Coarser grained units are generally rare. Along the western margin in the south and north of the Project Area, the Burrell Creek Formation has been metamorphosed to a massive indurated grey to black hornfels.

Contact with the underlying South Alligator Group sediments is gradational. Intermediately underlying the Burrell Creek Formation in the west is a sequence of laminated silts and shales with nodular chert, tuffs and banded iron units. This grades into coarser grained sandstone and greywacke units. These units mark the commencement of the Mine Sequence, which hosts the bulk of the gold and base metal mineralisation at Moline. The sequence includes tuffaceous units usually up to 3m thick, massive mudstones and siltstones, sulphitic carbonaceous shales, carbonate units and chert including nodular cherts. Figure 3 shows the disposition of the major formations at Moline.

4.2 Structure

The South Alligator Group sediments have been folded into a series of south west plunging overturned fold structures. The arenaceous units have been folded into more open, faulted structures, but the sulphitic carbonaceous shale, tuff and chert sequences have been repetitively folded into tight overturned asymmetric fold structures.

The axial planes of the regional fold axes have been the focus of regional shearing and gold and base metal mineralisation. North west trending shear zones host gold and base metal mineralisation at Tumbling Dice, Moline, Four Pit, School Pit and many other smaller deposits. Faulting and shearing trending north and east west has also been noted. A north trending shear zone hosts the major Hercules

gold deposit and the Cornwall Deposit. Where north trending shears intersect the north west axial plane structures, steeply plunging pipes or chutes of mineralisation are developed. This localisation of significant gold mineralisation at the intersection of the north and north west shear directions was particularly noticeable at School and Tumbling Dice Pits. The east west shears and faults are rarely mineralised and often infilled with massive milky quartz veining. Thermatic mapping by Cyprus Gold Australia Corporation (Figure 3) showed a number of major faults normal to the fold axes.

4.3 Intrusions

The Moline Project Area is bounded on three sides by the outcrop of the Cullen Granite. The north west striking axial planes and axial plane shearing link the Cullen Granite north west of Moline to the 60 sq. km Mt. Davis Granite Batholith south west of the Mine (Figure 3).

Massive white quartz veining is common in the Burrell Creek Formation, and in tension gashes and ladder veins in the cores of fold structures in the more massive coarser grained rocktypes of the South Alligator Group. However, this quartz veining rarely contains gold mineralisation.

4.4 Mineralisation

Gold mineralised zones within the Project area can be subdivided into those parallel or sub-parallel with the regional fold axes or cross-cutting deposits. The Hercules and Cornwall Gold deposits are described as cross-cutting, while Moline, Tumbling Dice, Dingo and Waterhole are examples of sub-parallel mineralised zones.

The sub-parallel mineralised zones are strongly sulphitic polymetallic deposits with gold associated with sphalerite, arsenopyrite, pyrite, pyrrhotite and chalcopyrite within repetitively, tightly folded carbonaceous shales, laminated shales, calcareous siltstones and nodular cherts. Quartz and calcite veining are associated with the mineralised zones. The mineralised zones form steeply south west plunging north-south elongated polymetallic pods.

The Northern Hercules is the major cross-cutting gold deposit. The gold mineralisation is associated with arsenopyrite, pyrite, chalcopyrite and minor sphalerite and galena. The sulphides and associated quartz veining are within a north-south shear zone which cuts across north west striking greywackes, sandstones and siltstones. The mineralised zones form elongate south plunging "en echelon" chutes.

Previous reports on the Moline Project have suggested, the polymetallic deposits at Moline Dam (Moline Pit) and similar deposits like Tumbling Dice are probably stratiform. However, the current investigations indicate all deposits are associated with regional structural features. The elongate podiform mineralised deposits, which plunge in the plane of the shear zones are clearly strongly structurally related.

5.0 PREVIOUS EXPLORATION

5.1 Historical

Gold was discovered in the Project Area in 1882 at Northern Hercules. The first shaft was sunk in 1891 and mining continued sporadically until 1957. The mine was worked to a depth of 90m and an exploration drive extended to a depth of 120m. Records indicate the Northern Hercules Mine produced 37,000 ozs from 38,000 tonnes of ore.

Base metals were discovered at the Evelyn Mine (within the Project Area but held by another Company) in 1886. The last recorded production in the late 1960's, took mine production to 80,000 tonnes @ 6.9% lead, 5.7% Zn, 9 ozs/tonne Ag and 0.7 g/t Au.

In addition to the hardrock gold deposit, alluvial gold workings were scattered throughout the area, in particular the High Chinese, and Low Chinese areas (see later - 7.5.10).

5.2 Previous Exploration

Greenbushes Ltd acquired the tenements, which ultimately became the Moline Project in September 1981. Following exploration in 1982 and 1983, Greenbushes farmed out 50% of their interest in the tenements to Amoco (later to become Cyprus Gold).

During 1982 and 1983 Greenbushes carried out mapping and rock chip geochemical sampling programmes, and drilled 9 percussion holes totalling 454.5m. Annual Reports on EL 3008 by R. Birrell in 1982 and 1983, and by J. Brigden (1984) document this work.

Between 1984 and 1987, prior to the feasibility studies being undertaken, Cyprus carried out approximately 18,000m of reverse circulation and diamond drilling in addition to various rock chip and soil geochemical surveys, aeromagnetic and ground magnetic surveys, and induced polarisation surveys. This work has been reported by Amoco and Cyprus to the Northern Territory Department of Mines & Energy in the following Reports :

"Exploration Licences 3008, 4492 and 4508 Report for Period Ending 15 March 1985". By G.C. Miller April 10 1985

"Exploration Licences 3008, 4492 and 4508 Report for Period Ending November 30th 1985". By G.C. Miller 16 December 1985

"Exploration Licences 3008, 4492, 4508,4894. Mineral Leases 748, 749 and 750 Report for Period Ending 15 March 1985". By G.C. Miller

"Moline Project - Exploration Licences 3008, 4492, 4508 and 4894. Exploration Retention Leases 75 and 76. Mineral Leases 748, 749 and 750. Report for Period Ending 15 March 1988". By G.C. Miller July 1988

"Moline Project Exploration Licences 4492, 4508, 4849 and 5674. Exploration Retention Leases 75 and 76. Report for Period Ending 15 March 1989". By G.C. Miller June 1989

"Moline Project Exploration Licences 4492, 4508, 4894 and 5674. Mining Lease N 1059. Mineral Claims N 1908 - 1913, 1925 - 1930, 2944 - 2957, 3042 - 3081, 3088 - 3089 and 3181 - 3187. Report on Exploration for Year Ending 15 January 1990.

6.0 EXPLORATION 1990 EXPLORATION METHODS

Exploration of the Moline Project Tenements involved gridding, extensive geological mapping/rock chip geochemical survey, costeaning and airtrack and reverse circulation drilling programmes.

6.1 Gridding and Survey

Survey grid was established in the Cornwall region (100 x 25m), south of the Moline Plantsite, in the area between Tumbling Dice and Waterhole Prospect and north-west of the Plantsite in the Mango region (Figure 16). The grid was surveyed by Moline Mine staff or by contract Surveyor Chris Bloomfield. All drill hole locations and excavator costeans were picked up by survey.

6.2 Mapping and Rock Chip Geochemistry

Previous exploration had concentrated on a number of prospect areas, determined primarily by aeromagnetic surveys. A geological mapping and rock chip geochemical programme was carried out to determine the potential of the entire tenement area for gold and base metal mineralisation. The programme involved Moline Project geologists traversing the tenement area, mapping exposures of bedrock and sampling any quartz veined or ferruginous gossanous outcrops for analysis for gold, arsenic and zinc.

For base metal evaluation zinc was chosen, as opposed to lead, because of its greater mobility, resulting in broader anomalies.

Figures 4 - 15 show the results of the rock chip geochemical programme and Appendix II contains the individual results and rock descriptions.

All costeans were geologically mapped and channel sampled. All samples, rock chip, costean and drill holes, were analysed by Australian Assay Laboratories in Pine Creek, and check analyses were carried out by Analabs in Darwin.

TABLE 3 ANALYTICAL TECHNIQUES AND ACCURACY

ELEMENT	AAL CODE	LEVEL OF DETECTION	PRECISION
Gold	FA 50	0.01	+/- 15%
Arsenic	D 100	100	+/-10%
Silver	D 100	1ppm	+/-10%
Zinc	D 100	2ppm	+/-10%
Lead	D 100	5ppm	+/-10%

Approximately 4 - 5 kgm of sample was collected from each rock chip sample location. The entire sample was pulverised before a subsample was taken.

6.3 Costeaning

Costeans were cut with the Moline Project's Komatsu PC 400 or contract excavators from Halkitis and Tricolore.

A total of 7,251.2 metres of costeaning was completed in exploration areas during the period.

The main areas investigated were :

Prospect	Costean metres
Cornwall	473.5
High Chinese	2,040.5
Waterhole	519.7
Dingo	687.9
Woodstock	319.5
Swan	443
Stockyard	240
Trig South	180

All costeans were cut approximately 1m into the bedrock. The trenches were geologically mapped and samples were collected over intervals from 0.5m to 5m. Sample weights varied from 3 - 5 kgms. All samples were pulverised before subsampling. Following sampling, where the results were negative, the costeans were backfilled.

6.4 Ditchwitch Trenching

A ditchwitch rocksaw with a 2m diameter cutting wheel has been employed by the Moline Project for grade control. This was used in several exploration areas to assess the gold grade of mineralised zones.

The ditchwitch cuts a 100mm wide trench to a depth of 400mm. Prior to trenching the surface scree and soil must be removed. The advantages of this system are :

* It produces homogeneous samples, which are easily collected from a windrow on the side of the trench.

* There is minimum environmental impact.

For exploration purposes the disadvantages of this technique are :

* The surface needs to be level.

* The trench is too narrow to allow adequate geological mapping.

A total of 2,658.8m of ditchwitch trenching was carried out on exploration areas during 1990. The main areas evaluated with the ditchwitch are summarised in Table 4.

TABLE 4 DITCHWITCH TRENCHING MOLINE PROJECT 1990

AREA	No. TRENCHES	TOTAL METRES
Divot	7	129
Swan	10	279
Kendergarden	16	525
Emu	11	188
Crow	8	156

6.5 Reverse Circulation Drilling

All reverse circulation drilling was carried out by Rockdrill Contractors Pty Ltd of Alice Springs N.T. using a track mounted Rockdrill 2,000 rig or a truckmounted Rockdrill 1,000 rig. All holes were 5.5 inch diameter.

Most holes were drilled at a depression of 60° to the horizontal and were oriented grid east. The holes were sampled at 1m intervals, with two samples being taken. The first sample was a 3 - 4 kgm split which was despatched to A.A.L. in Pine Creek for analysis. The rest of the sample was stored in bulk plastic (dry) or polywoven bags for future analysis if required. In the February reverse circulation drilling programme, all samples with grades greater than 0.5 g/t Au were reassayed for gold at Analabs in Darwin. The samples for reassay were resplits from the bulk samples (Appendix III).

Selected samples were analysed for zinc, lead and silver. Pulps of all samples are stored at Australian Assay Laboratories in Pine Creek.

A total of 111 holes and 4,590m of drilling was completed in two programmes during 1990. The areas drilled are summarised in Table 5.

TABLE 5 R.C. DRILLING MOLINE PROJECT 1990

AREA	**FEBRUARY/MARCH1990**		**JUNE/JULY 1990**	
	HOLES	**METRES**	**HOLES**	**METRES**
Trig	4	148		
School	7	326		
Waterhole			7	365
Dingo			5	171
High Chinese			7	321
Playground			3	108
Fourex			2	96
Stockyard			2	90
Tumbling Dice	31	1,058	9	408
Simple Dreams	11	373		
Cornwall	14	678	10	448
TOTAL	67	2,583	45	2,007

6.6 Airtrack Drilling

Airtrack drilling was used in exploration areas to evaluate near surface mineralised zones. Usually the drillholes were declined at 65° from the horizontal and drilled to depths ranging from 6m to, in the most favourable ground conditions, 20m. The drill holes were 100mm in diameter. Samples were collected with a cyclone and the sample was split to approximately 2 kg for assay.

The drilling contractor, Parkside Drilling, completed 395 holes for 3,883m during 1990. The main areas drilled with the airtrack were :

TABLE 6 AIRTRACK DRILLING MOLINE PROJECT 1990

AREA	No. HOLES	TOTAL METRES
Crow	35	262.5
Emu	30	225
Arm	29	217
Cornwall	63	620
Simple Dreams	8	144
Waterhole	41	548
Dingo	25	313
Trig South	25	315

6.7 Check Analyses

Check gold assays are carried out on both head feed and tailings samples from the Moline Plant on a continuous basis. This also served as monitoring for exploration sample assaying.

During the February/March 1990 exploration programme, all samples with a grade greater than 0.5 g/t Au were reassayed. Two duplicate 2 kg samples were split from the bulk sample of the anomalous interval. One was dispatched to A.A.L. for reassay and the duplicate sample was sent to Analabs in Darwin for analysis. The results of this analysis work is included in Appendix 3.