

Visit to Perth Mint Gold Refinery



8 members of the AUSTRALIA-Western Australia Branch visited the Perth Mint gold refinery near the airport. The plant receives Dore gold from the various mines with contaminants of gold silver, copper etc and produces 99.99% pure gold, 99.5% gold for the Indian market and 99.99% silver bars.

The Dore gold comes into the plant and is first remelted in an induction furnace and the melt sampled for accurate assaying with one sample XRFd to give an order of magnitude assay to determine the correct fire assay mix, two samples tested separately by fire assaying, a fourth as an umpire sample and the fifth for the gold seller. The gold is recast and labelled so that a mix of 85% gold can be compiled to the refining melt from the various bars on site. The current process then involves injecting chlorine gas into the melt with a powerful off-gas system pulling off impurities – Cu, Zn Pb etc leaving behind a AgCl mix and the gold – this gives 99.5% Au. The gold part is cast into bars for the Indian market or into anode bars for the 99.99% refining.

The refining to 99.99% is by electrolysis with the final step being a melting process for the cathode plates and then granulation by dropping through a plate into water.

The granules are carefully weighed into the target bar size – typically 1kg bars – with gold wire used to make a final weight adjustment. The granules are remelted in an induction furnace to produce the 1kg bars, polished in a ball peening screen, stamped and then a serial number engraved. The grade is usually 99.995-6%Au and the bar weight $1,000 \pm 0.002$ gms - today's value - \$A94,000 with the gold price at \$A3,000/oz.

Silver follows a similar route – but most is brought to site from other smelters – eg the Nystar smelter at Port Pirie – since the WA mines produce insufficient Ag for the demand.

The plant produces approximately 250 to 300 tonnes per year – but with a much higher capacity. There is currently a major overhaul in progress, to remove much of the manual handling and confining the fuming and heat areas into vacuum chambers – with employees being retrained to more technical roles.

The profitable part of the operation is not the refinery but the production of coin blanks for export around the world and the tourism venture at the old Mint in the City. The Mint is ultimately owned by the State Government and just declared a \$A55m profit for the last financial year.



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