



## Case Study: ADNOC's Takreer takes the low-impedance path to complete tank safety with Consilium and Lightning Eliminators

For tank storage firms, the risk of a lightning-induced fire event is too potentially damaging to bear. Floating tank storage facilities that have millions of dollars' worth of product can be destroyed with a single spark. Even worse is the downtime such an event will cause: a possibly lengthy period of investigation and reconstruction that impacts a storage facility's ability to deliver product to market and generate revenue.

Last year, Takreer, a storage and refinery subsidiary of the Abu Dhabi National Oil Company (ADNOC), completed a thorough lightning protection analysis and began transforming its protection profile for floating roof tank storage. Dozens of tanks, while operating efficiently, had potentially faulty lightning protection systems in place: metal shunt and wire systems that are meant to direct charge in the case of a lightning event but are prone to fall into disrepair over time.

"Because Takreer is a very safety-conscious company, they called us and [Lightning Eliminators & Consultants, Inc. \(LEC\)](#) for a better lightning protection solution," said Manoj Nambiar, General Manager of [Consilium](#) Middle East Fire Protection and Safety operations. "As a company that handles high volumes of storage, Takreer has to be very progressive about making sure their facilities are protected."



[Consilium Middle East \(FZC\)](#), which sells and installs fire protection solutions to many of the major oil and natural gas companies throughout the region, started offering [LEC's Retractable](#)

[Grounding Assembly \(RGA™\)](#) lightning protection solution to companies that want the best levels of lightning protection available. Last year, Consilium and [LEC services](#) outfitted 84 tanks at Takreer's Ruwais refinery with 450 RGA assemblies. And, the company is starting on a new contract to install RGAs on another 8 Takreer storage tanks in Abu Dhabi.

While those installations are retrofits to existing tanks that have less-effective lightning protection systems, Takreer has also begun including RGAs in its specifications for new tank construction as well.

Takreer and other oil storage and refinery companies worldwide choose the RGA because floating roof tanks are notoriously difficult to protect from lightning. Other floating roof tank grounding solutions often fail because they require a great deal of maintenance and upkeep: Metal shunts used for grounding on floating roof tanks regularly break, and wires used for the same purpose often tangle, compromising the low-impedance path they are supposed to create for safe operation.

The patented, award-winning RGA replaces the frequently damaged metal shunts and wires. While RGAs require routine maintenance and inspection like any other piece of hardware, they are not easily compromised and require a fraction of the repair and replacement work seen with other systems.

Takreer's stance with enhanced lightning protection using RGA solutions is especially progressive as the company operates in a part of the world that is not known for excessive lightning. While lightning activity in Abu Dhabi is in fact low, the company is now better protected from a global trend: incrementally higher lightning activity that scientists believe is the result of climate change. Higher temperatures worldwide are increasing the warm-weather patterns that lead to severe thunderstorm activity.

Even without the global increase in lightning, floating roof tanks need adequate protection. Large storage operations such as Takreer's Ruwais facility, for instance, houses millions of dollars' worth of product, which means a single, lightning-induced spark can result in a tremendous financial hit. It is a common and unfortunate challenge that storage firms face worldwide. In fact, some studies have indicated that a majority of fires that occur with petroleum storage tanks are caused by lightning.

Part of the difficulty is the fact that tanks are susceptible not only to direct lightning, but also to nearby strikes.

"When lightning is about to strike nearby, electrons in the area nearby rush over to the point of a strike, and good grounding systems allow that to happen without incident," explained Kirk Chynoweth, Systems Engineering Manager for LEC. "Unfortunately, when the roof of a floating roof tank is not properly grounded, the electrons on the top of the tank will move at a different rate than electrons on the side of a tank, and that difference in charge balance can create a spark on the edge of the floating roof."

Those sparks occur in just about the worst place possible, the empty space above a stored petroleum product that is full of flammable fumes. For that reason, tank fires are often very damaging. A July, 2012, strike that happened at a U.S. company in Kentucky is not all that unusual: it destroyed at least two tanks, set additional tanks on fire, and damaged on-site power lines, subsequently creating power outages in the surrounding areas. The floating roof from one of the tanks was blown off and landed in the middle of a nearby highway.

Fortunately for Takreer, those types of lightning-related incidents are less and less likely because of its proactive lightning protection operations with Consilium and LEC. The reduced maintenance that the RGA requires compared to older lightning protection systems has led Consilium to begin conversations about lightning protection with some of Takreer's sister companies in the energy sector.

“You can’t be too safe when you have as many assets to protect as Takreer does,” said Consilium’s Nambiar. “Takreer is a company that goes above and beyond even the most stringent guidelines for protection and, when it comes to lightning protection, they have made sure that they have the lowest-impedance path for grounding with their RGA systems.”

The RGA, a winner of the E & P Innovation award, solves the challenges that come with traditional grounding devices, providing comprehensive lightning strike protection for floating roof tanks. The product creates a permanent, reliable, low-impedance bond that prevents fires triggered by lightning currents. The RGA is also a highly economical device, and it can be installed on new and existing tanks in approximately two hours.

The ATEX-certified patented RGA conforms to both API 545 and NFPA 780 recommendations and is supported by API 545 as a bypass conductor.

LEC is dedicated to providing integrated, industrial lightning protection and prevention solutions, products and services by utilizing innovative, patented charge transfer technology, grounding systems engineering, surge protection, design and comprehensive consulting resources. To date, LEC has installed over 3000 solutions in over 69 countries and throughout the United States, providing lightning protection to companies in the petrochemical, oil and gas, biochemical, information technology, nuclear energy, utilities and manufacturing industries.

Roy B. Carpenter, Jr., a former chief engineer for NASA’s Apollo Moon Landing Missions and the Space Shuttle design engineering teams, founded LEC in 1971 to study and apply engineering principles to lightning protection.

Products used: Engineering Services and RGA®



*Lightning Eliminator's Retractable Grounding Assembly RGA®*