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**Letter to the Editor**

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**Mining rare earths poses toxic risks: CAP warns Kedah MB**

We refer to the announcement by the Kedah Menteri Besar (MB) last week that the State intends to mine for a rare earth element (REE) which could be worth RM62 billion.

REEs are extracted from ores and minerals as they are not often found concentrated in mineable deposits. REEs are almost always found in conjunction with significant radioactivity as these ores and minerals naturally contain Uranium and Thorium.

There are 17 rare earth elements existing namely, Scandium, Yttrium, Lanthanum, Cerium, Praseodymium, Neodymium, Promethium, Samarium, Europium, Gadolinium, Terbium, Dysprosium, Holmium, Erbium, Thulium, Ytterbium and Lutetium. Can the Menteri Besar let us know which type of non-radioactive rare earth is found in Kedah?

Rare earth mining and processing is a much more environmentally hazardous process than other mining activities, since radioactive waste is formed. They have serious environmental impacts if not properly managed. Low level radioactive tailings from the presence of Thorium and Uranium in REEs ores are a potential hazard and improper handling of these substances can result in enormous environmental and health damage. Both Thorium and Uranium remain radioactive for hundreds of years and exposure to them has been linked to increased risks of lung, pancreatic and other cancers.

The mining of REEs has caused the contamination of soil and water: Radioactive waste can leach out into aquatic environments and be absorbed by aquatic vegetation which can then bioaccumulate and potentially enter the human food chain if livestock or humans choose to eat the vegetation.

Exposure to radioactive waste can lead to cancer, respiratory issues, dental loss and even death. The group most at risk are children as radioactive waste can impact the neurological development of children, affecting their IQ and potentially causing memory loss.

No where is the industry's ecological and human fallout more stark than in China which accounts for more than 80 percent of the world's REEs output. In Jiangzxi province rare earth mining has led to extensive water and soil pollution while concrete leaching ponds and plastic lined waste water pools dot the hills.

As clean up of these polluted sites begins, China's Ministry of Industry and Information Technology estimated the cleanup bill could amount to 38 billion yuan (USD5 billion). According to Chinese authorities it will take 50 to 100 years before the environment can fully recover and the cost borne by the locals has been high.

In Jiangxi province two methods were used to extract the rare earths: the first method involved removing layers of topsoil and transporting them to a leaching pond, where acids and chemicals were used to separate the various REEs from clay, soil and rock.

The second process involved drilling holes (which the MB of Kedah vaguely alluded to) into hills inserting PVC pipes and rubber hoses, and then flushing out the earth using a mix of water and chemicals. This mix was then directly pumped or transported to the leaching pond for further separation of REEs.

Chinese officials have said that mining has dumped excessive amounts of ammonia and nitrogen compounds into the region's groundwater. Other pollutants like cadmium and lead are released during the mining process and long term exposure to these metals pose health risks as well.

Rare earth mining has led to radioactive material clinging to the elements in some areas according to a researcher who studied the environmental and health impacts. The end result he says could be central nervous system cancers like bone cancer, skin cancer and cardiovascular and respiratory disorders.

Nearer home at the rare earth refinery at Bukit Merah in Perak, CAP had documented birth defects and leukemia cases within five years in the community. Doctors say Thorium contamination from the plant had led to the increase in cancer. The company, Asian Rare Earth had also sold calcium phosphate, a by-product of rare earth processing as fertiliser which according to a former Bukit Merah resident the cows that ate the grass (grown with fertiliser) all died.

The factory operated by Mitsubishi Chemical closed in 1992 amid strong opposition from local residents, environmentalists and Japanese politicians. The company was involved in a USD100 million cleanup which entailed the removal of more than 80,000 steel barrels of radioactive wastes to a hilltop repository. The US Environment Protection Agency lists Bukit Merah one of Asia's largest radioactive waste cleanup sites.

It looks like history is about to repeat itself with the Lynas Advanced Materials Plant (LAMP) rare earth refinery, which is set to become the world's largest processing facility of rare earths. Lynas's operations, a complex project involving radiation hazards was fast tracked for approval without a permanent disposal facility in place. Since it started in 2012, it has accumulated wastes namely the Water Leached Purification (WLP) residue which is radioactive totalling 451,564 metric tonnes and the Neutralisation Underflow (NUF) waste which has been classified as scheduled waste, amounting to 1.2 million metric tonnes as at February 2018. Currently, the massive mounds of wastes are openly accumulating within Lynas's factory site. The NUF storage capacity had reached its limit in June 2018 and the need for a secure landfill is no where in sight. To date the public has no knowledge of the planned Permanent Disposal Facility.

In 2018 the Executive Committee Report (ECR) on Lynas had noted that 'the main cause of sediment pollution in Sg. Balok was from the LAMP operations. Citing the Radiological Impact Assessment Report (2016), it states 'there is a statistically significant increase in U 238 radioactivity from the stream sediments at the location of LAMP effluent dumps as compared to the downstream location'.

This means that radioactive materials such as Uranium-238 are able to settle from water and accumulate in sediments at the bottom of the river. Bottom feeders are able to collect these radioactive materials from river water and sediment. The ECR also found 'non compliance with some heavy metals (nickel lead, chromium and mercury) in ground water particularly alarming'.

In light of the above health and environmental hazards and problems associated with rare earth mining namely radioactive wastes; heavy metals contamination; waste disposal and storage; and lifetimes; the MB must realise that these issues and problems will have to be borne by the State and the people of Kedah. It will bring about irreversible damage to the environment; destruction of forests; devastation of watershed; scarred desert-like landscapes; poisoned soils and waters; and a public health crisis. The financial, social and ecological costs will be astronomical. The Malaysian experience and its toxic legacy is a sobering reminder and Kedah should learn from it.

Does the Kedah Department of Environment have the capacity to monitor and evaluate REEs mining and processing, supervise the decommissioning and approval of suitable land for the permanent disposal facility and disposal of toxic wastes among others?

Given the dangers highlighted above, CAP urges the State and Federal governments to declare a moratorium on any mining, production and refining of REEs, their wastes disposal and storage.



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