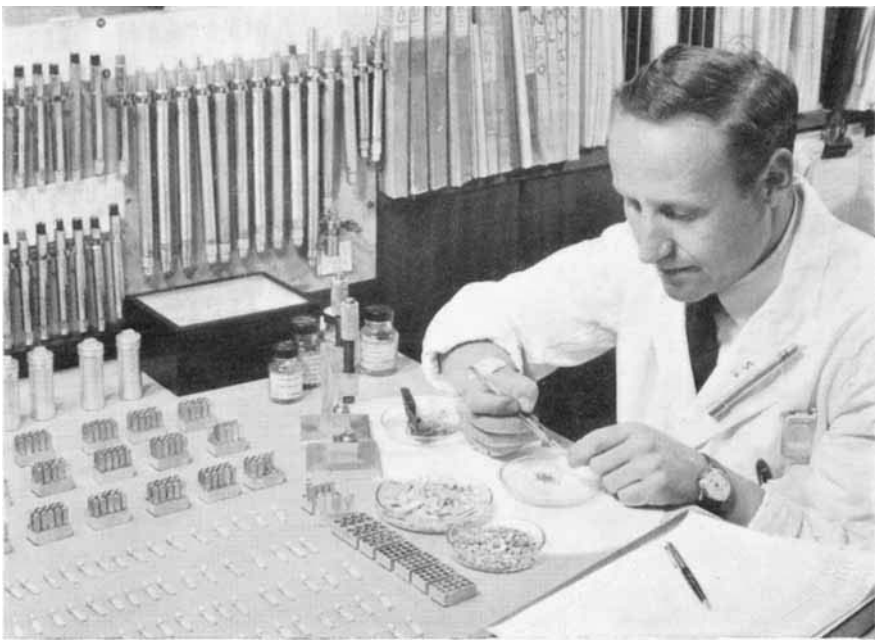
Iridium for Gamma Radiography

NEW SOURCES OF GREATER SPECIFIC ACTIVITY

Iridium is widely used as the source material in isotope radiography equipment. A small cylinder of pure iridium, a few millimetres in length and diameter, is made radioactive by irradiating it in a nuclear reactor. It then acts as an intense source of gamma rays, effectively doing the job of a high-voltage X-ray set. Iridium radiography equipment is cheap and easily portable. It is most effective for steel sections in the thickness range $\frac{1}{2}$ inch to $2\frac{1}{2}$ inches.

The definition obtained in gamma radiography can be improved by reducing the size of the iridium source cylinder, but this also reduces the intensity of the radiation and leads to longer exposure times. In the past it has not been possible to get sufficient intensity from a source smaller than 2×2 mm, but recent improvements in reactor facilities now make sources of 1×1 mm or even 0.5×0.5 mm a practical proposition. Dramatic improvements in definition have become possible without a corresponding increase in exposure time with new sources available from the Radiochemical Centre at Harwell.

The new sources are irradiated in the core of the Harwell reactor DIDO, in the most intense neutron flux available in any British reactor. One interesting consequence of this high level of irradiation is that an appreciable percentage of the source material is transmuted into the isotope adjoining iridium in the Periodic Table – platinum. This makes the source unsuitable for reactivation when its radioactivity has decayed, as platinum cannot be usefully activated, and the reduced amount of iridium left in the source would only reach full strength after an unduly long time in the reactor. For this reason decayed sources are now being discarded.



The preparation of iridium-192 radiography sources. Inactive iridium cylinders are mounted in capsules in which they will be activated in a nuclear reactor