

## Sinter Process – Uses and Exposures

### Manufacturing & Use

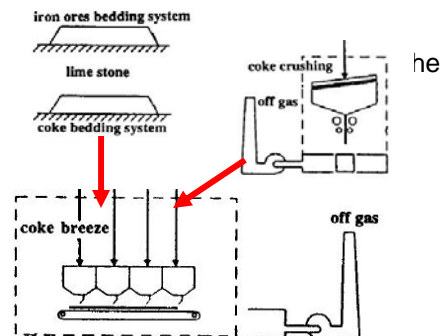
In REACH the definition of 'Use' relates to how the substance is handled.

Use means = **processing, formulation, consumption, storage, keeping, treatment, filling into containers, transfer from one container to another, mixing, production of an article or any other utilisation**

Preparation will not be included in the manufacture and use description for the REACH process

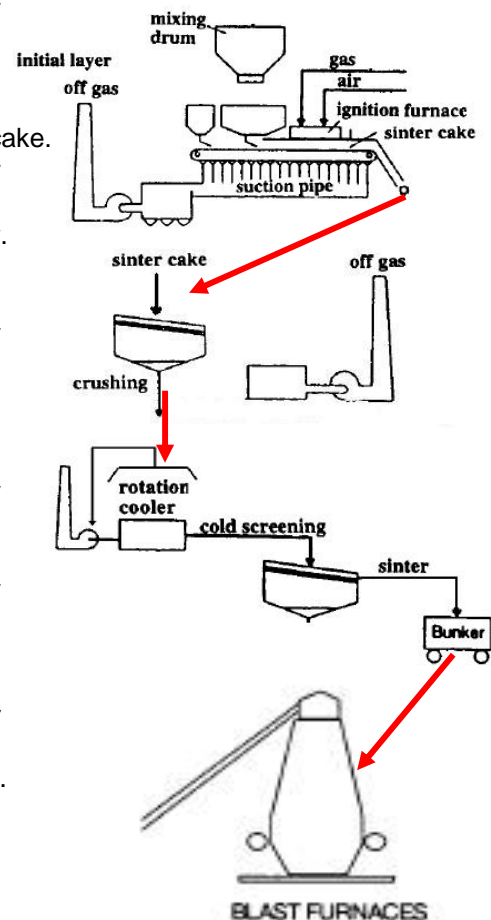
#### Preparation

- Ores, recycled materials, fluxes, lime and olivine at blending plant.
  - Mixed
  - Stored in bunkers or on beds
  - Transferred from one area to another container
- Coke / Coal crushed to form breeze.
  - Crushed (processed)
  - Transferred from one area to another container



#### <sup>1</sup>Production

- The blend (including return fines) along with burnt lime and coke are mixed together and weighed.
  - Mixed
  - Transferred from one area to another container
  - Pelletised (processed)
  - Weighed (processed)
  - Wetted (treatment)
- Added to the strand at high temperature to form a cake.
  - Transferred from one area to another container
  - Processed at High temperature
- Cake broken down on crash deck &/or with crusher.
  - Broken or crushed (processed)
  - Optional Hot screening
  - Transferred from one area to another container



#### Cooling and Screening

- Cooled at coolers.
  - Cooled (treatment)
  - Transferred from one area to another container
- Screened to remove over and under size sinter.
  - Mechanical screening (processed)
  - Transferred from one area to another container

#### Blast Furnace

- Transfer and Storage
  - Transferred from one area to another container
  - Transfer from sinter plant to blast furnace e.g. via wheel loader, wagon, conveyor belt etc.
  - Stored in bunkers
  - Stored in open air stock piles

<sup>1</sup> This written process along with the flow diagram on the right hand side is taken as a base reference from the European Commission Integrated Pollution Prevention and Control draft reference document on the best available techniques for Product of Iron and Steel July 2009.

- Transfer from stockpile to blast furnace  
e.g. via wheel loader, bucket etc
- Charging of sinter
  - Transferred from one area to another container
  - Bunker to charging bucket
  - Consumed by blast furnace as feedstock

### Other Activities

#### Maintenance

- Maintenance activities on several parts of the plant.
  - Bunkers
  - Conveyors
  - Screens
  - Crusher
  - Precipitators / bag filters
  - Wind boxes / mains
  - General cleaning operations

#### Sampling

- Sampling activities at the sinter plant.
  - Sinter Sampler
  - Hearth layer oversize
  - Hearth layer under size
  - Coal / Coke crushing plant
  - Precipitator dust
  - Return fines sampling
- Sampling activities at the blast furnaces.
  - Sinter fines
  - Bottom bunkers sinter

### Exposure

Activities in the above areas could all produce exposure due to areas of built up dust from the process. Cleaning operations will create the highest exposures due to the manual disturbance of the dust using brushes and shovels, bobcats and suction (vacuum removal). Due to the sinter process being semi automatic there is generally minimal numbers of employees on the plant during operation and when this does occur it is for only short periods of time. Preferably maintenance and some cleaning activities would normally take place on a down day or a turn-around when operations have been stopped and the number of employees increases in that area. Key areas of exposure are:

- **Pelletiser area, cleaning under general operations**
- **Wind mains cleaning during down days stoppage**
- **Screens, maintenance and cleaning during down days stoppage**
- **Conveyors, cleaning spilt material during down days stoppage**

The risk to human health presented by the dust is not due to the chemical composition / toxic effects of the dust but solely related to the concentration of dust in the air. The higher the concentration of dust the greater the risk of irritation to the respiratory system. In general certain risk management measures (RMM) should be applied when airborne concentrations of the dust is likely to be high. The recommended RMM for human health are dust suppression techniques either by wetting or vacuum and the mechanical collection of the dust instead of close contact human collection and as a last resort the wearing of suitable and approved respiratory protective equipment if airborne concentrations are likely to be high. Ori-nasal respirators fitted with a P3 filter may be used when dust levels are high, directions

for use must be followed. The RMM for environment should mirror what is written in the Iron and Steel BREF (2009) as referenced above on page 1.

### **Exclusions**

In this process we want to focus solely on the use and exposure of Sinter and its constituents. For example this will not include certain emissions such as Dioxins through the stack emissions. A list of other examples of similar emissions are written down and included in the European Commission Integrated Pollution Prevention and Control draft reference document on the best available techniques for Product of Iron and Steel July 2009.

**Sinter Process – Uses and Exposure (SU, PC and PROC taken from Guidance on Information requirements and chemical safety assessment Chapter R.12 Use Descriptor system 2009)**

Sector Use (SU)	Product Category (PC)	Process Category (PROC)	Env Release Categories (ERC)	Operational Conditions	Physical form of substance	Physical form of exposure	Fugacity	Route of Exposure
SU14 – Manufacture of basic metals	PC7 – Base metals and alloys PC19 - Intermediate	PROC 2 <sup>2</sup> PROC 8b <sup>3</sup> PROC 14 <sup>4</sup> PROC 22 <sup>5</sup> PROC 26 <sup>6</sup> (see footnotes for descriptors)	ERC1: Manufacture of substances	Large volume continuous 24 hours / day  Temperature: ambient to 1300°C  Semi closed system Semi automated operation Transported via conveyor and bunkers	Powder / dust to massive	Dust	Powder/dust: High  Massive: Low	Human Inhalation Environment Water (waste stream) Air

<sup>2</sup> PROC 2 - Use in closed process, no likelihood of exposure - Continuous process but where the design philosophy is not specifically aimed at minimizing emissions. It is not high integrity and occasional expose will arise e.g. through maintenance, sampling and equipment break-ins

<sup>3</sup> PROC 8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

<sup>4</sup> PROC 14 - Production of preparations or articles by tableting, compression, extrusion, pelettisation

<sup>5</sup> PROC 22 - Potentially closed operations with minerals/metals at elevated temperature - Activities at smelters, furnaces, refineries, coke ovens. Exposure related to dust and fumes to be expected. Emission of direct cooling may be relevant.

<sup>6</sup> PROC 26 - Handling of solid inorganic substances at ambient temperature - Transfer and handling of ores, concentrates, raw metal oxides and scrap; packaging, un-packaging, mixing/blending and weighing of metal powders and other minerals