

# A dusting of sugar: examination of safety hazards at imperial sugar



**ASSIGN  
BUSTER**

This paper examines the tragic events that occurred at the Imperial Sugar Refinery located in Port Wentworth, Georgia on February 7, 2008. An explosion and resulting fires lead to the deaths of 14 employees and injury to 36 others. The post accident investigation was conducted by the U. S. Chemical Safety and Hazard Investigation Board (CSB) which found that the explosion had been preventable. The investigation also showed that Imperial Sugar Co. had been aware of the hazards of combustible dust yet failed to take the necessary actions to prevent the disaster. As a result of the investigation, fines were levied against the company by the Occupational Safety and Health Administration (OSHA). A final report on combustible dust from the CSB prompted OSHA to take action to implement regulatory requirements for industries that produce combustible dust.

Keywords: combustible dust, Imperial Sugar

The Imperial Sugar Company facility located outside of Savannah Georgia erupted with a series of fierce cascading explosions on February 7, 2008. The sugar refinery is located on a 160 acre site founded in 1917 at Port Wentworth, Georgia. Port Wentworth boasts a population of 4, 000 people and is situated directly on the Savannah River. The area immediately adjacent to the sugar complex consists of an elementary school, church and residential neighborhood. The Imperial Sugar Company Port Wentworth facility had become one of the largest sugar refineries in the United States.

The Imperial Sugar facility received raw sugar cane and converted it into granulated sugar in addition to other specialty products. A seemingly harmless product that sweetens the taste of food soon erupted in a series of

violent cascading explosions that resulted in the death of 14 employees while critically injuring 36 others. The investigation concluded that the explosion was caused by a build up of sugar dust created during the course of sugar refinement, processing and packaging.

The packaging of the finished sugar took place in a four story building directly adjacent to three 100 foot tall storage silos. The granulated sugar was stored in the outside silos after refinement and transported throughout the facility with a network of conveyors into the packing building where it was further processed and packaged for distribution. The packaging building processed the granulated sugar into specialty products such as powdered sugar and brown sugar in addition to providing packaging of the product into bulk and individual resale packages.

The Imperial Sugar facility lacked the necessary dust management program in order to keep the accumulation of spilled sugar and sugar dust abated. The accumulation of spilled sugar during daily operations was a normal event which allowed the finer particles to become airborne further added to the overall dust problem. Furthermore the hammer mills that were used to manufacture powdered sugar added to the collection of dust throughout the facility. Although there was a dust collection system in place it is was grossly inadequate for the amount of dust collection required and was in need of maintenance. Over time the collection of dust had accumulated in hard to reach places increasing the overall dust explosion hazard. Workers also added to the accumulated dust problem when compressed air was used to routinely clean machinery dispersing sugar dust into the air.

The conveyors where the initial explosion occurred had been recently covered in an effort to avoid possible contamination, thereby resulting in the confinement of the sugar dust within the enclosure along the conveyor. Once the concentration of the dust reached explosive levels within this enclosure conditions were now perfect for a catastrophic event, the only thing that was needed was a source of ignition to start the chain reaction of events. The U. S. Chemical Safety and Hazard Investigation Board (CSB) determined that the initial sugar dust explosion occurred in the enclosed steel conveyor belt under the granulated sugar storage silos. (CSB, 2009, pg 33) It has been presumed that an overheated bearing or spark from the conveyor system ignited the dust and set off the series of chain reaction explosions. The initial explosion and fireball continued to propagate throughout the facility. Each cascading explosion resulted in the buckling of cement floors and collapsing of walls which lofted trapped dust into the air creating the fuel needed for the next explosive wave.

The Port Wentworth Fire Department consisted of five paid firefighters and 14 volunteers under the direction of Fire Chief Greg Long. The pre-incident response plan was still in the planning stages since becoming part of the Port Wentworth Fire District only six months prior to the incident. Chief Long (Riecher, 2008, pg 8) explained that since the location of the refinery was located in an industrial area in Chatham County where legislation introduced by the state was required in order to incorporate into the city, “ so while the refinery is now in my fire district, it is not in my city” (Riecher, 2008, pg 8)

The chain reaction explosions and resulting fires consumed the four story packaging building, storage silos and various support facilities. According to <https://assignbuster.com/a-dusting-of-sugar-examination-of-safety-hazards-at-imperial-sugar/>

the initial assessment from the fire department, the packaging building sustained major damage with floors buckling and collapsing. Tod Heil, a team leader with the Georgia Search and Rescue Coastal Task Force stated; “ We’ve got several different types of collapse – pancake collapse, lean to collapse.” (Riecher, 2008, pg 6) The blast exposed concrete foundations while twisting and tearing structural steel members exposing the skeleton of the structures of the facility.

Initially the Coast Guard closed the Savannah River around the port in order to search for victims that may have ended up in the river, fortunately none were found. Although many of the explosion victims self evacuated from the facility, many still were treated on scene and transported to area hospitals and regional burn centers.

Fire suppression efforts were called in from throughout the region. In addition to the local resources, Williams Fire and Hazard Control were brought in to tackle the large storage tank and silo fires. Fires were contained to the areas of origin however due to the location of the fires within the devastation it still required an extended time to totally extinguish. “ It took one week to extinguish the last smoldering section of the damaged refinery.” (Riecher, 2008, pg 6)

The Imperial Sugar Co. facility did not conduct employee safety training and employees had never received training for emergencies and emergency notification. Furthermore, there weren’t any policies or procedures in place for employee evacuation. The use of an emergency evacuation signal was not used to warn those directly in the path of the moving explosions and fire.

Emergency notification was accomplished only by two-way radios and cell phones. The CSB reported that after the explosions, employees that attempted to evacuate the facility were met with obstructed corridors and stairwells. As a result of the explosion and loss of power many exits were left in the dark without emergency lighting. (CSB, 2009, pg 20)

Employee response to the disaster was initially for self preservation. There had not been any evacuation training and there was no organized brigade or response. Many employees remained or returned to the facility to look for co-workers amongst the fire and collapsed building. Employee evacuations and accountability was non existent and once employees had self evacuated from the facility, accounting for them was near impossible.

Documents from the CSB indicated that as early as 1925, Imperial Sugar, along with the granulated sugar refining and packaging industry, had been aware of sugar dust explosion hazards. Furthermore, the Port Wentworth facility had experienced past fires caused by mechanical and electrical failures, although none had ever resulted in an explosion. (CSB, 2009, pg 63)

E-mail documents revealed that the company was acutely aware of numerous safety and operational concerns as a result of a corporate visit to the facility. In November 2007, vice president of operations Mr. Graham H Graham visited the facility and expressed concerns in an e-mail to John Sheptor, CEO of Imperial Sugar. Mr. Graham expressed unease regarding the facility and classified the problems into four categories; environment, people & management, process & machinery, and systems & procedures. Among the observations noted were “ waste sugar / liquid everywhere” and “ leaks,

<https://assignbuster.com/a-dusting-of-sugar-examination-of-safety-hazards-at-imperial-sugar/>

poor containment across the site”, in all the e-mail identified 33 operational issues. (Graham, 2006)

The February 2008 incident was not the first time that Imperial Sugar Company had been in the spotlight regarding fires and explosions. August 10, 1961, the facility experienced a small sugar dust explosion. However, according to the memo significant damage was avoided. ( Bynum, 2009)

Imperial Sugar Company started media damage control regarding the Port Wentworth facility almost immediately, issuing a press release on February 8, 2008, and reporting the explosion at the Port Wentworth facility. February 11, 2008, a subsequent press release was issued reporting the injuries along with a very generic description of current activities and citing full cooperation with authorities. (SEC, 2008)

March 21, 2008, Imperial Sugar was issued citations and notification of penalty from the Occupational Safety and Health Administration (OSHA). OSHA issued citations proposing penalties totaling over eight million dollars against the Imperial Sugar Co. and its two affiliates. The citations alleged violations at their facilities in Port Wentworth, Ga. and Gramercy, La.. The inspections were initiated following the employee deaths and injuries in the explosion and fire at Port Wentworth. The issued penalty against Imperial Sugar represents the third largest fine in the history of OSHA. (OSHA, 2008)

During federal investigation testimony it was revealed that the director of human resources, Deborah Haban, had been counseled by John Sheptor, CEO of the company regarding her role in the company safety program. Sheptor told Haban to minimize her involvement in the safety programs to more of <https://assignbuster.com/a-dusting-of-sugar-examination-of-safety-hazards-at-imperial-sugar/>

an administration support role. Testimony from the senior vice president of human resources, Kay Hastings, confirmed the actual role of Haban in that her role was to deal with plant managers on safety issues and that the corporate safety director also answered directly to Haban. Hastings also reaffirmed the fact that Haban had no experience or expertise in the safety field. (Pate, 2009)

Prior to the Port Wentworth incident, the CSB had filed a report concerning combustible dust hazards that was approved by the CSB board in November 2006. The report provided many examples of potential combustible dust throughout the industry, including food production, metal processing, wood products, chemical manufacturing, rubber and plastics and coal-fired power plants. Between 1980 and 2005 there were 281 fires that resulted in 119 deaths and 718 injuries in addition to damage within the industry. (CSB, 2006, pg 4) The extent of damage to the Imperial Sugar Co. facility highlights the devastation of combustible dust explosions.

At the time of the Imperial Sugar Explosion, OSHA did not have mandated requirements for the control of potentially explosive dust, yet recent industry accidents demonstrated the need for a combustible dust standard. “

Workplace safety experts are increasingly concerned that flammable dust in factories represents the same kind of danger identified two decades ago in grain elevator. Safety standards were adopted after deadly explosions were linked to combustible dust in the silos.” (Hayden, 2004, pg27)

In April 2009, Secretary of Labor Hilda Solis announced plans for a comprehensive regulatory standard for combustible dust. OSHA has also

<https://assignbuster.com/a-dusting-of-sugar-examination-of-safety-hazards-at-imperial-sugar/>



published a guideline for combustible dusts, entitled Hazard Communication Guidance for Combustible Dusts. The primary focus of the document is to help those in the industry recognize the potential for dust explosions, identify methods of mitigating the hazards and share the information with the workers. (Professional Safety, Pg 17)

The National Fire Protection Association (NFPA) standard 654 addresses measures for the prevention of fire and dust explosions. Among other safeguards, the standard states that sweeping or blowing down with steam or compressed air produces a dust cloud and shall be prohibited.

Additionally, vacuuming shall only be done with equipment that is electrically classified for the area. (NFPA, 2007) NFPA 654 along with six other NFPA standards can be used to effectively mitigate the hazards associated with combustible dust.

Engineering technology can be used to provide a means to prevent undesirable chemical reactions through properly designed plants. Although plant design is only one element of a properly engineered system, continued maintenance and necessary system upgrades are required in order to maintain the system in properly working condition. The attention to continued maintenance of the engineered systems provides the best assurance that the undesirable affects will not occur. (Merchant, 1986, pg 233)

“ A coordinated emergency response may further reduce loss of life through rescue and rapid medical treatment. While the number of injured survivors who might benefit from such an emergency response may be relatively

small, as was the case with the Mount St. Helens eruption in the state of Washington, plans must be made to anticipate an approximate number of casualties, how they may be evacuated to medical facilities, the type of injuries, and the most efficient and appropriate medical treatments.”

(Merchant, 1986, pg 235)

Findings from the CSB identified a lack of employee awareness concerning the explosive nature of a material. The Material Safety Data Sheets (MSDS) which is the primary means to communicate specific hazards to the workforce was not identified. (<http://www.osha.gov/Publications/3371combustible-dust.html>)

Emergency preparedness plans go hand in hand with business continuity when assessing the overall preparedness of a company. The importance of the private sector has been identified repeatedly, and on Aug 3, 2007 President George W. Bush signed into law the Implementing Recommendations of the 9/11 Commission Act of 2007. This act addresses a certification program that helps to ensure on a voluntary basis that businesses are prepared. The intent of the program was to help businesses evaluate their overall level of emergency preparedness. Additional recommendation from the legislation also references NFPA 1600 as the business model. (Clas, 2008, pg 46) A strong relationship exists between prior preparedness and the success of evacuations. Employees in an organization which had taken the time and effort to plan for disaster and required employees to participate in the drill were identified as being satisfied with the arrangements. (Alexander, 2000, pg 173)

“ Emergency preparedness and business continuity planning are not new concepts. Safety, Health and Environmental professionals have been heavily involved in emergency preparedness for decades – creating emergency evacuation plans, selecting and providing PPE, ensuring adequate emergency notification and protection systems (e. g., fire alarms, fire suppression systems), protecting the environment from HazMat spills. However, these programs are not a one-person / department endeavor – everyone in the company must be involved and understand their roles and responsibilities.” (Clas, 2008, pg 48)

The daily operation of the Imperial Sugar Co. refinery was conducted without regard for employee safety. Employees had never received training for emergencies and emergency notification and there was no policy or procedure in place for employee evacuation. Once the primary power was interrupted, exit lighting was compromised leaving the path of egress in the dark.

The management of the facility had repeatedly ignored the safety bulletins and warnings of the impending disaster. The CSB found correspondence dating back to the 1950’s showing plant managers knowledge of the facility’s hazards of sugar dust and the danger of dust accumulation. As early as 1961, documents showed fires which periodically occurred at the facility as a result of spilled sugar, yet management failed to take action. (CSB, 2009, pg 63)

“ Imperial Sugar quality assurance and safety personnel were made aware of the OSHA combustible dust national emphasis program in early December

<https://assignbuster.com/a-dusting-of-sugar-examination-of-safety-hazards-at-imperial-sugar/>

2007. Yet a January 20, 2008, “ Safety Focus of the Month” e-mails from the safety manager and the Written Program “ Housekeeping and Material Storage Program” that was attached made no mention of combustible dust. The memo said “ We will continue to focus on housekeeping, material storage and handling walking working surfaces, and leaks.” (CSB, 2009, pg 38)

More than two years after the series of deadly explosions and fires destroyed the Imperial Sugar Refinery; OSHA announced July 7th 2010, that it had reached a settlement with Imperial Sugar Co. The plant, safety and health violations that were discovered subsequent to the deaths of 14 workers at the Port Wentworth, Ga., facility. In the agreement, Imperial Sugar would pay just over four million dollars in penalties for the 124 violations found at the Port Wentworth plant, plus two million dollars for the 97 violations found at the sister facility located at Gramercy, La. In addition to the monetary penalty, Imperial Sugar Co. was required to make extensive changes to the safety program which highlights the importance of aggressively addressing workplace safety and health hazards. As part of the settlement, Imperial Sugar Co. agreed that it had corrected all deficiencies at both its plants or would correct those deficiencies according to a set timeline. Preventative maintenance and housekeeping programs have been established. Imperial Sugar Co. agreed to hire a full-time certified safety professional for the Georgia facility. The company will retain outside consultants to conduct safety audits for a three-year period evaluating Imperial Sugar Company’s combustible dust program relating to housekeeping, preventative maintenance and protective equipment for workers. Additionally, all safety

and health professionals will be approved by OSHA. OSHA will also receive all injury logs upon request in addition to an open house policy which allows a representative to enter the facility and conduct inspections based upon those logs, without objection from the company. Finally, OSHA will regularly monitor all progress and compliance with the agreement and perform regular inspections of the facility. (<http://www.osha.gov/as/opa/quicktakes/qt07152010.html#3>)