

Study of Heavy Metal Mercury (Hg) of River Sediment in People's Mining Area at Hutabargot Julu District of Mandailing Natal Regency North Sumatera

Dewi Widiastuti¹, Zulkifli Nasution^{2*}, Rikson Siburian^{3*}

¹Natural Resources and Environmental Management, Universitas Sumatera Utara, Indonesia.

²Department Of Agriculture Universitas Sumatera Utara, Indonesia..

³Natural Resources and Environmental Management, Universitas Sumatera Utara, Indonesia.

Keywords: Mercury, River Sediment, Peoples's Mining

Abstract: The purpose of this research is to know the potential of waste pollution and mercury (Hg) content in river sediment, due to the existence of Unlicensed Gold Mining effect in Sub-District of Hutabargot Julu of Mandailing Natal Regency North Sumatera, with the standard for Hg in sediment (guideline value 0.15 – SQG High 1.0 ppm) based on sediment guidance issued by the Australian Convergence of the Australian And New Zealand (ANZECC / ARMCANZ) Sediment Quality Guidelines may 2013. Sampling consists of 3 points, for point 1 in upstream (0,10 ppm) and point 2 in Aek Simalagi / mid (0,113 ppm) and point 3 in estuary (0,125ppm). This research method uses descriptive method. The research variable is the content of heavy metals Mercury (Hg) in river sediments. Mercury Analysis (Hg) using Mercury Analyzer. The results showed that the heavy metal content of mercury (Hg) in river sediments was still below the thresholds set by (ANZECC / ARMCANZ).

1 INTRODUCTION

People's mines or unlicensed gold mining has been since 2009 ago. However, in 2010 the gold mine in Hutabargot was increasingly well-known after several holes (gold excavation) were 'exploded' or had large yields in the Sarahan area, Hutabargot Julu Village, Hutabargot District.

The way the miners in Hutabargot Julu Village are still traditionally, where the mining process is by digging a hole using a hammer and chisel. All the rock results they carve will be transported out of the hole by using burlap (sack) and using human power. After that, will be taken to the processing site to be extraraked. The extraction process they are doing is still very traditional with amalgamation technology, namely the gold extraction process by mixing rock that has been made into sand with mercury (Hg) and which is carried out in the gelundung. Amalgamation methods can affect environmental conditions. Gold processing by amalgamation method can cause mercury contamination (Hg) and other heavy metals that have the potential to cause

environmental impact and dangerous to the health of the community around the mine site.

Health problems have begun to emerge in Hutabargot Julu Village. According to Mursidah (38 years) one of the people of Julu Hutabargot, the last 3 years there are three pregnant women who gave birth to the condition of children with total disability and the child does not survive. It is known that the work of the parents is a mine worker as a stone pounder, a mining pit digger and a teacher. There were also cases of children born with cleft lip conditions. There are indications that the case has something to do with mining activities.

Galundung activity is found in densely populated urban settlements of Panyabungan areas. Waste disposal of Galundung into the tailings to flow into the river and surrounding rice fields poses a serious threat to the surrounding people, livestock and agricultural lands. Therefore, the researcher is interested to conduct rese arch on "Study of Heavy Metals Weight of Mercury (Hg) in River Sediments In People's Mining Area In Hutabargot Sub-district, Mandailing Natal Regency of Sumatera". This research is focused on the body of the river Aek

Simalagi because many found gelundung process on the edge of the river.

2 METHODOLOGY

This type of research is an observational research, with research design using cross sectional, researcher do observation. In this study no intervention was made on nature.

Analysis of the data obtained from the results of the study using qualitative descriptive analysis. That is knowing the potential of mercury waste pollution (Hg) in sediment of Aek Simalagi river due to the existence of traditional gold mining in Mandailing Natal Regency based on Australian And New Zealand Environment And Conservation Council/Agricultural And Resource Management of Australian And New Zealand (ANZECC / ARMCANZ). Mercury analysis uses the Mercury Analyzer Method.

3 RESULT AND DISCUSSION

3.1 Mercury Concentrate

The results of the analysis of mercury concentration in the sediment of the Aek Simalagi river in 3 sampling locations are presented in Table 1 below. Of the three sampling sites, the highest mercury content was found in the sediment samples in the estuary, which was 0.125 ppm dry weight and the lowest was in the upstream sediment sample, which was 0.10, in the middle of the Aek Simalagi river which was 0.113 ppm dry weight.

Table 1.1: Results of Hg quality checks in sediment of Aek Simalagi river

Sample Type : Sedimen					
Location : Aek Simalagi					
Based On : ANZECC/ARMCANZ					
Metode Specification : USEPA 3050B/USEPA245.7					
N	Point	UTM		Quality Std	Res. Hg ppm
		E	N	ppm	
1	Before Amalgamation	554568	95948	0,15 – 1,0	0,10
2	Near Amalgamation	555846	97044	0,15 – 1,0	0,11
3	Estuary	558036	99194	0,15 – 1,0	0,12

Data on mercury (Hg) content in the Aek Simalagi River sediment is displayed in graphical form to make it clearer the difference in mercury concentration (Hg) between the three sample points. Following are Graph 1.1. which shows the level of mercury contamination in the Aek Simalagi river.

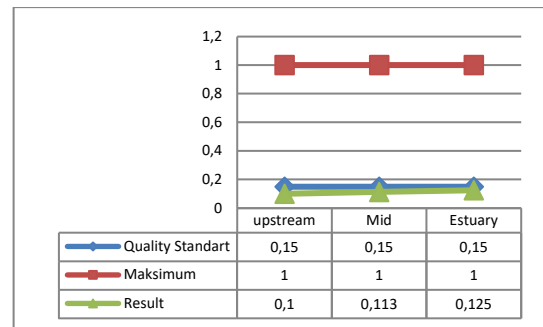


Figure 1: Results Mercury Measurement in Aek Simalagi River

From these data, it is known that mercury levels in the Aek Simalagi river sediment are still below the quality standard based on ANZECC / ARMCANZ. It was seen that the concentration of mercury (Hg) in sediments in the Hutabargot river and its surroundings at the mouth of the tributary was greater than the sediment concentration in the upstream and in the middle. This is due to the large number of PETI activities in the village or in the middle of the creek so that the concentration of mercury in the middle and estuary is higher. But the diagram still shows the presence of mercury in both upstream, middle and estuary. It is estimated that the existing mercury is an impact of the drum used in gold processing using mercury.

Gold processing with amalgamation techniques has caused river sediment contamination. Sediments that have been contaminated by mercury have the potential to cause negative and dangerous environmental impacts for the people living around the river.

River sediment contamination by mercury around the area of the people's gold mines is directly related to the process of gold processing by means of amalgamation where metal sulfide minerals, along with metal mercury are wasted as a fine mixture of tailing material.

Although the mercury level is still below the maximum threshold, it can also add to the existing mercury concentration due to ongoing activities but no effort has been made to manage waste rock contaminated by mercury.

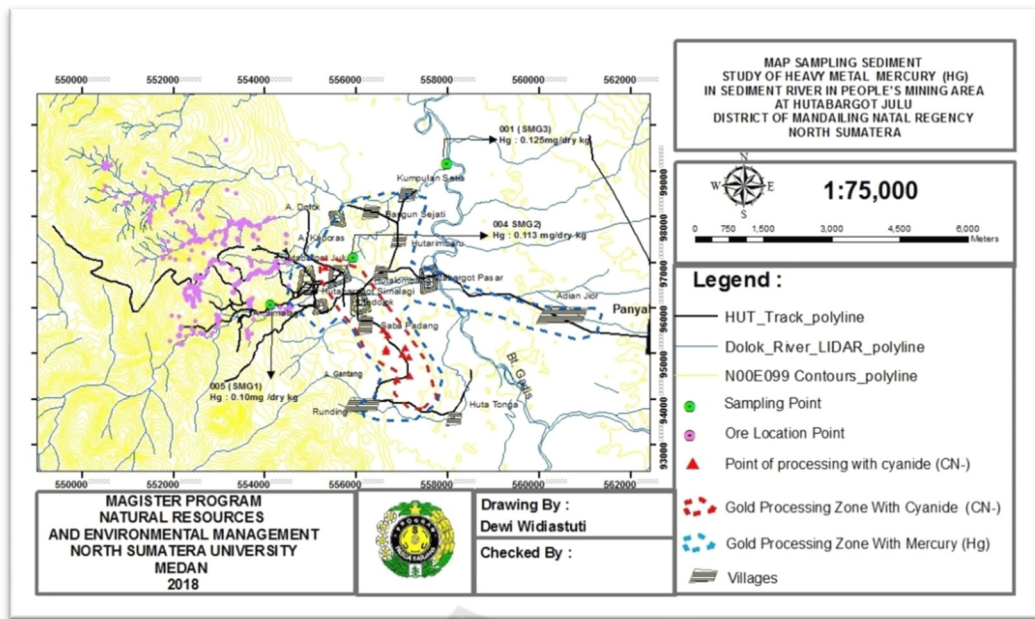


Figure 2: Sampling Sediment Map

4 CONCLUSIONS

The mercury concentration in sediment of Aek Simalagi River is before amalgamation process of 0,10, near of amalgamation process of 0,113 ppm dry weight and estuary of 0,125 ppm dry weight. The value is below the quality standard based on ANZECC / ARMCANZ.

REFERENCES

Australia National Water Quality Management Strategy. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality Volume 1*. October 2000. Agriculture and Resource Management Council of Australia and New Zealand

Bambang Tjahjono Setiabudi. 2005. Spread of Mercury due to Gold Mining Business in Sangon Area, Kulon Progo Regency, D.I. Yogyakarta. Thesis proposal. Yogyakarta State University.

Darmono, 2001. *Environment and Pollution*. Publisher: Universitas

Gunradi, R, Sukmana, 2000, *Investigation Report on Monitoring of Hg (mercury) Elements due to Unlicensed Gold Mining in Pongkor Area, West Java, with Geochemical Mapping*, Coordinator of the Affairs of the Department of Energy and Mineral Resources, West Java Province.

Palar, H, 1994., *Heavy Metal Pollution and Toxicology*, Rineke Cipta, Jakarta.

Silalahi, Jansen. 2005., *Mercury and Environmental Pollution*., Vol. XXXI, No. 3 Agustus 2005: h. 525-528.

Subanri, 2008., *Study of mercury (Hg) pollution on Menyuke River Water and Health Problems in Miners As a Result of Unlicensed Gold Mining in Menyuke District, West Kalimantan Landak District*-Thesis. Diponegoro university. Semarang.

Vogel, A.I. 1994., *Book of Macro and Semimicro Qualitative Inorganic Texts*.. Jakarta: PT. Kalman Media Pustaka.