


Incident Title		Granulated Sugar Conveyer Belt Explosion	
Incident Type		Dust Explosion	
Date		7 th February 2008	
Country		USA	
Location		Port Wentworth, GA	
Fatalities		Injuries	Cost
14		36	?
Incident Description		An explosion occurred in the enclosed steel conveyer belt system under the granulated sugar storage silos. Seconds later, a series of massive secondary explosions propagated through the granulated and powdered sugar packing buildings, bulk sugar loading buildings and parts of the raw sugar refinery. Eight workers died at the scene and six more eventually succumbed to their injuries. Thirty six workers ultimately survived the accident, but had to be treated for serious burns and injuries; some had suffered permanent life-changing injuries. The major fires in the buildings were extinguished by the next day but some burned for up to 7 days after the initial blast. The sugar packing buildings, palletiser room and silos were destroyed, and the bulk train car loading area and parts of the sugar refining process areas were severely damaged.	
			
Incident Analysis		<p>Basic cause was sugar dust concentration in the conveyer belt enclosure exceeded the minimum explosive concentration and was ignited by an overheated bearing.</p> <p>Critical factors included: 1) Poor housekeeping (combustible sugar dust allowed to accumulate on floors and elevated surfaces throughout the packing buildings), 2) Fire suppression sprinkler system was rendered ineffective due to damage caused by the initial explosion.</p> <p>Root causes included: 1) Inadequate hazard awareness (combustible dust), 2) Inadequate risk assessment (installation of conveyer belt enclosure), 3) Inadequate design (absence of dust removal and over-pressure protection systems), 4) Inadequate housekeeping practices (failure to remove sugar dust accumulation and granulated sugar spillages), 5) Inadequate leadership (failure to correct non-compliance led to normalisation of poor housekeeping standards), 6) Inadequate emergency preparedness (absence of emergency intercom system in refining and packing areas where the explosions took place), 7) Inadequate training (absence of evacuation drills).</p>	
Lessons Learned		1) Provision of dust-handling equipment and good housekeeping to prevent dust accumulation are critically important risk mitigation measures against potential dust explosions, 2) Shockwaves from an initial explosion can dislodge accumulated dust, and the fireball can ignite it, triggering a chain reaction of secondary explosions, 3) Secondary explosions can be more powerful and destructive than primary explosions because of the increased concentration and quantity of airborne particles.	
More Information		<ol style="list-style-type: none"> 1) "Sugar Dust Explosion and Fire", US Chemical Safety and Hazard Investigation Board, Report No. 2008-05-I-GA (2009). 2) NFPA 61: "Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities", US National Fire Protection Association (2020). 3) HSG103: "Safe Handling of Combustible Dusts – Precautions against Explosions", UK Health & Safety Executive, ISBN 978 0 7176 2726 4. 4) INDG370: "Controlling Fire and Explosion Risks in the Workplace", UK Health & Safety Executive (2013). 5) BS EN 60079 Part 10-2: "Explosive Atmospheres – Classification of Areas – Combustible Dust Atmospheres", BSI (2015). 6) BS EN ISO 80079 Part 36: "Non-electrical Equipment for Explosive Atmospheres – Basic Method and Requirements", BSI (2016). 	
Industry Sector		Process Type	Incident Type
Food & Drink		Sugar Refining	Dust Explosion
Equipment Category		Equipment Class	Equipment Type
Rotating		Conveyer Belt	Bearing