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Received 25.1.83

BEACONSFIELD GOLD PROJECT, TASMANIA

ANNUAL REPORT

1 JULY 1981 to 30 JUNE 1982

83 - 1915

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HART SHAFT

At the beginning of the period, a depth of 50 metres had been reached by removal of the debris from the collapsed shaft collar. Excavation continued until mid-September 1981 to a depth of 55 metres. Significant difficulties were experienced due to water inflows peaking at 1,850 gpm and continuous settlement and subsequent deformation of the temporary collar being constructed. This work was persevered with in order to test the properties of the sandstones known to exist at about 55 metres and to reach less disturbed original shaft timber which would allow more accurate fixing of the location of the shaft.

The sandstone beds proved to be extensively broken by structural movement and highly leached by mine water. It was clear that it was not possible to support the collar and headframe on this material, particularly in view of the construction difficulties that would be experienced. The old timber sets were in reasonable condition at this point with eastern wall plates and some dividers being recovered for the first time. These sets confirmed earlier measurements of the shaft location. A rotary drilling rig was positioned over the shaft to test the remaining debris. Three holes were drilled but down-hole surveys showed that the rods were deflecting into the shaft walls at about 90 metres.

Excavation of debris was halted at 55 metres as the legal limit for use of a slewing crane had been reached and the settlement of the collar was posing an unacceptable risk. It was decided to hang the new collar construction from pad footings at the surface due to the unsuitability of the phyllites and sandstones exposed in the shaft to provide support.

Design of the construction by Hardcastle & Richards Pty Limited was accelerated and included a detailed geotechnical study of the soils adjacent to the collar by Golder Associates. Construction was undertaken by AMAX personnel already on site and included:

1. A ring beam of reinforced concrete, 1m x 1m in section, 38m below the surface, on which the weight of the previously installed concrete lining was to bear.
2. Twenty-two 38mm diameter high tensile bars in polythene ducts which transfer loads on the ring beam to the surface beams.

3. Two reinforced concrete beams measuring 14m long by 1m wide by 2.7m deep which span the shaft and transfer loads to the footings.
4. Two pad footings each 10m x 4.5m in area and 1.2m deep situated to the east and west of the shaft and connected by edge beams, 2m wide, to the north and south of the shaft.
5. Thirty steel sets fabricated from 250UC at 900mm centres to 10m below surface then at 1200mm from then on.

This support concept has been designed to carry 2,000 tonnes of both superimposed loads of backfill and headframe, etc, at surface and shaft sets and lining hung to a depth of 100 metres given about 30% support from surrounding ground.

In late December 1981, a cable tool drilling rig was located on top of the shaft during a break in construction activities. This rig succeeded in drilling a straight hole through the blockage. Thirty metres of debris remains to be removed. This appears to be mainly phyllites from the upper collar area with the last 10 metres being random shaft timbers. A plumb line was lowered through the casing to a depth of 391 metres or 25 metres short of the shaft bottom. Underwater photographs taken at 96 and 112 metres below the surface show that the shaft sets are undisturbed with even the guides visible and in place. Two 10 inch and one 8 inch diameter holes were drilled and cased through the remaining debris to allow the installation of submersible turbine pumps and controls to facilitate further excavation.

Before the end of the period and commencement of the care and maintenance period, infill concrete panels were poured between the steel sets from 29 to 37 metres from surface to tie together badly fractured sections of the temporary lining. Extra bracing was installed to support the sheet pile lining of the shaft from 38 to 55 metres. A temporary ladderway was installed to the shaft bottom, pumps rearranged and secured, and the shaft cleaned down. The bore casings through the remaining blockage were extended to the surface.

EXPLORATION DRILLING

In view of the escalating cost of reopening the mine, it was decided within the Minerals Exploration group that a drilling programme from surface to increase confidence in the ore reserves was justified. Accordingly, a four hole programme aimed to intersect the orebody at around 640 metres below surface and to provide information at the presumed flanks of the mineralised zone, was initiated.

Two holes were precollared to 90 metres and 120 metres although difficulties were experienced while drilling the overlying weathered black shales and the shaft/limestone contact. The programme was halted at this point due to the continuing escalating costs of shaft clearing and collar stabilisation and consequent over-run on budget.

HART SHAFT PUMPHOUSE

Excavations and consequent settlements around Hart Shaft were causing structural damage to the remains of the pumphouse. While the rear of the building had been demolished because of damage caused by the original collapse of the shaft collar, it was decided to save the front section in order to honour a commitment made to the local community. A heavily reinforced concrete slab floor was constructed which was designed to tie the various footings of the building together and prevent differential settlement.

WATER DISCHARGE AND TREATMENT

Water inflow to the shaft excavation was 1,850 gpm in August 1981. The inflow gradually slowed to 1,150 gpm after excavation was stopped but increased to 2,250 gpm as a result of the drilling through the blockage. Subsequently, the inflow again reduced to a rate of 600 gpm at the end of June 1982. It is clear that pumping from the shaft has reduced the water table over a wide area as the old limestone quarries nearly two kilometres south of the shaft have been dried up completely. Assistance was given to Woodfield & French, operators of a quartzite crushing plant, to relocate their wash water supply from one of the quarries.

The water quality has remained unchanged with the only problem constituent being iron which oxidises rapidly and precipitates in the discharge channel and settling dams. Channels and pipes need to be cleaned regularly and it is clear that a means of trapping iron precipitates in a readily removable form will be required before serious dewatering is undertaken. It is suggested that sand filtration would be the most economical method. It is also recommended that a second discharge pipeline should be constructed from the shaft to the old channel behind Weld Street to cater for high pumping rates and to allow maintenance. The diversion of Middle Arm Creek around the limestone quarries remains in good condition. Monitoring of the flow of the Creek above and below the diversion is being carried out by the Rivers & Water Supply Commission.