



MEASUREMENT OF LOW LEVELS OF CYANIDE

By

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There is a common belief that cyanide represents a “signature” pollutant, the detection of which at low levels in surface or ground water in the vicinity of a mining operation automatically indicates a release to the environment has occurred from a manmade source. The presence of cyanide indicated by such a measurement could merely be the result of several types of analytical error. The possibility of false reporting supports implementation of meaningful detection and quantification limits coupled with realistic standards. On the other hand, if the presence of cyanide is confirmed and/or adverse impacts have been reported to humans or other animals, the source could be manmade or possibly natural. There are thousands of natural sources of cyanide present as cyanogenic glucosides and other compounds in animals, microorganisms, and plants. A partial list of these sources and their potential cyanide content are presented in Table 1. Ironically, the mass of natural cyanide available from its many ubiquitous and diverse natural sources could potentially be greater than that produced by man annually. A more detailed evaluation of the potential global natural production of cyanide is currently underway.

One of the most common of these sources and a major food staple for over five hundred million people globally is cassava, as shown in Figure 1. Hundreds of millions of tonnes of this plant are harvested each year for its roots as shown on Figure 2. Cassava is the fourth largest harvested crop following rice, maize, and wheat, and can yield over a thousand parts per million of cyanide through a natural process known as cyanogenesis. The preparation of the roots for consumption generally involves shredding, about four days of soaking, wet pounding, and then drying over a period of about three days before it is dry pounded into flour. The improper processing of this plant using short cut methods can result in the disease konzo, which is a partial, but permanent paralysis that occurs primarily in children due to ingestion of high dosages of natural cyanide. Several thousand cases of konzo have been documented to date around the world.

The ingestion of cyanide from natural sources by humans and other animals is a public health and environmental issue globally. There is cause for concern, since cassava is considered a very important and growing food source for the expanding world population, particularly in emerging nations and developing countries within the equatorial regions of the world. Over fifty years ago in the United States, a pamphlet describing the problem of natural cyanide poisoning of livestock and wildlife and identifying cyanogenic plants, such as arrow grass and chokecherry, was distributed by the federal government to farmers and ranchers.

In the event cyanide is detected in water or cyanide related poisoning of humans or other animals occurs in the vicinity of the mine, a natural cause other than the mine itself may be responsible. It is recommended that all mining companies using cyanide conduct a botanical survey during baseline permitting and during operations to identify and catalog local plant species known to cause cyanogenesis. Furthermore, all local surface waters should be monitored prior to initiation of operations to establish the baseline absence or presence of cyanide due to analytical error or natural sources. The establishment of realistic detection limits for cyanide along with the proper identification of the source of an impact can aid in the reduction of unwarranted legal and regulatory actions, and in the identification of the real causes of cyanide contamination.

As part of ongoing community outreach programs in areas prone to cyanogenesis, precious mining operations using cyanide are encouraged to provide public education about its toxicity, the proper preparation of cyanogenic plants for ingestion, and medical assistance particularly in the poorer countries within equatorial regions of the world. It is interesting to contemplate at some point in the future a mining operation aiding in the bulk preparation of cassava for local villagers and disposing of the soaking and rinse solutions containing cyanide in the process circuit. If the reader is aware of documented cases of cyanogenesis involving humans, livestock, or wildlife resulting from exposure to natural sources of cyanide, please submit them to MEM.