

The Result of Water Analysis surrounding the Nickel Mining Site and the proposed Nickel Processing Plant  
(Dates of Water Sampling: February 25 and 26, 2013 in Surigao del Norte)

Sampling Location No.	1	2	3	4	5	6					
Date of Sampling	02/25/13	02/25/13	02/25/13	02/26/13	02/26/13	02/26/13					
Location of Sampling	Water in the dispenser for drinking in a house at the Resettlement site of Mamanwa (Brgy. Cagdianao)	Water to be able to get in front of resettlement site of Mamanwa (Brgy. Cagdianao)	Water to be able to get in a higher land area where some of Mamanwa people reside (Sitio Barabangkaw)	Water to be able to get inside of the resettlement site of Mamanwa (Brgy. Cagdianao)	Mouth of the Hayanggabon River (Brgy. Hayanggabon)	Mouth of the Taganito River (Brgy. Taganito)					
Latitude and Longitude	N9 30.838 E125 52.497	N9 30.753 E125 52.272	N9 29.819 E125 48.724	N9 30.736 E125 52.345	N9 32.429 E125 50.239	N9 32.424 E125 49.486					
pH (examination paper)	7	7	6	7	8	8					
Result of examination by simple detector tube for hexavalent chromium (mg/L)	0.05	0.05	0	Trace	0.3	0.1	Japanese Environmental Standards (Cr=Cr6+)	Japanese Water Supply Act (Cr=Cr6+)	Control Target under the Japanese Water Supply Act	WHO Guidelines for drinking-water quality (Cr=Total Cr)	Unit: mg/L
Cr (µg/L)	41.0	47.4	6.5	17.2	352	79.8	0.05	0.05	0.01	0.05	Cr
Ni (µg/L)	29.5	34.8	63.6	21.8	25.1	6.7			0.01	0.02	Ni
B (µg/L)	5.2	5.2	4.2	6.2	490	55.2	1	1		0.5	B
Na (µg/L)	1270	1130	724	1270	1100000	97000					
Mn (µg/L)	0.1	0.2	0.0	0.0	26.0	2.9		0.05	0.01	0.4	Mn
Fe (µg/L)	12.3	15.6	1.6	6.2	118.0	18.8		0.3			Fe
Co (µg/L)	0.0	0.1	0.0	0.0	1.9	0.1					Co
Cu (µg/L)	0.0	0.2	0.1	0.2	2.7	3.2		1		2	Cu
Zn (µg/L)	0.0	0.0	0.0	0.3	18.1	5.8		1			Zn
As (µg/L)	0.0	0.0	0.0	0.0	0.2	0.2	0.01	0.01		0.01	As
Cd (µg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.003		0.003	Cd
Hg (µg/L)	0.0	0.0	0.0	0.0	0.4	0.0	0.0005	0.0005		0.001	Hg
Pb (µg/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.01		0.01	Pb
Remarks	This family has got this water from the location No. 2 for the drinking water. According to them, TMC delivered the drinking water around November 2012 for only 1 month due to the drought. (In fact, the residents went to the TMC office to get such water, but it was not the delivery.)	The water is the same water sample as the sample No. 12 last May 2012. The source is spring. Some residents know that this water cannot be for drinking, but the others not. Thus, some families have been using this water for drinking as well as domestic-use.	The location was reached by a 30-min-ride (truck) and a 30-min-walk. There hasn't been mining activity yet in this area, where some Mamanwa people are trying to till the land for agriculture and are putting up some huts. The source is spring and the residents use it as drinking and domestic water.	The source is spring. The residents use it for drinking and domestic water. According to a certain resident, the source is the same as the water sample No. 2, but it is not confirmed. There is a private company who comes and sells the drinking water here, but it is too expensive for almost all the residents to buy.	The water is the same water sample as the sample No. 7 last May 2012. The dredging machine operated to dredge the siltation in the 5-meter-upper portion of the sampling points. Thus, some materials contained in the siltation might have been come out in the upstream.	The water is the same water sample as the sample No. 13 last May 2012.					

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**Comments (by Mr. Junichi Onuma, Lecturer of Kinjo-gakuin University / Former Principal Investigator of Environmental Investigation Center in Aichi Prefecture):**

1) The analysis by simple detector tube for hexavalent chromium are parallel to the analysis of total chromium by ICP-MS, or Inductively Coupled Plasma Mass Spectrometer, at the laboratory in Japan, which has been repeatedly demonstrated in the analysis of hexavalent chromium in the surrounding area of Coral Bay Nickel Processing Plant in Palawan. Further, precision analysis of hexavalent chromium was done by LC-ICP-MS (Liquid chromatography-inductively coupled plasma mass spectrometry). The result are parallel to the analysis of total chromium by ICP-MS.

2) Every water sample, except for No. 3, contained hexavalent chromium. The waters, namely No. 5 and No. 6, exceeded the Japanese environmental standards of hexavalent chromium(0.05mg/L). The waters of No. 1 and No. 2 contained hexavalent chromium at the highest possible standard level of the Japanese environmental standards and the Japanese Water Supply Act's standards (0.05mg/L). Further, the water samples of No. 1, No. 2, No. 3 and No. 4 exceeded the control target value for Nickel under the Japanese Water Supply Act (0.01mg/L). The above-mentioned results show that the almost same level of contamination in the water samples in this area was found as it had been last May 2012, and imply that this serious level of contamination has been continuing at almost all times.

3) It has been proved that the significant contamination of hexavalent chromium has been found in the residents' domestic/drinking water and in the river water in the whole area of Taganito, Surigao del Norte. Given that the the same kind of contamination had been found in the area of Rio Tuba, Palawan, the hypothesis could be set up that the open-pit mining exploitation of laterite peculiar to the tropical region inevitably brings about the contamination of hexavalent chromium anywhere. In any case, any immediate countermeasures must be considered and taken in the nickel mining sites and processing plants in Palawan and in Mindanao, because the damage of human health and the destruction of ecosystem in the estuary and along the coast area could be concerned. If any countermeasure cannot be taken, the suspension of the projects must be considered.

Note 1: The results of analysis on metal is the results of examination by ICP-MS, or Inductively Coupled Plasma Mass Spectrometer, at the laboratory in Japan

Note 2: The results of examination by simple detector tube for hexavalent chromium are the results of the on-the-spot examination.