

## MAJOR ACCIDENT CASE STUDIES

### Imperial Sugar Company Dust Explosion and Fire

#### Cause of incident:

1. **Design and maintenance** - Sugar and cornstarch conveying equipment was not designed or maintained to minimize the release of sugar and sugar dust into the work area.
2. **Inadequate housekeeping practices** resulted in significant accumulations of combustible granulated and powdered sugar and combustible sugar dust on the floors and elevated surfaces throughout the packing buildings.
3. Airborne combustible sugar dust accumulated above the minimum explosible concentration inside the newly enclosed steel belt assembly under silos 1 and 2.
4. An **overheated bearing** in the steel belt conveyor most likely ignited a primary dust explosion.
5. The **primary dust explosion** inside the enclosed steel conveyor belt under silos 1 and 2 triggered massive **secondary dust explosions** and fires throughout the packing buildings.
6. The 14 fatalities were most likely the result of the secondary explosions and fires.
7. Imperial Sugar **emergency evacuation plans were inadequate**. Emergency notifications inside the refinery and packaging buildings were announced only to personnel using 2-way radios and cell phones. Many workers had to rely on face-to-face verbal alerts in the event of an emergency. Also, the company did not conduct emergency evacuation drills.

#### Recommendations

1. Apply required standards to the design and operation of the new Port Wentworth facility:
  - NFPA 61: Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities
  - NFPA 499: Recommended Practice for the Classification of Combustible Dusts and Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas.
  - NFPA 654: Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids.
  - NFPA Handbook, Electrical Installations in Hazardous Locations.
  - NFPA 70 Article 500: Hazardous (Classified) Locations.
2. Conduct a comprehensive review of all existing Imperial Sugar Company sugar manufacturing facilities against the standards listed in recommendation R1 and implement identified corrective actions.
3. Implement a corporate-wide comprehensive housekeeping program to control combustible dust accumulation that will ensure sugar dust, cornstarch dust, or other combustible dust does not accumulate to hazardous quantities on overhead horizontal surfaces, packing equipment, and floors.
4. Develop training materials that address combustible dust hazards and train all employees and contractors at all Imperial Sugar Company facilities. Require periodic (e.g., annual) refresher training for all employees and contractors.
5. Improve the emergency evacuation policies and procedures at the Port Wentworth facility; specifically,
  - Install an emergency alert (alarm) system in the facility, and
  - Require routine emergency evacuation drills and critiques.
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