The role of placer mining companies in the State-sponsored gold rush in Mongolia

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ABSTRACT

Mongolia is experiencing a sustained boom in gold production, reaching 11.5 tons in 2000 having increased every year since 1993 from a low base of only 1.1 tons. This boom is a State-sponsored ‘gold rush’ by placer mining companies, predominantly Russian and Mongolian. Virtually all of the gold output is from placer gold mines (99%). In 2000, gold was produced by 102 placer mining companies, but only 21 of them produced more than 100 kilos of gold each, yet 4 companies each produced more than 1 ton of gold. The boom has continued in spite of the fall in the world gold price and the Bre-X scandal, as most of the placer companies are either State-owned, private corporations or controlled by private companies. Therefore there was only limited western stockmarket funding to arrive and depart. Being focussed on placer, and focussed on mining in preference to exploration, the mining companies generated early cash flow that enabled some to become major players in the local economy and diversify into many sectors.

Introduction

Gold production in Mongolia has risen every year since 1991. In 2000 gold production reached 11.5 tons. Almost all the gold production was from placer gold mining. This paper describes this ‘gold rush’, examines the reasons for it and outlines the role of placer mining companies within it.

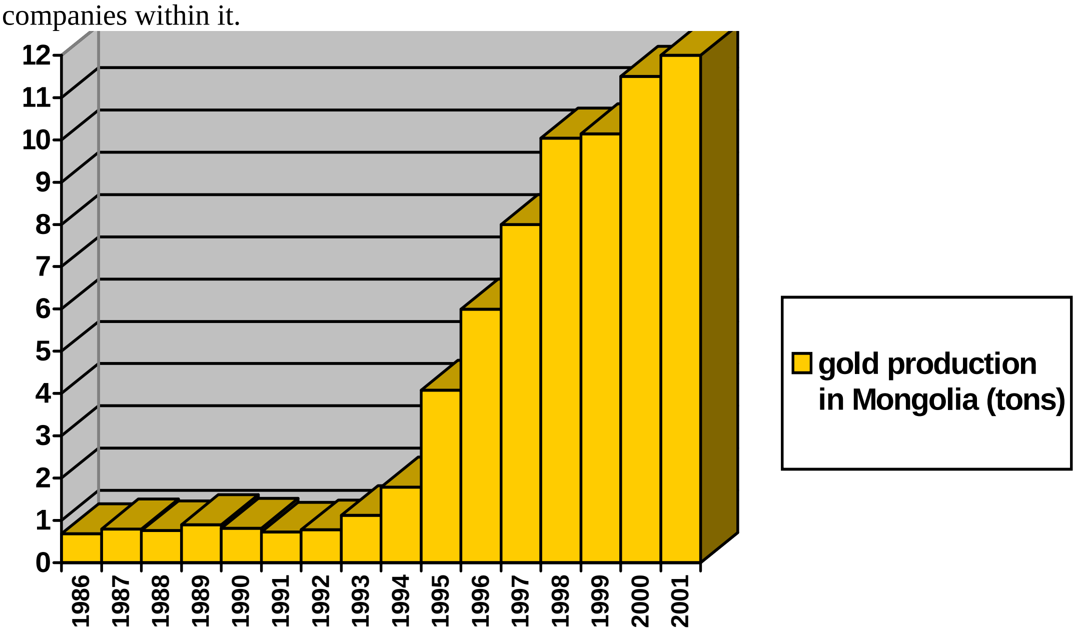

Fig.1: Gold production in Mongolia, 1986 to 2000. Almost all (99%) is from placer gold mining.

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Methods

An analysis of the gold production in Mongolia was carried out, using information from the Minerals Resources Authority of Mongolia (MRAM) including the Geological Cadaster and the Geofund, articles in the local media, reports of the Mongol Bank, information from local companies and numerous observations by the authors.

Seasonal Factors

The placer gold mining sector of Mongolia is controlled by the sharply continental climate. Gold recovery is achieved by washing the placer to disaggregate the particles, remove the oversize and after this to separate the heavier gold particles by gravity in water. Gold recovery is thus essentially a water-process. For a typical placer gold mine in Mongolia, water is available for only 155 days a year, the rest of the time the temperature is below the freezing point. Thus gold recovery is typically possible on only 42% of the days of the year, and this has an enormous negative impact upon the output, internal rate of return (IRR), financial efficiency and the size and structure of loans.

The ‘weather window’ also has a profound effect upon the viability of the gold mining operations. The limited ‘weather window’ renders the mines acutely vulnerable to the slightest delay in unscheduled breakdowns, getting spare parts, temporary fuel shortages, temporary failure of the electrical grid, pump failures etc. Loss of a week causes a reduction of 4.5% of the planned annual output of gold.

Under ideal conditions a gold recovery plant should be able to operate 20 hours per day, thus achieving 3,100 operating hours in the 155-day season. In practice, a ‘good’ mine in Mongolia achieves an average of 16 hours a day, totalling 2,480 hours, producing 20% less gold in a season than the theoretical amount. Many of the mines, particularly the smaller mines, tend to operate only 12 to 14 hours a day, and many lack floodlighting for night-time working.

Furthermore the shortness of the ‘weather window’ means that a company that mobilised its gold recovery plant one week behind schedule also loses 4.5% of its planned annual output. Bad luck, bad planning or bad weather can be the cause, but many mines are also constrained to start-up on a date dictated by the availability of cash. Inevitably, with loans so expensive (4-6% per month from the local commercial banks) and only short-term (3-8 months), the company priority is to defer the start-up to the very last moment, in order to minimise the duration of the loan, and the overriding priority is to repay the loan, not to optimise production. A further negative factor is a tendency to mobilise the excavation of overburden late, only at the start of the 155-day season, and thus the gold recovery often commences a month or more later, cutting achievable annual production by 20%.

During the winter, mines and Mining Licenses tend to be bought and sold, and often also agreements concluded for contract mining. All of these necessary activities take time, often more than envisaged. The contract miner or new owner is often faced with a race to catch the ‘weather window’ and there are many examples of mines starting up late in the season and incurring unexpected losses as a result.

Some of the well-organised companies, with stronger financial and management resources, undertake preliminary muck-shift of the overburden for 30 days or more *before* the start of the 155-day weather window thus transforming the economics. At the end of the 155-season, they continue muck-shifting of more overburden for a further 30 days or more, and may also strip off and stockpile some placer ready for processing the following year. Again the economics are transformed.

Stockpiling of placer is highly desirable in order to ensure that the gold recovery plant has ample feed at the start of the 155-day season. A case can be made for creating a stockpile during the season in order to compensate for any interruption of supply of placer during the season (e.g. breakdown of trucks and excavators and consequent delays for spare parts and repair), but in many cases stockpiles accumulate due to an avoidable mismatch between the capacity/performance of the gold recovery plant and the capacity/performance of the placer excavators and trucking. In this case, stockpiles are an expensive waste of scarce capital, complicate site management and increase the temptation to excessive and expensive double-handling of placer. A documented example of an excessive stockpile being created occurred in 1997 and 1998 during the placer mining activity of Java Gold Corporation, an Ontario public company, as described by Grayson (2000).

Expansion of Number of Gold Mining Companies

The number of gold mining companies in Mongolia was formerly very small. The first wave of expansion was by increasing the number of State-owned gold mining enterprises, from a low base of 3 in the 1980s to 12 by 1992.

The second, and much larger, wave of expansion – still underway – has been driven from the outset by the private sector, starting in 1993. That year saw a dramatic increase, due to placer gold Mining Licenses being taken up by 22 private companies, resulting in a total of 33 gold mining companies by year-end. Another sharp increase was recorded in 1994 with placer gold Mining Licenses taken up by a further 17 private companies, resulting in a total of 54 gold mining companies by year-end. A marked slow-down of entry of new private companies occurred in the following year when only an additional 5 (net) companies taking up gold Mining Licenses, bringing the total number of 60 gold mining companies by the end of 1995.

The success rate of the companies in getting Mining Licenses into gold production has generally been very high, 30 of the 33 companies in 1993, 47 of the 54 companies in 1994 and 52 of the 60 companies in 1995. However this success rate is not quite as high as it appears, as many companies held more than one Mining License. The high speed of conversion of Mining License into an active placer gold mine is still impressive.

After 1995, statistical comparison between the number of companies holding Mining Licenses and the number in production is rendered meaningless, due to the rapidly increasing complexity of the business operations.

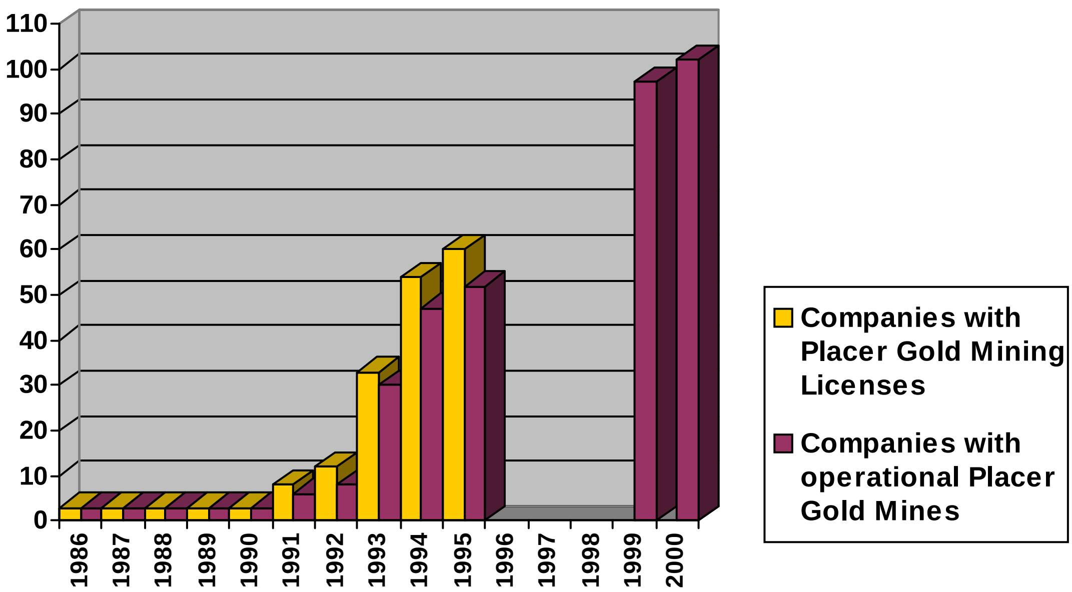

Fig.2: Increase in the number of placer gold mining companies in Mongolia.

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Number of Gold Producers in 2000

According to official figures, 101 companies achieved placer gold production from Mining Licenses in the 2000 season. However, analysis demonstrates an enormous disparity between the top 8 'large' producers and the remaining 93 'small' producers. An attempt to visualize this is depicted in Fig.3, with the largest gold producers shown to the left and the smallest gold producers to the right. For completeness, Fig.3 also includes small amounts sold by the Trade & Development Bank, and by the State Police.

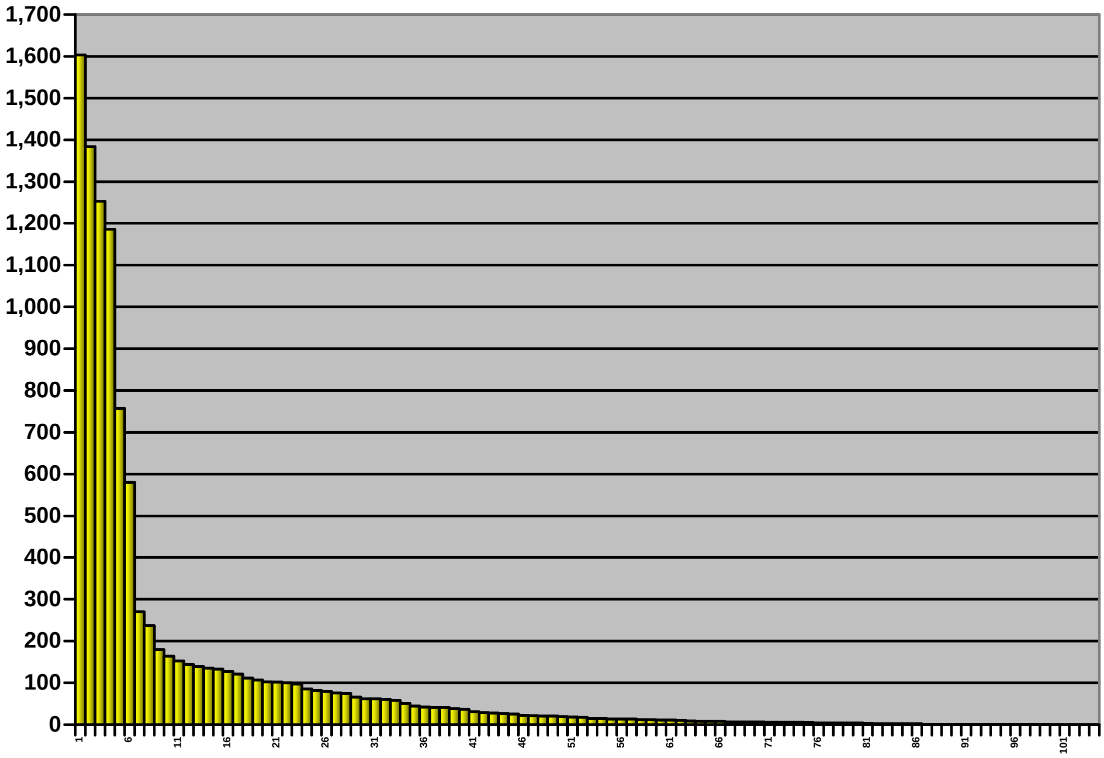

Fig.3: Gold production by each of the producers in Mongolia in 2000, expressed in kilos.

It can be argued that a handful of larger gold producers determine the placer gold industry of Mongolia and that the large pool of small producers is virtually irrelevant. While this is true on the basis of the production figures for 2000, this study shows the situation to be much more complicated. In particular, a significant number of smaller producers have the potential to rapidly become large producers provided certain conditions are fulfilled.

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Importance of Large Gold Producers in National Output : 2000

The national importance of the large gold producers is illustrated in the table below, with a mere 8 companies producing 66% of the national gold output in 2000. The top of the league table for 2000 was as follows:

RANK	GOLD PRODUCER	GOLD - KILOS	% NATIONAL OUTPUT
1st	Mongol Gazar Ltd.	1,603	15.0%
2nd	Erel Ltd.	1,364	12.9%
3rd	Altan Dornod Mongol Ltd.	1,252	11.6%
4th	Shijiir Alt Ltd.	757	11.0%
5th	Gatshuurt Ltd.	579	7.1%
6th	MAC	269	5.4%
7th	Monpolymet Ltd.	237	2.5%
8th	Datsan Trade Ltd.	179	2.2%
9th	Borzon Trade Ltd.	179	1.7%
10th	Ikh Temuulel Ltd.	163	1.5%

Fig.4: Share of national gold production by mining company, 2000.

Changes in Large Gold Producers in National Output : 1999 - 2000

As in 2000, in 1999 the top 8 gold producers produced 66% of the national output. However, 1999 differed in the astonishing but temporary dominance of Erel Ltd. that produced nearly a quarter of the national production. Erel's output fell by nearly 50% in 2000. A steep fall in production was also recorded by Shoroon Ord Mining Ltd. in 2000, while TAS Ltd. fell from 10th place to 65th place and is no longer engaged in gold mining. Analysis shows that TAS Ltd. had historically never been a significant mine operator, having contracted out mining to a Russian-Mongolian company Argos Ltd. When TAS became overextended in numerous sectors it had to surrender its mining licenses as collateral, and today its former contract miner, Argos, is a significant producer on the ex-TAS licenses. By this means, Argos replaced TAS.

The biggest change from 1999 to 2000 has been the sudden rise of two small producers to leading positions. In 1999, Mongol Gazar Ltd. was 25th with 60.9 kilos, but leapt to 1st place with 1.6 tons in 2000. Similarly in 1999 Altan Dornod Mongol Ltd. was 74th with a mere 4.3 kilos, but leapt to 3rd place with 1.2 tons in 2000.

RANK 1999	GOLD PRODUCER	KILOS in 1999	% NATIONAL OUTPUT in 1999	% NATIONAL OUTPUT in 2000	RANK 2000
1st	Erel Ltd.	2,340	24.2%	12.9%	2nd
2nd	Shijiir Alt Ltd.	1,440	14.9%	11.1%	4th
3rd	Gatshuurt Ltd.	838	8.7%	7.1%	5th
4th	MAC	596	6.2%	5.4%	6th
5th	Bugant Ltd.	432	4.5%	1.4%	11th
6th	Serelt Tur Ltd.	271	2.8%	1.9%	16th
7th	Shoroon Ord Mining Ltd.	263	2.7%	0.5%	33rd
8th	Monpolymet Ltd.	225	2.3%	2.5%	7th
9th	Datsan Trade Ltd.	214	2.2%	2.2%	8th
10th	TAS Ltd.	213	2.2%	0.1%	65th

Fig.5: Share of national gold production by mining company, 1999 and 2000.

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Profiles of the Leading Gold Mining Companies

1. Mongol Gazar Ltd. (‘Mongol Land’ Ltd.)

Mongol Gazar is a private Mongolian company formed in 1992. The company started as an importer of consumer and food products from the USA, Singapore and Europe, and an exporter of cashmere, camel and sheep wool, cow hide and leather to Japan, China, Belgium and France. In 1992 the company brokered the payment of a debt due to the CIS from the construction of a State steel manufacturing plant.

The company developed a joint venture, Hasebe International Ltd. with the Hasebe Group of Japan, leading to the purchase in 1994 of the State-owned ‘Altai Hotel’, renaming it the Flower Hotel which is today one of the most popular 4 star hotels in Ulaanbaatar.

In 1996, Mongol Gazar took up a license for gold placers projected to have 40 tons reserves in the valley of the Khumul River in Binder Soum in Khentii Aimag, and was soon employing more than 70 direct mining employees and a further 150 workers via mining subcontractors. The company encountered severe operational difficulties due to frozen ground and other factors and pulled out of the region with losses.

In 1997, Mongol Gazar acquired 71% of Ikh Uusgel Joint Stock Company, a specialised metal fabrication company that served as the base for mining operations.

In 1998, Mongol Gazar discovered and acquired the licenses for the Harguit gold placer and others in the remote Tsenger Soum in Arkhangai Aimag and this laid the foundations for the current success of the company. Start-up of the **Ulzit Teel Gold Mine** was much more difficult than expected, largely due to permafrost. This led to Wagner Asia International Ltd., who had leased to Mongol Gazar a substantial amount of Caterpillar earth-moving equipment, taking over both the mine and Mining License, and Wagner Asia produced 56 kilos in 1999 before selling the property to Altan Dornod Mongol Ltd.

Mongol Gazar rose dramatically to 1st place in the league table of gold producers in Mongolia in 2000, due to the rapid commissioning in June 2000 of the exceptionally large **Harguit Gold Mine** in Tsenger Soum in Arkhangai Aimag. This mine has the capacity to produce significantly more than 1 ton of gold a year. The Harguit placer is 120 to 220m wide and a remarkable 12km in length. The placer is 4m thick and the average grade is an impressive 3g/m^3 and ample water is present. The proven reserves are 10.3 tons of gold (dore), of which 2.3 tons of gold (dore) were mined in 2000, the first season. The hard-rock source of the gold has not yet been located.

The Harguit Gold Mine is the first placer gold mine to be developed in Arkhangai Aimag. The project has been financed by a 20 million US$ investment of the Japanese Itochu Corporation that had previously put 12 million US$ investment into the placer mines of Erel Ltd. Itochu financed the supply of heavy equipment, including 4 Komatsu excavators, 14 large Komatsu trucks and 8 Komatsu bulldozers. The Harguit Gold Mine had 400 employees in 2000, increasing to 460 people in the current season. Most are recruited from Ulaanbaatar, but jobs for about 50 locals are also provided. Substantial investment has taken place in infrastructure, including road building and the construction of a village for employees.

Gold washing at the Harguit Gold Mine is by means of Russian-style sluices fed by 3 Russian-built trommels (model SB22) each processing 120m^3/hour operating 10 hours a day. The company is introducing 2 more trommels of similar size to increase the total hourly processing rate to 600m^3/hour.

The main problems are patches of permafrost and patches of clay that make washing difficult. The gold grains are small, and gold recovery by washing is around 75%. The tailings are stored carefully, and Mongol Gazar claims it is experimenting with technologies for recovery of fine gold from the tailings.

During the 2000 season, the Harguit Gold Mine produced 1.6 tons of gold (pure) sold to the Mongol Bank as 2.3 tons of dore gold, unusual in containing 25% silver. In a single season the multimillion US$ financing package from Itochu Corporation has been paid back in full. Mongol Gazar expects to increase production in 2001 possibly as high as 3 to 5 tons of dore gold (implying 2 to 3.5 tons of pure gold). Such an outcome will significantly increase Mongolia's gold production and strengthen Mongol Gazar's lead over other producers.

To maintain its reserve base, Mongol Gazar has taken up a large portfolio of Exploration Licenses, with an emphasis upon western Mongolia.

Mongol Gazar has diversified into hard-rock gold exploration, and 2001 will see the start-up of hard-rock gold mining at the Olon Ovoot Mine in Tsogt Ovoo Soum in Omnogobi Aimag in the Gobi Desert. Water is limited but piping water will be attempted. Average gold grades are 5-6 gram/ton, and the mining will commence in an area with 10g/ton. Production is expected to start in August or September 2001, initially employing 50 miners. The ores are hydrothermal gold sulphides associated with quartz veins. Mining will be all-year-round using igloo techniques. No production forecasts have been released.

The future direction of Mongol Gazar is firmly in the mining sector, and to proceed from placer gold mining to hard rock gold mining. The company is also interested in moving into copper and other metal prospecting. Mongol Gazar has no plans to diversify significantly into other sectors, and will therefore not be following the 'Erel model'.

2. Erel Ltd. (= 'Search' Ltd.)

Erel was first established in 1989 as the Erel Co-operative under the leadership of B. Erdenebaatar, a native of Hovsgol educated in Novosibirsk in Russia, together with three other engineers and four drivers. The company began activity in geology exploration assisted by a short-term bank loan. In 1991, the company was reorganised as Erel Ltd.

In 1989-90, Erel completed substantial geological mapping of 1,780 sq. km. of Ovorkhangai Aimag at a scale of 1:50,000 and documented 40 gold occurrences, and focussed its attention on one of these that enabled Erel to commence 'dry' mining and gold production at its first mine, the **Ult Gold Mine**. From 1993 to 1997, the Ult Gold Mine produced 2,482.5 kilos of gold, 44% of which was produced in 1997.

The early success of Erel attracted 12 million US$ investment from the Japanese Itochu Corporation. This permitted the successful and rapid development of the Bayangol placer at Zaamar, achieving major production from 1997 by 'dry' mining at the **Bayangol Gold Mine**. This placer mine has a gold melting and gold bar production plant. Erel produced 1,470 kilos of gold from the Bayangol Gold Mine in 1997, a further 1,481.5 kilos in 1998, declining sharply to 281.5 kilos in 1999.

Erel also developed a range of multi-sectoral subsidiaries. In 1998 it reorganised as the Erel Group with more than 2,500 employees.

Today the Erel Group has more than 3,000 employees with more than 10 subsidiaries and divisions active in a wide range of sectors:

- **Utiin Placer Gold Mine**, Overkhangai Aimag – started 1998
- **Bayangol Placer Gold Mine**, Zaamar Goldfield, Tov Aimag – started 1999
- **Erel Cement Factory** (bought in mid 1990's at privatisation auction) – built near Darkhan in 1968, refurbished by Erel in 1998 for 1m$. 450 employees;
- **Concrete Slab & Block Factory** (bought in 1994 at privatisation auction);
- **Erel Toosgo Factory** (brickwork bought in 90's by privatisation) - 280 employees;
- **Bitumen & Asphalt Plant** (started in 1990's) – modern plant for road surfacing
- **Erelstroi Company** (started 1998) - construction, house-building, 400+ employees;
- **Engineering Repair Workshops** – 150+ employees
- **Erel Bank** (started 1997) – private commercial bank, opened in December 1997
- **Erel Daatgal Ltd.** – insurance company
- **Erel San** (established in 1990's) – an educational foundation;
- **Erel School** (founded 1990's)

- **Erel Research Centre**
- **Flour Mill**
- **Sewing Factory**
- **Vehicle Workshops**
- **Construction Materials Company** – sand & gravel mining & crushed aggregate
- **Mongoliin Medee** (first issue in November 1998) – independent weekly newspaper
- **Hurd** pop group

3. Altan Dornod Mongol Ltd. (= 'Golden East Mongol' Ltd.)

Altan Dornod Mongol Ltd. is a USA-registered private company with Russian owners. The company rose suddenly to 3rd place in 2000, having brought into full production three large placer properties:

- **Ar Naimgan** 'dry' placer in the Zaamar Goldfield;
- **Ulziit Teel** 'dry' placer in Arkhangai Aimag;
- **Bayangol** 'wet' placer in the Zaamar Goldfield.

The **Ar Naimgan Gold Mine** is a 'dry' mine, using USA Caterpillar-350 bulldozers, and 3 Russian PgSh washing plants capable of processing 100m^3 per hour each, plus one scrubber. Overburden is remarkably thick but mining is profitable.

During the 2000 season, the company bought a Mining License at Ulziit Teel in Arkhangai Aimag from Wagner Asia Ltd., a license that had been pledged by Mongol Gazar Ltd who had experienced acute start-up problems and defaulted on leased equipment. The **Ulziit Teel Gold Mine** uses Russian PgSh washing plants and USA Caterpillar equipment supplied by Wagner Asia Ltd.

Also during the 2000 season, the company undertook the successful completion of the **'Bayangol' Gold Dredge**, Mongolia's newest. The 'Bayangol' was launched in August 2000 and full production commenced on 29th September, producing 19 kilos of gold before stopping in early December for the winter.

The 'Bayangol' Gold Dredge has a largely Russian crew, and is mining gold from the floodplain and lower terrace of the Bayangol valley, a side-valley of the Tuul River in the Baikal watershed. Prior to dredging, overburden is stripped off by 2 Russian-made draglines (ESH-6/45) with an 11m^3 bucket, and a 70m long boom, capable of removing 1.8-2 million m^3 of overburden a year. The placer is 6.6km long and from 80 to 800m wide (average 253m) with reserves of 6.5 tons of gold, recoverable in 8 years. The dredge area covers 1,400 hectares.

Fig.6: 'Bayangol' Gold Dredge in Zaamar Goldfield, August 2000. (Photo: Altan Dornod Mongol Ltd.).

The history of the completion of the 'Bayangol' Gold Dredge is complex, and the following account is adapted from the paper by Bazuin, Grayson, Mc.Bride & Barclay (2000). The 'Bayangol' was formerly known as the 'Hailaast' gold Dredge after the original owners of the project, the 90% State-owned Hailaast Shareholding Company, who signed a contract with the dredge manufacturer IZTM in Irkutsk, Russia on 14th March 1997 (amended 15th May 1998). But by 1st October 1998 the project had run into problems. Originally 7m US$ finance had been obtained from the Sumito Corporation of Japan though the Central Bank of Mongolia (Mongol Bank) with the support of the Government of Mongolia, at an interest rate of 7-8% per year – very favourable terms in Mongolia where loans from local commercial banks are typically 4-8% per month. After 2m US$ had been paid as an advance, the financing ceased for various reasons. Thus the Hailaast Shareholding Company did not actually complete and launch the dredge, but had partly assembled the dredge on-site. The partly assembled dredge together with the Mining License were then privatised, and purchased by Alt Dornod Mongol.

The 'Bayangol' Gold Dredge is a Russian-made bucket-line dredge, manufactured by ITZM in Irkutsk, model 'Draga D 250 M' and it became operational in August 2000 after a prolonged construction and assembly period. The dredge is 5-storeys high, 44m long and 18m wide, with a draught of 3.2m, and a maximum reach (depth) of 8m. The dredge has 73 buckets on a chain, scooping 250m^3/hour. The dredge has a design capacity of excavating 800,000 to 1 million m^3 of material a year. The dredge is intended to operate 24-hours a day with a crew of 7 per shift.

Of great significance, the 'Bayangol' Gold Dredge is designed to operate at air temperatures as low as -25 C. This is achieved by the insulated envelope of the dredge plus internal heating supplied by steam generated by a purpose-designed on-board coal-fired boiler system. Even in the severe cold weather of early December 2000, the 'Bayangol' Gold Dredge was still actively producing gold at the normal rate.

The outlook for the 2001 season for Altan Dornod Mongol is very encouraging. Now that the 'Bayangol' Gold Dredge has been launched and trialled successfully, an output of 500 kilos in 2001, the first full year of operation, is anticipated. The Ar Naimgam Mine is also fully operational and is expected to produce a ton of gold. The Ulziit Teel Mine is expected to produce 300 kilos or more in 2001. Thus Altan Dornod Mongol is expected to produce, conservatively, 1,800 kilos, up by at least 143% on 2000. This appears reasonable, as the start-up of the three projects has been satisfactorily accomplished.

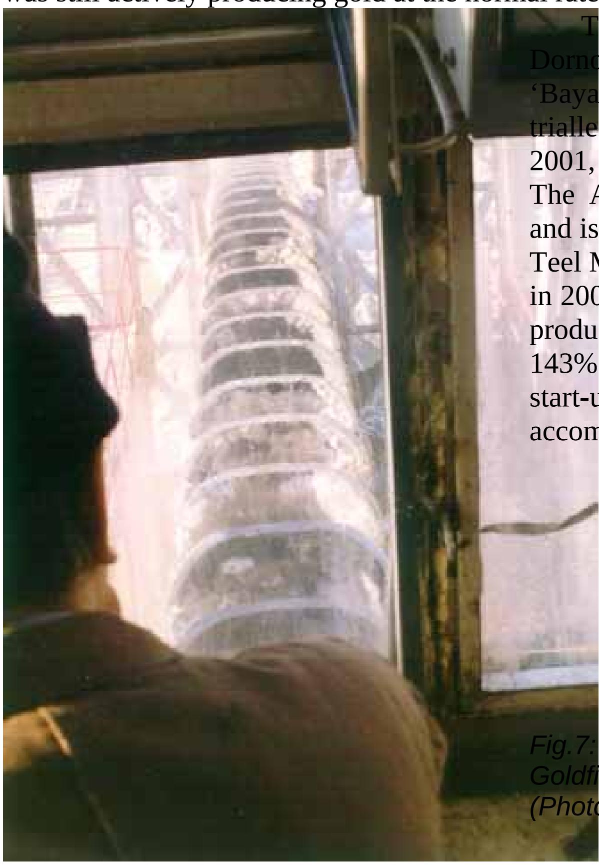

Fig.7: 'Bayangol' Gold Dredge in Zaamar Goldfield in December 2000. (Photo: Gerrit Bazuin).

4. Shijiir Alt Ltd. (= 'Fine Gold' Ltd.)

Shijiir Alt was established on 7th September 1995, and began its operations in the Zaamar Goldfield on 1st October 1995. The company owns and operates the **'Alt' Gold Dredge** built in Irkutsk in Siberia, plus a Russian Esh 11/70 drag-line excavator, Caterpillar D9R, DET-250, T-170 bulldozer, Komatsu bulldozer, and PgSh-SO high-pressure gold washing equipment.

In June 2001, Shijiir Alt expect to launch their second large dredge, purchased second-hand from the owners Mongolrosvetmet who until recently were operating this dredge in the Eroo Goldfield but its reserves were close to exhaustion.

The second dredge is expected to produce an additional 500-600 kilos of gold for Shijir Alt in 2001, and probably more in 2002 and onwards. The two dredges are about 10 km apart.

The following account of the 'Alt' Gold Dredge is adapted from the paper by Bazuin, Grayson, Mc.Bride & Barclay (2000). The dredge is mining placer gold from the floodplain and lowermost terraces of the Tuul River in the Baikal watershed.

Fig.8: Rear view of the 'Alt' Gold Dredge showing disposal of coarse and fine tailings.

The 'Alt' Gold Dredge is a Russian-made **bucket-line dredge** manufactured in Irkutsk, and it became operational in the mid-1990's after a 10-month construction and assembly period. The 'Alt' has a displacement of 1,500 tons, and a maximum reach (depth) of 12m although the average operating depth is about 7m. The dredge has 77 250-litre buckets on a chain, and a dredging design capacity of 1.2 million m^3 a year. The rated capacity is $350m^3$/hour, with 1,800kW of on-board power and a nominal power load of 700-800kW. Power is supplied by the electric grid. Including dredge crew, dragline, gold-room, and workshops, about 500 people are employees including 50 Russians. Prior to dredging, overburden is stripped off by a Russian-made dragline with an $11m^3$ bucket and a long boom. Mining operations include the dredge, 2 water monitors and one scrubber. Gold recovery is by traditional Russian sluice boxes designed for continuous operation.

The entire operation averages 12 kilos of gold per day, and the original in-situ reserves were about 20 tons in a placer deposit with an average grade of about 0.87g/m^3 with sporadic nugget anomalies between 20 and 30 g/m^3. However the placer includes significant fine gold.

Shijiir Alt is an unusual company, being a join venture between three partner companies:

- 51% Mongolrosvetmet Corporation – Mongolian-Russian joint venture
- 25% Erdenet Concern Co. Ltd. – Mongolian private company
- 24% Zarubejtsevetmet JSC. – Russian engineering company

Mongolrosvestmet Corporation is a Russian-Mongolian joint venture established in 1973. Mongolrosvetmet owns and operates substantial fluorspar (fluorite CaF_2) mining and fluorspar concentrating plants in eastern Mongolia, and is one of the world's largest producers of fluorspar concentrates and its success puts Mongolia as third in the world for exports of fluorspar concentrates. Mongolrosvestmet operates 5 fluorspar mines, 2 coalmines and 2 placer gold mines. In addition, its subsidiaries hold the Asgat silver project in western Mongolia, as well other tin, silver, molybdenum and tungsten projects.

Erdenet Concern Co. Ltd. is a large private conglomerate established in 1995. It was spun-out – but is independent of – the Erdenet Mining Russian- Mongolian joint venture that owns and operates one of the top 10 copper mines in the world at Erdenet city. Erdenet Concern has 7 main companies in which it is either the sole shareholder or an active investor:

- Shijiir Alt Ltd. – 25% shareholder
- Erdmin Co. Ltd. – Mongolian-USA joint venture
- Erdenet Stroi Ltd. – Mongolian-Russian joint venture
- Erdenet Nooluur Ltd. – Mongolian-Swiss joint venture
- Erdenet Metal Ltd. – Mongolian-Swiss joint venture
- Erdenet Khos Joint Stock Company
- Zaluuchuud Joint Stock Company

Zarubejtsevetmet JSC is a large Russian engineering and mining-support company based in the Russian Federation.

5. Gatsuurt Ltd. (= 'Fir Trees' Ltd.)

Gatsuurt is a private company, but its origins go back to the early 1990's. In 1990-91, a Soviet international expedition drilled up Mandal Soum in Selenge Aimag and delineated the Gatsuurt placer deposit. In 1992 the **Gatsuurt Gold Mine** began, operated by a Russian state-owned enterprises and by a Mongolian state-owned enterprise called Gurvan Gol Ltd. In 1993, Gatsuurt was founded as a Mongolian state-owned mining company as part of the Government's Gold Programme.

By 1998, Gatsuurt had become independent of Gurvan Gol Ltd. and henceforth undertook all the mining of the Gatsuurt gold placer. Gold output from the placer rose significantly from 1993 to 1998, and then rose abruptly in 1999 to a record 838 kilos, easing back slightly in 2000 to 757 kilos. In 2000, the company held 5th place in the league table.

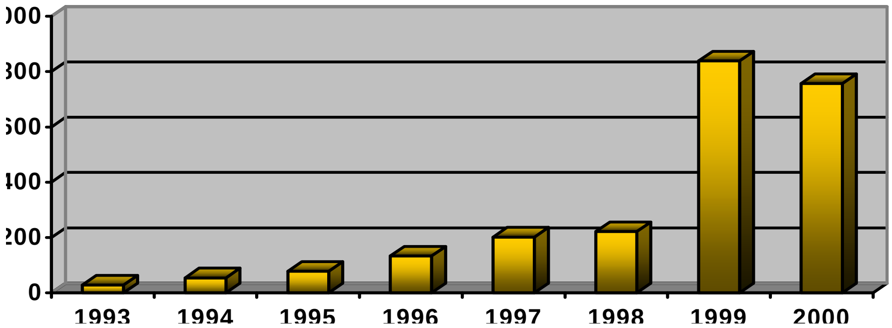

Fig.9: Placer gold output of Gaatshuurt Ltd, 1993-2000.

Gatsuurt is now a wholly private company with 90+ employees. Recently the company pushed westwards from its traditional placer mining area in northern Mongolia into central and western Mongolia, with a team of 10 specialists and an active exploration programme. As part of this strategic move, Gatsuurt has held 23 mineral Exploration Licenses in western Mongolia. The first fruit of the new strategy was the start-up in 2000 of a new placer gold mine in Overkhangai Aimag with reserves of 3 tons – the first placer gold mine in this Aimag. The mine produced 130 kilos in its first year of operation. The western push in production was followed shortly afterwards by Mongol Gazar Ltd. in nearby Arkhangai Aimag.

The westwards push by Gatsuurt was to maintain the reserves of the company, as their original mine in Mandal Soum in Selenge Aimag is fast approaching exhaustion, with only small virgin reserves left plus perhaps120-130 kilos of gold in the tailings.

In 2001, Gatsuurt plan to continue the new placer mine in Arkhangai Aimag, and to start-up small new placer mines in Exploration Licenses it holds near to its original nearly-exhausted mine in Selenge Aimag. One of these new mines is planned to produce 350 kilos in 2001. Meanwhile exploration of its many Exploration Licenses in western Mongolia is continuing and expected to yield results in 2001-2. Overall it is expected that in 2001 Gatsuurt will achieve approximately the same production as in last season.

Gatsuurt has recently branched out into completely different sectors:

- **Monojapan Ltd.** – a Mongolian-Japanese joint venture, specialising in importing Japanese motorbikes into Mongolia, started in 1999;
- **Gatsuurt Tours** – offering motorbike tours in Mongolia;
- **U-Wise Ltd.** – offering business consultancy in Ulaanbaatar, started in 1999;
- **Gatsuurt-GIS** – offering GIS and map production services.

6. Mongolyn Alt Corporation (= 'Mongolian Gold' Corporation)

Mongolyn Alt Corporation (MAC) is a private Mongolian company, not to be confused with a public company listed on the Mongolian Stock Exchange bearing almost the same name.

MAC was established in 1994 with the encouragement of the Government of Mongolia in furtherance of the Gold Programme. In 1994, MAC produced 30.8 kilos of gold from placers in the Zaamar Goldfield, but output rose steeply in subsequent years, peaking in 1998.

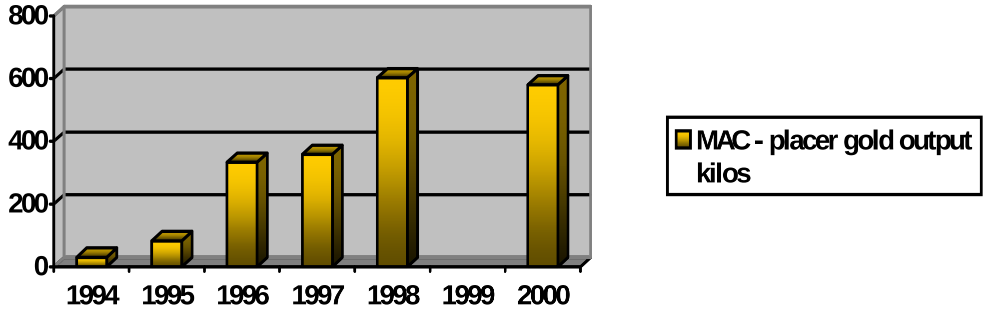

Fig.10: Placer gold output of MAC, 1994-2000.

By 1998 MAC had become one of the first Mongolian companies to use USA Caterpillar equipment such as D8N, D8R, D9R bulldozers, 350L excavators, 988F wheel loaders, 769C dump trucks ad 627 tractor-scrapers. For gold separation, as well as traditional sluices, MAC was an early user of high percentage recovery equipment, using a 20-inch Knelson Concentrator, a RR-700 Separator and other centrifugal devices.

At an early stage of its history, MAC entered into a joint venture in 1994 with Mongolia Gold Resources, a Canadian public company (listed on the Vancouver Stock Exchange), in order to develop the Bumbat hard-rock gold mine at Zaamar. The Canadian partner raised most of the funds required and project-managed the further testing of the quartz veins and translocated into Mongolia a gold mill and recovery mill plant. After a short interval of pilot production, the Bumbat Mill closed for modification and upgrading, but disagreement between the partners meant that no further progress took place and the Bumbat Mill remains suspended. The Canadian partner has now reverted to its old name of Tyhee Corporation.

MAC holds important Exploration Licenses in Biger, Erdene and Chanmandi Soum in Gobi-Altai Aimag in western Mongolia, for gold, platinum and polymetal hard-rock deposits.

MAC has also branched out into coal mining, and in 1998/9 acquired the relatively high-quality Dalanjargalan coal deposit in Dorno-Gobi Aimag in the Gobi region. The short-term plan is to produce 100,000 tons a year of coal.

MAC has also diversified into agriculture and agroprocessing. In 1998, MAC acquired 2,500 ha of arable plantations at Khalkh Gol in eastern Mongolia, for production of wheat, buckwheat, rapeseed, vegetables and fruit-berries. In 1999, MAC set up another farming subsidiary at Baruun Kharaa in Selenge Aimag.

7. Monpolymet Ltd. (= 'Mongolian Polymetal')

Monpolymet is one of the completely self-built mining companies in Mongolia. Established by Mrs. Tsenden Garamjav in early 1996, the company carried out detailed exploration of the Buudun placer gold deposit in the Zaamar Goldfield, and prepared for mining 92.6 kg of the 1.6 ton total reserve.

In 1997, Monpolymet recovered 4.5 kilos of gold from the Bayangol placer deposit in the Zaamar Goldfield, but got into full production the following year, producing 260 kg in 1998 and each year has seen modest increases. The company uses USA Caterpillar bulldozers and Komatsu bulldozers, and at present operates traditional sluice boxes to recover the gold.

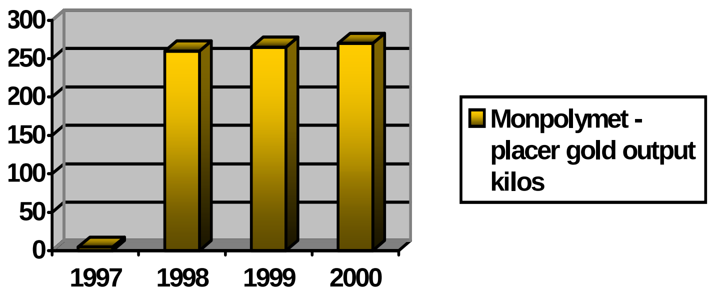

Fig.11: Placer gold output of Monpolymet Ltd, 1997-2000.

From this strong position, Monpolymet then was able to negotiate control (60%) of the 13-ton gold Toson Alluvial placer in the Tuul river in the Zaamar Goldfield from the cash-starved Zaamar Goldfields Ltd., a 100% wholly-owned subsidiary company of Java Gold Corporation, a Canadian public company (JVAG on CDN) registered in Ontario. The details are presented by Grayson (2000). At the same time, Monpolymet also negotiated control (90%) of the Toson Terrace placer on the east bank of the Tuul river, again from Zaamar Goldfields Ltd.

In 2000, Monpolymet began mining the Toson Terrace alluvials. At the same time, Monpolymet began preparation of a large new 1-ton a year gold dredge project for the Toson Alluvials, in accordance with the Government agenda for stimulating gold production. The dredge project inherits a lot of detailed drilling investigation carried out by the Government in 1988-90, and confirmed by drilling in 1996 by Golden Tiger Corporation (registered in British Virgin Islands), a 100% subsidiary of a private Ontario company, Mongolian Goldfields Corporation, a company set up at the instigation of Armand Beaudoin and later taken over by Java Gold Corporation (JVAG on CDN). Implementation of the Toson dredge project will place Monpolymet amongst the top 3 or 4 producers and boost Mongolian gold production.

Monpolymet have more than 30 mining and geological engineers, and over 100 staff. As well as mining gold on its own account, Monpolymet also assesses deposits for others, and in February 1998 purchased Food Store No.1 in Ulaanbaatar to convert it into a supermarket. In addition, Monpolymet has a partnership with INMEX Company, USA regarding access of Mongolian students to go to the USA for study.

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8. Datsan Trade Ltd. (= Temple Trade)

Datsan Trade is a good example of a completely self-built and successful private mining company. The company was founded in 1994 for trading, collecting cashmere and camel wool from herders in remote areas and exporting it worldwide. In 1994 Datsan Trade formed a joint venture with Forte Ltd., a large USA cashmere company, called Mon-Forte Ltd. The joint venture was active in cashmere and camel wool collection and processing, and in 1997 the USA company bought out the shares of Datsan Trade in the joint venture.

Datsan Trade, being traders of cashmere and camel wool in rural Mongolia, became aware of the placer gold potential of western Mongolia through local unemployed geologists, and in April 1997 secured Exploration License 27-X covering 18,600 hectares in Tarialan Soum in Uvs Aimag. This license had originally been awarded to a local company, Khar Tamvagatai Ltd. on 23rd April 1997 as Exploration License 275.

Datsan Trade began immediately with trial pitting and rapidly proved placer reserves, enabling them to start-up the **Tarialan Gold Mine** in 1998. However, as the company management acknowledges, at that time the company had no experience whatsoever at placer mining, and made many mistakes, such a commencing too late in the season – starting in June/July, and experienced many delays due to breakdown of Russian earth-moving equipment, thus only 4 kilos of gold were produced in 1998.

Datsan Trade learned swiftly from its early mistakes, and in 1998 hired Russian drillers who proved up 500 kilos reserves, and engaged an experienced Russian placer mining company from Irkutsk as mining subcontractor, as well as building up its own mining team made up of competent and adequately-equipped Mongolians. Thus in 1999 Datsan Trade produced 214.36 kilos of gold (pure) and shot up to 9th place in the national league table of producers. This was a major achievement and was also the first significant gold production in western Mongolia.

Substantial progress was made by Datsan Trade in the 2000 mining season, increasing production to 237.02 kilos of gold and securing 8th place in the national league table of producers. By the end of the 2000 season, the company had proved up 1.5 tons of gold reserves of which it had exhausted approximately a third. The average grade is high, 1.5 grams/m^3, and the overburden is only 2 to 5 metres thick. Gold recovery presents some problems, although the gold is mostly not fine-grained and clay is minor. Recovery is thought by the company to be around 70% and a test on 7m^3 of tailings produced 1 gram of gold. The company expects to re-mine part of its tailings in 2001. The low recovery is considered to be due to the use of water-cannon and for the 2001 season the company is introducing a scrubber unit. Introduction of USA Caterpillar bulldozers and advanced gold recovery systems are being considered.

The placer consists of Quaternary sands and gravels, and the gold is generally of medium to large size, including nuggets. Some platinum is present in the placer, and also native copper and nuggets of native silver. Although the source of the platinum remains problematic, a search for the source of the mineralisation has had some extraordinary good results:

- Firstly, a significant amount of the gold is derived by modern erosion of a large palaeoplacer consisting of sandy conglomerate of Jurassic age. This palaeoplacer has visible gold and the company will begin systematic exploration in 2001.
- Secondly, gold has been detected in the slatey country-rock, and this is also thought to be shedding gold. A mercury anomaly is present.
- Thirdly, mapping has revealed polymetal mineralisation related to fault zones and to a circular intrusion with rare earth elements REE. The polymetal deposits include gold, silver, azurite, malachite, native copper and barite. One such polymetal zone has been surface mapped for 4km and is 20 to 100m wide. No hard rock drilling has yet been undertaken, but in 2000 the company began cutting trenches in the hard rock mineralisation.

Currently Datsan Trade has 40 Mongolian employees with 2 drilling rigs each manned by 7 crew, and a significant mapping group. The company currently has 5 Russian bulldozers, 1 excavator, 2 Russian F50 washing plants and 2 drilling rigs. During the mining season, the Russian subcontractor has 60 Russian workers.

The mining season in Uvs Aimag begins in March and April focussed on repairs, and mid-May is the start of mining, finishing 10th-20th October.

The company has set a production target of 300 kilos for 2001, an increase of 26% over the last mining season. Given the size of the reserves, simplicity of the deposits and the experience of the company, this target should be comfortably achieved and perhaps exceeded.

The outlook for Datsan Trade is very good. As well as proving placer reserves faster than mining, the company has rapidly built up a substantial land position, with 32 Exploration Licenses, of which 31 are in western Mongolia –18 in Bayan Olgii Aimag, 15 in Uvs Aimag and only 1 in Tov (="central") Aimag. The company has taken a strategic decision to "go west" and ignore the main current placer mining areas of Zaamar Goldfield and Selenge Aimag in central Mongolia.

9. Sharoon Ord Mining Ltd.

Sharoon Ord Mining is an example of a state-owned enterprise that has been privatised. The company began placer mining in 1993 at the **Sharoon Ord Mine** in Darkhan Uul Aimag as a State-owned enterprise called 'Sharoon Ord'. This was privatised in 1999 to a single 100% Mongolian owner under the name of 'Sharoon Ord Mining'. Prior to 1999, the overburden was not so thick, but now is a daunting 25 metres and pumping is required to remove groundwater. Water is the biggest problem. However grades are good, from a minimum of 0.8grams/m^3 to a remarkable 16 grams/m^3.

Output had been 306.89 kilos of gold (pure) in 1998, but dropped by almost 30% in 1999 during the transition to being a private enterprise, and strong recovery only began in the second half of the 2000 season. The newly-privatised company has replaced the old and low-capacity Russian earth-moving equipment of the State-owned enterprise with Caterpillar and Komatsu machines. Gold washing is by two 50m^3/hour Russian PgSh plants. Tailings are now being remined, assisted by a Russian-made centrifugal concentrator. The gold is mainly coarse, assisting recovery. The water problem is addressed by using a 300-400m^3/hour Russian pump, but in the medium-term the company may need to consider switching to dredging. Meanwhile the heavy investment in new earth-moving equipment means that the company target of 351kilos of gold (pure) in 2001 has a good chance of being fulfilled, an increase of 15% on normal production levels when State-owned.

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Potential of Smaller Gold Mining Companies

The huge disparity between the output of the large producers and the very large number of small producers is a central issue in understanding the placer gold industry of Mongolia. If enough of the ‘small’ producers succeed in becoming ‘large’ producers given the right mix of geology, reserves, finance, incentives and management, then the ongoing boom in placer gold production will continue to grow is assured.

The sudden growth in a single season of Mongol Gazar Ltd. (60.9 kilos in 1999 to 1.6 tons in 2000) and Altan Dornod Mongol Ltd. (4.3 kilos in 1999 to 1.2 tons in 2000) are concrete examples. Far from being a mature sector with unchallengeable ‘market leaders’, the placer gold sector is typified by sudden and sustained leaps in output by smaller producers.

To gain more understanding, a selection of smaller gold mining companies were examined, a discussed below.

10. Hailaast JSC (= Elm)

Hailaast is an example of a recently privatised state-owned enterprise, with the new majority shareholder being an energetic private Mongolian company that is now investing and attempting to boost gold production.

Hailaast is the oldest 100% Mongolian gold mining company, established in 1990 as a State-owned enterprise, focused on the Hailaast placer in the Zaamar Goldfield. As a result, a permanent small mining town of 3,000 inhabitants has grown from zero at Tsaagan Bulag (‘White Spring”), with a large number of small detached houses with hot and cold water and sewerage. Most of the residents live in the town all-year-round as permanent residents but some also are seasonal, staying at miners’ hostels.

Later 10% of Hailaast shares were issued to the workforce. Gold production declined significantly from its main Hailaast Gold Mine in the Zaamar Goldfield, due partly to the problems in financing the Bayangol Gold Dredge.

Recently the Bayangol placer was privatised and bought by Altan Dornod Mongol Ltd., a private USA-registered Russian-owned company who successfully completed the Bayangol Gold Dredge and it commenced production late in the 2000 season.

Output from the Hailaast Gold Mine fell from a peak of 394.5 kilos in 1997, to 220 kilo in 1998 (plus 44 kilos from mining the dry part of the Bayangol placer), to 157.2 kilos in 1999. The following year saw a steep drop in output due to delays and uncertainties regarding privatisation. In May 2000, the 90% block of shares in Hailaast JSC was sold by the Government at auction, not via the Mongolian Stock Exchange. The successful bidder was Monnis Ltd., a private Mongolian company who paid 1.4 billion Tugrugs (= approximately 1.5m US$). Inevitably, production resumed very late, only in September 2000, but in only 1.5 months before winter, with new management brought in by Monnis, the Hailaast JSC produced 75 kilos of gold.

Monnis plan to increase production in the 2001 season to 600 kilos, and are confident that they will achieve 500 kilos – a major increase on previous years. The high cost of finance is a driving force behind stepping up production so sharply, as well as the introduction of new working practices. The Hailaast JSC had accumulated a major debt burden, and Monnis has now paid off 80% of the debt. Until recently Hailaast JSC had 400 employees but this has been cut to a more realistic 170.

The Hailaast Gold Mine is equipped with 3 Russian elevated sluices – two PgSh operating at 100m^3/hour and one PgSh operating at 40m^3/hour, washing the placer that bears mainly medium to coarse gold. The source rock are swarms of gold-bearing quartz veins that outcrop in the Hailaast watershed, and several of these veins have been open-pitted to supply hard-gold ore to the Bumbat Gold Mill – currently suspended due to a dispute between the Canadian (49% Tyhee Resources) and Mongolian (51% MAK) owners.

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Earth-moving equipment at the Hailaast Gold Mine includes 2 large Russian-built draglines, each with a $10m^3$ bucket and 70-metre long boom. These have proved effective in stripping off the thick gravely overburden in the long and thin Hailaast Valley, covering 1,100 hectares. In addition the Hailaast Gold Mine has 3 Russian bulldozers and 2 D8 Caterpillar bulldozers. Monnis is currently considering investing in an additional 1.5m$ Russian dragline.

The official reserves of the Hailaast Gold Mine are 2.1 tons of gold, but Monnis consider that this will be increased by 400-500 kilos with further investigation. Even so, the mine will be no more than 3 or 4 years at the proposed stepped-up rate of extraction.

In September 1999 Monnis set up MDS Ltd. as a 100%-owned daughter company and bought the Zolu Huar gold placer in the Shariin Gol Goldfield in Darkhan Uul Aimag. The license covers 1,660 hectares and has a prognosis of 1.4 tons. Infrastructure is good, being close to the large Shariin Gol Coal Mine. When the reserves of the Hailaast Gold Mine are exhausted in 3 to 4 years, then Monnis expect to relocate the mining operation of Hailaast JSC to Zolu Huar.

Monnis Group International Inc is an example of a trading company that has invested heavily in mining, engineering and construction. The company began in 1997 as a small trading company with 3 employees, as importer of Japanese Nissan vehicles.

By October 1998, the company had become powerful enough to purchase 90% of the shares of Chin Yeson Orgil Ltd., a former State-owned enterprise known as Nairamdal engaged in design and construction of offices, apartments and houses.

In May 2000, Monnis bought at auction 90% of the shares of the Hailaast Joint Stock Company, adding mining to its business activities.

In November 2000, Monnis bought 50% of the former State-owned enterprise Energy Repair Ltd. in Darkhan, with 350 workers, $11{,}000m^2$ of workspace and engaged in power engineering.

The Foreign Trade Division of Monnis are the official distributor for Nissan vehicles (notably the Nissan Patrol); official dealers of the Yokohama Rubber Company (notably tyres); official dealers of Japan Tobacco Inc. and official dealer of Bremer Pharma GmbH (veterinary drugs).

The Tour & Hotel Service Division of Monnis owns and operates 2 new small hotels (Prince Hotel and Black Pearl Hotel) and a vehicle service unit.

11. Mongol Bulgar Geo Mining Ltd. (=Mongolian-Bulgarian Geology & Mining)

Mongol Bulgar Geo has what is today an unusual company structure, being a joint venture 50%:50% between the Government of Mongolia and the Government of Bulgaria. This state-owned-enterprise was founded by the joint agreement of the two governments, signed on 6th June 1979.

The company has undergone a series of changes of name, but not of ownership:

- **1979-1990 Mongolbulgarmetal Factory**
- **1990-1993 Duvunt Gold Mine**
- **1993-1997 Jargalant Mining Company**
- **1997-now Mongol Bulgar Geo Mining Ltd.**

From 1980-84, the company undertook detailed exploration of the Muhar Ereg - Uvurchuluut - Sairin Khudag group of gold placers in Bayanhongor Aimag.

From 1984-96 the company has undertaken further exploration in Bayanhongor Aimag of the gold placers at Jargalant, Altan Valley (“golden valley”), Bayan Valley, Hooloi Hudag, Dalt, Dalt-2, Archuluut, Buht and Bumbatyn Spring. In addition from 1980 to 1995 the company completed exploration and evaluation of gold placers in the Ulziit River, Shar Burdim Valley, Gunii valley and Baidrag River, all in Bayanhongor Aimag.

Gold production commenced in 1984 and up to the end of the 1997 season the company produced 2,028.5 kilos of gold (pure), averaging a respectable 144.9 kilos a year. From 1997, the company began operating as a normal company, with corresponding change of name to the current 'Mongol Bulgar Geo Mining Ltd.', but the results have been disappointing. By 1999, gold production had fallen to 89 kilos and the company had fallen to 19th place in the league table of gold producers, and the 2000 season recorded a further fall to 82 kilos and 25th place – achieving less than 1% of national production. The company has incurred debts although its assets are considerable. The disappointing recent performance was attributed to management, resulting in the replacement of the board and appointment of a new Executive Director on 10th December 2000 – Purevgyal, an economist from the Governor's Administration Office of Bayanhongor Aimag.

The new management plan to put in the field 3 exploration teams in the 2001 season, in Exploration Licenses held by the company in Tov, Bayanhongor and Arkhangai Aimag, with the target of increasing the reserves to 2 tons of gold, up from the present 1 ton.

A production target of 150 kilos of gold has been set for 2001, an increase of 87% on the previous mining season. This will be produced from the company's 3 active placer gold mines in Bayanhongor Aimag. Each mine is equipped with a Russian-made monitor, trommel and PgSh sluice, and with dozers and excavators supplied by Wagners Asia Ltd., notably USA Caterpillar. Until the end of the 1997 season, Russian earth-moving equipment had been used.

The placers are narrow and very long and thin, causing logistical problems and additional costs for truck movements. Other local problems include patches of permafrost (permanently frozen ground), zones of abundant clay, zones of fine-grained gold, and a reliance on limited groundwater for process water. However, subject to successful management, the production target for 2001 should be met, an 82% increase on 2000.

The new areas currently being explored have gold placers of rather similar characteristics, and the company is considering bringing additional newly-equipped placer mines into production from 2002 onwards, subject to results and finance.

12. Er-Shi-Ju Ltd.

Er-Shi-Ju is a private limited company with one 100% shareholder, Ing. Ts. Gankhuyag who is the company Chairman. Educated in Prague, he began business in 1990 with a loan enabling him to travel to Czechoslovakia where he purchased 7 second-hand Russian cars that he imported into Mongolia and sold profitably in Ulaanbaatar. This enabled him to purchase 600m3 of timber in Tomsk in the Russian Federation that he bartered in China in 1992 for sugar that at the time was in very short supply in Russia and Mongolia.

In 1993, the Government of Mongolia for the first time permitted private companies to hold Exploration Licenses and Mining Licenses, and so Er-Shi-Shu Ltd. took up a Mining License in the Zaamar Goldfield, with the advantage of Gankhuyag having had professional training as a geophysicist. Under his leadership, using a Russian scrubber and Russian sluice (PGSh) operating at $50m^3$/hour, and by the end of the 2000 mining season his company had extracted a total of 200kg of gold at the **Ogoomor Gold Mine** close to Ogomoor Bag centre. Nuggets of gold are a feature of the Ogoomor Mine. The total reserves are 500kg of gold, suggesting at least 2 years of future production, even at an increased rate.

A potential problem for Er-Shi-Ju is the decrease in available electricity from the local segment of the Buriat-Mongol Grid at Zaamar, due to the increased electrical demand following the start-up in 2000 of the second big dredge (the 'Bayangol' Gold Dredge of Altan Dornod Mongol Ltd.) last year, and the planned launch of the third big dredge by Shijiir Alt Ltd. in summer 2001.

Er-Shi-Ju is seeking new placer deposits in order to replace the depleted reserves. The company has helped to fund successful wildcat placer exploration in Arkhangai Aimag but the relationship with that company has been severed. Instead Er-Shi-Ju is actively pursuing in 2001 the exploration of a large Exploration License it holds in Uvs Aimag. Until last year, this had been the focus for hard-rock gold exploration by the company, with a prognosis of 100 tons of hard-rock gold. The company had had some interest in the past from potential joint venture partners, but the low price of gold has caused foreign interest to evaporate and prevented further exploration and precluded development the hard-rock gold prospects for the foreseeable future. Thus Er-Shi-Ju is now focussed on the new strategy of bringing the hitherto neglected placer potential into production as soon as possible.

The outlook for placer gold production appears to be at least as good in 2001 and 2002 as in previous years, and the wild card of significant production in Uvs Aimag is possible from 2002 onwards.

Er-Shi-Ju has also achieved highly successful diversification. In 1995, Er-Shi-Ju bought all the 58% of shares held by the Government in the Bornuur JSC, and thus secured a controlling interest in this large arable farming concern north of Ulaanbaatar. Subsequently, Er-Shi-Ju has increased its shareholding stake to 66.5%. The farm covers 10,000 hectares, and produces substantial cereals, 2000 tons a year of potatoes and in 2000 began production of vegetable oil from 'Canola' seedstock imported from Canada. In addition, the farming concern has 3,000 head of livestock, mainly sheep and goats plus some horses.

13. Almaas JSC (=Diamond)

Almaas is unusual in having a long history, being established in 1991 as a small State-owned enterprise. The company was privatised in 1997 and today has two shareholders, Mr. Jansav and his son. Almaas has traditionally mined only small placer deposits, and output has been around 50 kilos of gold a year, with 59 kilos in 1999 and 41 kilos in 2000.

In recent years, most production has been from the **Bor Tal placer** near to Railway Station No.7, not far from Ulaanbaatar, with good grades (400mg/m^3) and excellent infrastructure. However reserves are limited, only 47 kilos, and a prognosis of a further 23 kilos. The placer is only 8 to 10 metres wide, and at least 800 metres long on the valley floor. Production problems are formidable due to a lack of surface water and drilling for groundwater has been disappointing. The technical response of Almaas is interesting. The company waits for enough snowfall or rainfall and trap the surface runoff, allowing short bursts of profitable mining. Kept at standby are 1 bulldozer and 1 excavator plus company-built monitors and sluices.

Almaas has explored the **Baruun Urt placer** in the Sergelen Goldfield close to Ulaanbaatar, but the reserves discovered are limited (100kilos) and, although water is plentiful, frozen ground is also present. The grade is good (400mg/m^3) and overburden is only 1.6 to 2m thick. Initial production may be attempted in 2001.

The company is also interested in hard-rock gold and holds a 50% stake in an Exploration License at Mongon Morit in Bayan Ondor Soum, Bayanhongor Aimag. This has a prognosis of 27 tons of gold to a depth of 80 metres in quartz veins at an average grade of 4.7 grams/ton. Total economic reserves may be as high as 100 tons, but much drilling and testing is required.

Almaas have a production target of 50 kilos for the 2001 season. In spite of the smallness of the placers, Almaas has long experience in mining them successfully thus the target is realistic. However, the company will need to address the issue of its strictly limited reserves base in the near future.

14. TCH Gold Ltd. ("Tsagaan Chuluut Hudag" Gold = "White Stone Well" Gold)

TCH is the wholly-owned exploration and mining subsidiary of Capital Resources Mining Ltd. (CRM), a 100% USA private company with a single shareholder, Mr. Raymond Brown. CRM is active in China, Mongolia and England. Of particular interest, CRM is the largest shareholder in Erdmin Ltd., a company producing pure copper sheets by electrolysis of copper-rich leachates from the vast tailings of the large Erdenet copper mine in northern Mongolia. CRM are also unusual in being active in the export of gold dore from Mongolia, having the necessary license to do so. In 1999, CRM exported 500 kilos and in 2000 a further 800 kilos of gold from Mongolia. CRM also have a particular interest in assisting local companies to revive cassiterite placer mining in order to export the tin concentrates.

With CRM as a strong parent, TCH have the potential for strong growth. Although TCH appears in the list of Mongolian gold producers they are near to the bottom in 87th place in 1999 with under a kilo and 92nd place in 2000 with just over a kilo. This anomaly is due to test production from pilot mining.

TCH has bought a placer Mining License in the Tsagaan Chuluut area of NE Mongolia, with “substantial” gold reserves but thick overburden, and are currently reviewing the economics of full-scale mining for the 2001 season.

TCH have an alternative option, holding a large Exploration License in Khentii Aimag that includes 2 Mining Licenses. A gold placer is present – small, but with good grades and water. TCH has improved the infrastructure, not only for the placer, but more particularly to explore in detail the considerable hard-rock gold potential of the Exploration License.

TCH have a third option, holding Mining License 388A in the Khargast Valley in Eroo Goldfield in Selenge Aimag, formerly part of Mining License A-002 but renumbered in 1998 when the cadastral numbering system changed. Until the second half of 2000 Mining License 388A was held by TAS Ltd. (100% subsidiary of TAS Corporation) and transferred to TCH.

It would appear that, if TCH embarks on full-scale placer mining, then it is likely to achieve more than 100 kilos a year, judging from the portfolio of licenses that it holds. With the funding of CRM behind it, TCM could become a major placer gold producer.

Role of Russian Contract Mining Companies

Much of the success of the boom in gold production in Mongolia has been due to the role of Russian-contract mining companies. The Russian companies having better access to finance, a very large and long-established placer mining industry, and a large pool of placer equipment manufacturers and a pool of highly-experienced placer miners. Cultural contacts between the Russian Federation and Mongolia have been strong for a 70-year period up to the early 1990s, during which period the Russian alphabet became the main Mongolian alphabet, the Russian language became the main language of science and engineering (including geology and mining) and many Mongolian geologists and economists were educated in the Russian Federation and worked alongside Russians on large mining and infrastructure projects. Furthermore, neighbours of Mongolia inside the Russian Federation include the Buriat Mongols in the Buriat Republic and Chita Republic – both with a sizeable placer gold mining industry. Economic ties between the Russian Federation and Mongolia are still strong; large Mongolian-Russian joint ventures dominate Mongolia’s mining sector, a shared Buriat-Mongol Electrical Grid and vital diesel fuel and much mining equipment is sourced in Russia.

Finally, the early phases of the current boom in placer gold mining have largely been in the northern parts of Mongolia, close to the border with the Russian Federation, assisting cross-border collaboration.

The influx of seasonal placer miners from the Russian Federation is noticeable but centralised documentation is unclear. Our estimate is at least 1,000 Russian placer miners. Similarly the percentage of Mongolian placer gold production achieved by Russian contract miners is unclear, but is perhaps in excess of 3 tons of gold each season.

Contract placer mining companies from Canada, New Zealand and the Netherlands have been active as subcontract miners in Mongolia but so far generally on a minor scale only. Contract miners from western countries incur higher overheads for professional staff and lack the linguistic, cultural and economic ties that the Russian subcontractors have.

An interesting example of a Russian contract mining company with a mixed experience of local Mongolian companies but successfully mining challenging placers is Argos Ltd. described below.

15. Argos Ltd.

Argos Ltd. is a 90% Russian 10% Mongolian joint venture with 4 individuals as main shareholders. The company's origins are in the Buriat Republic, rooted in the long-standing placer gold mining sector. The joint venture commenced in Mongolia in 1996, as contract placer gold miners on behalf of TAS Ltd., a daughter company of TAS Corporation, a powerful Mongolian multisectoral holding company. TAS Ltd. had been awarded Mining License A-002 covering a group of placers in the Ulaant Tsamskhag district of Eroo Soum in Selenge Aimag. TAS Ltd. and Argos Ltd. entered into a contract mining agreement in June 1996, but several months were lost due to TAS Ltd. reconsidering its position and entering into various understandings with Mongolian Goldfields Corporation, a Canadian private corporation whose leading shareholder was Armand Beaudoin, a Canadian national who was an Indonesian resident. Later, Mongolian Goldfields Corporation was taken over by Java Gold Corporation, a Canadian public company.

Delays attributable to the Canadian option put back first contract mining production on A-002 by Argos Ltd. and only 13-18 kilos of gold were produced in 1996 by Argos for TAS. Full production was achieved in 1997, with 140 kilos of gold mined by Argos for TAS. 1998 was the peak year of production at Ulaant Tsamskhag, with 366 kilos of gold mined by Argos for TAS.

In 1999, Argos mined an impressive 60 kilos of gold in May, the first month of the mining season, and a further 90 kilos in the June. However, at that time TAS was experiencing financial problems, having over-extended itself in its multisectoral activities. Due to non-payment for its contract mining efforts, Argos suspended mining and no production occurred in the months of July and August. Partial resolution of the problem caused Argos to resume mining in September producing a further 100 kilos on behalf of TAS, a total of 250 kilos (214 kilos pure) gold for 1999.

In March 2000, the Mining License for Ulaant Tsamskhag had been taken up by the Trade & Development Bank, due to difficulties that TAS Corporation was having in servicing loans to support its multisectoral daughter enterprises. During the interregnum, 150 unemployed local people – men, women and children – entered the inactive mine site and began primitive tunnelling into the placer. Two illegal miners were killed by roof falls, and Argos had to rescue 4 other injured miners.

In June 2000, the Mining License was purchased by Argos from the Trade & Development Bank for an undisclosed sum, and by the end of the season Argos had produced 143.5 kilos of gold (pure) and sold it to the Central Bank.

Substantial payments to Argos for production in previous years was still outstanding from TAS, and on 10th November 2000, the Arbitration Court of Mongolia (based in the Mongolian Chamber of Commerce & Industry) ruled that TAS had to pay Argos 470,000 US$. TAS, by asset disposal, was able to pay off much of this debt but at time of researching (February 2001) a sum in the region of 200,000 US$ is still outstanding.

With the TAS difficulty largely behind them, and now holding legal title of the main part of Mining License A-002 (renamed A225), Argos are bullish about the 2001 season at Ulaant Tsamskhag, planning to produce 350 kilos - plus a further 200 kilos as contract miner elsewhere to a second Mongolian company, Borzon Trade Ltd. In contrast with the difficult TAS experience, Argos has maintained a successful and mutually satisfactory contract mining relationship with Borzon Trade.

Argos owns a substantial fleet of earth-moving equipment, including 5 large Komatsu bulldozers, 7 hydraulic excavators, 15 30-ton Russian trucks and 8 scrapers plus a number of Russian PsGh elevated sluices. Currently Argos is invested in the building by Irkutsk Heavy Engineering Plant JSC of a Romanshka circular sluice (model KOY-1200) with a design capacity of 50-100m^3/hour. This is expected to be the first automatic circular sluice in Mongolia, capable of continuous operation with no down-time for cleaning of sluices.

The Ulaant Tsamskhag placers demand a mining company with ample earth-moving equipment and substantial experience, as indeed Argos possesses. The Ulaant placer is formidable, with 18 metres of overburden resting on a 3-metre thick placer with an impressive 2.43 grams/m^3 of gold, and un-mined reserves of 1.5 tons remaining. The Tsamskhag placer is a little less daunting with 14 metres of overburden resting on a 2.1-metre thick placer averaging a remarkable 2.83 grams/m^3, and un-mined reserves of 1.2 tons. Thus even at the planned rate of extraction of 350 kilos per year, Argos expect a mine life of 10 years.

In spite of the thick overburden, the Ulaant and Tsamskhag placers are currently dry mining operations, contrary to that envisaged by Java Gold Corporation of Ontario in the late 1990s when it loaned TAS 3m$ in order to become the mining contractor for a dredge project at Ulaant Tsamskhag.

Rise and Fall of TAS Corporation

TAS Corporation is a privately-owned Mongolian company that in 1999 ranked 10th in the league table of gold producers in Mongolia, producing 213.9 kilos of gold (after allowing for purity) valued at 1,854,000 US$ (at a price of 8.67 US$ per gram NET). However, in 2000, TAS Corporation appears to have ceased gold production and may no longer be active in placer gold mining. Some of the background to the rise and fall of TAS Corporation are noted below.

The growth of TAS Corporation has been phenomenal. By 1997, TAS had over 1,500 employees in many divisions across numerous sectors:

- **placer gold mining;**
- **coal mining;**
- **gemstone preparation;**
- **tourist camp;**
- **supply of petroleum products;**
- **warehousing;**
- **restaurants and bars;**
- **fast food: 'Tasburger';**
- **wool & cashmere processing factory;**
- **knitting factory;**
- **dairy;**
- **livestock rearing;**
- **hospital.**

A close relationship emerged between TAS and Mongolian Goldfields Corporation (MGC). TAS was lent 3mUS$ by MGC under 'the TAS Agreement', a material fact declared by Java Gold Corporation (Ontario public company) and International Pursuit Corporation (Ontario public company).

Armand Beaudoin gained 31.6% of the benefit of the sale of MGC to Java Gold that carried the 3m$ TAS debt onto the balance sheet of Java Gold, yet he was both the Chairman of Java Gold and on the TAS Governing Council. This 'material fact' should have been disclosed by Java Gold Corporation. It was not.

A further connection between TAS Corporation and Java Gold Corporation was Ch. Khajidsuren, who was a director of MGC (Java Gold subsidiary) and on the TAS Governing Council.

Fig.12: Governing Board of TAS Corporation in 1998. Armand Beaudoin is seated (right) and Khajidsuren is standing (second from left).

The TAS Loan' was funded 50:50 by International Pursuit and MGC: "*Mongolian Goldfields Corporation and International Pursuit Corporation have each funded half of the TAS loan and as consideration for Pursuit's 1,500,000 US$ contribution has received a 50% interest in each of TAS's assignments of its 20% interest in net profits to Mongolian Goldfields Corporation and the Pledge, in addition to a 12.5% interest in Mongolian Goldfields Corporation's interest in the net profits.*"

'The TAS Agreement' of 26th August 1996 was a 'contract mining' and profit sharing agreement whereby MGC became exclusive surface gold mining contractor for the TAS Mining License in the Bukhelei district, Selenge Aimag – License A-002 Ulunt Tsamkhag. MGC (thus now Java Gold) was required to fund the purchase of the placer mining equipment (including a large gold dredge) and pay all operating costs and royalties. Net profits were to be distributed 80% to MGC, 20% to TAS.

Part of the logic for MGC (in effect Armand Beaudoin backed by International Pursuit) giving the 3m US$ 'TAS Loan' was remarkable – "*As additional compensation for the license and to encourage TAS and Jamyanyav Batbaatar to assist Mongolian Goldfields Corporation and the Company in its negotiations with the Government of Mongolia, Mongolian Goldfields Corporation agreed to loan TAS 3,000,000 US$ ("the TAS loan") by way of a demand promissory note bearing interest at the rate of 8% per annum, of which 1,500,000 US$ was funded by each of International Pursuit Corporation and Mongolian Goldfields Corporation.*"

The TAS Loan was paid in full to TAS Corporation in March 1997, as shown by the 1997 Annual Information Form of International Pursuit: "*The final 1,000,000 US$ of this TAS loan was advanced in March 1997 (of which International Pursuit Corporation funded 500,000 US$) upon the granting of hard rock mineral exploration licenses covering at least 4,000,000 hectares to Mongolian Goldfields Corporation together with the Company.*" Thus it is evident that the TAS Loan was intended to assist International Pursuit and MGC gain huge exploration licenses, far bigger in total that usually permitted at that time. This is confirmed by 1m US$ of the 3m US$ being forgiven "*In the event that at least 6,000,000 hectares of hard rock mineral exploration licenses is granted to Mongolian Goldfields Corporation together with International Pursuit Corporation, 1,000,000 US$ of the TAS loan will be forgiven with International Pursuit sharing in the forgiveness based on the percentage of hectares of hard rock mineral exploration licenses granted to International Pursuit, relative to the number of hard rock mineral exploration licenses granted to International Pursuit and Mongolian*

Goldfields Corporation." In the event, the 6,000,000 hectares required for forgiveness was almost, but not quite, achieved, and thus no forgiveness took place.

Collateral for the 3m US$ TAS loan was given, known as **'the TAS Pledge'**, namely 65% of the shares in TAS held by TAS's President, Jamyanjav Batbaatar. In addition, TAS assigned its 20% interest in the net profits to MGC until the entire TAS Loan was repaid in full.

In the event, the TAS Loan could not be repaid, as Java Gold did not exploit the placer gold deposits in TAS Mining License A-002, probably due to being unable to raise the finance for the gold dredge – in spite of lending 3m US$ to TAS.

Mining License A-002 held by TAS Corporation at Ulunt Tsamkhag in Selenge Aimag, north Mongolia. The placer is in 3 separate areas: the Ulunt Valley, the Tsamkhag Valley and the Kharganst Valley. TAS had recovered 241 kilograms by the end of 1996, and estimated a total in-situ resource of 8.5 million m^3 suitable for dredging containing 195,000 troy ounces of gold. MGC had an 80% share in this license ('the TAS Agreement'), duly inherited by Java Gold. But Java Gold never took this proposal beyond the concept stage, in spite of giving a 3m US$ loan to TAS to be repaid out of production.

The failure of Java Gold Corporation to finance the gold dredge has caused considerable delay and uncertainty regarding gold production. The protracted delays and mounting costs caused TAS Corporation to later surrender Mining License A-002 Ulunt Tsamkhag, after it had been renumbered and divided into two portions:

- **Mining License 388A – Khargast Valley.** In 1998, the cadastral numbering system changed, and part of A-002 was renumbered as Mining License 388A (Khargast Valley – 212ha). In July 2000 this license was still held by TAS Ltd. (100% subsidiary of TAS Corporation), but later in the year it was transferred to TCH Ltd., a USA-owned private company.

- **Mining License A225 – Tsamkhag Valley.** A larger portion of A-002 was renumbered as Mining License A225 (Tsamkhag Valley – 521 hectares). In 2000 this license was surrendered by TAS Corporation to the Trade & Development Bank of Mongolia as pledged collateral and, after a delay of some months was purchased by Argos Ltd., a private Russian-Mongolian joint venture.

Currently TAS Corporation is facing financial difficulties regarding activities outside of placer gold mining and this has led them to sell or surrender the Mining Licenses they formerly held. It appears unlikely that TAS will re-enter mining in 2001.

16. Jump Ltd.

Jump is a private limited company with the General Director L. Tserendaavaa holding 73% of the shares. Currently the company has 4 field geologists and its own drilling team.

In its short history, Jump has indeed jumped - from being an equipment and fuel supplier to placer gold mines, to itself being a successful placer miner. Rather than the exhaustion of reserves of its first placer mine being a deterrent, it has stimulated it to take up licenses in remote areas, and is now poised to be a long-term placer gold producer plus a significant placer cassiterite (SnO_2) producer.

Jump was established in 1996, engaged in trade and leasing equipment to placer mines and selling them fuel. Only as late as 1998 did Jump become a mining company. Having purchased the Salkhit Placer Gold Mine in the Sergelen Goldfield, formerly owned by Elst Ltd, gold production by Jump began in 1998 very late in the season, on 13th August. Placer mining for 1998 ended on 13th October after Jump had recovered 19 kilos of gold. In 1999, the Salkhit Mine produced 54 kilos and in 2000 a further 68 kilos of gold. After producing 141 kilos, the Salkhit Mine is now exhausted. However, Jump believes that gold recovery was 70%, which means that the tailings contain a further 42 kilos – plus more from the earlier tailings of Elst Ltd. Currently Jump is evaluating different technologies for recovering the gold from the tailings, but the capital cost of the equipment is a deterrent.

Processing at the Salkhit Mine was undertaken using a PGSh sluice operating at $50m^3$/hour. The main problems at the mine were a lack of clean water, the water being re-circulated from the tailings pond; plus the presence of large amounts of clay and the gold being fine-grained.

Jump have swiftly built up a large land position, with 12 Exploration Licenses in Khentii Aimag, 3 Exploration Licenses in Uvs Aimag and 1 Exploration License in Khovsgol Aimag. These include not only placer gold prospects but also hard-rock gold prospects. Jump hold 2 Mining Licenses in Khentii Aimag and in March 2001 will decide whether to transfer mining equipment from their exhausted Salkhit Mine in the Sergelen Goldfield to Khentii and if so expect to produce 70 kilos of gold in 2001. Alternatively Jump will switch to cassiterite (SnO_2) placer mining in Khentii Aimag and in this case expect to produce 70 tons of cassiterite in 2001 instead of gold. The total reserves of cassiterite are 580 tons.

17. Num Impex Ltd.

Num Impex is an example of an agricultural concern that, in an effort to generate cash, has set up a division to engage in placer gold exploration and mining.

Num Impex. began as Ord Ltd. ('Star Ltd.') in 1994 but in 1997 changed its name to Num Impex due to the numerous companies all bearing the same name. The company's main activity is agriculture, owning a farm in Selenge Aimag with 1,200 hectares of wheat and a small flour mill with a capacity of 25 tons of wheat a day, plus a pig farm on the outskirts of Ulaanbaatar (adjacent to Altan Taria Flour Mills) rearing 1,200 pigs a year. The farm also includes some greenhouses producing vegetables such as tomatoes.

Due to increasingly tight margins in pig farming, stemming from the increasing costs of feed, utilities etc., Num Impex recently broadened its activity into placer gold exploration and mining.

In 1999, Num Impex entered into a partnering arrangement with an existing license holder in Bulgan Aimag. This partnership terminated soon afterwards after limited production.

In 1998, Num Impex purchased Mining License A-186 known as the 'Tuul West Terrace' covering 49.5 hectares in the Zaamar Goldfield. The property had a long history, having been explored under the former command Government, and with official reserves of 481 kilos of gold. The property was first awarded 14th June 1995 to Denjiin Ord Ltd. as Mining License 077, and reissued to the same company as Mining License A-186 on 16th September 1997. Denjiin

Ord Ltd. briefly mined the deposit, but stopped mining in 1995 having been able to produce only 17.46 kilos of gold from the placer in that year. The property remained idle for two years before its purchase by Num Impex in 1998. Shortly after purchase, further exploration by Num Impex down-rated the reserves towards 200 kilos.

Num Impex commenced mining the Tuul West Placer in Mining License A-186 in 1999, but production only started late in the season in August, and was negligible. Management attributed the poor performance to reliance on rented Russian earth-moving equipment to remove the 6-7m thick overburden to reach the 1m thick placer averaging 880mg/m^3 resting on bedrock. In 2000 Num Impex switched to renting USA Caterpillar equipment from Wagner-Asia, and has bought one excavator. Gold recovery is by a set of scrubbers and sluice built in Darkhan, Mongolia, with a capacity of 50m^3/hour. Num Impex has invested 150,000 US$ so far in placer mining.

Gold production in 2000 was only 11.63 kilos due to the thick overburden and problems of influx of groundwater from the adjacent Tuul River, the base of the excavation being 2 to 3 metres below the water-table. Some interruptions to production were caused by electrical failures, attributed to increased power consumption by the new large dredges at Zaamar. Some problems were experienced with the clay content of the placer and weathered bedrock, however gold recovery was thought to be "good", the gold being of medium size.

The company is not satisfied with the performance at Zaamar, and considers that a small dredge might be needed to achieve reasonable production. Shortly the company will decide whether to continue mining in the Zaamar Goldfield in 2001.

18. Durvun Erkh Ltd. (= Four Rights)

Durvun Erkh is an example of a private mining company, established in 1995. The company began exploring for placer gold in Bat Ulziit in Overhangai Aimag and by 1997 had established the Hongilt Placer Mine on a proven resource base of 300 kilos, of which it has mined half. In 1999, Durvun Erkh undertook further exploration in the same district but with disappointing results.

Durvun Erkh has experienced difficulties. Having produced a satisfactory 111 kilos of gold (pure) in 1999, output fell sharply to only 21 kilos in the 2000, due to severe problems with permafrost encountered from July to the end of the season. In 2001 the company expect to produce 68 kilos, and will use a range of methods to overcome the permafrost, possibly including blasting.

The company has a Caterpillar D9 bulldozer, Caterpillar 320 excavator, 5 Russian Kraz trucks, 2 T130 Russian bulldozers and a Russian 4124 excavator. For washing the placer, the company uses its own-built scrubber operating at 30m^3/hour and own-built monitor operating at 30-35m^3/hour feeding own-built sluices. Power is supplied by one 200kW D200 and two 100 kW D100 diesel generators. The overburden is 6-7 metres thick overlying the placer sands varying from 0.8 to 2.2 metres thick. Apart from the severe problem of permafrost, the placer presents no special difficulty, the gold being of medium size, the grade being from 0.5 to 2 grams/m^3, the sand is fine and clay is virtually absent.

In 1998, Durvun Erkh undertook radical placer exploration in the remote southern Gobi desert around Altan Uul (= Golden Mountain), close to the Chinese border, spending 59 million Tugrog (65,000 US$) in 1:2000 scale topographic mapping, drilling and pitting of a 4km^2 area. A gold grade of 200-500 grams/m^2 was proven, together within significant platinum, in a series of active wadis. The company recognised that the gold and platinum was being actively shed from the Cretaceous conglomerates that abut Altan Uul.

On 29th April 1999, a rival company, Buyan-Uguuj Ltd. was awarded 2 exploration licenses (1521-X - 23,260 ha, and 1522-X - 7,247 ha) and earlier (19 December 1997) had been awarded a small mining license for placers (375A). Durvun Erkh and Bayan Uguuj are in dispute and the matter is sub-judice in the Ulaanbataar civil courts regarding the award of the

Exploration Licenses. Hopefully a decision will be announced before the start of the 2001 season.

In June 1999, EMI funded an expedition to Altan Uul, and some results have been published by Grayson, Tumenbayar, Batbayar & Altanzul (2000). EMI targeted Upper Cretaceous sandstone’s and conglomerates as prospective for palaeoplacers and confirmed the presence of gold and platinum. Lithification is minor, and the uncemented palaeoplacer seems amenable to processing without crushing. Outcrops are excellent facilitating pitting, and the irregular 'badlands' erosion allows trench sampling without recourse to drilling during prospecting. The thickness of the gold-platinum placer is unclear, but maybe in the order of 3m or more. The potential for a stacked placer sequence has not yet been considered. The perfect exposure, low dip and 'badlands' landscape would enable strip mining with minimal overburden removal.

The lateral extent of the Upper Cretaceous placers was not established but is expected to in the order of at least several tens of kilometres along strike.

On a regional scale, it seems probable that, if the Altan Uul ridges were positive elements in the landscape shedding gold and platinum into placers during Upper Cretaceous times, then this 'play' is now valid throughout the 1000's sq. km. where Upper Cretaceous sands occur close to such basement highs.

The EMI expedition proved some Quaternary placers to be highly 'active', with gold and platinum particles being transported actively in the modern environment. These active placers consist of silts and sands in low-angle alluvial fans discharging from passes and gaps in the ridges of the Altan Uul source-rocks. In general, overburden is minimal (40cm) to non-existent, allowing the EMI team to identify gold and platinum particles on the surface of dry fans by crawling over the ground surface using hand lenses (see Fig.6). This was confirmed by panning.

Fig.13: The EMI team sampling the Upper Cretaceous conglomerate at Altan Uul.

Not investigated is the considerable potential of stacked Quaternary placers, a concept that seem likely if the ridges of Altan Uul have been positive since at least late Cretaceous times.

Hard rock gold at Altan Uul became apparent only recently, in a sequence of metamorphosed cherts, basic lava's and altered gabbros of supposed Devonian age. In 1998 a prognosis was made of 259 tons of gold in a strike zone 4km long, 100m wide and 125m deep. The sequence may be an abducted oceanic or ocean-margin crust, and part of an E-W lineament. The prognosis was based on surface sampling, without drilling.

In 1998 the Government funded a wider search of the Quaternary sediments and proved widespread placer platinum with placer gold. Grades are 300-400 mg/m^3 for gold and 15 mg/m^3 for platinum. The platinum source is not known, but expected to be the altered gabbros of Altan Uul, making it an attractive gold-platinum prospect. A search should be made for a 'stacked' placer sequence in the Quaternary low-angle fans, by drilling to determine presence/absence of placers throughout the Quaternary. Assuming a moderate number is discovered and economic, then the prognosis needs to be revised upwards to perhaps as high as 20+ tons of gold and 1+ tons of platinum for the Quaternary.

Fig.14: Discovery by hand lens of active platinum and gold placer deposition near Altan Uul.

The discovery of palaeoplacers requires a further upward revision of the total placer resource of the Altan Uul area to 40+ tons of gold and 2+ tons of platinum. These estimates are speculative and subject to drastic revision (+ or -) upon detailed pitting and drilling.

19. Ikh Nomt Ltd. (= In Large Book)

Ikh Nomt is another example of a private company that commence in small-scale placer mining and is now strong enough to be contemplating larger mining projects. The company has two shareholders and started in 1995. On 3rd June 1995 the company was awarded Mining License 130-A covering 10.7 hectares at Mandal Bulag in Sergelen Soum, Tov Aimag, where the company started the **Mandal Bulag Mine**. All the miners are recruited in Ulaanbaatar.

In 1999 the production of gold (pure) was 19.39 kilos falling to 14.35 kilos in 2000 with the approach of the exhaustion of the reserves. The mine was, like most of the mines in the

Sergelen Goldfield a low-cost producer but suffering from limited water supplies, clay and fine gold. The mine uses Russian earth-moving equipment and own-made monitors and sluices with power supplied by diesel generators. With no clay the washing plant is able to operate at $50m^3$/hour, but in the Sergelen Goldfield the presence of clay usually restricted throughput to $25m^3$/hour.

The **Mandal Bulag Mine** will finally close in the current season due to exhaustion of reserves, but the company plans to switch its mining effort to the Zaamar Goldfield, enabling it to boost 2001 production to 50 kilos of gold (pure). The Zaamar placer is close to the Tuul river as a terrace deposit with 4 metres of overburden on 1-2 metres of placer with grades averaging $1gm/m^3$. Given the significant experience of Ikh Nomt at processing placers in the more technically-challenging Sergelen Goldfield, there is an expectation that the company will achieve its higher production target in 2001 in the Zaamar Goldfield.

Ikh Nomt is now reviewing the potential of placer mining of tin (cassiterite SnO_2) in various districts and is seeking foreign investors for joint venturing production and securing of markets for tin concentrates. The company is also reviewing the potential of hard -rock mining of substantial phosphate deposits in western Mongolia for which a joint venture partner is also sought.

20. M & Diamond Ltd.

M & Diamond are a special case, being a 51% Mongolian 49% Russian private joint venture, focussed on hard rock gold and late in the 2000 mining season opened the **Tavt Gold Mine** – a pilot hard-rock gold mine in northern Mongolia.

Backed by their Russian partners, they have been able to leap past placering to immediately focus on hard-rock gold. Formed in 1996, the company obtained an Exploration License at Tavt (= “fifth”) in Bulgan Aimag very close to the border with the Buriat Republic, and commenced hard-rock and placer gold exploration. The placer results were disappointing and thenceforth the company focussed on its prime objective, the development of the Tavt hard-rock gold deposit. This had been identified in 1986-88 by Russian geologists who suggested a prognosis of 130 tons of gold, 370 tons of silver and significant copper. The Tavt prospect consists of gold-silver-copper bearing quartz veins in Mesozoic gabbro, and the topography and dip of the veins renders mining by open-pit relatively straightforward to extract ore from 100m down-dip of the veins.

With funding from the Russian partners, from 1997 to 1999 the company explored part of the deposit by drilling and proved reserves of 5.6 tons of gold, 25 tons of silver and significant copper. Grades proved by drilling are good: 7.8 grams/ton of gold, 45 grams/ton of silver and 1.3% copper. A revised prognosis to 60 tons of gold was estimated, of which 20 tons is mineable, but requires further confirmatory infill drilling. Bulk samples of ore were tested by the Irgiredmet Research Institute in Irkutsk who also prepared a feasibility study. Results were favourable for an 8 million US$ project mining 100,000 tons a year and with an annual production of 1 ton of gold, 2.7 tons of silver and 1,000 tons of copper.

Project funding was sought with the assistance of Price Waterhouse (Moscow office) and promised in 1998 by the Alrosa Bank in Russia. The financial crisis in Russia caused this financing to be aborted. M & Diamond therefore continued with their own resources, establishing a trial mine and 100 tons/day pilot gold recovery plant. Equipment was moved on-site from March to May 2000, and only 2 months were required to build the gold recovery plant. Before the onset of winter, only 2 weeks remained to operate the plant and produce 4.5 kilos of gold. M & Diamond plan to produce 100 kilos of gold in 2001 from this plant, as well as test-mine different parts of the deposit, and examine the option of heap-leaching.

The pilot gold recovery plant consists of a Russian-made crushing plant capable of handling 100 tons of ore a day, equipped with a 35 ton bunker. The bunker feeds crushed ore by conveyor into a purpose-built timber building that houses the gold recovery plant. The gold recovery equipment is all of Chinese manufacture, consisting of a ball mill, spiral classifier, 4.5m x 1.8m shaking table and a smaller concentration table. At present, power is by diesel generator. M & Diamond has 20 employees, but local recruitment of herders as trainee miners will raise the figure to 60 employees in 2001. Full-scale production envisages a total of 200 employees, most to be recruited locally. The local infrastructure is being improved by the Mongolian state and the opening up of the border with the Russian Federation gives excellent access to a good metalled road to Ulan Ude. Furthermore a 100km spur from the Mongolian-Buriat Grid s envisaged, giving electrical power to the Tavt Gold Mine.

In summary, 2001 sees M & Diamond becoming a small but significant hard-rock gold producer, able to generate enough cash-flow from sales of 100 kilos of gold a year to finance a rolling programme of hard-rock infill drilling. Furthermore the pilot production gives considerable credibility with banks and potential investors for securing the 8m$ funding required for the 1 ton a year gold project.

21. Tusulch Ltd.

Tusulch is an example of a private company operating a single small placer mine. Established in 1997as a private company, it sought an Exploration License at Baruun Zakhtsag in Buregkhangai Soum in Bulgan Aimag, on the basis of a prognosis of 220 kilos of gold in the State records of the Geofund. The Exploration License was duly awarded and the company converted part of its property to a Mining License.

The **Baruun Zakhtsag Mine** is equipped with a Mongolian 35m^3/hour trommel built at the Darkhan Geo-Machine Factory. Overburden is 6 to 15m thick on the 600ha mining are, and the placer has a gold grade of 0.7 to 0.8g/m^3. The gold is flaky and fairly coarse. Permafrost is not a problem, nor is clay, but excess water poses some difficulties. The mine uses a Caterpillar excavator supplied by Wagner-Asia Ltd., plus several Russian bulldozers and Russian Kraz trucks.

Output in 1999 was 20.3 kilos of gold (pure), halving to 10.5 kilos in 2000. However the company has set a target of 50 kilos of gold for 2001.

Recently Tusulch has diversified into the repair and servicing of Korean-built cars and tourism.

22. Mining Consulting Ltd.

Mining Consulting was established as a small private company in 1996 by Z. Tumurbaatar, to offer consultancy services based on his 30 years' experience in the mining sector .From 1996-97 the company was very active in assisting many foreign exploration companies in Mongolia. After the decline in investor interest with the fall of the gold price, fall of the copper price and Bre-Ex scandal, the company switched to mining on its own account.

In 1998, Mining Consulting started a small gold mine near to Tolgoit in the Eroo Goldfield of Selenge Aimag. Output in 1999 was 35 kilos of gold (pure) but production does not seem to have occurred in the 2000 season. The company plans to complete the mine in the 2001 season and produce 30 kilos of gold, at the same time explore for new placer gold deposits.

All equipment is rented from the Tolgoit Placer Mine of Mongolrosvetmet Ltd. Mining Consultants uses 2 Russian bulldozers but is exceptional in having a Russian dragline with a 45m boom and a 6m^3 bucket in order to remove the 6 metre thick overburden. Water is a problem but drained by bulldozing channels avoiding the need to resort to pumping. Gold is recovered using a Russian PgSh 50m^3/hour washing plant. The gold is of medium size and averages 2 grams/m^3. The placer is 0.8 metres thick resting on bedrock. Permafrost occurs but is only minor and clay is not a problem. Small garnets occur with the placer gold.

Mining Consultants recently diversified into hard-rock tungsten (wolfram) and rare metal exploration, taking up an Exploration License in Khentii Aimag.

23. Geo Altai Ltd. (= Geology Gold)

Geo Altai is an example of a small start-up private gold mining company. Formed as recently as March 2000 with 3 shareholders – all geologists, the company took up an Exploration License at Salaa in the Sergelen Goldfield. By the end of the 2000 season, the company had proved reserves of 95 kilos of gold, with an average grade of 0.5grams/m^3 beneath 0.4 to 2m overburden. The placer is long and narrow, 40 to 60m wide and hundreds of metres long. The placer includes some clay and some fine gold. Permafrost seems to be absent. Surface water is insignificant, so the company drilled 3 water boreholes in the 2000 season, yielding 5.4, 6.5 and 9.0 m^3/hour respectively, and excavated a reservoir. Geo Altai plan to start the **Salaa Mine** on 20th May 2001 having taken out a 225 hectare Mining License. The company plan to use 1 Russian Kraz truck, Russian excavator and a Russian trommel working at 30m^3 an hour. The mine is not connected to the electric grid, so energy will be via a Russian AT 100 diesel generator.

The company plan to produce 29.5 kilos in the 2001 season from the Salaa Mine. The biggest problem is the combination of limited water, presence of clay and presence of fine gold. By choosing to use a trommel rather than a monitor, the water requirement is cut from approx. 9 x the volume of placer processed to approx. 4 x the volume of placer processed, i.e. about 120m^3 of water per hour. Provided the re-circulation reservoir is large enough, and divided into 2 portions separated by a rock filter, and water abstracted from the reservoir is filtered and the filters cleaned on an hourly basis, then the company should achieve its target production of 29.5 kilos.

Placer Mining Equipment in Mongolia

1. Wagner Asia-Equipment Ltd.

Wagner Asia is now one of the leading suppliers of mining equipment in Mongolia, and now has a well-equipped headquarters and engineering workshops in Ulaanbaatar and currently has 73 employees.

The parent company is Wagner Inc whose headquarters are in Colorado, USA. The company began in Mongolia in 1994, as the Representative Office of 'Caterpillar Asia', whose parent company is also in the USA. Due to good progress, in autumn 1996 Wagner Asia-Equipment opened the Caterpillar dealership in Ulaanbaatar. The company also represents Good Year Tires (USA), mining drills of Ingersoll-Rand (USA), and welding equipment of Miller (USA). However the main activity is as the 'Cat' dealer for Mongolia.

Since 1994, a trend and growing has developed in the Mongolian placer gold industry away from Russian dozers and excavators that had previously been pre-eminent over to 'Cats'. Many of the smaller placer gold mines now have a Cat D8 tracked bulldozer plus a Cat hydraulic excavator (notably 320b or 325b). Many of the larger placer gold mines have also switched to Cat bulldozers and excavators. Some also use Cat Motor Graders and Cat Scrapers. Russian equipment is substantially cheaper but the very tough operating conditions in the Mongolian placer gold mines causes unacceptable breakdowns and excessive wear on Russian-made bulldozers and excavators. Furthermore the severe diurnal temperature variations in the Mongolian summer cause substantial hours to be lost in the middle of the day to avoid overheating the equipment.

However, most of the placer mines – large and small – still prefer to use Russian trucks, notably Kraz, which are generally adequate, and spares are plentiful. Wagner has sold off-highway trucks to some mines, notably Shoroon-Ord now have a fleet of six 37-ton Cat trucks.

Many Mongolian placer gold companies cannot afford to buy Cat equipment, but Wagner have 35 units for seasonal lease/rental, up by 10 excavators from 2000. Lease/rental is by a fixed monthly charge (regardless of the seasonal peak), plus how many kilometres per month, read-off by Wagner staff.

The seasonal nature of the industry means that the demand for Cat units starts in March, by mid-April is very busy and by 1st June all stocks are leased/rented or sold. March is the peak for take-up of bulldozers (to remove overburden) and the peak take-up of excavators is later in My-June (to excavate the placer). By end of October most of the rented/leased equipment is back at Wagner's depot in Ulaanbaatar and winter maintenance/overhaul commences ready for the following year.

An unusual phenomenon is that, starting from its base in Mongolia, Wagner is currently using Mongolian know-how with Cats to break into the Siberian market, and in spring 2000 established Wagner-Siberia Ltd. serving Irkutsk Oblast, Chita Republic and Buriat Republic. This is a reversal of the traditional phenomenon of Russian know-how assisting Mongolian enterprises.

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Value of Gold Production

The boom in gold production must be viewed against the fall in the world gold price (Fig.2), particularly since 1996.

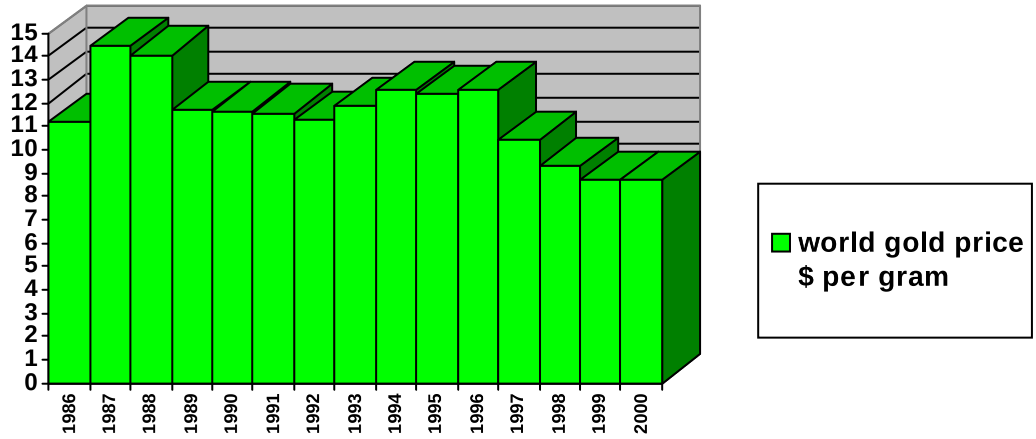

Fig.15: Fall in the world gold price, shown as US$ per gram. Information from www.kitco.com converted from US$ per Troy ounce, as this unit has little relevance in Mongolia. To make some allowance for the seasonal peak of production in Mongolia, an approximate mid-year price has been selected.

The Mongolian national currency is the Togrog (Tg) and for reference purposes the US dollar (US$) is used by the Mongol Bank, and US dollars are by far the largest foreign currency for official and unofficial exchanges, and is the main currency used by Mongolian companies for pricing exports and paying for imports, even though the main trading partners are China and the Russian Federation.

In spite of the recent fall in the world price of gold, the value in US$ of the Mongolian gold output has risen strongly and swiftly.

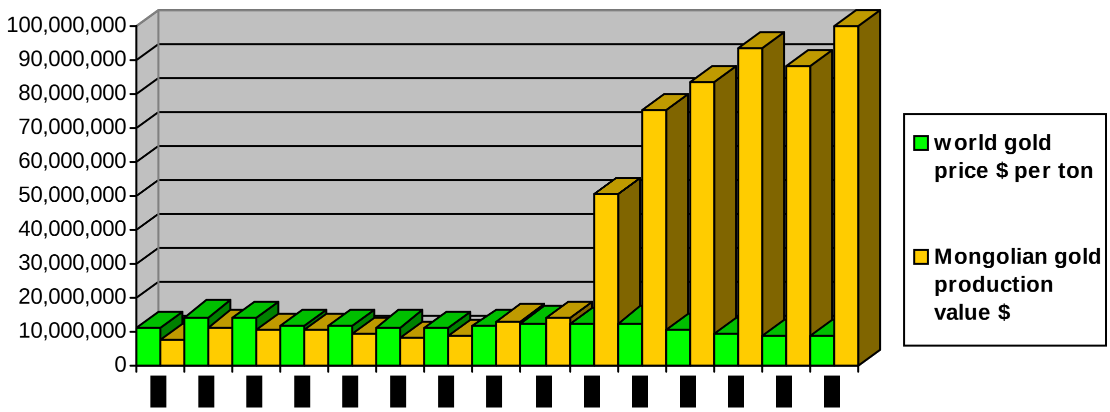

Fig.16: Rise in value of gold production in Mongolia, expressed in US$.

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The Minerals Law of 1997

The start of the placer gold boom in Mongolia, and its ongoing success, were made possible by a series of policies implemented by the Mongolian Government.

The Government introduced the new Minerals Law that became effective on 1st July 1997. This created a favourable framework for development of the minerals industry, both exploration and production, including placer gold. Key elements of the new Minerals Law include:

- Award of Exploration Licenses on a first-come first-served basis;
- Exploration License areas throughout Mongolia, except for protected areas;
- Payment of Exploration License fees straightforward and simple;
- No work or expenditure requirement for Exploration License;
- Exploration License granted for term of 3 years, extendable by a further 4 years;
- 1st year of Exploration License, annual license fee of 0.05$ per hectare;
- 2nd & 3rd years of Exploration License, annual license fee of 0.10$ per hectare;
- 4th & 5th years of Exploration License, annual license fee of 1$ per hectare;
- 6th & 7th years of Exploration License, annual license fee of 1.50$ per hectare;
- Exploration License area can be up to 400,000 hectares;
- Exploration License can be held by any Mongolian or foreign citizen or company;
- No limit to how many Exploration Licenses that a person or legal entity may hold;
- Exploration License holder has right to Mining License in his territory, no-one else;
- Exploration and Mining Licenses issued by Minerals Resources Authority;
- Exploration and Mining Licenses can be pledged or transferred to third parties;
- Mining Licenses issued for 60 years, extendable for a further period of 40 years;
- Mining Licenses only issued to a company formed in Mongolia;
- Royalty on gold production set at 2.5% of sales revenue;
- Projects of >2m$ may apply for 10-15 year Stability Agreement with Finance Ministry;
- Able to export gold or sell to Mongol Bank (State Bank) or other approved banks.

The new Minerals Law is widely acclaimed as being amongst the best in the world from the point of view of both the mining industry and regulators. The full text (English version) is downloadable free-of-charge from the web site of the Minerals Resources Authority of Mongolia: http://www.mram.mn

Further relevant financial factors are:

- Equipment is depreciated on a straight-line basis over 5 years;
- Buildings depreciated on a straight-line basis over a period of 10 years;
- Exploration and site preparation costs amortised on a straight-line basis over 5 years, beginning in the tax year in which production commences;
- License acquisition costs amortised on straight-line basis over term of the license;
- Value-added Tax (VAT) of 10% payable on gold sales (incl. gold exports);
- VAT payable on imports of equipment and supplies, most can be recovered;
- 15 to 40% Corporation Tax on profits.

Mineral Exploration and Mining are both covered by environmental legislation, some of which is contained in the Minerals Law and the remainder in the various Environmental Laws and regulations. Overall the environmental laws and conditions are in line with other countries, and, provided a reasonable and favourable Environmental Impact Assessment (EIA) is carried out, and sensible environmental mine management executed, then no special problems are envisaged.

With the exception of the VAT on gold sales, and the relatively high Corporation Tax, the Minerals Law and other legislation are favourable, certainly to local companies.

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Acknowledgments

The authors thank the following people and organisations for assisting in various ways in the compilation and production of this paper: encouragement and comment from many staff at the Minerals Resources Authority of Mongolia (MRAM), Minjin Batbayar (Senior Geologist of EMI), Chimid-Erdene (Office Manager of EMI), John Farrington (Peace Corps), Mr. D. Jargalsaikhan (Chairman of the Minerals Resources Authority of Mongolia MRAM) and SAC International for encouraging early investigation. Special thanks are due to the managers of mining companies that agreed to be interviewed including:

Mr. N. Janchiv, Executive Director of Shijiir Alt Ltd.;
Mr. L. Chinbat, General Director of Gatshuurt Ltd.;
Mr. L. Tserendavaa, General Director of Jump Ltd.;
Mr. Ing. Ts. Gankhuyag, Chairman of Er-Shi-Ju Ltd.;
Mr. Gerrit Bazuin, General Director of Ochir Leasing Ltd.;
Mr. Yo. Bayarsaikhan of Wagner Asia-Equipment Ltd.;
Mr. Nyamsuren, General Director of Num Impex Ltd.;
Mr. D. Bayanbat, General Director of Datsan Trade Ltd.;
Mr. Purevgural, Executive Director of Mongol Bulgar Geo Ltd;
Mr. Jansav, General Director of Almaas Joint Stock Company;
Mr. Birukov Vladimir Vasilevich, General Director of Argos Ltd.;
Mr. B. Chuluunzorigt, Executive Director of Hailaast Gold Mining Joint Stock Company;
Mr. Baz Chuluunbaatar, President & Chief Executive Officer of Monnis Group International Inc.;
Mr. Igoshin Boris Alexandrovich, Director of Altan Dornod Mongol Ltd.;
Mr. Siva Pillay, Financial Director of Capital Resources Ltd.;
Mr. G. Bulgan, General Director of TCH Ltd.;
Mr. J. Purevtseren, Vice-Director of Mongol Gazar Ltd.;
Mr. D. Odbaatar, Executive Director of Shoroon Ord Mining Ltd.;
Mr. B. Davaasambuu, General Director of Durvun Erkh Ltd.;
Mr. L. Baatar, Director of Ikh Nomt Ltd.;
Mr. N. Munkhbileg, Vice-director of Ikh Nomt Ltd.;
Mr. D. Baatar, General Director of M & Diamond Ltd.;
Mr. Z. Tumurbaatar, General Director of Mining Consulting Ltd.;
Mr. D. Tsogtbilegt, General Director of Tusulch Ltd.;
Mrs. D. Tuul, General Director of Geo Altai Ltd.;
Mr. B. Dalai, General Director of Mongolczechoslovakia Metal Ltd.;
Mr. N. Algaa, Executive Director of Mongolian National Mining Association;
Mr. Ts. Bayanjargal, General Director of Buurgent Ltd.;
Mr. M. Damdenbat, General Director of Khunan Ltd; and
Dr. James F. Baur, President of Science Solutions Ltd.

The authors remain responsible for all of the facts and opinions expressed in this paper.

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