CHAPTER 5

5.0 DISCUSSION

There are two incident that we observed damages occurrence and non-occurrence with the tower erection. To account for the observations of increased lightning activity to tower of moderate height (less than 100m) on high mountains a so called " effective height" being larger than the physical height of the object is assign to the structure [13]. The effective height accounts for the additional field enhancement at the tower top due to the presence of the mountain.

A new methodology, the Collection Volume Method, is given for the placement of lightning rods or air terminals for the protection of tower structures against lightning. In this concept it is define particular area where object within that area get protected through the same volume. But there may be shielding failure rate and there may be possibility of by passing CVM. This can be handling only case by case. Therefore it is important to identify such incidents and need to take precautions before it gets worsen.

If we look at the Table 3.5, we can see MW antenna mounted on the tower structure got failed in both site types where separate copper down conductor available site and non-available sites within same iso keuranic level and with fairly same earth resistance system. But we cannot figure out any arcing marks on the equipment. This is because the down conductor termination and tower footing integrated. As per the observations we can see there is no any effect of having separate copper down conductor. For an example, if we consider Getaheththa, Erathna and Parakaduwa, it is very clear that there is no considerable effect of installation of separate copper down conductor installation.

It is also noted that the measured earth resistance values are very high in hard rock areas where high resistivity exist and it is difficult to carry out grounding system improvement. In some cases the access to the nearest large mass of soil required a metal extension for more than 100 m. Therefore copper tapes were extended parallel

from the tower site to this location. We have done such two improvements to the Nakiyadeniya and Galapatha sites. Please see the figure 5.1.

Figure 5.1: Extended Copper tape for the nearest mass of soil

(Source: Author)

It has identified that power line surges have developed in neighbourhood due to the direct lightning stroke to tower and then it return to the power line through the surge reduction filter installed at tower equipment cabin and it is obvious in simulation results rather than the direct lightning induced on power line.

If we compare the Potential rise in power line with the earth resistance value, to have effective reduction in potential rise in power lines, it is needed to achieve earth system resistance below 1 ohm. This is not a practically achievable value and it can be seen from measured earth resistance values in 18 sites. But it is very clear that we can achieve this using secondary surge arrester installation at meter cubical. But as we can see throughout the simulation results, we have to use them in effective configuration so that only we can reduce the power line damages effectively. Therefore Combine Effect of Phase to Ground and Neutral to Ground secondary surge arresters is suit for the installation near meter cubical (i.e. power input to the RBS) so that we can

effectively reduce voltage rise and reduce the damages to both RBS electrical equipment and neighborhood electrical equipment.

It is also obvious that we cannot have a standard value for earth resistance value for a particular site, The Earth resistance data measured in Table 3.5 also taken as per the availability of space and the measured distances are different to each other. Therefore it is difficult to get idea about earth resistance value and compare it with another site.
In some sites we cannot find regular earth profile. Some sites are constructed on rocks. Some sites are constructed on mountains and surrounded by forests which cannot be access. Therefore it is sometimes even too difficult arrange apparatus to measure earth resistance. Therefore measuring the accurate earth resistance is questionable.