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**The North Dredge of Shijiir Alt**  
**in the Zaamar Goldfield of Mongolia**  
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## ABSTRACT

*"...a displacement of 1,500 tons, and a maximum reach (depth) of 12 metres although the average operating depth is usually about 7 metres. The dredge has 77 250-litre buckets on a chain..."*



### **DREDGING BELOW THE OLD RIVER...**

Having diverted the Tuul River by construction of a dragline channel, the North Dredge is now able to dredge directly below the old course of the river.



### **OVERSIZE WITH GOLD CLAY BALLS...**

This photo is several years old and shows red clay balls being dumped with the oversize stones. The dredge pond looks like tomato soup due to the suspended red clay in the tailings.

The "North Dredge" of Shijiir Alt Ltd, more properly named the Alt (= Gold) Dredge is the oldest dredge in the Zaamar Goldfield. The dredge is mining the Tuul Placer and the underlying red Ulaan Placer from beneath the floodplain of the Tuul River, and beneath the lower terraces.

The dredge belongs to Shijiir Alt Ltd, and is a Russian-made Bucket-Line Dredge manufactured in Irkutsk in Siberia. The dredge became operational in the mid-1990's after a 10-month construction and assembly period. It has a displacement of 1,500 tons, and a maximum reach (depth) of 12m although the average operating depth is usually about 7m. The dredge has 77 250-litre buckets on a chain, and a dredging design capacity of 1.2 million m<sup>3</sup> a year. The rated capacity is 350m<sup>3</sup> per hour, with 1,800kW of on-board power and a nominal power load of 700-800kW. Power is supplied by the electric grid. Gold recovery is by traditional Russian sluice boxes designed for continuous operation.

The normal working speed of such a dredge is 22 to 24 buckets per minute (bpm) in gravels and 18 to 20 bpm in clayey intervals such as the Ulaan Placer. The bucket volume is 250 litres (0.25 m<sup>3</sup>) and the average fill is 75%. Therefore the normal working capacity is 24 bpm x 0.25 m<sup>3</sup> x 60 minutes x 75% = 270 m<sup>3</sup> per hour.

The number of buckets is not important for capacity calculations and is a confusing figure. It is related to the maximum dredging depth and used to estimate dredge price and the wearing costs one can expect. Important for capacity calculations is the number of buckets per minute going over the tumbler and



### THE FRONT END...

The special observation gallery helps the dredge master in steering the vessel and in raising and lowering the bucket-line.

discharging material.

The operation has often attained 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<sup>3</sup> with sporadic nugget anomalies between 20 and 30 g/m<sup>3</sup>. However the placer also includes significant fine gold.

In spite of high gold production, output can be increased further if gold losses with the oversize can be stemmed. This opportunity arises as the dredge mines not only the easily washed alluvial Tuul Placer but also the underlying stiff red stony clay that is also rich in gold - the Ulaan Placer, a much older paleoplacer of Neogene age. Large gold-rich red clay balls are ejected with the oversize, and smaller clay lumps probably act as 'gold robbers' in the sluices.

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### BUCKET-LINE RAISED OUT OF WATER...

In this view the bucket-line is clear of the water. Note the smoke stack from the coal-fired boiler that provides hot water for the central heating system.

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