



**WACAM REPORT**



**DETERMINATION OF HEAVY METALS IN  
WATER BODIES IN THE TARKWA AND  
OBUASI MINING AREAS**

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## **EXECUTIVE SUMMARY**

Water is a major pathway through which toxic chemicals such as heavy metals affect plants, animals and man. Gold mining in the study area generates a lot of chemical and other mine wastes, which cause various degrees of environmental damages and constitute a threat to existence human beings, plants, animals and the ecosystem. Chemical wastes generated are soluble in water. Heavy metal pollution from gold mining is difficult to control and unless eliminated or strictly contained in tailing pond, mining remains a major source from which heavy metal pollutants can spread into water bodies and the environment.

The long period of mining in the study area has resulted in increased concentrations of heavy metals and other pollutants in water bodies. For example, from 1947 and until 1992, mine effluents have been discharged without restriction into water bodies, soil and air, thereby resulting in the degeneration of the environment (Carboo, 1997; Tufour, 1997 and Tsidzi, 1993). According to Amegbey and Adimado (2003), there have been 11 officially reported cyanide spillages between 1989 and 2003 in the study areas.

Recent accounts in the media about cyanide spillages as well as the release of other hazardous chemicals into water bodies from mining operations have necessitated assessment of the levels of heavy metals in water bodies in the study area. Whereas cyanide species in water bodies are photo – degradable, heavy metals on the other hand are not photo – degradable and persist in the environment. The Ghanaian society is constantly faced with three fundamental questions:

- What are the risks associated with exposure to heavy metals in water bodies in the study area?
- How serious are the exposure?
- How well can it be estimated?

Obtaining answers to the above questions provide strong justification for a study of this nature to assess scientifically the quality of water bodies in Tarkwa and Obuasi mining areas. The study areas have long histories of mining activities, which have resulted in the release of toxic chemicals into the environment and water bodies.

The objectives of this study are therefore:

- Determine the levels of heavy metals in streams and rivers in the Obuasi and Tarkwa mining areas.
- Determine the levels of heavy metals in alternate source of drinking that has been provided for communities whose source of drinking water have been impacted upon negatively by mining activities in the study areas.
- Compare the levels of heavy metals in streams and rivers in the areas with permissible levels of heavy metals in streams and rivers prescribed by GEPA (Ghana Environmental Protection Agency), USEPA (US Environmental Protection Agency) and WHO (World Health Organisation).
- To recommend to government and other stakeholders the need to provide alternate potable water for the inhabitants should mining operations in the area cease.

Random sampling techniques developed by USEPA were used to obtain 41 rivers/streams perceived to be polluted, six streams/rivers, which communities perceived, were not polluted and three alternate sources of water provided for the some communities whose rivers/streams have been impacted upon for the Obuasi study area. In addition, 43 streams/rivers perceived to be polluted and seven alternate source of water provided for some communities were sampled for the Tarkwa area for the study.

In all, 400 water samples i.e. 200 samples from Obuasi and 200 samples from Tarkwa mining areas were collected between May and September 2008 from the two sites. Each sample was analysed separately for the following toxic chemicals; As, Mn, Fe, Pb, Cd, Hg, Cu and Zn. Physico – chemical parameters such as pH, conductivity, turbidity and total dissolved solids were

measured using standard methods of analysis as prescribed by American Water Works Association (AWWA, 1998).

The results of the study shows that most of the water bodies in the study area have elevated levels of arsenic, manganese, cadmium, iron, copper, mercury, zinc and lead which are above WHO and GEPA permissible limits. The pH and turbidity of some of the water bodies and the alternate source of water provided have low pH and high turbidity values, which exceed the WHO, and GEPA permissible limits.

Most of the mining communities visited enumerated a variety of health problems prevalent in their environment are attributed to mining. At Obuasi, medical officers at the Bryant Mission and Obuasi Government medical facilities acknowledged that some of the diseases prevalent in communities in the periphery of the mine are in part attributable to mining. Common diseases suffered by community dwellers include skin diseases, chest diseases including TB, diarrhoea and malaria, as well as typhoid. Communities located very close to centres of mining activities for example Anyinam residents claim that air pollution makes them experience dizziness and headache. Other communities like Akatakyieso, Binsere and Dokyiwaa complained of the prevalence of mosquitoes in their communities due to stagnant waters in abandoned pits and trenches dug by the mining company. The communities claim that water borne diseases they suffer from are caused by the bad quality of water after their rivers and streams were destroyed by large scale surface mining operations of the mining companies. For instance, the people of Abekoase in the Western region complained of episodes of cyanide spillage, which polluted their main source of drinking water and poisoned fish in the river. They further alleged that those who ate the contaminated fish suffered stomach disorder (CHRAJ, 2008).

Exposure to elevated levels of toxic chemicals in the water samples poses significant health hazard to residents. It is important for all stakeholders to adopt pragmatic policies and technologies to reduce high levels of toxic chemicals in water bodies in the study area.

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