The Result of Water Analysis surrounding the Nickel Mining Sites and the Nickel Processing Plants in Rio Tuba, Palawan in April 2018

(Dates of Water Sampling: April 29 and 30, 2018)

Sampling Location No.	1	2	3	4	5
Date of Sampling	2018/04/29	2018/04/30	2018/04/30	2018/04/30	2018/04/30
Time of Sampling	16:19:36	10:39:31	14:42:58	14:59:43	15:09:17
Location of Sampling	Togpon River	Togpon River	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 33.163 E117 24.815	N8 33.163 E117 24.815	N8 32.285 E117 24.784	N8 32.111 E117 24.675	N8 31.897 E117 24.626
Result of on-the-spot examination by simple detector tube for hexavalent chromium (mg/L)	Trace	Trace	ND	ND	ND
pH	7.7	6.8	6.5	6.7	6.7

Sea Water	Well Water	River Water

Remarks: FoE Japan noticed Sumitomo Metal Mining Co. on April 27 in advance that the water sampling activity would happen on April 30.

<The results of examination on metsl by ICP-MS, or Inductively Coupled Plasma Mass Spectrometer, at the laboratory in Japan > (Unit: μg/L)

ug/kg	1	2	3	4	5	(Avarage concentration in the 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 drinking-water quality (Cr=Total Cr) mg/L	
Cr	13.5	16.2	11.7	7.7	5.0	0.212	0.05	0.05			Cr
Ni	50.0	66.7	99.9	76.1	63.8	0.48			0.01		Ni
Zn	0.0	0.0	3.0	0.0	0.0	0.350		1			Zn
B	16	17	4180	5090	5080	4500	1	1			B
Mn	198	277	229	148	113	0.020		0.05	0.01	0.4	Mn
Cu	0.6	0.3	1.3	0.0	0.0	0.150		1			Cu
As	0.2	0.2	1.6	1.5	1.2	1.2	0.01	0.01		0.01	As
Se	0.3	0.3	1.9	3.1	3.1	0.155	0.01	0.01		0.01	Se
Cd	0.0	0.0	0.0	0.0	0.0	0.07	0.01	0.003			Cd
Pb	0.2	0.2	0.9	0.2	0.2	0.0027	0.01	0.01			Pb
Hg	0.2	0.2	0.7	0.3	0.2	0.00014	0.0005	0.0005			Hg
Fe	78.2	102	1440	912	525	0.030		0.3			Fe
Co	1.5	2.1	8.4	5.3	3.3	0.0012					Co
U	0.2	0.3	1.8	1.7	1.6	3.2			0.002		U
Na	70300	95400	7800000	8040000	9020000						
Ca	84200	121000	504000	605000	635000						

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) It is a dry season this time. Although two water samples showed “trace” with the simple detector tubes, all the samples were lower than the quantitation limit of hexavalent chromium. In the previous analysis of water in this area, the result of examinations by simple detector tube for hexavalent chromium are parallel well to the result of examinations by ICP-MS, or Inductively Coupled Plasma Mass Spectrometer, at the laboratory in Japan. 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. Likewise, the results of “trace” are also parallel well to the amount of total chromium detected by ICP/MS.

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 June 2018, 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 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.

4) 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.

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

6) Nickel (Ni) is greatly over the Control Target under the Japanese Water Supply Act in every water sampling locations. Iron and Manganese are also detected at the same level of amounts in rainy season, which shows the different tendency from Hexavalent Chromium.
We have already pointed out in the previous analysis that there is the other liquate mechanism, which is different from the one for hexavalent chromium. The source of Nickel (as well as Iron and Manganese) in the Togpon River might be in the processing plant but not in the mining area. It is necessary for SMM to conduct the joint investigation with the NGOs, which the NGOs have been proposing long time, so that we can find out the real source of water contamination.

7) 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).

Note 1: The results of examination on metal 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.