

## Case Study: International Paper, Pensacola, FL

April 2020

### Background

The International Paper (IP) mill in Pensacola, FL, manufactures linerboard, corrugating medium and fluff pulp from forest trees. The mill generates about two-thirds of its own power, with the other third being purchased from the local electrical utility.

### Phase 1

Lightning Eliminators & Consultants (LEC) was contacted by Kellogg, Brown and Root (KBR) to perform a site survey of the utility's substation and switchgear building. There had been numerous occasions that power was lost from this substation during lightning storms, which in turn caused the mill to shut down. The survey included an inspection to identify areas of vulnerability to both direct lightning strikes and to the secondary effects of lightning. Inspections of the existing grounding system and lightning and surge protection equipment were also included.

### Phase 1 – Findings

1. The grounding between the utility's substation and switchgear building was questionable. The grounding between the switchgear building and mill's Power Complex was also questionable.
2. The substation had Early Streamer Emitters (ESE's) and static lightning masts installed. (An ESE is a device designed to capture lightning strikes. A lightning mast is a tall pole intended to be a preferred lightning target.)



Figure 1: (left) ESE on pole; (right) lightning masts on substation structures

3. The utility's switchgear building had no lightning protection or surge protection equipment installed. A DC rectifier/charger for the switchgear battery had suffered lightning-related damage.

### **Phase 1 – Recommendations**

1. Install direct lightning strike protection on the utility's substation and switchgear building.
2. Install surge protection devices (SPD's) on relay control wires inside the switchgear building, and on the new rectifier/charger.
3. Perform a grounding system test and audit of the substation and switchgear building, including a bonding test from switchgear building to the mill's Power Complex.

### **Phase 1 – Implementation and Testing**

1. A Dissipation Array System (DAS) was installed on the substation. The DAS prevents all direct lightning strikes to the substation.
2. Spline Ball Terminals (SBT's) were installed on the switchgear building and Spline Ball Ionizers (SBI's) were installed on the nearby poles. The SBT's and SBI's will prevent the building and poles from collecting lightning strikes.



Figure 2: (left) SBI's on pole and DAS being installed on substation; (right) SBT's on switchgear building

3. SPD's were installed on the relay control wires and rectifier/battery charger.
4. The grounding system was tested and audited. The recommendations included improving earth grounding and bonding between the substation and switchgear building. It was also noted that transmission towers to the substation needed to be bonded to the substation.

### **Phase 2**

Due to the success in remediating problems with the substation and switchgear building, IP asked LEC for recommendations for its entire Power Complex. This scope included protection for the Distribution and Sync Building, the Boiler #3 Building, the Turbine Building, 3 Conveyor Buildings, Boiler Stack #3, Boiler Stack #4, Recovery Boiler Stack #1 and #2, and the Recovery Boiler Building. LEC also recommended another grounding system test and audit.

## **Phase 2 – Implementation**

The grounding system test confirmed a good grounding system ready for DAS installation. Four DAS Stack Arrays, several DAS Roof Arrays and multiple SBI's were installed at the Power Complex.



Figure 3: DAS Hemispheres being installed on stacks

## **Phase 3**

Due to the success in remediating problems with the substation and switchgear building, and the work done so far in the Power Complex, IP again asked LEC for lightning and surge protection recommendations to protect the Water Treatment Area. The Water Treatment Area is critical to plant operation, for its outage results in the mill being shut down. This phase would include protection of multi-story I-beam structures, pipe racks, tanks, floating mobile dredges, MCC enclosures, lab equipment, motor starter RTU cabinets and camera and security poles, plus grounding system augmentation.

## **Phase 3 – Recommendations and Implementation**

LEC recommended that a grounding test and audit be performed throughout the large Water Treatment Area. Recommendations were made for DAS, SBT and SBI for direct lightning mitigation at the various structures. Chem-Rods were recommended for the various DAS and SBT/SBI locations. Various SPD's were also recommended, which included SPD's for AC power protection in each MCC enclosure, at the lab, at tank monitoring and control panels, on the motor starter RTU, on the movable dredges and at the outfall cabinets. These recommendations were later implemented.

## **Summary**

IP has invested in plant protection by following LEC's recommendations. LEC's work with IP is ongoing, which is testament to the effectiveness of LEC's technology and equipment.

For more information, please contact LEC at 303-447-2828 or [info@LECGlobal.com](mailto:info@LECGlobal.com).