NFPA 660
&
A Dust Hazard Analysis Case Study

Katie Kuhn

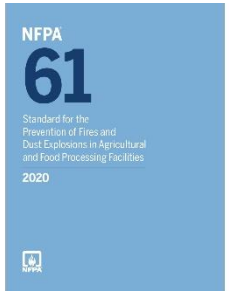
Process Safety Engineer
Fauske and Associates

NFPA 652 → NFPA 660

- NFPA 660 has been effective since December 6th, 2024
- Consolidated and replaced NFPA 652 and the commodity standards
- NFPA 660 did not consolidate NFPA 68, 69, or any other supporting standards

The New – NFPA 660

- NFPA 652 chapters 1–9 → **NFPA 660 chapters 1–10**
- None → **NFPA 660 chapters 11–20**
- Commodity Standards → **NFPA 660 chapters 21–25**

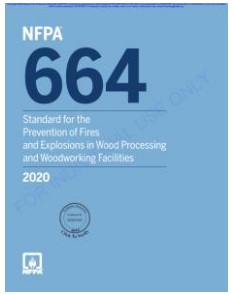


Chapter 21 – Agricultural and Food

Chapter 23 – Sulfur

Chapter 25 – Combustible Dusts Not Otherwise Specified

Chapter 22 – Combustible Metals



Chapter 24 – Wood Processing and Woodworking

Compliance and Implementation

- International fire code (‘27), International Building Code (‘27), state fire codes, and municipal fire codes
- Insurance carriers
- OSHA General Duty Clause
  - “shall furnish to each of his employees employment and a place of employment which are free from **recognized hazards** that are causing or are likely to cause **death** or **serious physical harm** to his employees”

NFPA®

OSHA®
GENERAL DUTY CLAUSE
5(A)(1)

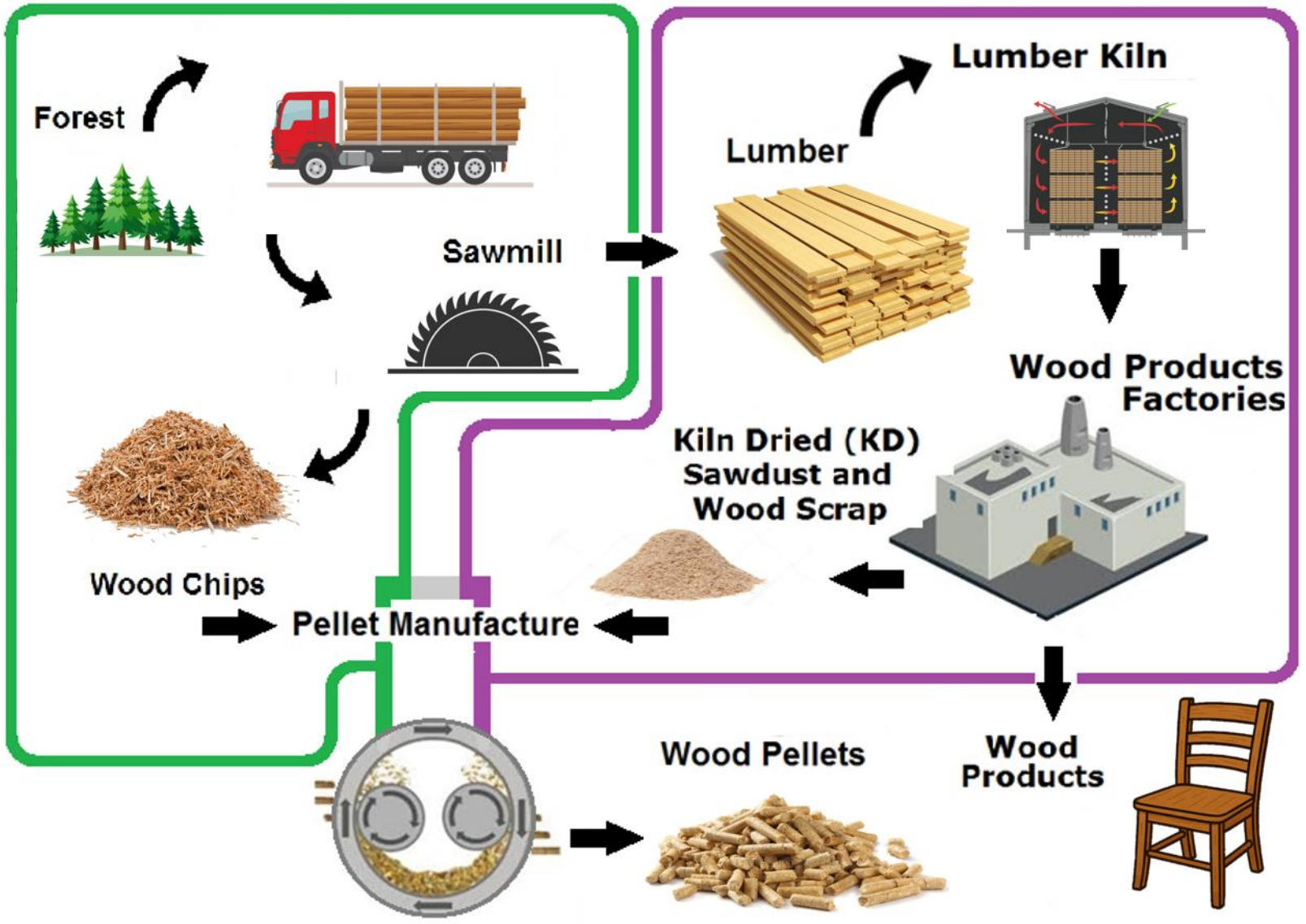
Wood Pellet Explosion Case Study

- Facility overview
- Incident Description
- Incident Investigation
  - Material Characteristics
  - Safeguards
  - Shortfalls
- How the incident was addressed

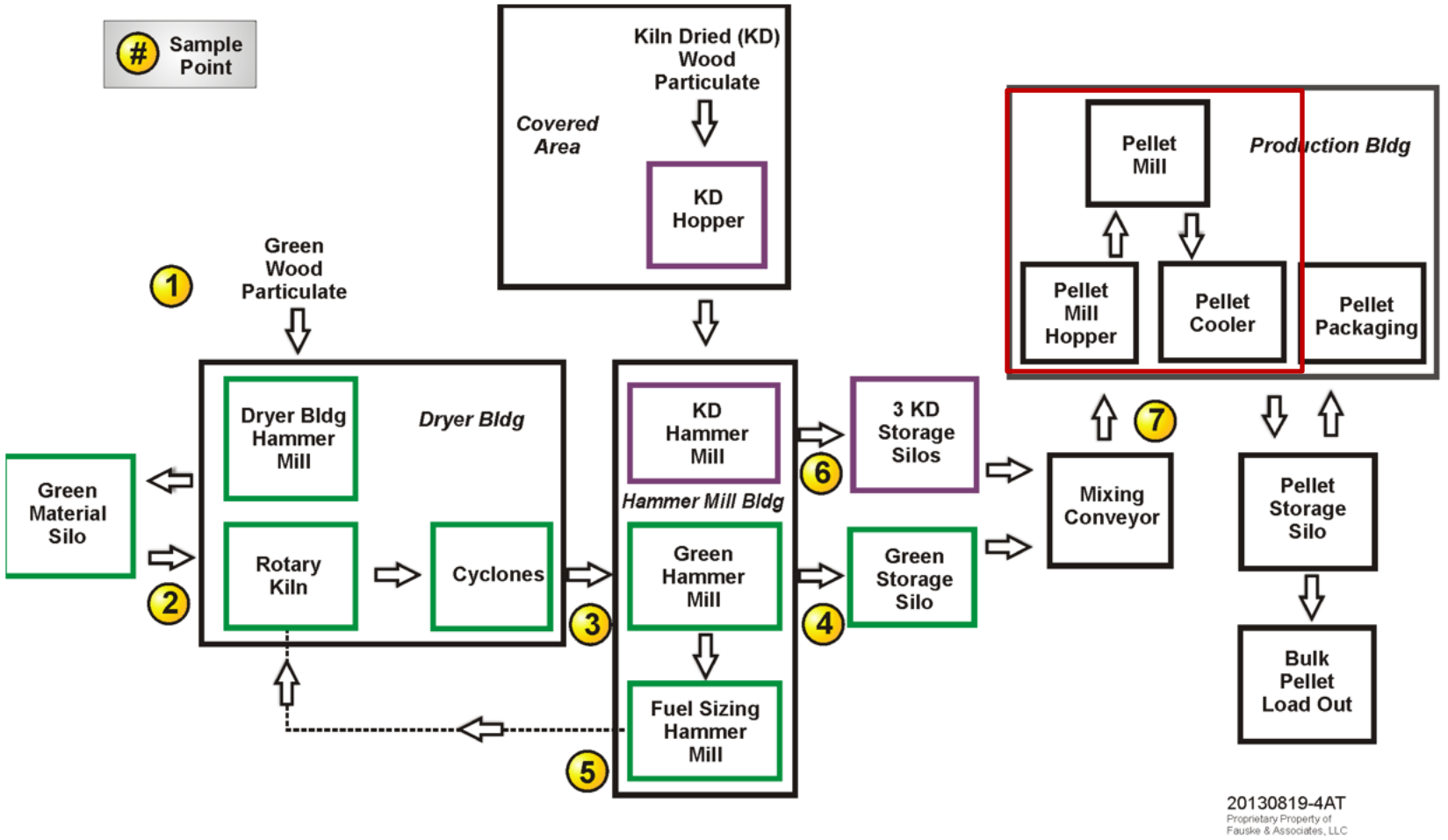
Facility Background

- Wood pellet manufacturing facility
- Indoor/outdoor
- Producing / receiving
  - Kiln dried particulate
  - Green wood particulate
- Producing
  - Final products
    - Dried wood pellets
    - Wood products
  - Intermediate materials
    - Green wood chips + milled
    - Kiln dried wood + milled

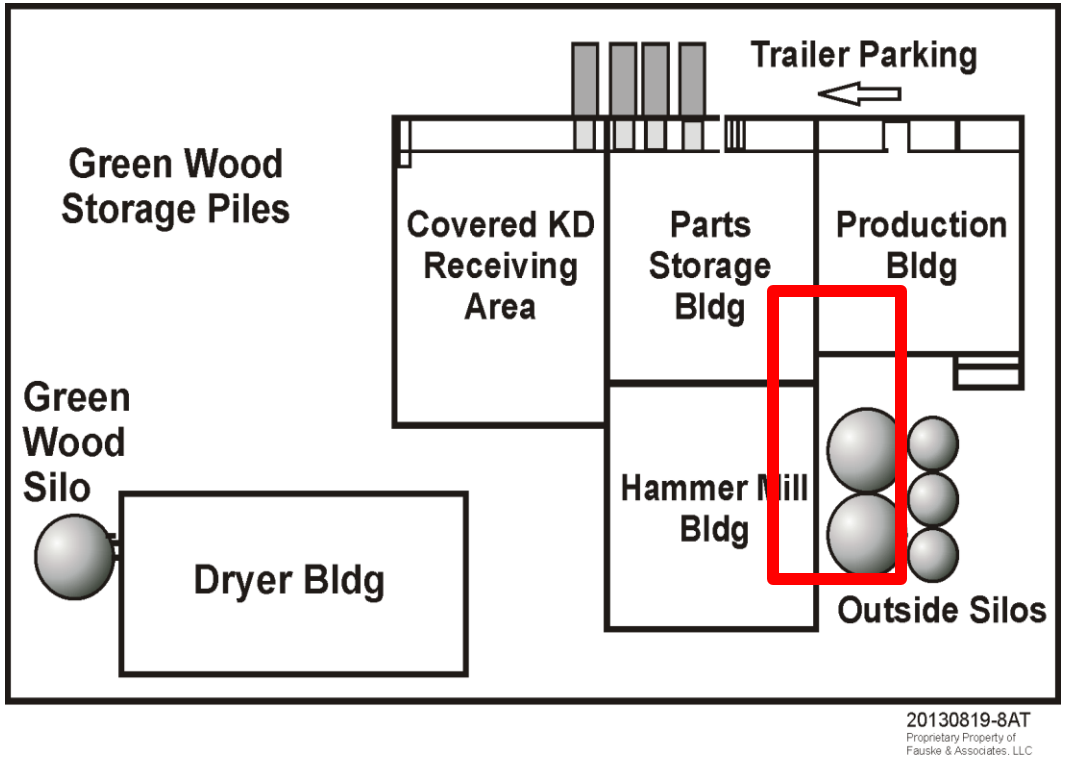
Manufacturing Process – High Level

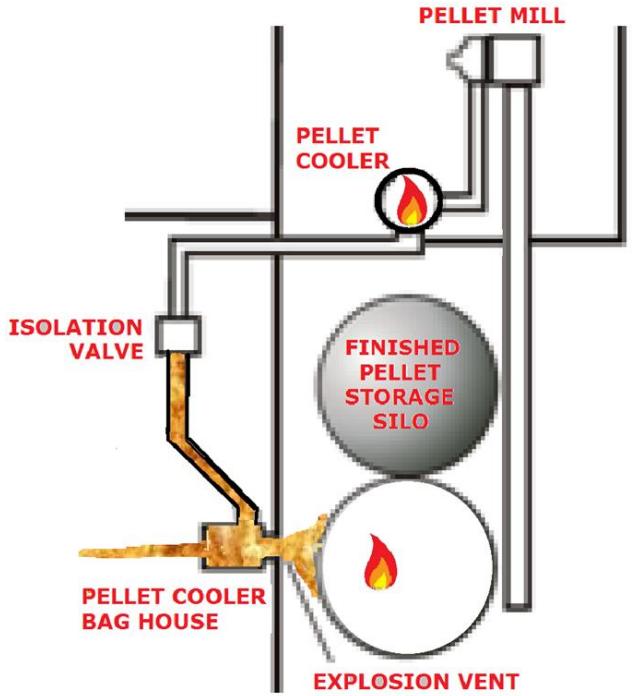


Facility Overview – Block Flow

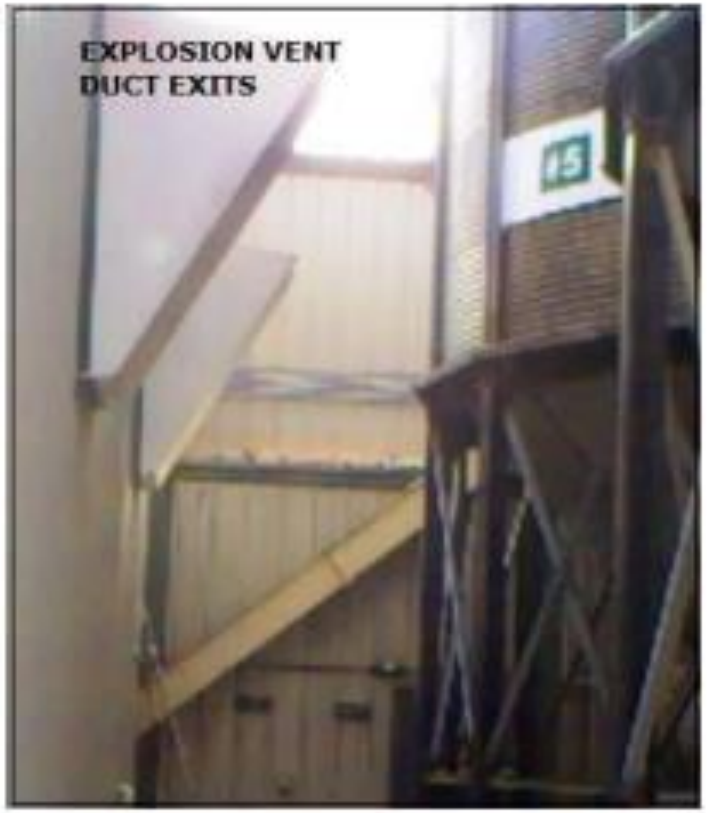


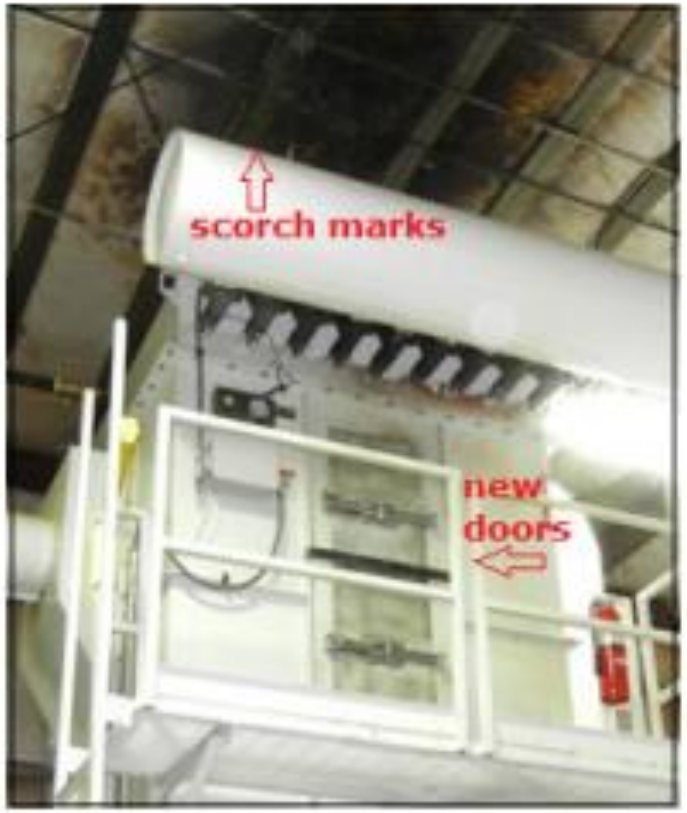
The Incident – Facility Map



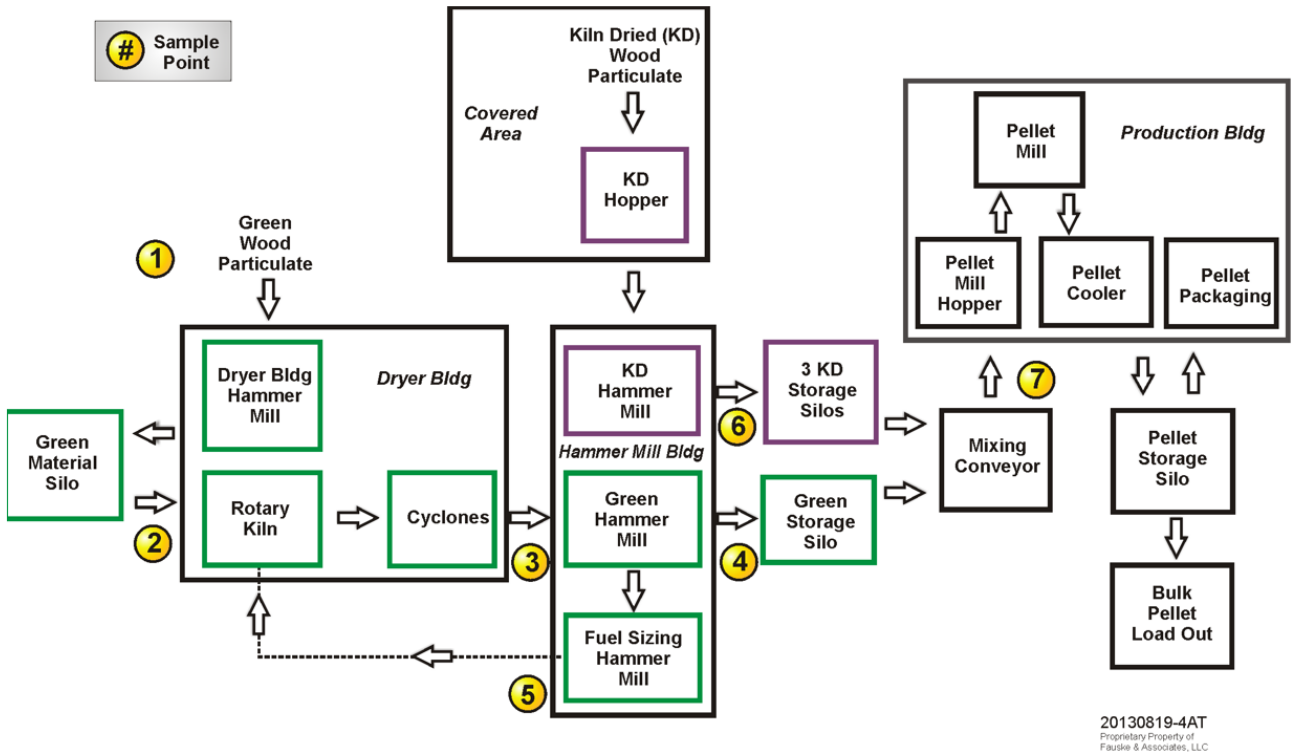


The Incident – Facility Photos





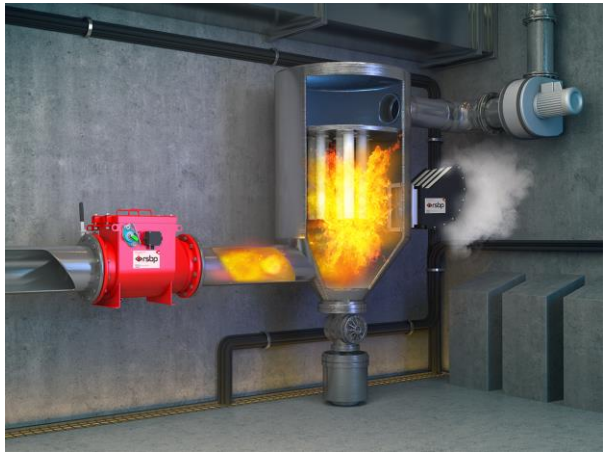
Material Testing

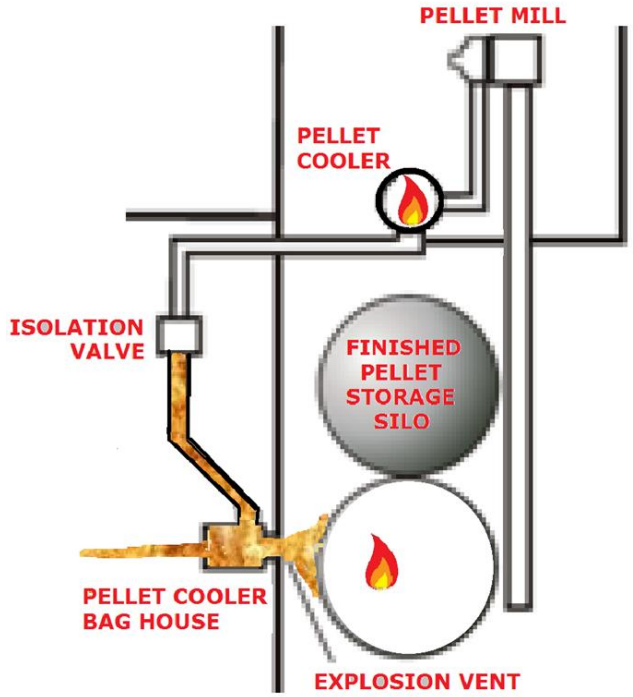


Sample Identification	Sample Point #	Moisture content	Particle Screening Result (µm)
Green Storage Pile	1	> 50%	
Green After 1st Size Reduction	2	> 48%	
Green After Drying	3	10.4% - 14%	89% > 425
Green After 2nd Size Reduction	4	9.4% - 13.4%	77% > 425
Green After 3rd Fuel Size Reduction	5	1.3% - 3.1%	70% > 425
Kiln Dried After 1st Size Reduction	6	2.6	95% < 75
Both After Mixing	7	2.6	97% < 75

Safeguards In Place

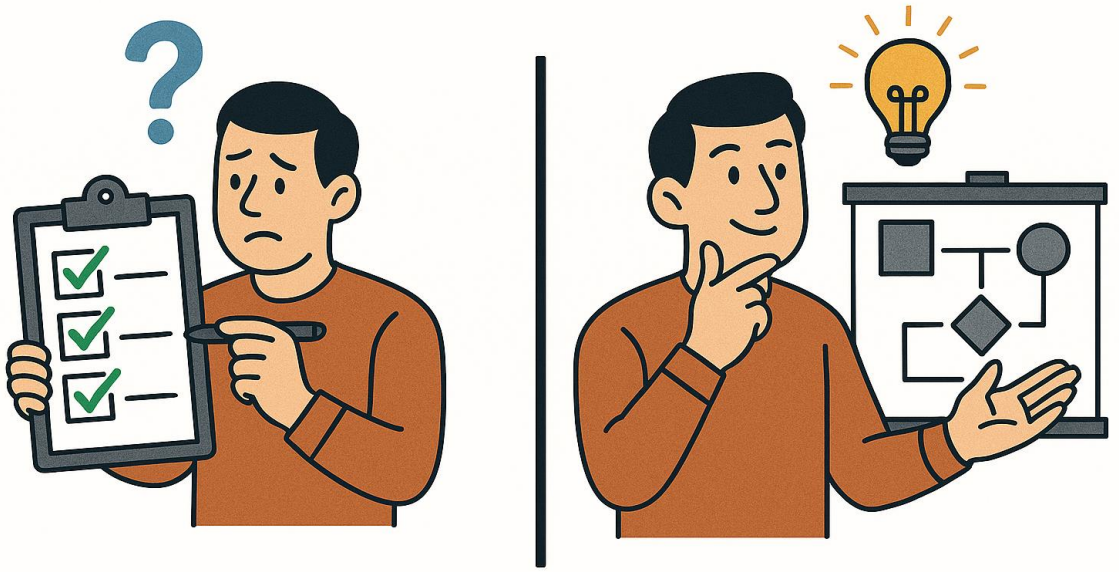
- Explosion vent panel on pellet cooler bag house
  - Short (6 ft) ducting to the exterior of the building
- Isolation valve between pellet cooler bag house and cooler
- Effective housekeeping in Hammer Mill Building
  - No exposed combustibles





Shortfalls

- Protection Failures
  - Inaccurately sized explosion vents
    - OSHA data vs Test data
    - Destruction of doors
  - Lack of reinforced ductwork
  - Inappropriately directed explosion vents
  - Lack of explosion venting on silos
- Lack of Combustible Dust Management Programs
  - No written management of change (MoC) program
  - No written housekeeping program
  - No written preventative maintenance (PM) program
- Insufficient electrical Area Classification



Continuation of the Case

- Fauske and Client evaluated prescriptive options
- Subsequent PHA
- Performance Based Design Option
  - Chapter 6

Thank you!

Katie Kuhn
Kuhn@fauske.com
DHA@fauske.com
Dust@fauske.com