

# GLOBAL CORAL REEF ALLIANCE

A non-profit organization for protection and sustainable management of coral reefs

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To: Environmentally concerned Indonesian policy-makers and public  
From: Dr. Thomas J. Goreau, President, Global Coral Reef Alliance  
Re: Impacts of toxic gold mine wastes pumped into the sea on coral reefs,  
biodiversity, fisheries, and tourism in North Sulawesi

The proposed disposal of toxic mine wastes into the sea by the Toka Tindung Mining Project in North Sulawesi should be rejected by the Indonesian Government and people because it will cause unacceptable damage to the exceptionally rich fisheries, tourism, and biodiversity of coral reefs and marine ecosystems of this region.

The region surrounding the proposed toxic waste disposal site is one of the most biologically rich marine areas in the world and contains many famous dive sites that attract people from around the globe because it is the only, or the best, place to see many rare and unusual marine organisms. The fisheries and tourism resources that this unique region provides could be sustainable economic resources for future generations forever, but they risk being damaged or destroyed by the toxic wastes of a mining project that will last only six years. The long-term value of these marine resources for the entire region far outweighs the short-term profit the mine will bring to a few.

I have dived extensively in the region and am currently advising students on coral reef restoration projects in areas that are likely to be affected by the toxic wastes the mine proposes to release into the ocean. In my 50 years of diving all around Southeast Asia, the Pacific, the Indian Ocean, and the Caribbean (longer and in more places than any other marine scientist), some of the most remarkable coral formations I have ever seen are located next to the Tangkoko National Park, very near to the proposed toxic waste dump site. These exceptional coral reefs lie in a small bay that would be severely damaged, and likely destroyed, if they were exposed to the toxic mine wastes.

The mining company incorrectly claims that the toxic wastes will simply vanish forever into the deep and will not affect any of the marine organisms and the people who depend on them. Their claims are easily shown to be wrong. Although they claim that the minerals in the waste material are dense and will sink into deep water, this ignores the fact that these materials must be ground to a fine powder in order to efficiently extract gold with cyanide, and these fine solid materials will be readily re-suspended if there are strong currents. The area proposed for the toxic waste disposal is well known for very strong currents, as all divers and fishermen are well aware. They further claim that the wastes will be disposed into deep waters that cannot mix upwards. In my dives in the area I found very cold water at quite shallow depths, indicating that this is an area of strong upwelling of deep waters to the surface. This is caused by the very strong tidal currents in the region, which suck deep cold water upwards. This is a persistent feature,

not a rare event, as seen by the fact that the hard corals are limited to shallow and protected waters, and beneath them lies a very different community of organisms that filter cold and rapidly moving water. So any toxic materials released will be mixed upwards into shallow water, and then transported up and down the coast by the currents throughout the region. The mining company only discusses the solid wastes that will be dumped into the ocean, and not the dissolved chemicals, yet the soaking of the ores in cyanide will dissolve most of the toxic materials, and these will move with the water, not with the solid sludge. They do not mention that these wastes will be mixed with freshwater, not seawater, and since freshwater is much lighter than seawater, the dissolved chemicals will rise right up to the surface. I have personally seen this happen in many parts of the world where sewage is pumped into the sea. Although it is always claimed that the sewage stays deep down, in fact any observer can plainly see that the freshwater in sewage pumped deep down floats straight up to the top of the water, and the smelly slick with its garbage and oil can be traced for long distances at the surface of the ocean. The same will happen with the toxic mine wastes. This is a serious and fundamental flaw in their plan, which should not be permitted for exactly this reason.

Gold mining wastes contain very high levels of many toxic chemicals, including not only the cyanide and mercury used to extract gold, but also very high levels of other toxic elements such as lead, arsenic, copper, and zinc that are present in the minerals that are intimately associated with volcanic rock gold deposits. In addition the high levels of sulfur associated with them is toxic to marine life and causes sulfuric acid to be formed by bacteria which remove oxygen from the water. The net impacts will be devastating for any marine organisms exposed to the wastes, or to people who eat fish contaminated by even very low levels of these toxic materials. These kinds of toxic wastes need to be securely contained and isolated to prevent damage, and they have caused severe damage to human health and to ecosystems in many parts of the world where they have leaked out into rivers or seas. It is appalling that the mining company proposes to simply pump them into the ocean. Although I am a coral reef scientist, I am qualified to comment on the environmental impacts of these mining wastes, because my PhD advisor in Bio-Geo-Chemistry at Harvard University, Professor H. D. Holland, is one of the world's top experts in the formation of such ore bodies, and I studied and worked with him on how they form and the effects they produce on the environment.

As a marine scientist working around the world to protect and restore our irreplaceable marine ecosystems, I have no financial interest for or against this project. I simply feel that releasing such toxic wastes into an area of strong currents, where deep water is being sucked to the surface, in the center of one of the richest and most unique marine habitats in the world, is an irresponsible recipe for disaster. I strongly urge the Indonesian Government and people to ensure that their priceless natural marine resources are protected from all harm so that they can be managed and restored to benefit future generations forever, and not thrown away so that foreign companies can make a quick profit and leave Indonesia to deal with the mess they leave behind.

Sincerely yours,

Thomas J. Goreau, PhD, President, Global Coral Reef Alliance