

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	Unknown												
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.													
 <p>Credit: US Chemical Safety Board</p>		<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>													
Incident Analysis		<p>Lessons Learned</p> <p>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.</p>													
Lessons Learned		<p>More Information</p> <p>1) "Sugar Dust Explosion and Fire", US Chemical Safety and Hazard Investigation Board (CSB), 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).</p>													
More Information		<table border="1" style="width: 100%;"> <tr> <td>Industry Sector</td> <td>Process Type</td> <td>Incident Type</td> </tr> <tr> <td style="text-align: center;">Food & Drink</td> <td style="text-align: center;">Sugar Refining</td> <td style="text-align: center;">Dust Explosion</td> </tr> <tr> <td>Equipment Category</td> <td>Equipment Class</td> <td>Equipment Type</td> </tr> <tr> <td style="text-align: center;">Rotating</td> <td style="text-align: center;">Conveyer Belt</td> <td style="text-align: center;">Bearing</td> </tr> </table>		Industry Sector	Process Type	Incident Type	Food & Drink	Sugar Refining	Dust Explosion	Equipment Category	Equipment Class	Equipment Type	Rotating	Conveyer Belt	Bearing
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