

# If you could prevent a disaster, why wouldn't you?

There are hundreds of thousands of terminals worldwide that are susceptible to loss, damage and destruction by lightning. Millions of dollars can be gone in a matter of seconds. Lightning events can halt production instantaneously, sometimes for hours, impacting a company's bottom line. A strike can explode volatile substances, start fires, take out electrical systems, and/or destroy or degrade equipment, which was meant to last for years. In addition, lives can be lost and the environment irreparably damaged, which leads to liability, potential fines and sanctions.

When lightning strikes and causes an explosion or ignites a fire, it opens the door to a host of issues that must be considered. The obvious ones are death, destruction and loss of assets. Large explosive fires, of any sort, can have a negative effect on the

environment. In addition, when toxic materials catch fire, they create an added hazard for employees, firefighters and residents who live in the area. Those same toxins, once carried into the air, create a corrosive problem - similar to the effects of acid rain when they come back down out of the atmosphere. Not to mention the effects on the air we breathe and the land or water surrounding a facility.

In addition to the risk of explosion or fire are the secondary effects of lightning, such as a power surge through the ground. This poses a threat to expensive technology that keeps machines and sensitive equipment running, and could result in unpredictable downtime. In some instances, a strike to the ground nearby can destroy significant amounts of electronic equipment without sparking a flame, which is called meantime-between-failure, leading to

unplanned replacement costs and impeding production. Many manufacturing facilities have downsized the number of functioning locations and increased working hours, making it imperative to operate continuously. Downtime and loss at the remaining operating facilities can now have an even more disastrous effect. All of these issues can cause additional expenditures, sometimes into the millions of dollars per day, as well as liability, regulatory fines and, in some cases, closure of a facility.

There is no shortage of repercussions from lightning. In 2011, an explosion was reported in a Foxconn manufacturing plant in China. The explosion was caused when lightning struck the building, initiating a dust explosion. Hundreds of employees had to be evacuated due to airborne toxic smoke. The explosion and toxic smoke left three workers dead and 15 injured. At the time this manufacturing facility produced iPad2 and iPhone4; the special dust that had ignited from the lightning strike is used to clean the screens of the iPads. This event prohibited production, causing a setback and loss not only for Foxconn, but for Apple, who were unable to meet their demand and distribution. Additional investigations by the authorities set back operations even longer, continually delaying not only production, but also shipments. Both companies were impacted financially by

this strike, as they were 300,000-600,000 units short, estimated to be worth \$1-\$3 million (€0.8-€2.4 minimum), not to mention the ensuing potential liability.

In May 2012, a Dow chemical plant in Pennsylvania was struck by lightning and ignited a blaze of two 250,000 pound chemical storage tanks containing ethyl acrylate and butyl acrylate - chemicals used to manufacture acrylic paints. These hazardous chemicals released vapours into the air that could potentially cause minor health problems. Fortunately, there was no spike of emergency room visits as a result of the vapours, although one firefighter suffered a heart attack and died after directing traffic during the incident. As a precautionary measure, plant employees were evacuated, schools in the area were shut down and people were advised to stay indoors. It took approximately four hours to contain the fire, slowing production.

In addition, a TPC Group chemical plant in Houston, Texas, was shut down after being struck by lightning. The strike caused the boilers to shut down, which resulted in a loss of steam feeding inside the plant. Black smoke and bright flames could be seen for miles as a result of this event. The plant has a butadiene capacity of 545,000 tonnes per year, which is used to manufacture synthetic rubber, fuel additives and other products at TCP, which are integral to their offering.



Phillips 66- Spline Ball Ionizers



*Dissipation arrays (DAS) protecting BASF*

The TPC Group lost valuable production and equipment.

May 2012 through August 2013, PDVSA in Venezuela experienced 15 incidents throughout all of their refineries. Out of those, three incidents were caused by lightning and several were brought about by electrical failure, arguably the potential of meantime-between-failure was a cause. The total losses were \$7.7 billion for 2012 and more if you include 2011 and 2013. The main instigator cited is lack of maintenance and risk mitigation. It is known that in two of the lightning strike incidents there was no lightning protection, although it had been highly recommended, and that those parts of the refinery that did have lightning protection had not been inspected or maintained, in some cases, for over 15 years.

Lightning is one of the primary natural causes of business interruption and is, more often than not, attended to after the fact. Making a decision to protect a facility in hindsight can be very costly and in many cases, has cost companies millions of dollars in risk management. Organisations are looking for ways to minimise, monitor and control the probability or impact of unplanned, unfortunate events. These events range from financial crisis and project failures to legal liabilities, accidents

and natural disasters. Over the past 20 years in the US alone, the average annual damages from natural disaster totals over \$30 billion, \$5 billion of which is known to be caused by lightning.

About 258 million people are affected by natural disasters each year – from tornadoes, hurricanes, earthquakes and tsunamis to floods, droughts, fires, landslides and pandemics. Many of these unfortunate events are related to extreme weather, such as lightning, and climate changes. Some climate change researchers predict as much as a 6% increase in lightning strikes for every degree of global temperature change. In a number of industries, it is very easy to see why companies take a proactive stance.

The National Fire Protection Association (NFPA) developed a lightning risk assessment programme that many companies undergo when evaluating their need for lightning protection. The many variables and factors of this assessment include, but are not limited to: type of structure, geographical location, lightning density, and the impact lightning might have on the environment and personnel. When not protected, lightning poses many real threats for companies, such as loss of human lives, loss of public safety, let alone huge economic losses.

The fact is, negative effects of direct and indirect lightning strikes can be greatly minimised. Lightning is one of the only forms of natural disaster that can be diverted, if companies stay ahead of the game by implementing the correct technology and strategies. Thereby saving companies and organisations thousands, and sometimes millions, of dollars in the event of a lightning storm. Utilising lightning protection and prevention technologies is a cost-effective approach for risk management because it ensures that companies looking to do more with less can stay ahead of the game. Discouraging strikes ends up being a significant benefit to the companies looking to effectively manage risk. In fact, it is a preferred method of lightning protection throughout the manufacturing sector which deals with flammables, combustibles and volatile substances, as well as those who need to keep operations flowing and electronics intact.

### **Why collect a strike when you can prevent it from occurring within designated area?**

In 2012 at Map Ta Phut Industrial Park, Thailand, the Bangkok Synthetics Co (BSC) experienced a lightning strike to a toluene vessel. Twelve people perished, 129 were injured and extensive environmental

damages occurred. They experienced huge damages, fines and finally, plant closure. BSC manufactured 140,000 tonnes/year of butadiene (BD), 55,000 tonnes/year of MTBE, 55,000 tonnes/year of butane LPG, 40,000 tonnes/year of C4 raffinate (isobutylene) and 35,000 tonnes/year of butene-1; at last estimate losses exceeded \$1 billion dollars. It is not clear that they had any lightning protection at all, but it has been suggested that they were using lightning rods in key locations, which we have not been able to validate. In the same industrial park, several miles away, a client of Lightning Eliminators & Consultants, Inc. SCG Chemical (Siam Cement Group) survived the same storm unscathed using a comprehensive lightning protection solution based on charge transfer technology (CTS). The system was comprised of the Dissipation Array System (DAS), in concert with grounding engineering and surge protection solutions which diverted the strikes, rather than collected them.

There are close to 3,500 installations, in over 80 countries, of companies successfully using charge transfer technology solutions to protect their facilities from a lightning strike. The majority of these are facilities handling combustible liquids and volatile substances. By using products such as DAS, in addition to the Retractable Grounding Assembly (RGA), Chem-Rods, In-Tank Potential Equalizers and more, companies achieve their goal of continued operations while reducing risk. Lightning is on the increase, becoming stronger and more frequent. Protection is imperative and diverting strikes is certainly much more attractive and secure than collecting them, especially when considering explosive materials, sensitive electronics and human life. ⚡

### **For more information:**

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