DETERMINATION OF HEAVY METAL POLLUTION IN DEPTH PROFILE OF MARINE SEDIMENT SAMPLES FROM THE STRAIT OF MALACCA

Elias Bin Saion1, Ab Khalik H. Wood2, Zainal Abidin Sulaiman1, Awad A. Alzahrany1, 3, Md Suhaimi Elias2* and Wee Boon Siong2

1 University Putra Malaysia (UPM), College of Sciences, Department of Physics, 43400 Serdang, Selangor, Malaysia
2 Malaysia Institute for Nuclear Technology Research (MINT) BANGI, 43000 Bangi, Malaysia
3 Atomic Energy Research Institute, King Abdul-Aziz City for Science and Technology (KACST), P.O. BOX 6086, RIYADH 11442, Saudi Arabia

SUMMARY
In this study, four core marine sediment samples from the Strait of Malacca were collected and analyzed by using instrumental neutron activation analysis (INAA). This work was carried out to evaluate the level of heavy metal pollution in the water-body. In addition, inductively coupled plasma-mass spectroscopy (ICP-MS) technique was used for non-measurable elements by INAA. The following heavy metals (As, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Sb and Zn) have been determined in the core sediment samples collected from the Strait of Malacca. Moreover, the obtained results were compared to the national studies and the international guidelines for marine sediments.

KEYWORDS: INAA, ICP-MS, Strait of Malacca, heavy metal pollution, marine sediment.

INTRODUCTION
Malaysia has a total coastline of 4810 km, and the Strait of Malacca is representing the West Coast of Peninsular Malaysia with a length of about 1111 km. The Strait of Malacca is situated between the East Coast of Sumatra Island and West Coast of Peninsular Malaysia, and located between latitude 1° N to 7° N and longitude 98° E to 104° E. The Strait of Malacca is surrounded by four countries, namely, Malaysia, Singapore, Indonesia and Thailand. A large proportion of the Straits face the Malaysian and Indonesian region [1]. The Strait of Malacca is one of the longest and narrowest straits in the world, and one of the most important and busiest waterways. There is several river discharge into the Strait of Malacca. The four major Malaysian rivers, Perak river which is the second largest in Malaysia extending for about 322 km, Muar river, Muda river, and Kelang river drain into the Strait of Malacca. Moreover, many small rivers and streams also drain into the Strait of Malacca [2].

The Strait of Malacca is a very important and productive coastal ecosystem, which is of great significance to 25 million people living along its shore [3]. The eight states along the West coast of Peninsular Malaysia that border it, are highly populated, with a total population of around 13.78 million in 1994, accounting for more than 65% of the population of Malaysia. These eight states constitute the most important economic region of the country [4].

Moreover, the Strait of Malacca is a very important source of seafood to Malaysian coastal states. From 1990-1998, more than 60% of the fish landed in Malaysia came from the Strait of Malacca [5]. Contribution of fish catch on the Indonesian side of the Straits is the second to fishery landing of the North Coast of Java [6].

Environmental problems in the Strait of Malacca are very seriously because of the many river discharges along the straits, and due to agricultural and industrial activities concentrated on the West Coast of Peninsular Malaysia [7-9].

Therefore, it is important to investigate its elemental pollution level using sediment samples providing useful information regarding the marine pollution. The heavy metal contamination may extend its hazardous effect to aquatic life, system and human health, especially to human consumers of seafood, by bioaccumulation in food chain.

The main objectives of this study are a) to determine the horizontal and vertical distributions of the heavy metals pollution in the Strait of Malacca, b) to establish its base-line data, and c) to determine the sediment pollution trends. This paper will cover only the core sediment samples collected from the Strait of Malacca.