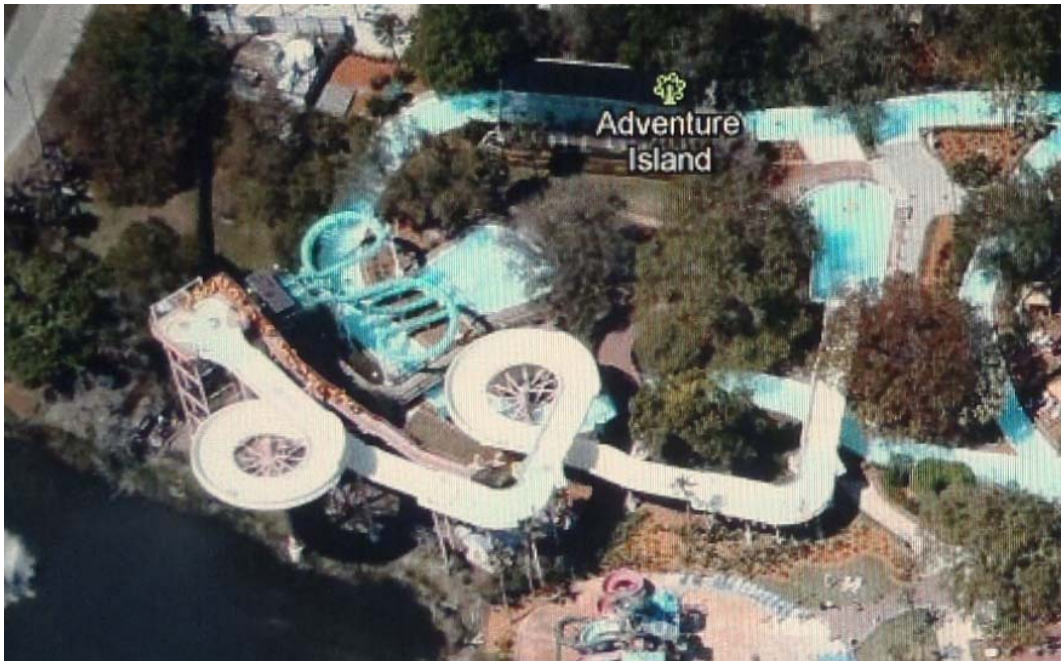
ADVENTURE ISLAND LIGHTNING INCIDENT

REPORT ON THE DEADLY FAILURE OF AN EARLY STREAMER EMISSION LIGHTNING ROD

(Revision 1)



By

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Introduction

In March 2012, a student was struck and killed by lightning on a Malaysian university football field while he was within the claimed protection zone of a French-made early streamer emission (ESE) lightning rod.

http://www.scribd.com/doc/87557964/Death-at-the-Stadium

Following the posting of the incident report, the authors were informed about a similar incident that had occurred recently at the Adventure Island theme park in Tampa, Florida, USA. In that incident, a young lifeguard supervisor of the park was struck and killed by lightning while he was on duty at the Key West Rapids water slide (see news printout at the end of this report).

The authors were informed that a photograph had been posted on Google Map that shows the ESE lightning rod installed on a tall free standing pole. A visual survey of the park using Google Map revealed that the water slide was located between two French-made ESE lightning rods. This suggests that the fatal incident was located within the claimed ESE protection zones of one or both lightning rods.

Cover picture:
The Key West Rapids water slide at the Adventure Island theme park, Tampa, Florida.
(Source: Google Map)

1. FATAL LIGHTNING INCIDENT REPORT

The Adventure Island theme park is located in the city of Tampa, Florida, in the United States of America (USA). Florida, which has the highest number of annual thunderstorm days, is also considered to be the "Lightning Capital" of the USA.

The Key West Rapids water slide (Fig. 1) is a six-story (high), 700 foot (long) slide with entry pools at the top (X) and bottom (Y).

Fig. 1: The Key West Rapids water slide. (Source: Google Map/Satellite view)

According to the news report, the lifeguard supervisor was helping the guests off the water slide when he was struck by lightning. However, the news report made no mention whether he was at the top (X) or bottom (Y) entry pool when the incident happened.

Using Google Map to scan the theme park, a photograph was found that shows a tall free standing pole near the water slide (Fig. 2). On closer inspection, a small device was found to have been installed on top of the pole which resembled a Prevectron air terminal i.e. lightning rod (Fig. 3).

In order to confirm that the device is a Prevectron air terminal, its shape and shade is compared with similar photographs of other Prevectron air terminals available on-line. Several photographs of the Prevectron air terminals were found on the Indelec India website which closely resembled the one photographed at the theme park (Fig. 4).

Fig. 2: View of the free standing pole from the water slide. (Source: Google Map)

Fig. 3: Image of the Prevectronair terminal at the top of the pole (left) and the Prevectron air terminal (right/Source: Indelec).

Fig. 4: Images of Prevectron air terminals taken from (l. to r.) E&L factory (Ahmadebad), Bali Bridge (Kolkata), Mangalore Airport (Mangalore) and Red Fort (Delhi), India. (Source: Indelec India / http://www.indelecindia.com/indian_reference.php)

By using the Google Map facilities (eg. Satellite and Street views), the approximately 20 m tall free standing pole shown in the photograph was located at position A (Fig. 5). A similar pole was also identified and located at position B (Fig. 6). With the exact locations of the two pole-mounted Prevectron air terminals known, it is possible to determine whether the water slide is within the claimed ESE protection zones.

Fig. 5: The Prevectron air terminal location at A.

Fig. 6: The Prevectron air terminal location at B.

According to Indelec, the French manufacturer of the Prevectron air terminal, the air terminal has a claimed protection radius (i.e. zone) of up to 109 meters. This protection zone is in accordance with the French ESE standard, NFC 17-102. (http://www.indelec.com/)

Using the distance scale provided by Google Map, it was found that both entry pools X and Y were located within the claimed ESE protection zone (Fig. 7). The upper entry pool X was located within 50 m of the Prevectron air terminal at location B while the lower entry pool Y was located within 100 m of both Prevectron air terminals at locations A and B.

Since the victim was reportedly struck by lightning while he was on duty on one of the two entry pools, this incident provides firm evidence that the actual ESE protection zone is very much smaller than is claimed.

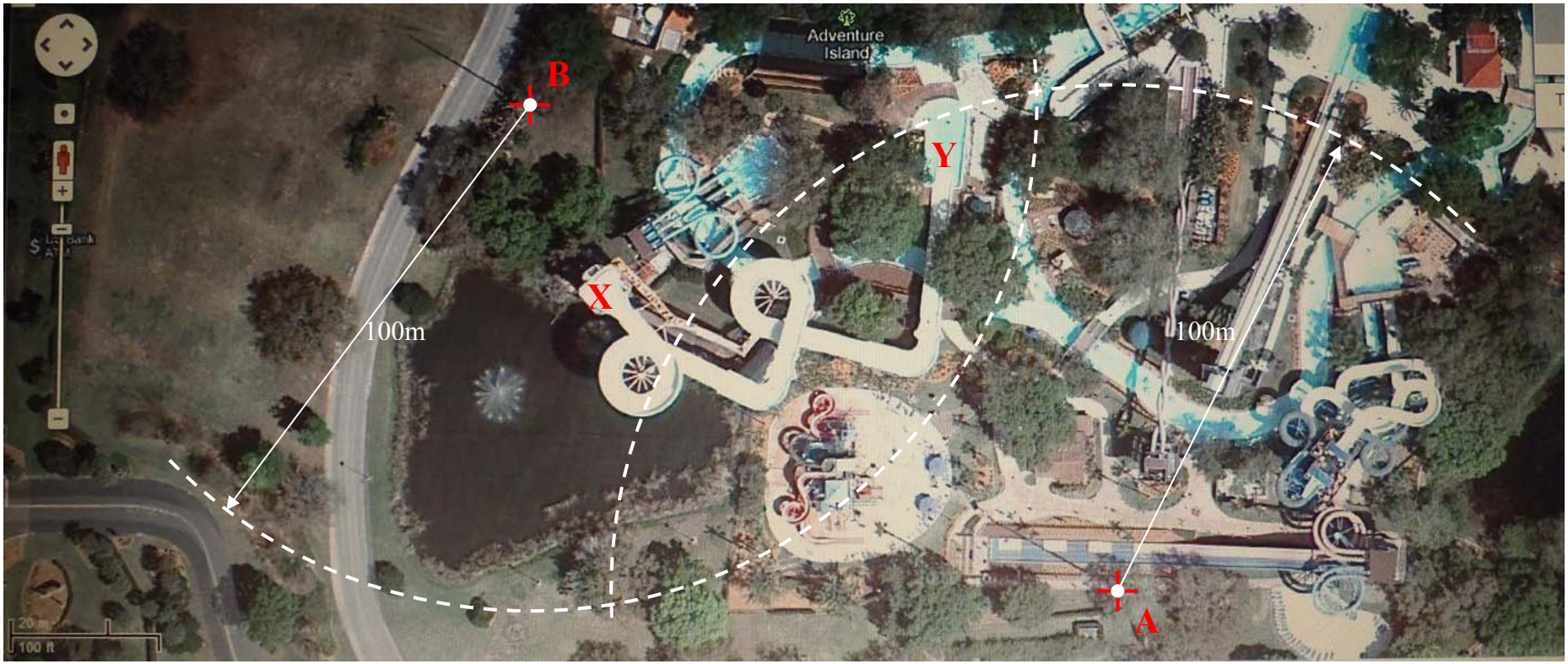

Fig. 7: The positions of the entry pools X and Y in relation to the Prevectron air terminals A and B. (Source: Google Map satellite view)

2. DISCUSSIONS

The failures of the ESE lightning rods to attract lightning have been highlighted by the authors in several technical reports and conference/seminar papers since 1995. In their latest conference paper presented in 2011, the authors have highlighted the fact that lightning can strike within 10 m of the ESE lightning rod.

http://www.mikeholt.com/download.php?file=PDF/CloseProximityBypasses.pdf

Hence, it is not surprising that the unfortunate victim in this incident was struck within the claimed protection zone of one or both ESE lightning rods. In fact, the failure of the Prevectron ESE lightning rod has been observed in a number of cases in Malaysia. One of them was mentioned in the above paper and is shown below (Fig. 8).

Fig. 8: The lightning struck TNB building in Johor Baru, Malaysia.

The failures of the ESE lightning rods have been reported not only in high thunderstorm activity areas like Malaysia and Florida but also in France where the thunderstorm activity is very much lower.

In the scenic town of Sigolsheim, a stone cross which is located barely seven meters away from another French-made ESE lightning rod was struck and damaged by lightning. Since the ESE lightning rod system had been inspected and confirmed to be in working order by independent French technical experts, this suggests that the French ESE standard and the claimed ESE protection zone must be technically unsound.

http://www.lightning.org/document/belltower-sigolsheim-france

3. SUMMARY

The failure of two ESE lightning rods to protect the Key West Rapids water slide from lightning strike is not surprising. A study conducted by the University of Florida nearly a decade ago had revealed that the ESE lightning protection technology is not supported by scientific theory or field data.

http://www.lightning.ece.ufl.edu/PDF/umanrakov.pdf

In 2005, the United States District Court for Arizona issued a permanent injunction, which prohibits the vendors of ESE lightning rods from claiming that their gadgets have been proven to significantly extend the maximum range of protection against lightning damage beyond that afforded by NFPA 780 requirements. The Order was issued pursuant to provisions of the Lanham Act, which prohibit false advertising.

http://www.lightningsafetyalliance.com/documents/finalinjunction.pdf

The opposition to the ESE lightning protection technology can also be found among CIGRE lightning experts. For the past two decades, these experts could not find any scientific evidence to support the ESE technology. In their latest study, they found that the ESE lightning rods do not work under natural lightning conditions and that there is no justification to assume that ESE lightning rods perform better than Franklin rods.

http://www.iclp-centre.org/pdf/Cooray-CIGRE-2011.pdf

The failure of the ESE lightning rods to protect buildings and structures from direct lightning strikes has been widely known for the past two decades. Hence the ESE lightning rods are also ineffective for the protection of open areas like theme parks, stadiums and other recreational grounds.

In order to avoid further lightning casualties, it is highly recommended that theme parks be installed with NFPA780 compliant lightning protection systems and implement proven lightning safety rules.

Adventure Island employee dies after being struck by lightning

By Robbyn Mitchell, Times Staff Writer

Published Saturday, September 10, 2011

TAMPA — Officials are investigating the death of an Adventure Island employee struck by lightning Saturday morning.

The employee, Justin Inversso of Dade City, was the 21-year-old son of Pasco County Sheriff's Office Bailiff Frank Inversso. Late Saturday, the Sheriff's Office issued a statement expressing "great sadness" upon learning of Justin Inversso's death.

"Justin showed great promise as a young man and he cared a great deal about the safety of others," Pasco Sheriff Chris Nocco said. "His actions not only to save the lives of the people in the park but his entire life demonstrated that he is and will always be a hero.

"His strong faith led him to live a courageous life of service. There is no question he is in the comfort of our Lord looking down on us."

At the time of the lightning strike, Inversso had been working at Key West Rapids water slide. He was a lifeguard supervisor at the park. The water park, located at 10001 N McKinley Drive near Busch Gardens, monitors inclement weather with real-time radar, lightning detection and a park manager whose responsibilities include physical monitoring of weather conditions, a park spokeswoman said Saturday. It is unclear if the water slide was closing when Inversso was struck.

The monitoring system has been in place since the park's opening in 1980.

"Nothing is more important to us than the safety of our employees and guests," said Jim Dean, park president for Busch Gardens and Adventure Island. "This is the first incident of its kind at the park."

Inversso was reported to be standing in 2 to 3 feet of water when the lightning struck at about 11:45 a.m., according to Tampa Fire Rescue. Key West Rapids — a six-story, 700-foot slide — has entry pools at the top and bottom where employees help guests on and off the ride. The entry pool at the top is 1 1/2 feet deep. It was unclear Saturday which entrance Inversso manned.

After the incident, the water park's employees removed Inversso from the water and began performing CPR. Fire units arrived at the park within four minutes. Paramedics continued resuscitation efforts as they transported him to University Community Hospital, Fire Rescue said. He was pronounced dead at the hospital.

A storm was moving through the area and out into Tampa Bay during the strike, according to the National Weather Service.

"There were several isolated lightning strikes in that area at that time," said Jennifer McNatt, a meteorologist with the Weather Service. The front dissipated and others rolled in behind it, she said.

Dean, the park's president, said the tower at the water slide may have taken the lightning strike.

"Being near tall objects during a lightning strike is dangerous because lightning is attracted to tall objects," McNatt explained. "On top of a water slide is definitely a dangerous place to be when it's lightning."

The Key West Rapids slide closed after the incident, but the park remained open for business, park spokeswoman Jill Revelle said. Park officials have not decided if the slide will reopen today.