

weight from ingots of 1,500 ounces to a few ounces and may contain from 99·9 p.c. of gold to 20 p.c. of gold, the remainder being silver and base metals (copper, lead, zinc, etc.). Regulations prohibit the acceptance of bullion containing less than 20 p.c. of gold or any deposit containing less than one ounce of gold.

From the receiving office the deposits are transferred to the Rough Gold Melting Room. Each deposit is melted separately and two small dip samples are taken during this process. The molten metal is poured into moulds that shape the ingots. Cuts are taken from these ingots and, along with the dip samples, are sent to the Assay Office for assay. If the assays of the dips and cuts agree within certain limits, the assay is reported and payment made, less the refining charges, for the gold and silver contents calculated on the weight after melting. When concordant assays cannot be obtained, the deposit is remelted and the operation repeated. When the bullion is passed for payment, it becomes the property of the Mint and there is no necessity to retain the separate identity of each deposit. The whole purpose of this process is to obtain the actual weights of gold and silver contained in the deposits and thus determine the amount to be paid the consignor.

The rough gold ingots are then taken to the Gold-Refining or Chlorination Room. The Miller Chlorine Process is based on the fact that chlorine attacks base-metals and silver in preference to gold when passed into a molten mixture of these metals. Chlorine gas is passed into molten crude bullion covered with borax. The chlorine combines with the metals to form chlorides. A large portion of the base-metal chlorides and some silver chloride volatilize and are carried off while the remainder rise to the surface. When all the silver and base metals have been converted into chlorides, the addition of chlorine is stopped before the gold is attacked. The chlorides are bailed off, leaving the refined gold which assays 995·0 and over. The chlorides, which contain a little gold, are melted and some carbonate of soda is scattered on the surface. This reduces a portion of the silver chloride and the metallic silver settles to the bottom carrying the gold with it. The container is allowed to cool below the melting-point of silver and the chlorides, which are still liquid, are poured off, leaving a 'button' of silver which contains all the gold. This bullion is put in with another charge of rough gold and again passes through the chlorination process.

The refined gold, obtained in the foregoing manner, is poured into moulds, each holding 400 ounces. The weight of the fine gold ingots (trade bars) must not be less than 390 and not more than 410 ounces. Small sample bars of about 20 ounces are poured before casting the first ingot and after every tenth ingot. Cuts taken from these sample bars are assayed in the regular manner.

The chlorides remaining after the removal of the gold are treated with nascent chlorine to dissolve the base-metal impurities, the principal one being cuprous chloride. The silver chloride is reduced to metallic silver, washed, and transferred to the silver melting room where it is cast into ingots of 1,000 ounces in the same manner as gold. The liquids drained off during the silver chloride reduction process are treated further to precipitate the copper. This copper is sold as a copper sweep containing a little silver and a trace of gold.

Every possibility of loss of precious metal is guarded against. Slags, discarded crucibles, furnace linings, chamber dust, etc.—known as sweeps—are crushed and any metals extracted. During the process, samples are continually being taken and these are sent to the Assay Office for further sampling and assaying. The sweep is stored in drums until sold to smelters. In addition to this, the fumes from all