



Southern African Power Pool

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Message from the desk of the SAPP Environmental Sub-Committee (ESC).

It has been noted that the occurrence of fires under transmission lines is responsible for a great number of line outages in the SAPP region.

The SAPP Sustainability Bulletin for Second Quarter of 2015 focuses on the Impact of Bushfires on SAPP Transmission Network.

One of the causes of System Disturbance on the SAPP Grid is fire though such incidences have drastically reduced of late. Bush fires and grass fires are common in the SAPP region especially during the dry periods stretching from June to October. They largely originate from human activities and can be accidental or deliberate. Bushfires can have a high risk of infrastructure impact or can result in loss of life. The major impact that bushfires normally have on the Grid network is tripping of transmission lines that generally traverse open or in vegetated areas. Due to the fuel underneath the lines, the impact is normally greater in National Parks.

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Bushfire – threat to Transmission Lines –thick vegetation beneath the Transmission Network.

What Causes Tripping?

Tripping of Transmission lines is caused by smoke or flames from the fire creating a path for electricity to flow from wires to the ground in a similar way to a lightning strike. The flame is a kind of plasma where air molecules are chemically and thermally ionised. The rate of ionization processes increases with temperature. The electrical strength decrease of air under the influence of flames and smoke can be explained as a result of three factors:

- i. High temperatures reduces the air density
- ii. The electrical charge is generated in the flame
- iii. The influence of smoke particles

When conductors are exposed or heated by fires, their mechanical strength is reduced below the rated values of new conductors.

What is the Impact Bushfire on the Grid?

The impacts are many and can be summarised as follows:

- i. Direct damage to assets resulting in loss of transmission capacity and loss of supply to customers.
As the SAPP is largely an inter-connected network, direct damage to one transmission line can lead to widespread power interruption and loss of supply to customers
- ii. Continued tripping of lines resulting in voltage surges and permanent outages where the fires

continue along the wayleave. This type of impact is more likely in urban areas where the structures are constructed from steel towers. Continued tripping of lines and concurrent permanent outages has a significant impact on business and commerce due to loss of essential services and potentially a total loss of supply.

Wayleave and Bushfire Management

There are number of ways that can be applied to manage bushfires that affect transmission infrastructure. These include direct fighting of the fires, creating firebreaks and/or initiating back burning.

A number of the wayleaves on which fire-fighting or controls activities have occurred have been cleared of tall and fast growing timber species. These wayleaves have very low growing vegetation established resulting in low residual fuel loads and combined with their associated access tracks, have provided a natural vantage point for fire-fighting activities.



If a fire with high flames is detected in direct vicinity of operating line, the utility should be requested to de-energize the affected power line.

The area within 10 m from towers should be avoided at all times to protect against the risk of flashovers of insulators under the wet polluted conditions generated by the flames, the dense smoke and fire fighting action.

Recommendation

It is recommended that the following actions be adopted:

- Determine SAPP Transmission lines that may provide a strategic advantage for bushfire prevention and control, and
- Develop wayleave management plans for those transmission lines to maximise the outcomes of bushfire mitigation, environmental impact, safety, cost and reliability of supply.

References.

1. Southern African Power Pool 2014 Annual Report – Causes of System Disturbances (April 2013to arch, 2015) Operating Sub- Committee Report
2. Krystian, L C and Z. WROBLEWSKI – (2004) The Threat caused by Fires under High Voltage Lines., Wroclaw University of Technology, Poland.

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