

# **M501: MEASUREMENT OF HAZARDOUS SUBSTANCES INCLUDING RISK ASSESSMENT**

## **CASE STUDY 4 – ACME MINERALS**

Acme Minerals is a small company whose main activity is the processing of a limited number of minerals into suitable size ranges for use in the brick making industry. An overview of the process is provided in Figure 1.

The process consists of an area where bulk minerals are stored, from which they are transferred by front end loader to the hopper feeder of a large grinding mill. Following grinding, the fine product is transported by open conveyor to a series of storage bins via a series of screens. Oversize material is returned to the grinding mill. When the bins are full, product is drawn off via a pneumatic system and transferred to a bagging machine from which it is placed in 20 kg paper bags (Figure 2).

When the process is operating at full capacity, approximately 5 tonnes of product can be ground to a size of less than 1 mm. Considerable material of a particle size much less than 1 mm is known to be produced but as the specification only requires less than 1 mm the amount of "fines" is not measured.

### **SITUATION TO BE STUDIED**

An occupational hygienist has been asked by Acme Minerals to investigate concerns in respect to dust exposures, especially when the plant is processing siliceous manganese ore.

As the first step the occupational hygienist decides to inspect the operation with the Chairman of the plant OH&S Committee, during which they observe the following

- The plant works 8 hours/day, 5 days/week, with manganese ore being the major product crushed (80% of yearly production).
- Only six employees work in the grinding/bagging area.

- A considerable quantity of fine black dust has built up on all surfaces throughout the grinding/bagging plant. Dust appears to be escaping from the process especially during the bagging operation due to leaking seals and an inefficient extraction system.
- The wind usually blew the dust away from the front end loader driver when he was filling the hopper.
- The mill hand sometimes cleaned out filters with compressed air.
- A mechanical sweeper is on site but is out of order and the floor is being dry swept by employees using hand brooms.
- All employees are wearing respirators although they appear to be of different types.
- No hearing protection was worn by employees even though the grinding mill appeared very noisy.

Following the inspection they decide to undertake some preliminary workplace monitoring, the results of which are listed in Table 1.

**Table 1 – Results of Preliminary Workplace Monitoring**

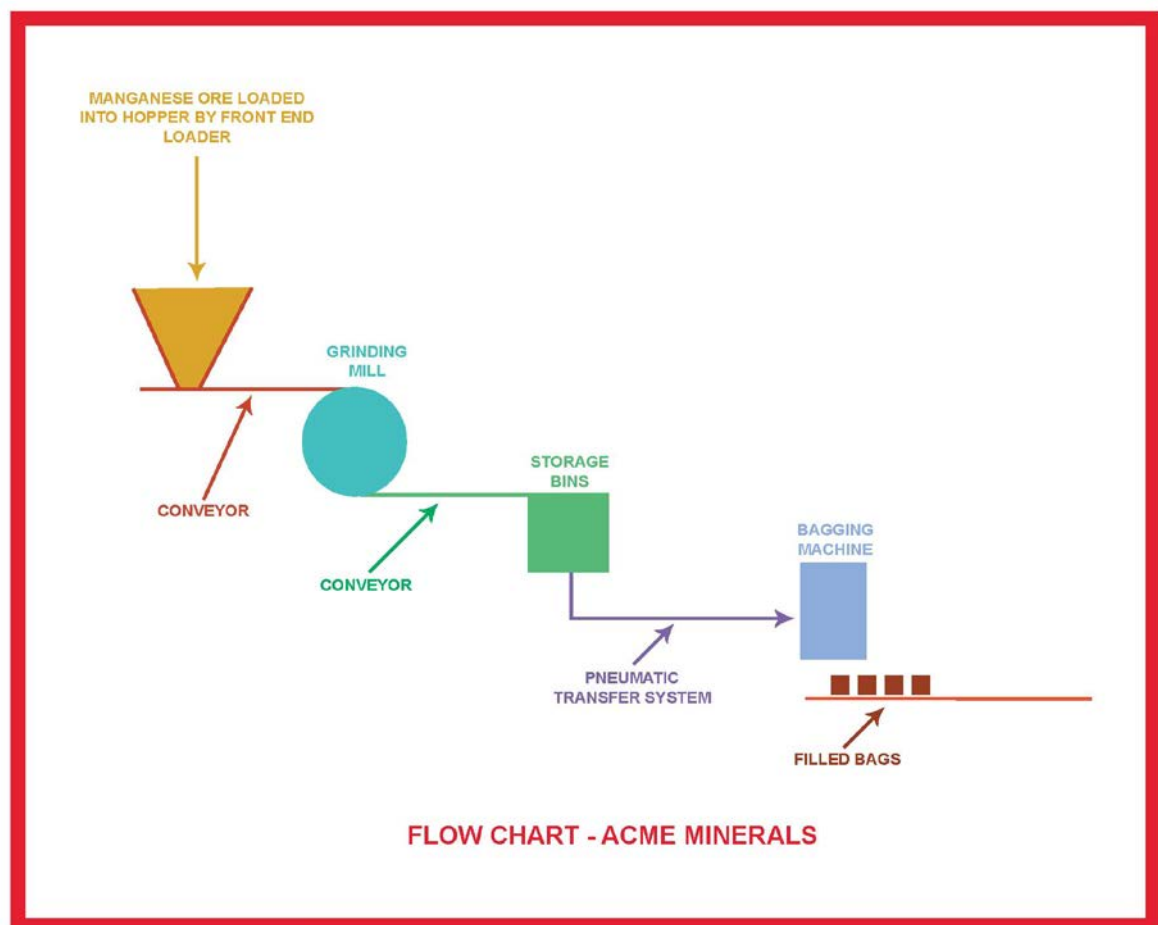
Location	Duties	mg on Filter			SiO <sub>2</sub>	Sampling Time (mins)	Sampling Rate (L/min)
		Respirable Dust	Inhalable Dust	Mn			
PS Mr D Jones	Front End Loader Driver	2.5	-		0.12	420	2.2
PS Mr G Evan	Bagging Machine Operator	-	12.3	6.2	-	420	2.0
PS Mr P Quinn	Bagging Machine Operator	4.1	-		0.18	420	2.2
PS Mr J Cross	Labourer - sweeping floors	-	20.1	10.0	-	420	2.0
PS Mr Z Witt	Foreman	2.0	-		0.10	420	2.2
PS Mr A Smith	Mill Hand/Fitter	-	10.2	5.1	-	420	2.0
SS Adjacent to Hopper	-	0.7	-		0.05	420	2.2
SS Bagging Area	-	-	6.0	3.0	-	420	2.0

PS Personal Sample  
SS Stationary Sample

## QUESTIONS

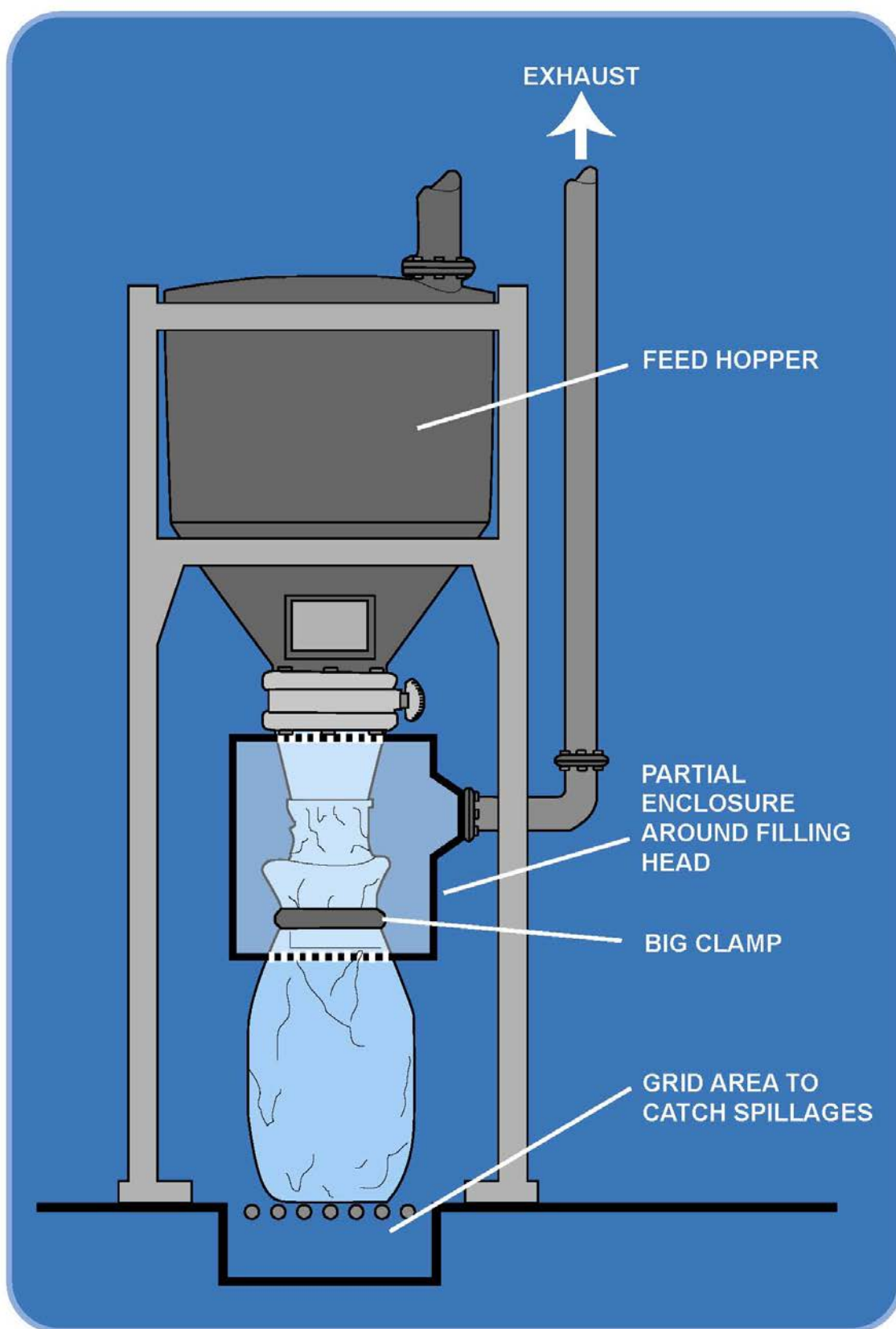
1. Does the monitoring conducted give an accurate representation of potential workplace exposures?
2. What sampling techniques and analysis methods would you have used if you had done this study?
3. Calculate out the individual exposures and use the exposure standards provided to assess the level of risk.
4. Are there any activities which the data suggests need to be controlled? Do you have any recommendations to control any excessive exposures?

**Note:** This case study is based on a range of archive materials adapted to create a case study for student use. It does not represent any particular company or situation past or present. Any resemblance to current people, organisations or companies is coincidental.



(Source: University of Wollongong)

**Figure 1 – Flowchart – Acme Minerals**



(Source: BP International)

**Figure 2 – Schematic of Bag Filling Machine**