

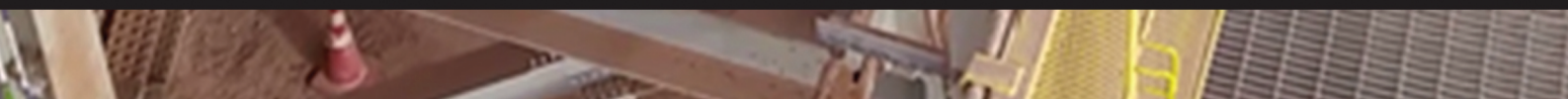
# *Dust Containment Mechanicals*

*– Dust Control Attainment through Self Containment*



**the first step to  
DUST control is  
- don't let it out !**

---



# Four *Self Containment* Principles

*Self Containment* Features to be inherently in place in the Bulk Material Handling process

Absence of these *Self Containment* Features is an incomplete design of the Plant / Process / Equipment

Ensure that the Bulk Material Handling process / equipment is not 'under featured'

Without the assistance of these *Self Containment* Features in place, Dust Control Systems alone cannot be expected to meet the norms



# Dust Containment

*some ideas  
in action*



# *Containment in action : Truck Dump Hopper*



**For Fixed  
Side Tippling**

**Ideal,  
permanent  
structure to  
avoid cross  
winds from all  
3 sides**



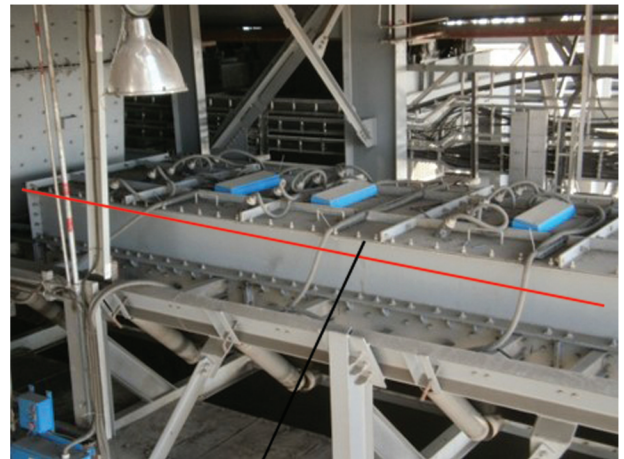
# Containment in action – Belt Conveyor Receipt Point

Adequate skirt height and length with baffles along the belt length to ;

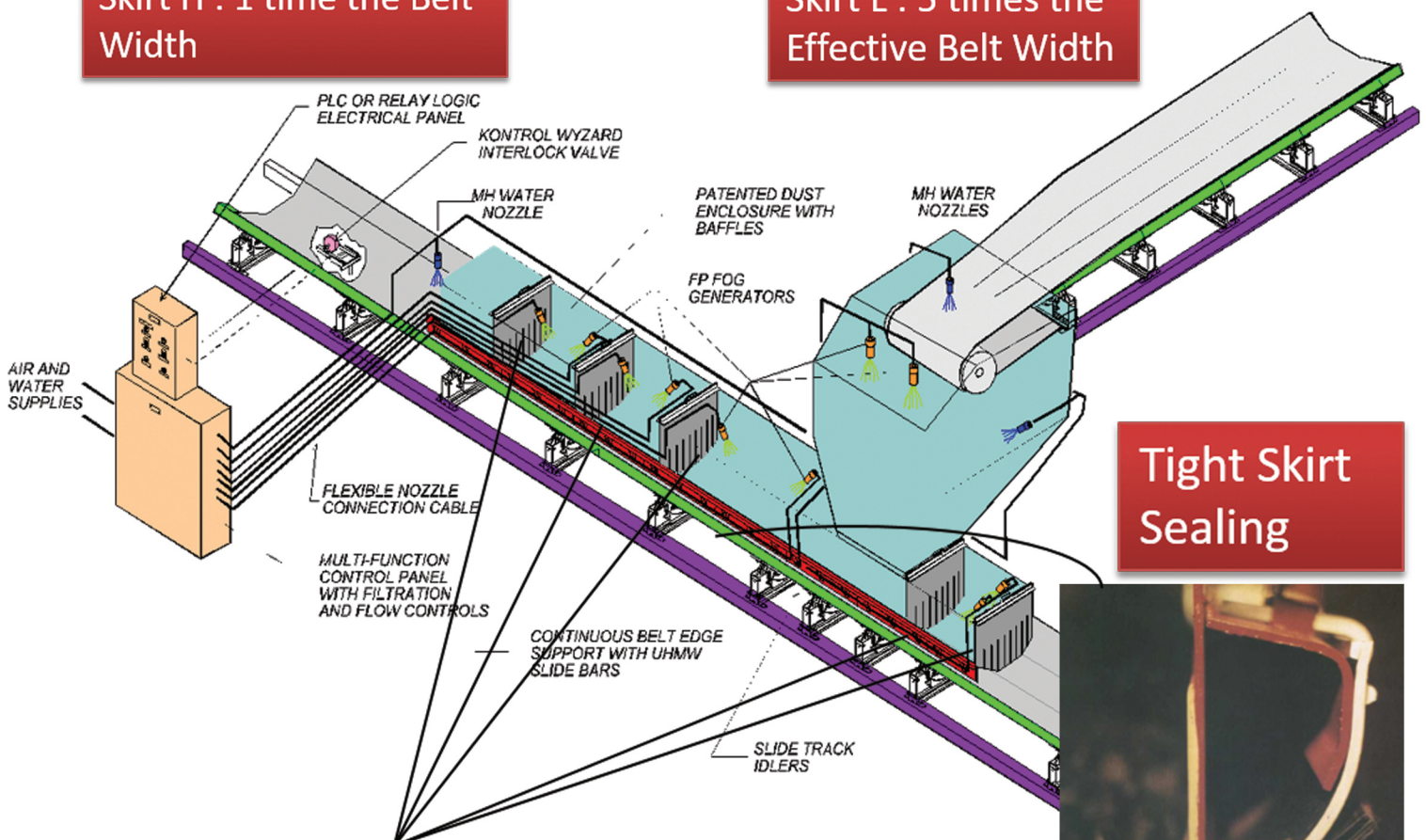
- retard the displaced air velocity and
- contain the dust ,and the fog applied,
- helping retention & better agglomeration of like sized water droplets and dust particles,
- and increase in mass to fall back in the material conveyed



Skirt H : 1 time the Belt Width



Skirt L : 5 times the Effective Belt Width



Tight Skirt Sealing



'Baffles' for retarding displaced air velocity

## *Containment in action – Truck Dump Hopper*



**BEFORE**

Without  
Containment

**AFTER**

With  
Containment



**Arrangement could be applied for Multiple Side Tippling**

# *Containment in action – Pay Loader*

**BEFORE**



Without  
Containment

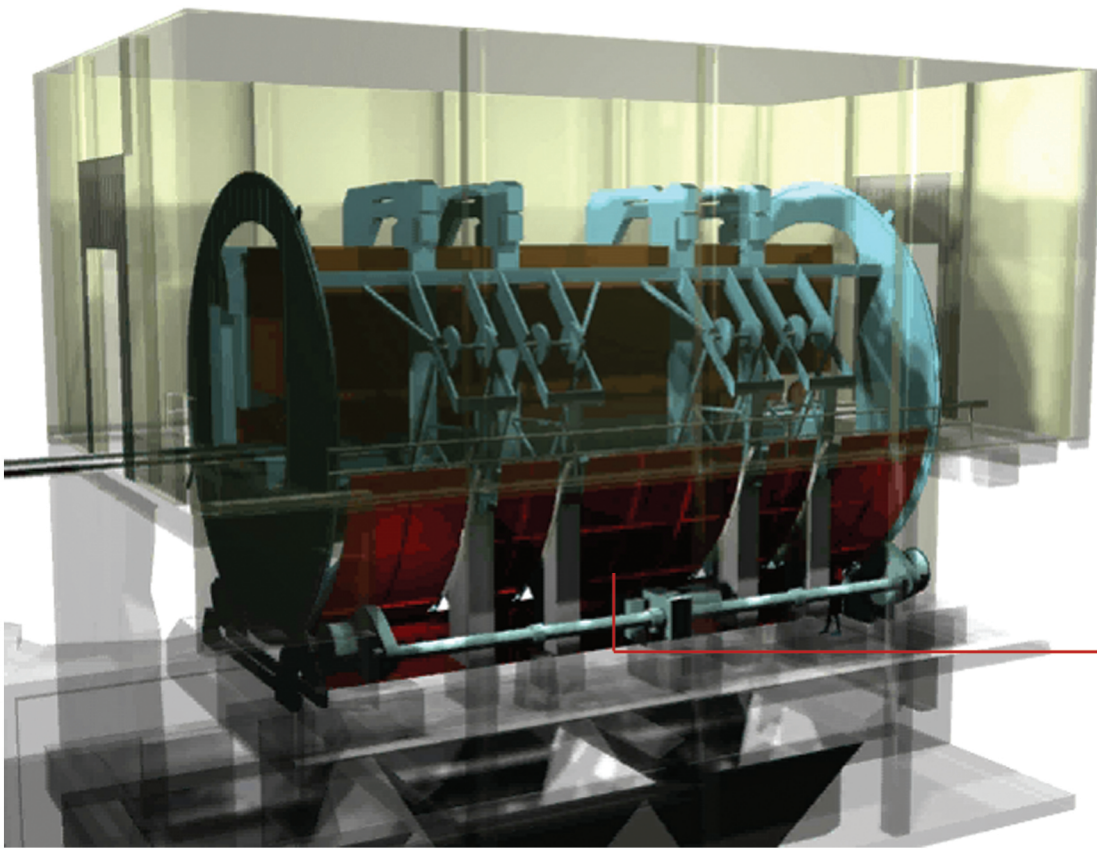
**AFTER**

With  
Containment

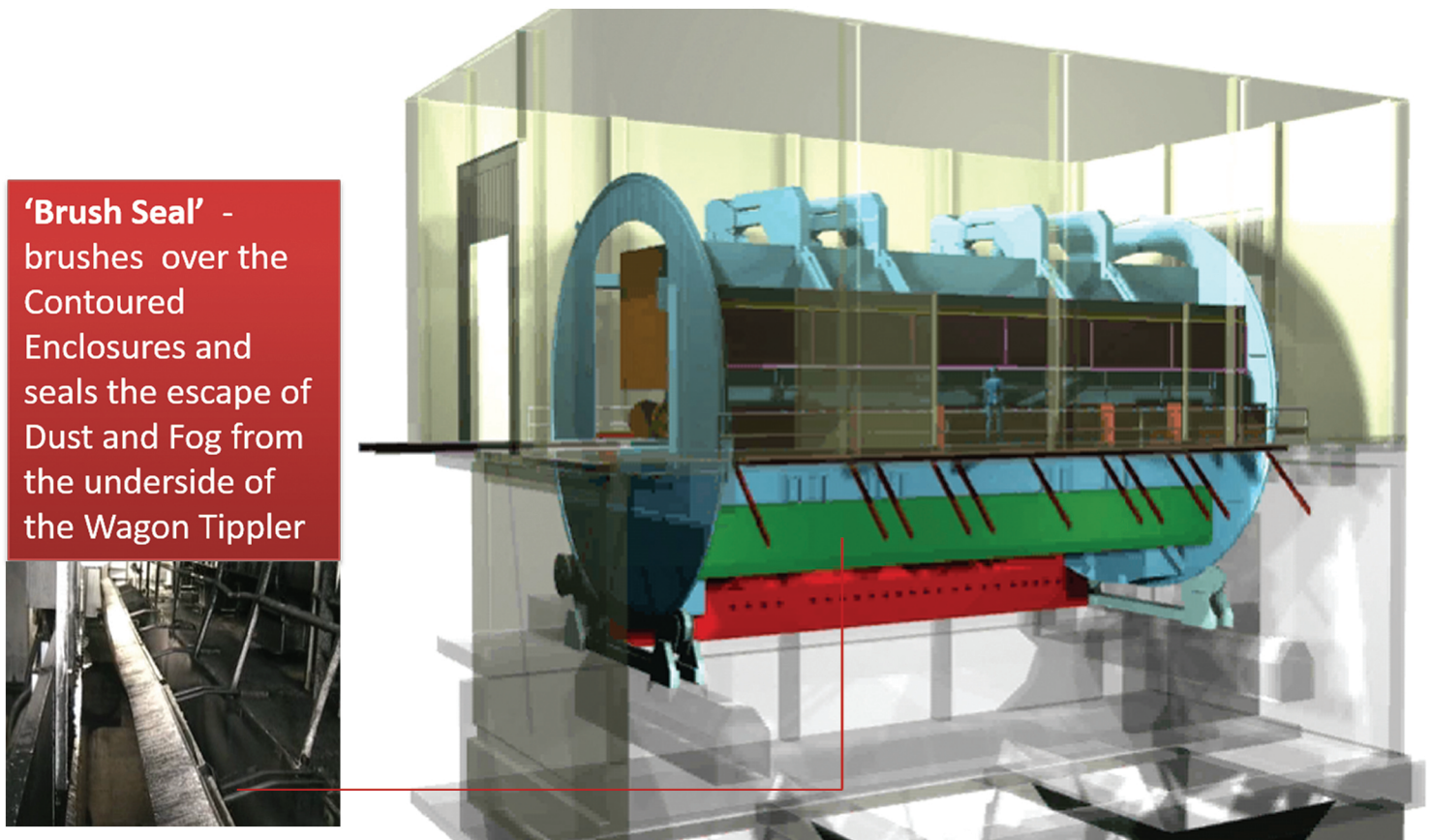


# Containment in action – Rotary Wagon Tippler

*-anatomy of a dust free wagon tippler*



**'Contoured Enclosure'**  
ensuring  
containment of  
Fog and Dust

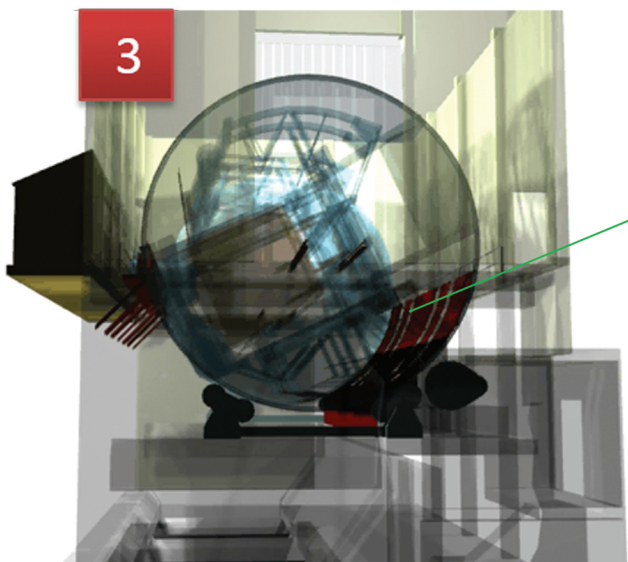
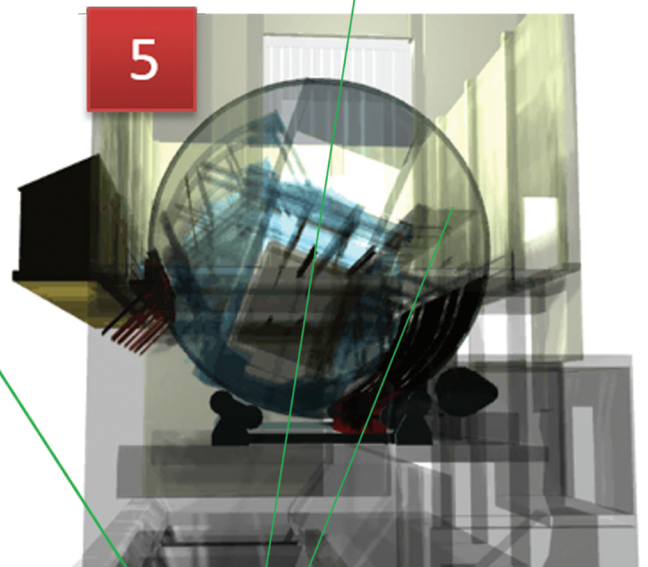
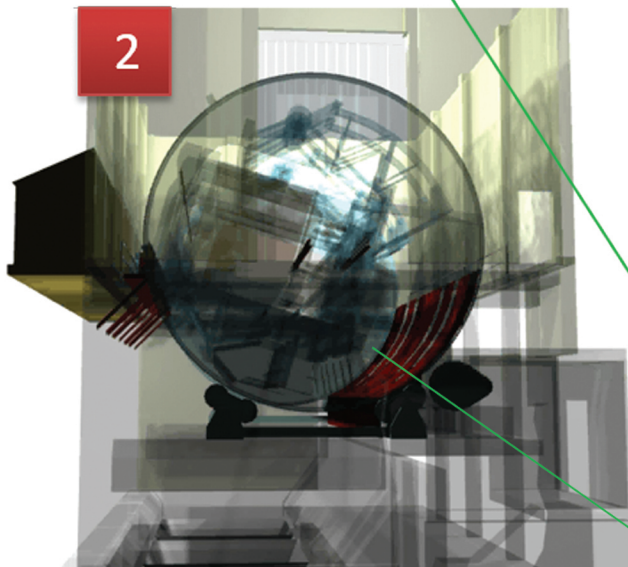
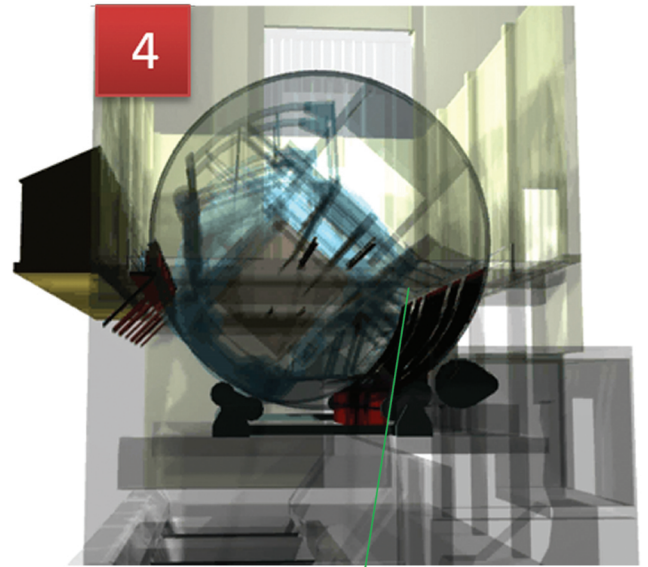
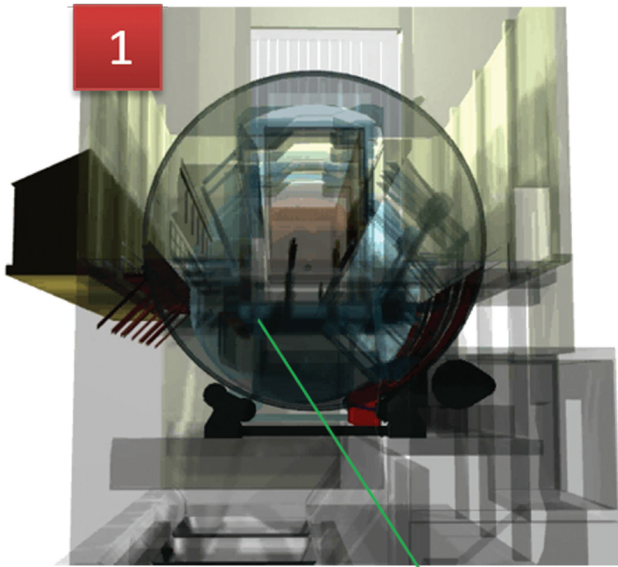


**'Brush Seal'** -  
brushes over the  
Contoured  
Enclosures and  
seals the escape of  
Dust and Fog from  
the underside of  
the Wagon Tippler



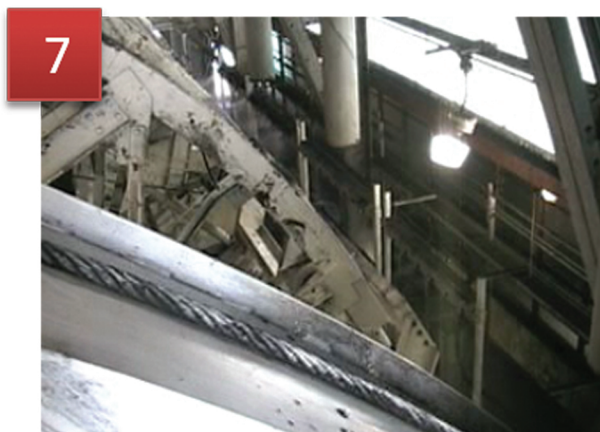


# Wagon Tippler – The Brush Seal Position



Observe the change in colour from Red to Black as the seal brushes - over the Contoured Enclosure

# 'Dust Free' Wagon Tippler – in action....



# Rotaside Wagon Tipplers

- source of uncontrollable dust emissions



Uncontrolled dust generation at the point of fall viz. Grizzly A



Dust beginning to gush out from the parallel Grizzly B due to air displacement in the Hopper below, common to both grizzlies



Dust envelopment over Grizzly B



Complete Dust Envelopment over Grizzly B



Dust coming on to Grizzly A from Grizzly B



Increase of dust plume over Grizzly A

**Project after project, the same copy and paste technical specifications continue, with no thinking towards improvement, and with only Plain Water based Dust Suppression specified, making no difference, instead causing a flooding at the bottom of the Hopper Area !**

# Rotaside Wagon Tipplers

- AS IT SEEMS.....

- Virtually no containment, and no possibilities of it also
- Enormous dust emissions in twin grizzly with common hopper with material falling in one hopper and dust gushing out of the other
- Existing dust suppression design which are wet type dust suppression systems are only a namesake dust control system which only ends up flooding the hopper bottom area is not suitable for such high velocity and dust concentration applications
- No possibility of dust extraction in such open application
- Dry Fog based dust suppression system would be most suitable to combat the high velocity and dust concentration emissions containing fines, due to the kinetic energy of the fog generated, but the fog requires containment which is not possible in this open application area
- With no possibility of proper dust control, the Rotaside Wagon Tippler is a major challenge application area from view point of PM pollutant

## But, it can change for the BETTER.....

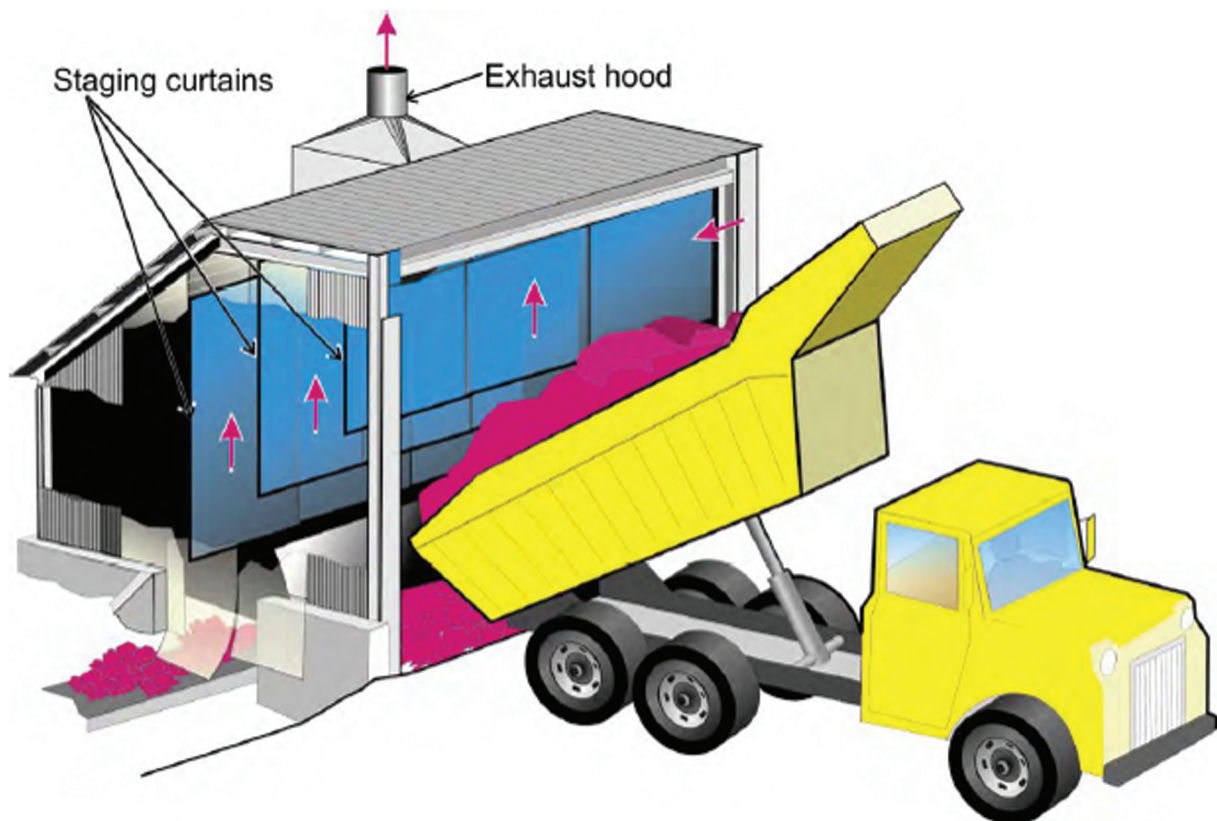
Through an integrated approach and not a disjointed one (at present) which does not include Dust Control wholeheartedly, as it is visible. It would require a re-engineering on the construction of the Wagon Tippling facility

**Peek into the future** – Winch operated spray header assembly with slit belt containment arrangement to contain and control the dust at the time of tipping from three sides of the grizzly, over both the grizzlies simultaneously to reduce escape of dust into the environment during operation time. Thus gaining access to the dust generating points without any structural interference required to support the spray headers in the working area, which would otherwise hamper the rock breaking activity, whether mechanized or manual or any vehicle movement whatsoever.

## More *Containment* Ideas.....

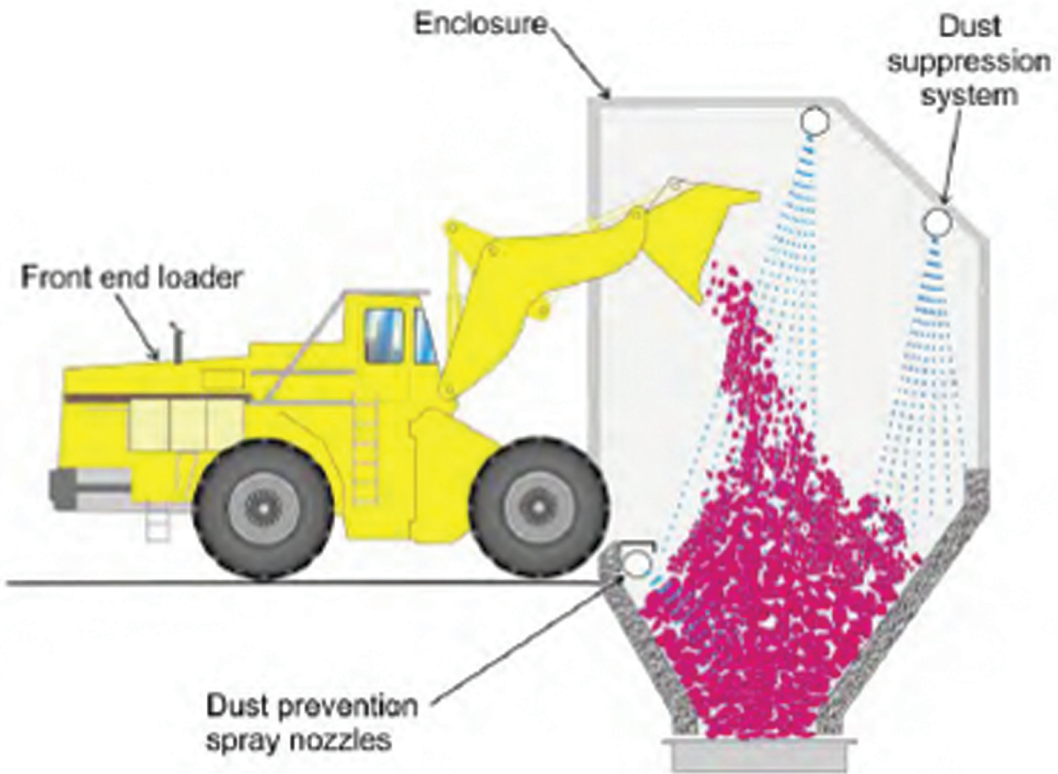
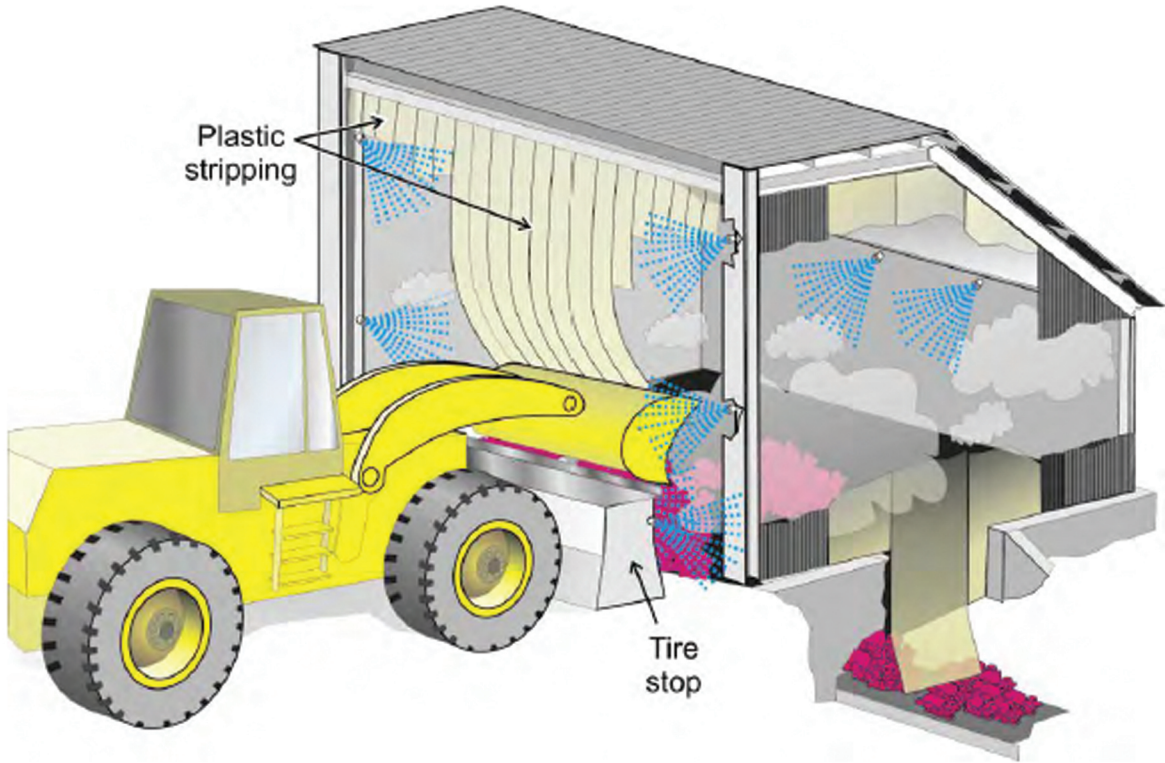


Figure 7.7. Rail car loadout area enclosed with plastic strips to contain dust.



**Stilling Shed – assists in ‘stilling’ the air for such open applications, with the assistance of Staging Curtains to help retard the displaced air. Idea not restricted to Dust Extraction System as shown in the illustration.**

# More *Containment* Ideas.....



**Figure 2.10. Typical loader dump dust control application.**

# More *Containment* Ideas.....



## Windfencing

Stops your precious minerals from flying away and causing a nuisance to the surroundings





**ATTENTION**

Containment Ideas are not limited to these pictures and illustrations.

Conscious , visible efforts and continuous improvements need to be made in this area, with Consultants stressing upon the same in Technical Specifications , to help the End User better in meeting the statutory norms.

Most importantly, Containment Ideas need to be exhibited and discussed as seriously with the Bulk Material Handling System Manufacturers as other production and capacity related matters, as after all the potential of dust generation from the inadequacies in the Bulk Material Plant can be much higher than what a Dust Control Systems is designed to handle. Here is an excerpt from an OSHA document supporting this view, as below ;



**UNITED STATES DEPARTMENT OF LABOR**  
OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION

<http://www.osha.gov/index.html>

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## Chapter 7: Controlling Surrounding Dust Sources

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### Introduction

Although a dust control system is the best way to reduce dust levels in a workplace, it cannot control dust from secondary sources such as material spillage or leakage from a process or piece of equipment, or dust brought in through the ventilation system or through doors and windows. These secondary sources can contribute significantly to dust levels and can render the existing dust control system ineffective. This chapter describes some of the most important, but often overlooked, measures to aid in control of workplace dust levels.



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**#1 DUST CONTROL SPECIALISTS**

