

Platinum-lined Furnaces for Plutonium Production

NEW EQUIPMENT TO BE INSTALLED AT WINDSCALE

The process of extraction of plutonium from irradiated uranium, carried out at the Windscale works of the United Kingdom Atomic Energy Authority, includes in its final stages the treatment of the oxide with anhydrous hydrofluoric acid to yield plutonium tetrafluoride.

In this reaction, the oxide is contained in platinum trays and heated in a battery of high temperature electric muffle furnaces into which the HF gas is passed for several hours. To prevent contamination of the charge by corrosion products all parts of the muffle that come into contact with the HF gas are protected by platinum. This lining also prolongs the service life of the furnace. The process and equipment were originally described in *Platinum Metals Review*, October 1957, pages 132-133.

Recently the United Kingdom Atomic Energy Authority placed a further contract for electric furnaces with the General Electric Co. Limited, the platinum lining for the fluorination furnaces being carried out by Johnson Matthey. These furnaces are of the horizontal front-loading type, and are operated on a batch production line, the charges being brought to the furnaces in their platinum-lined trays by a totally encased conveyor belt.

When a tray reaches the furnace the door is first raised and then the tray automatically fed into the muffle. After several hours' treatment the furnace is force-cooled, the door removed and the tray dropped back on to the conveyor belt. A new tray is then fed into the furnace.

The high level of radio-activity exhibited by the charge, and eventually by the equipment, necessitates the whole operation being conducted inside glove-box compartments. A detailed view of a platinum-lined muffle and door is shown here.

When the equipment eventually becomes obsolete the platinum will be recovered after it has passed through a special refining process to remove the radio-active contaminants.



The platinum-lined muffle and door of one of the new fluorination furnaces