

## CHAPTER 5

# CONCLUSIONS & SUGGESTIONS FOR FUTURE WORK

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### 5.1 Conclusions

The deterioration of water quality is there due to mining during and in abundant stage. In this work, an attempt has been made to suggest whether fly ash can be fill with overburden to mitigate water pollution and the ways how to manage the pollutants in a way so that the ecosystem of the area gets least disturbed by the associated mining activity. The laboratory investigation of the R-pH value of overburden indicates that overburden (sandstone) is alkaline in nature. Flyash and O/B (sandstone) both are appreciable neutralization potential and may effectively be used for acid neutralization of mine water. The present research highlights a few observations on the geochemical and leachability study of flyash, OB as well as with OB+30% FA along with mine water. In the near future, flyash can be used with OB in an abandoned mine and working mine particularly to reduce the problem of acid mine drainage. Opencast coal mining in India is a major mining activity. The voids of mine usually being filled with overburden and consequently, the quality of water is changed depending upon the composition of coal and associated rocks (overburden). Now, there is suggestion that flyash may be added to co disposed in working and abandoned mines. Obviously, the quality of water in mine will change. Keeping all the above aspect in mind, a detailed investigation has been conducted both in field and at laboratory scale. As a result of field and laboratory investigations, following conclusions have been drawn:

1. The laboratory study showed that the overburden material comprising sandstone is alkaline in nature and this will be helpful for the treatment of the acidic mine water.
2. The laboratory study also showed that flyash is alkaline in nature and this will be helpful for the treatment of the acidic mine water.
3. Both the overburden and flyash have significant neutralization capacity for reducing the acidity of mine water and therefore this can be used with advantage in abandoned mines, having a problem of acid mine drainage.
4. By putting overburden and flyash mixture in mine pit, the pH level of mine water was increased and the TDS level was also decreased.
5. The above study on a laboratory scale show that the acid-neutralizing property of fly ash and overburden will be an asset for coal mines suffering from slight to acid drainage problem.
6. The water quality of Gorbi abandoned mine is not good and the pH value is ranging from 2.5 to 2.7.
7. The detailed water quality analysis of all active mine conclude that water is alkaline to slightly acidic
8. It has been also concluded that deterioration of quality of water leached from mine through only overburden is not much.
9. There is no need to mix flyash with overburden where mine is having alkaline water quality.
10. The neutralizing components ( $\text{Na}_2\text{O}$ ,  $\text{K}_2\text{O}$ ,  $\text{CaO}$ , and  $\text{MgO}$ ) in sandstone is in appreciable quantity.
11. The neutralizing components ( $\text{Na}_2\text{O}$ ,  $\text{K}_2\text{O}$ ,  $\text{CaO}$ , and  $\text{MgO}$ ) in flyash relatively much less in comparison to sandstone associated with coal.

12. After laboratory investigation, the groundwater quality were found to be well within permissible limits in the Singrauli Coalfield.
13. There is need to mix flyash with overburden where mine is having very acidic water quality and it is best suited in Gorbi Abandoned mine.

## **5.2 Suggestions for future work**

1. The filling and of dumping of overburden along with flyash in pit having acid water needs time-dependent study for knowing the pathway of toxic metals migration. Leachate from such heap containing trace elements may enter into plant and groundwater. Hence, detail investigation of migration of toxic metals and migration of groundwater contamination is required with respect to the geology of the area, time and temperature parameters.
2. The next important issue related with a heap leaching of coal dump is bioremediation in protected area to remove toxic metals from such heaps through adsorption by plants.
3. Continuous leachate flow during and after rainy seasons may cause deterioration of quality of surface water in the adjoining area. Hence, adequate treatment technique are to be developed depending upon the severity of the problems (such as acidity, amount of water released and concentration of toxic metals in leached water.
4. For such abandoned mine, mine closure plan should be developed in such a way that no leachate be allowed to percolate into or out of closed mine. Geo-liner and other geo-polymer may be used to avoid groundwater contamination.