

CHAPTER 9 – CONCLUSION & RECOMMENDATIONS

9.1 Conclusion

Gold mining continues to play an important role in the economy of South Africa. This contribution to the economy has, however, compromised the integrity of the environment. This has been due to lack of appropriate environmental legislation, lack of knowledge and the focus on financial benefits. The recent focus on the environment has been brought about by promulgation of environmental legislation, notably NEMA (1998), NWA (1998) and MPRDA (2002) as well as the international emphasis on sustainable development. Both the NEMA and MPRDA ensure implementation of principles of Integrated Environmental Management (IEM) such as the polluter pays, consideration of alternatives to select the Best Practicable Environmental Option (BPEO), bearing in mind the carrying capacity of resources, the precautionary approach and participatory principles of transparency, democracy and environmental training. A further force driving environmental management is possible resultant criminal or civil liabilities, negative publicity and enormous long term financial burdens to the responsible companies that fail to take reasonable measures to prevent or reduce pollution. In order for AngloGold Ashanti to comply with relevant environmental legislation and ensure that they are awarded closure certificate, they need to undertake a baseline investigation to know the status of its environmental performance. It is only when the current status is known that monitoring and remediation can take place. This study serves as that baseline.

This study was conducted at AngloGold Ashanti gold operations in the West Rand Region. The aim of the study was to assess the impacts of mine waste at a typical South African gold mine. The mine comprises of three shafts and two gold processing plants. The by-products of gold extraction and processing are disposed of in tailings dams – North Mine tailings dams and South Mine tailings dams as well as mine dumps. There are two sewage plants within the mine property. These waste disposal sites, the tailings dams, the mine dumps and the sewage plants, have potential negative impacts on the surface water, the ground water and in the long term, the final land use the land will be

rehabilitated to. The impacts on the water quality are a major concern for South Africa in general as it is a water-scarce country and the mining industry in particular due to the high volumes of water used and the water pollution resulting from the mining activities. Using GIS tool the relationship between these different parameters was established. The findings of the study were as follows:

The changes in the sizes of the tailings dam with time are insignificant. Of concern is the pollution and potential pollution arising from the tailings dams. The section of the plantation closest to the North mine dam 7 is decreasing in size, a result of pollution from this dam. Some impacts linked to the shrinking plantation include increased soil erosion, loss of income for people dependant on the plantation, increased air pollution (due to the reduced capacity of the plantation to act as a sink for air pollutants) and the aesthetic loss for the area in general. The West Rand is already generally vegetation-sparse due to both poor soils and the impacts of mining activities.

The quality of the surface water contained in the dams is poor. The impact on the environment is negligible as long as the water is contained and does not leave the dams. The occasional accidental discharge of the water into the environment has negative impacts on soils, fauna and flora which come into contact with the polluted water. Comparisons between water quality recorded in 1993 and the period 2000-2003 show the quality to have deteriorated.

The sewage plants have not always met the quality targets for the different parameters as well as the quantities allowed by the permits. The impact of this non-compliance arising from the South sewage plant is minimal as the sewage is first discharged into the aquatic dam before being discharged into the environment. The discharge from the North sewage plant is a concern as it is discharged directly into the environment. There was no microbial non-compliance from the North sewage plant. South sewage plant, on the other hand, contained *faecal coli* in two of the sampling months. There is a health risk associated with discharge of sewage from this plant.

The seepage from North mine dams, facilitated by the high specific gravity, is intercepted by North boundary dam. The dam is highly polluted as a result. The close proximity of the tailings dams to the cultivated areas means that the cultivated areas are the recipients of runoff and seepage from the tailings dams. This is likely to result in reduced productivity from the cultivated areas.

Most of the boreholes have good quality water. The exceptions are MBH 18, MBH 8, MBH5 and MBH 3. MBH 5 shows an improvement over time and this is likely to continue into the future. The pollution in these boreholes is attributed to the North mine dams and the North boundary dam. Mine dumps do not contribute to the pollution in the boreholes.

9.2 Recommendations

In order to improve the environment in the West Rand Region and to prevent further pollution the following actions are recommended:

- Planting of indigenous trees to replace the shrinking plantation. AngloGold Ashanti can involve the community in this project which can be carried out during Arbor Week. This will have a number of benefits, namely, maintenance of the green surroundings in a sparsely vegetated region, community awareness of the need to plant indigenous species and improved relationship between the mine and the community.
- Stringent maintenance of the sewage plants to avoid release of poor quality sewage and also to ensure that the volumes discharged always comply with the permit conditions.
- Maintenance and monitoring of the surface water dams to avoid discharges that exceed permit guidelines.
- The surface water dams, in particular the Holding dam should be lined to prevent percolation of polluted water into the groundwater. Further groundwater analysis

should be undertaken to determine whether there has been pollution from the unlined holding dam.

- A study to quantify the groundwater pollution arising from both the tailings dams and other surface water bodies should be undertaken. The data should be collected over a long period of time (a number of years) to ensure that the slow movement of pollutants into and within the groundwater is not missed.
- The causes of improved water quality downstream of Savuka dump should be investigated. The results of the investigation can be used to prevent/reduce pollution on other dumps.

These measures, if implemented, will not only benefit the environment but will also reduce the financial loss AngloGold Ashanti will suffer in terms of waste discharge costs which will be substantial once the WDCS is in place.