EP013 Assessment of BAT techniques

The Pollution Prevention and Control Act 1999 requires that operators show that they have applied BAT (Best Available Techniques) in their processes. The BAT approach differs but complements the regular approach on EQS (Environmental Quality Standards). BAT requires measures to be taken to prevent or reduce emissions, irrespective of whether the EQS are already being met, if this can be done at reasonable cost.

General Comments

The European Commission has produced Best Available techniques references document BREF_0907 for the Production of Speciality Inorganic Chemicals, which covers Sofnocat 423 manufacture.

All the raw materials and product are stored in closed containers to prevent losses to the environment.

The facility is in a covered area protected from wind and rain, with temperature control environment.

It is BAT to capture dust in the work areas and duct it to abatement, which in this case is a filter sock. The abated dust, along with contaminated PPE, gloves, rags etc are then collected for recovery of precious metals.

It is BAT to use management controls to restrict the total amount of virgin product manufactured per year in order to limit the emissions to air to insignificant levels.

Mixing of components

The raw materials which are either solids or liquid are combined in a mixer, and the shear forces of the stirrer blade to create a homogenous mixture. This is the best way, using mechanical stirring to create a mixture. The mixing of solid fine materials (powder) can generate dust that can be emitted to air. Mixing equipment dust capture systems can be installed on top of mixing equipment in order to minimise diffuse emissions. The ducted dust is led to an abatement system (e.g. sock filter) to minimise emissions to air.

Extrusion

The Sofnocat mixture is forced through a die-plate to form pellets of a pre-determined size. This method of extrusion again is the best method to form pellets. Material which is recovered from the extruder is reused in subsequent batches, which Is BAT for minimisation of waste.

Drying and Calcination

The damp pellets are dried in a static tray oven at 300C. The oven is equipped with extraction hood and ducting. During the drying process water and nitric acid are given off as vapour. In the calcination process, some products of decomposition can be emitted to the air, ie.,NOx, ammonia. It

is not possible to obtain the metal oxides from the starting materials without doing so. These emissions are vented from the top of a stack to ensure appropriate dispersion. The emissions are not abated, as calculations demonstrate that the level of these emissions will be insignificant. MPL will commit to demonstrate by air monitoring of emissions during the first year of the new permit. This will confirm emissions are insignificant and hence BAT not to abate them.

Sieving

Because drying may cause particles to be lumped together, a subsequent particle size reduction operation may be required to obtain the required fine particle size. This operation involves passing the particle materials through openings of a particular standard size in a screen in order to make them smaller. sieving processes are potential sources of dust emissions. The dust is extracted by LEV and recovered via a filter sock.

Reduction of metals by hydrogenation

This process is conducted in a 5L jacketed reactor. The reaction does not use a solvent so reduces the environmental footprint of the process. Use of hydrogen to achieve the reduction is the most atom efficient method and produces the environmentally benign water vapour as a by-product.

Oxidation of reduced metals

After the hydrogenation is complete (as indicated by the temperature traces provided by the thermocouples) and excess hydrogen purged, a stream of air diluted with nitrogen is gradually introduced. The use of oxygen in the air is the most efficient way of oxidising material to the active metal oxides, so this is BAT.