# Dust Hazard Analysis (DHA)

**CLIENT:** CONFIDENTIAL
**MARKET:** Food & Beverage
**LOCATION:** Texas | Maryland | California
**SERVICES:**
- Project Management
- Process Engineering

**COMPLETED:** 2020
**VALUE CLASS:** < $1 MM

**ABOUT:** *The Client is an American multinational food company that manufactures, markets, and distributes spices, seasoning mixes, condiments, and other flavoring products to retail outlets, food manufacturers, and food service businesses A Fortune 1000 company, the Client has approximately 13,000 employees around the globe. The company is headquartered in Maryland with manufacturing plants across America.*

## CHALLENGE

New regulations for processing and manufacturing facilities have provided businesses with additional compliance measures to keep their facilities and people operating in safe work environments. Namely, NFPA 61, 652 and 654. To stay compliant, the Client required a Dust Hazard Analysis (DHA) for three of its plants in Maryland, one in Texas, and one in California.

NFPA 652 requirements include determining the combustibility and explosibility hazards of materials; identifying and assessing fire, flash fire, and explosion hazards, managing fire, flash fire, and explosion hazards, and communicating the hazards to affected personnel. NFPA 654 requirements include the safety measures needed to prevent and mitigate fires and dust explosions in facilities that handle combustible particulate solids, which includes combustible dusts, fibers, flocks, flakes, chips, and chunks.

TAI provided Engineering Services to perform Dust Hazard Analyses (DHA) for these five individual manufacturing facilities to include all processes that use, consume, or produce combustible dusts, including areas where dust accumulates, where dust is dispersed into air, and where potential ignition sources exist for combustible dust. A HAZOP methodology was adopted in conducting the DHA.

For each facility, TAI provided a Project Manager and a Sr. Process Engineer for the duration of each project to coordinate and perform the DHA, manage the budget, coordinate client meetings and ensure the project was completed on time and within budget constraints.

TAI adhered to the following standards to provide the Client compliance recommendations:

- **NFPA 652 - Standard on the Fundamentals of Combustible Dust**
- **NFPA 61 - Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities**
- **NFPA 654 - Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids**

## SOLUTION

This standard presents safety measures to prevent and mitigate fires and dust explosions in facilities that handle combustible particulate solids, which includes combustible dusts, fibers, flocks, flakes, chips, and chunks.

For each facility, specific hazards were identified, the risks and likelihood of incidents, categorization, and specific recommendations were presented. TAI submitted a comprehensive Dust Hazard Analysis, coordinated the lab analysis and provided the lab test report, and provided a detailed summary for each of the Client's facilities, as well as recommendations for actions to ensure compliance with applicable codes and standards with the intent of providing the Client with clear actions to mitigate dust explosion risk concerning combustible dust.

The following **tests** were conducted for each material:

- Sieve analysis; 40, 70, 100, 200, (230) screens, per CRC-SD4
- Dust classification by Explosion Severity (OSHA Class II), per CPL 03-00-008
- Explosibility of combustible dusts, PMAX and KST, per ASTM E1226
- Minimum explosible concentration of dusts, MEC, per ASTM E1515
- Minimum ignition energy of a dust cloud in air, MIE, per ASTM E2019
- Minimum auto-ignition temperature of dust clouds, TC, per ASTM E1491
- Bulk Density, per ASTM D1895

Each manufacturing facility had its own unique process areas but TAI's **Procedural Recommendations** to stay in compliance applied to all facilities as follows:

- Creation of a Combustible Dust Hazard Management Plan (CDHM)
- Updates to Housekeeping Requirements and Maintenance Plans
- Updates to Standard Operating Procedures (SOPs)
- Employee and Contractor Training

TAI's **Equipment and Facility Recommendations** included the following:

- Dust collectors need to meet NFPA 654
- Duct work - inspections and bonding/grounding
- Dust Collection Ductwork
- Dry Blending / Spray Drying / Extrusion
- Drum Dumpers – process enclosure
- Vacuums and compressed air – make safe for use with combustible dust, including Central Vacuum System Receiver and Portable Vacuum Cleaners
- Waste Processing Area Compactor Room – Dust mitigation outside of compactor
- Bulk Silo Area – Secondary Explosion Mitigation
- Electrical Area Classification (EAC) study – Classify the extent of hazardous locations and ensure electrical equipment is suitable for use
- Filling Operations
- Powered Industrial Vehicles

## RESULTS

TAI's Dust Hazard Analysis identified procedural enhancements and facility/equipment upgrades necessary to bring the sites to code compliance based on the relevant NFPA and OSHA standards. The DHA performed on each process served as a template to be applied to similar processes in the area. The series of recommendations are necessary to meet code, to increase the safety of the entire facility, and to bring a heightened awareness of the serious hazards that combustible dust present in the facilities. The collection and evaluation of the data gathered in these studies can be used by the Client to develop and prioritize mitigation plans.