CHAPTER 6

CONCLUSIONS AND SUGGESTIONS FOR FUTURE WORK

The following conclusions have been drawn on the basis of this study carried out to investigate the impact of depth on the dust dispersal from an opencast coal mine.

1. The dust concentration values predicted by the AERMOD were within the acceptable limits with the field measurements for the Indian opencast coal mines.
2. The predicted PM_{10} concentrations by the model was relatively more accurate in the summer than the winter.
3. AERMOD does not perform well for the lower dust concentrations ranges as visible from the Q-Q plots.
4. High level of the PM_{10} concentrations were observed for the 50 and 100 m depths of the mine.
5. PM_{10} concentration levels had reduced outside the mine after 150 m depth when the dust sources were at the bottom and the wind was easterly in nature.
6. For the similar scenario, in westerly wind the reduction in dust concentration was higher than that of the easterly wind.
7. PM_{10} concentration levels had also reduced outside the mine after 150 m depth for the southerly wind. The dust sources were at the bottom.
8. 150 m could safely be considered as “critical depth” below which the dust dispersal from the mine on the surface would be significantly reduced.
9. When internal overburden was made against the wind direction, PM_{10} concentration levels increased significantly outside the mine with the increase in the depth of the mine.
10. When the internal overburden was made along the wind direction, PM_{10} concentration levels were high in the region outside of the mine. These levels were trapped inside the mine itself almost for every depth and these levels were reduced for the each depth in comparison to easterly wind.
11. When the wind was hitting parallel to the longer axis of the internal overburden, PM_{10} concentration levels were high in the region outside of the mine. Further, it can be concluded from the previous discussion, that when the wind direction is against the location of the internal overburden dump, the dust concentration was high outside the mine.

12. When the haul road was on the west side of the mine and wind was westerly in nature, dust concentration levels were increased up to 100 m depth and thereafter , these levels were decreased for the subsequent deepening of the mine.
13. When the wind was westerly in nature and haul road was made in the west side of the mine, estimated PM_{10} levels were the highest outside the mine for the 150 m depth of Mine 'B'. Further, these levels were reduced for the depth of 200 m and 250 m significantly. These concentrations level were found to be comparatively less than those, with easterly wind.
14. When the wind was southerly in nature and haul road was made in the west side of the mine, the interaction of the wind with the haul road was vertical in nature. In this condition estimated PM_{10} levels were high outside the mine up to a depth of 150 m. Further, these levels reduced significantly from the depth 150 m.
15. Another conclusion can be made from the previous discussion that when the wind direction is against the location of the haul road, the dust concentration was highest outside the mine for all the depths of the mine whereas these levels were less for the condition when wind direction was along or vertical to the location of the haul road.

This study was aimed to discover the effect of depth on dust dispersion from an opencast coal mine in the region outside the mine. The area outside the mine was chosen considering that there are several mines which are on the verge of closing due to dust dispersion in nearby living community from them. There are several mines which are also closed due to this problem. Although, the nearby community region is the most important region which the mining administration has to deal with but at the same time, one also need to take care the health of workers, working inside the mine. The area inside the mine was not considered for the dust dispersion modelling due to the limitation of the model. The model can predict the dust concentration levels more accurately at large distance based on the literature review conducted. In the future, one can develop or use a model to determine the effect of the depth on dust dispersion inside the surface mine. This future study can also take in to the account the percentage of emission coming out from the deeper surface mine by assessing the dust dispersion inside as well as outside the mining region.