

The Result of Water Analysis surrounding the Nickel Mining Sites and the Nickel Processing Plants in Rio Tuba, Palawan in March 2019
 (Date of water sampling: March 22 and 23, 2019)

Sampling Location No	1	2	3	4	5	6
Date of Sampling	2019/3/22	2019/3/23	2019/3/23	2019/3/23	2019/3/23	2019/3/23
Time of Sampling	14:18:37	10:14:48	11:32:17	14:27:38	14:41:56	14:49:54
Location of Sampling	Togpon River (East side of junction)	Togpon River (East side of junction)	Nearby springs used by indigenous people of Okayan village GK mainly for domestic water (washing and bathing)	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
Latitude and Longitude	N8 33.164 E117 24.813	N8 33.165 E117 24.813	N8 33.165 E117 24.813	N8 32.283 E117 24.783	N8 32.111 E117 24.673	N8 31.909 E117 24.625
Result of on the spot examination by simple detector tube for hexavalent chromium (mg/L)	ND	ND	ND	ND	ND	ND
pH	7.7	7.9	8	7.9	7.9	7.7

			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	(average 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	
chromium	6.2	6.7	0.3	2.0	11.9	2.4	0.212	0.05	0.05			Cr
Ni	202	193	11.0	41.4	74.7	36.3	0.48			0.01		Ni
Zn	0.9	0.0	8.2	0.0	0.0	0.0	0.350		1			Zn
B	13.2	12.8	9.5	3570	3770	3720	4500	1	1			B
Mn	82.6	108	225	38.7	88.3	32.6	0.020		0.05	0.01	0.4	Mn
Cu	1.6	0.4	1.5	0.4	1.4	0.6	0.150		1			Cu
As	0.1	0.1	0.1	2.6	6.4	2.9	1.2	0.01	0.01		0.01	As
Se	0.2	0.2	0.1	1.8	2.5	3.2	0.155	0.01	0.01		0.01	Se
Cd	0.0	0.0	0.0	0.0	0.0	0.0	0.07	0.01	0.003			Cd
Pb	0.1	0.1	0.2	0.1	0.3	0.2	0.0027	0.01	0.01			Pb
Hg	0.0	0.0	0.0	0.0	0.0	0.0	0.00014	0.0005	0.0005			Hg
Fe	85.1	122	1220	192	1460	184	0.030		0.3			Fe
Co	0.5	0.7	0.4	1.1	4.2	1.3	0.0012					Co
U	0.4	0.4	0.0	2.5	2.7	2.5	3.2			0.002		U
Na	46600	44000	5080	8100000	8800000	8700000						
Ca	94500	90300	28100	548000	593000	598000						

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)

- Same as April 2017 and April 2018, it was the dry season in this time. So, hexavalent chromium wasn't detected in all points. This proved that most of the amount of total chromium detected by ICP/MS is hexavalent chromium, which has been proved by the fact of no detection this time.
- 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 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", which is related to pollution whole construction is demonstrated at every observation. 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.
- 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 for the Coral Nickel Bay Processing Project. In addition, SMM needs to conduct the joint site investigation with the NGOs, which the NGOs have been proposing long time, so that drastic anti-pollution measures can be developed
- Further, SMM must take measures to rehabilitate the mangrove ecosystem in the Rio Tuba bay, which has been heavily destroyed due to the serious contamination, but not only taking measures to improve the water quality in the Togpon River.
- Boron (B) here is seawater-derived component.
- This time, it was confirmed why hexavalent chromium was liquated by rainwater in the mine area and project area. As it was mentioned in the previous report, the measures which SMM, conducted such as sheeting, activated carbon treatment, and dredging soil, were not enough and not effective. Fundamental measures should be taken as soon as possible. As suggested at last and this year's meeting, it is desirable to convert hexavalent chromium into trivalent chromium. 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", which is related to pollution whole construction is demonstrated at every observation. 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.
- We showed the results of examination on Sodium (Na) and Calcium (Ca), too, this time, in order to indicate the dilution rate in the water of Togpon River by seawater. The Na's concentration in the sea water is around 12,000 mg/L (12,000,000 μg/L).