

3M Science.
Applied to Life.™

Right Sizing Combustible Particulate Management while meeting NFPA 652 requirements

Denise Albrecht, CSP, CCPSC

3M Environment, Health, and
Safety



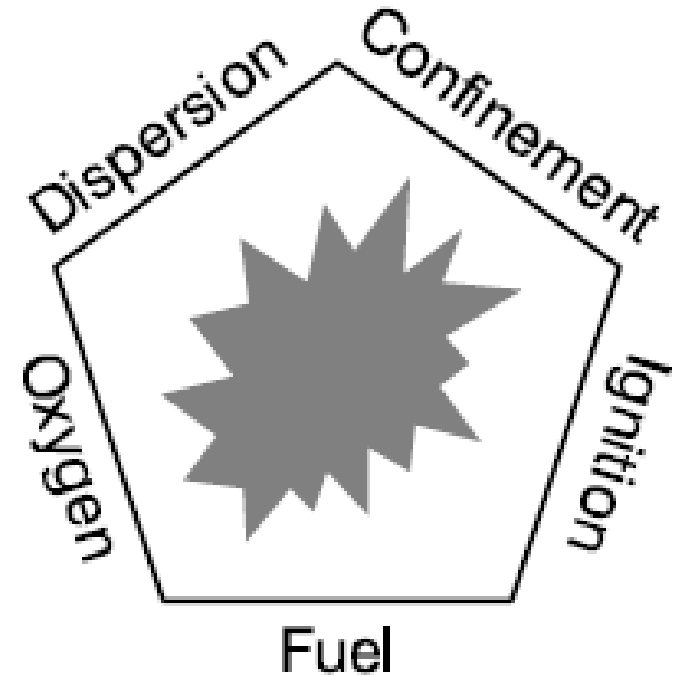
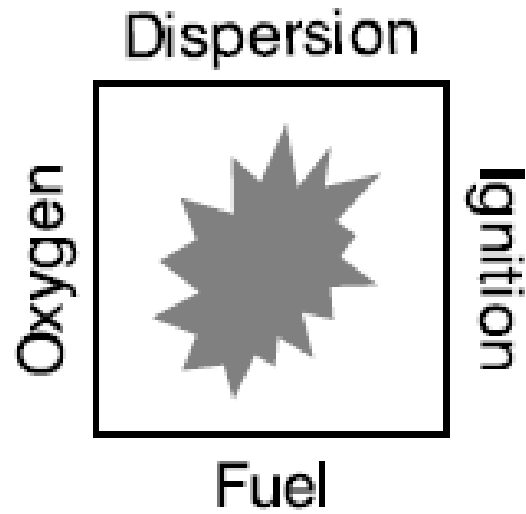
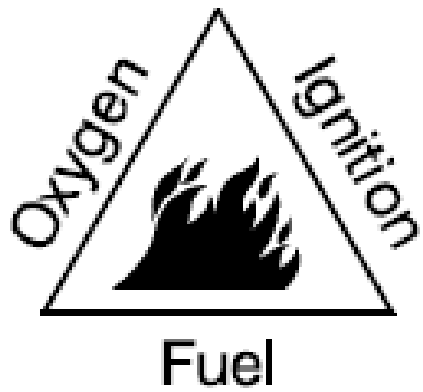
Fundamentals

What is Combustible Solid Particulate?

- **Combustible Solid Particulate:** Any solid material composed of distinct particles or pieces, regardless of size, shape or chemical composition, that when processed, stored, or handled in the facility has the potential to produce a combustible dust. (NFPA 652, 2016)
- **Combustible Dust:** A finely divided combustible particulate solid that presents a flash fire hazard or explosion hazard when suspended in air or the process-specific oxidizing medium over a range of concentrations. (NFPA 654, 2013)



Hazards of Combustible Dust



Importance of Surface Area and Particle Size



The smaller the particle size the easier it is to ignite.

NFPA Requirements

NFPA®

652

Standard on
the Fundamentals of
Combustible Dust

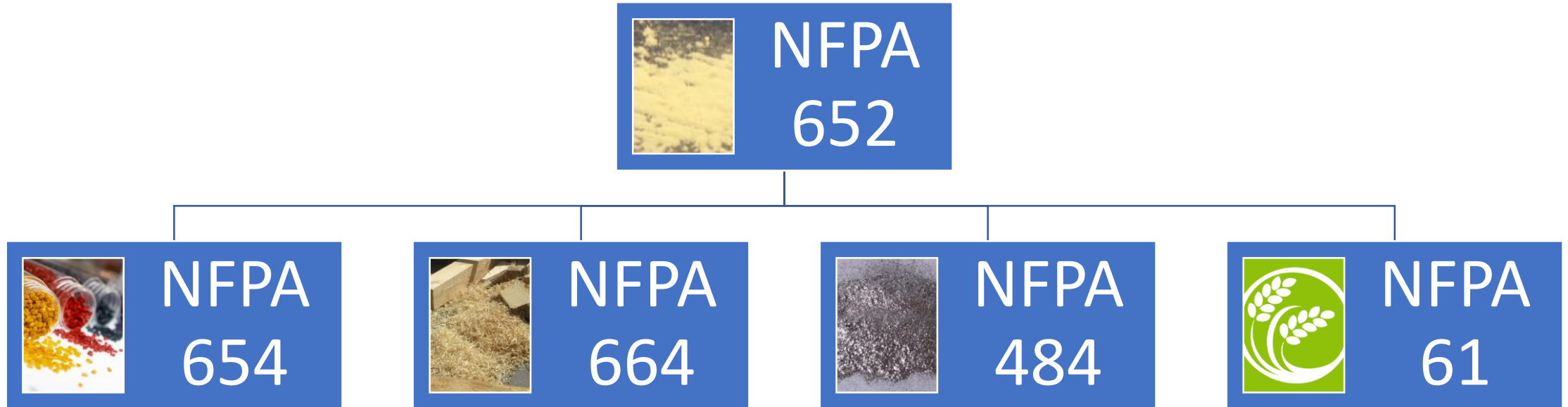
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NFPA 652

- Basic principles managing fire and explosion hazards of combustible dust and particulate solids.
- Provides minimum requirements
- Directs user to industry or commodity specific requirements

Industry and Commodity Specific Requirements

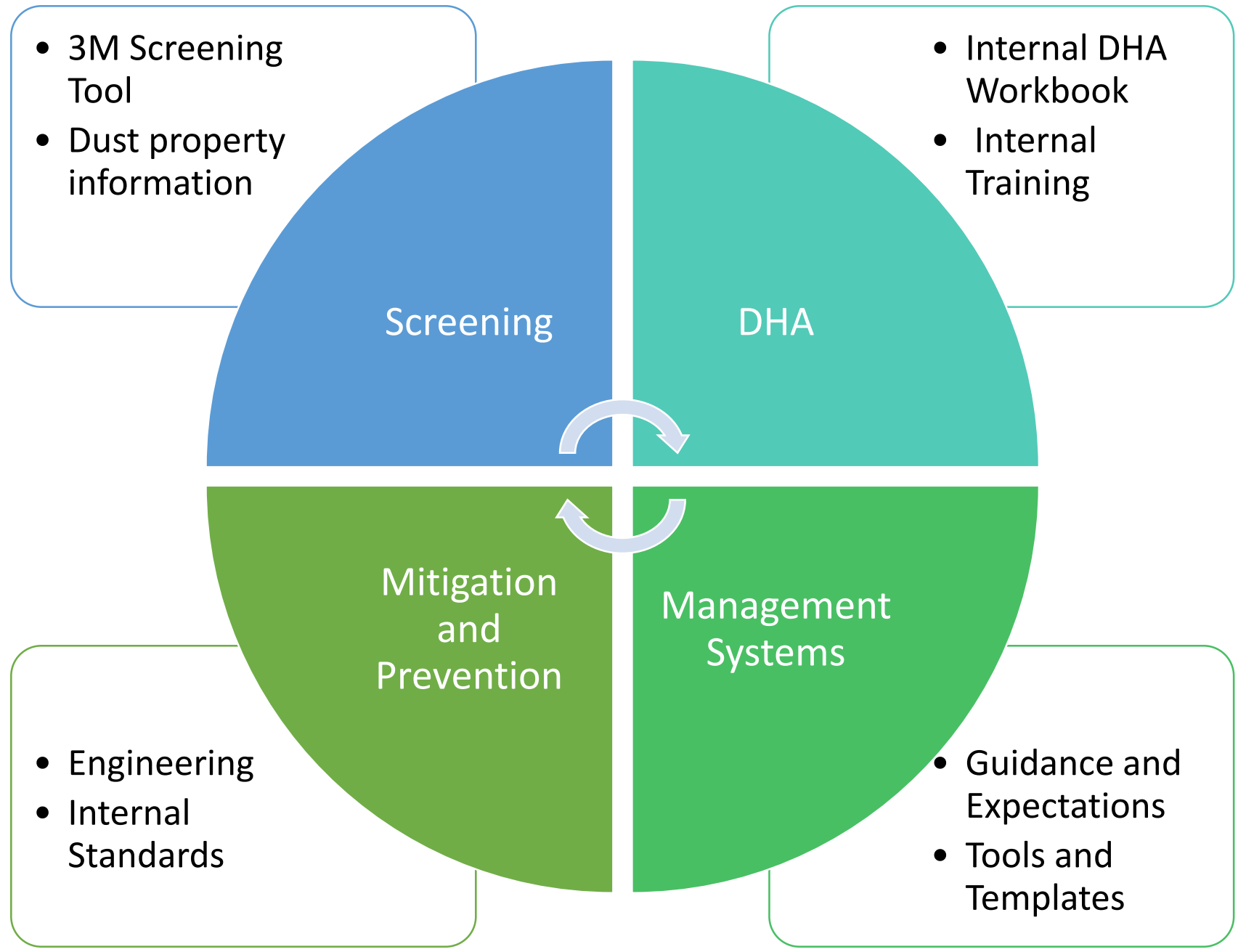


Key Components of NFPA 652

- Hazard Identification - *determining combustibility and explosibility*
- Dust Hazard Analysis (DHA)
- Management Systems – *Operating procedures, Housekeeping, Hot Work, PPE, Training, Contractors, Emergency Planning, Incident Investigation, Management of Change, Etc.*
- Hazard Management: Mitigation and Prevention

3M Process

3M Process



Screening Tool Steps

Material Properties

- Identify particulate use (raw, intermediate or generated)
- Determine combustibility (SDS, UN Test, Vendor sheets, Industry data or 3M SharePoint)

Process Methods

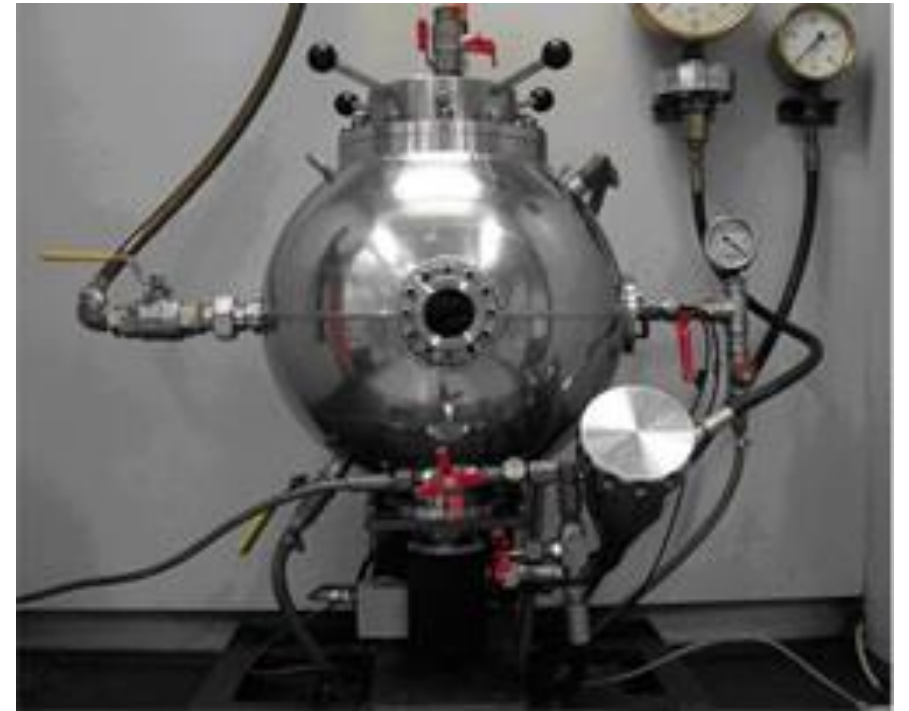
- Air Material Separator (Baghouse, Dust Collector, Cyclone)
- Conveying, Grinding and/or an Enclosure
- No Enclosure

Manage Hazards

- DHA Full
- DHA Lite
- DHA Mini

Material Evaluation Tools

- Testing Guidance Document
- Testing Request System
- Internal Test Data Repository



DHA Requirements

	DHA Mini	DHA Lite	DHA Full
Facilitator	EHS with knowledge of combustible solid particulates	Trained Facilitator (In process – DHA Lite Facilitator)	Trained Facilitator
Team	EHS and Process Engineer, may include operator, maintenance, etc.	Must include: Process Engineer, Maintenance Operator, EHS	Must include: Process Engineer, Maintenance Operator, EHS
Workbook	Combustible Particulate Screening Tool (worksheet)	DHA Workbook	DHA Workbook
Required Nodes	NA	Equipment checklists, Solids and Housekeeping	Equipment checklists, AMS checklist/HAZOP, Solids and Housekeeping, Siting & General Issue, Human Factors

Example of DHA Checklists

Equipment Index:

Equipment Index			
#	Node Name	Definition	Process Equipment <i>(Identify all equipment associated with this process)</i>
1	Auger / Screw Conveyor	A screw conveyor consists of an auger or screw that is used to move granular powder material along a trough by the rotation of the auger.	Yes
2	Belt Conveyor	A belt conveyor consists of a flexible belt that travels over a set of rollers configured to form a continuous trough to hold and carry the material from the tail or loading section to and over the head pulley.	No
3	Bucket Elevator	A bucket elevator is a vertical conveyor used for lifting solid material by means of buckets attached to a belt that picks up material at the boot of the elevator and using the belt with the attached buckets travels around the tail pulley in the boot or input section and discharges the material after it passes over the head pulley at the top of the elevator.	Yes
4	Flexible Connections (i.e. boots, hoses, etc.)	Flexible boots, hose, or sleeves connect vibrating equipment to fixed equipment to isolate vibration. May also be used to transport material from a hopper, bin, etc.	No
5	Fluidized Bed Conveyor	Fluidized air conveyors use low-pressure compressed air that is diffused through a canvas membrane and lets the powder particles flow down a slight incline to a discharge point.	Yes

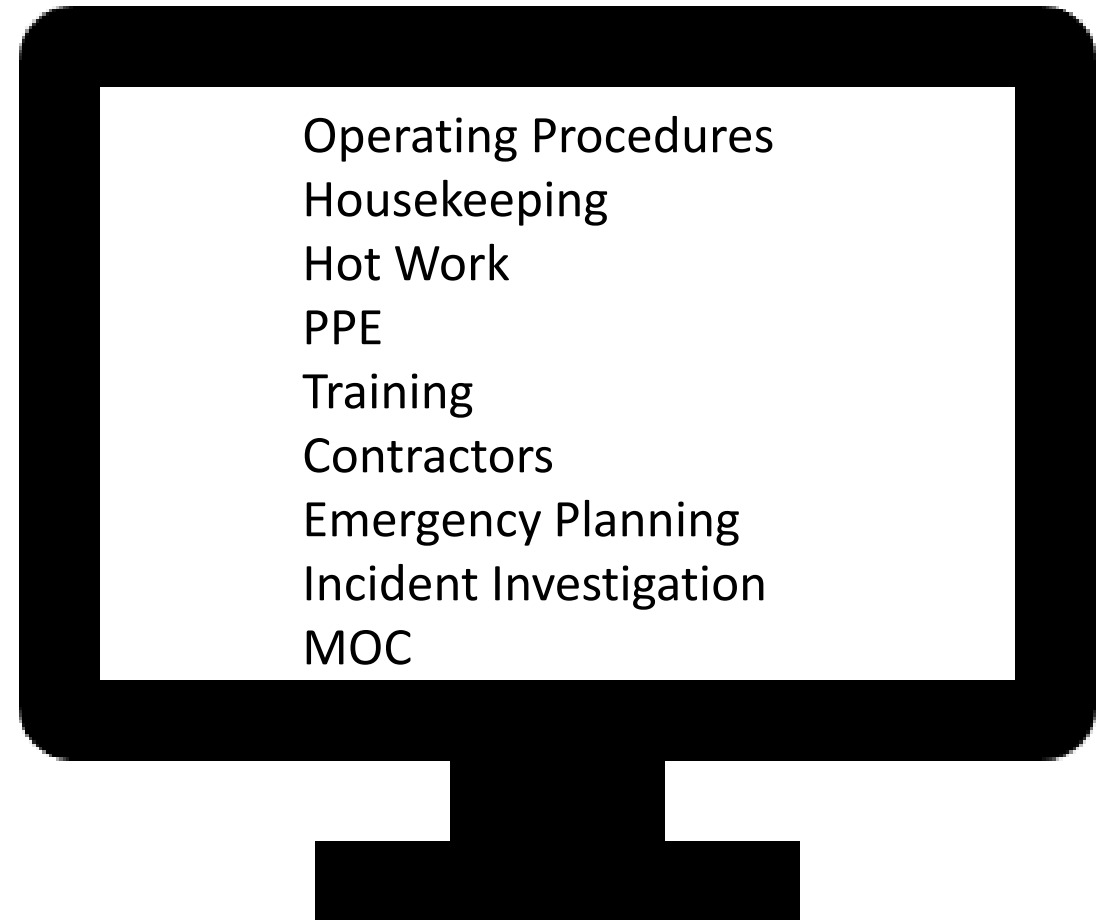
For every 'yes' result, that specific equipment checklist appears; copy for multiple pieces of equipment.

Other DHA Elements

Node Index		
#	Node Name	Design Intent <i>(Include function, equipment, and normal operating condition)</i>
A	MOC Review	Review of changes made to the process described in the Description & Scope page since the last revalidation.
B	Incident Review	Review of internal and external incidents that have occurred at similar processes.
13	Solids & Housekeeping Checklis	Review of the unique characteristics and the safety/health concerns of a particulate solid, or family of particulate solids, used in the process.
14	AMS HazOP	
15	3M HazOP (blank)	
16		
17	Siting and General Issues	Review on-site and off-site consequences as well as general maintenance and utility issues that could impact the process.
18	Human Factors	Review human factors that could contribute to a consequence of concern for the entire process covered by this PHA Workbook.
NA	<i>(Leave blank - Insert new lines above)</i>	

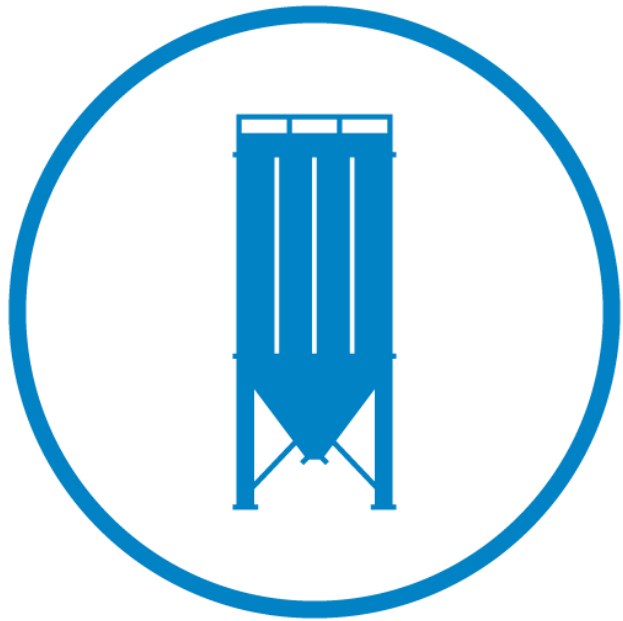
Management Systems

- EHS Management System:
Combustible Particulate Solids
Element
- Internal website for our facility
to access tools and examples for
these expectations



Operating Procedures
Housekeeping
Hot Work
PPE
Training
Contractors
Emergency Planning
Incident Investigation
MOC

Mitigation and Prevention



- Engineering Group
- Internal Design Standards

Questions?

Thank You