The Result of Water Analysis surrounding the Nickel Mining Sites and the Nickel Processing Plants in Rio Tuba, Palawanin October 2019
(Dates of Water Sampling: October 1 and 2, 2019)

Sampling Location No	1	2	3	4	5	6
Date of Sampling	1/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019
Time of Sampling	16:41:24	9:15:41	14:21:52	14:38:09	14:47:12	16:07:04
Location of Sampling	Togpon River (East side of junction)	Togpon River (East side of junction)	The upper end of estuarine basin where the Togpon River flows into	The middle of estuarine basin where the Togpon River flows into	The estuary of the Tuba River where Togpon River merges into	Togpon River (East side of junction)
Latitude and Longitude	N8 33.166 E117 24.814	N8 33.166 E117 24.814	N8 32.284 E117 24.786	N8 32.105 E117 24.674	N8 31.901 E117 24.626	N8 33.165 E117 24.812
Result of on the spot examination by simple detector tube for hexavalent chromium (mg/L)	0.05	0.05	ND	ND	ND	0.2
pH	7.7	7.7	7.7	7.4	7.4	7.4

			colorlessness
sea water	well water, ground water	river water	ponding

processing plants	CBNC office in the site	the first tailing dam	the entrance of quarry of limestone
N8 33.500 E117 25.250	N8 33.463 E117 25.510	N8 34.000 E117 25.333	N8 35.770 E117 27.928

ug/L	1	2	3	4	5	6	(avareage consistency in sea water)	Japanese Environmental Standards (Cr=Cr6+) mg/L	Japanese Water Supply Act ((Cr=Cr6+) mg/L	Control Target under the Japanese Water Supply Act mg/L	WHO Guidelines for drinkingwater quality (chromium=Total chromium) mg/L	
Cr	48.4	47.1	10.5	5.0	3.6	172	0.212	0.05	0.05			Cr
Ni	22.6	19.8	49.1	35.7	36.5	219	0.48			0.01		Ni
Zn	9.9	1.4	1.0	10.5	0.0	2.2	0.350		1			Zn
B	0.0	0.0	2430	3030	3350	30.9	4500	1	1			B
Mn	17.8	17.7	74.7	57.1	45.0	124.4	0.020		0.05	0.01	0.4	Mn
Cu	4.4	3.2	1.7	6.8	2.5	1.9	0.150		1			Cu
As	0.0	0.0	1.8	2.0	2.5	0.0	1.2	0.01	0.01		0.01	As
Se	0.8	1.7	3.2	4.8	5.8	2.4	0.155	0.01	0.01		0.01	Se
Cd	0.0	0.0	0.1	0.1	0.1	0.0	0.07	0.01	0.003			Cd
Pb	0.4	0.6	0.4	0.3	0.6	0.4	0.0027	0.01	0.01			Pb
Hg	0.0	0.0	0.5	0.2	0.2	0.0	0.00014	0.0005	0.0005			Hg
Fe	29.8	28.5	366	262	247	880	0.030		0.3			Fe
Co	0.3	0.3	2.4	1.6	1.6	7.8	0.0012					Co
U	0.1	0.1	1.7	2.1	2.2	0.1	3.2			0.002		U
Na	17100	17000	6480000	8510000	9920000	24400						
Ca	19500	20700	338000	426000	496000	44900						

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

1) Even in the rainy season, if there is little rainfall, the Togpon River is clear in appearance, but Cr (VI) is just around the standard value(No.1 and No.2). There is no such thing as last time (March 2019: dry season) where all points ND (no detection). The river turned to unclean and reddish-brown, with Cr (VI) about four times higher than the standards after only one hour of heavy rain fell in the mine area. As I repeatedly made comments in the previous analysis, the amount of total chromium detected by ICP-MS has been consistent with the one of hexavalent chromium detected by simple detector tubes, which has proved that almost all of the total chromium consists of hexavalent chromium.

2) With the results this time, it is reconfirmed that hexavalent chromium is liquated by rainfall in the mining and the processing plant areas. As we stated in the previous analysis, some countermeasures the companies have been taking, such as covering the stockpiles with canvas sheet and deepening the siltation ponds, are not sufficient or not effective.
The companies must take drastic measures immediately. As we proposed in a meeting with Sumitomo Metal Mining Co. (SMM) in last year and this year, it is expected that they will take a measure to reduce hexavalent chromium to trivalent chromium on the spot. We have already assumed in the previous analysis that "hexavalent chromium is liquated mainly by rainfall in the mining and the processing plant areas, is flowing out, and is transferring into the Togpon River, which is flowing into the Rio Tuba bay at last." This hypothesis on the whole mechanism of water contamination has been proved every time when we conduct the examination of the water quality in this area

3) SMM must immediately take drastic anti-pollution measures, taking the joint responsibility with Rio Tuba Nickel Mining Co. (RNTMC), who is under its supply chain of raw material procurement. In addition, SMM needs to conduct the joint site investigation with the NGOs, which the NGOs have been proposing a long time so that drastic anti-pollution measures can be developed.

4) During the meeting on October 29, 2019, Sumitomo Metal Mining stated that it has began planting mangroves, but more drastic environmental recovery measures are desired. For example, we would like to see measures to rehabilitate the fishery in Rio Tuba bay, such as removing sludge with a high heavy metal content that has accumulated in the mouth of the Togpon River.

5) Boron (B) here is seawater-derived component