

POLYCYCLIC AROMATIC HYDROCARBONS (PAHs) DISTRIBUTION  
AND ITS VERTICAL PROFILE AT KERTEH RIVER, TERENGGANU

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FACULTY OF MARITIME STUDIES AND MARINE SCIENCE  
UNIVERSITI MALAYSIA TERENGGANU

2011

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**DEPARTMENT OF MARINE SCIENCE  
FACULTY OF MARITIME STUDIES AND MARINE SCIENCE  
UNIVERSITI MALAYSIA TERENGGANU**

**DECLARATION AND VERIFICATION REPORT  
FINAL YEAR RESEARCH PROJECT**

It is hereby declared and verified that this research report entitled:  
POLYCYCLIC AROMATIC HYDROCARBONS DISTRIBUTION AND ITS  
VERTICAL PROFILE IN KERTEH RIVER, TERENGGANU by CHUA CHIA YEE,  
Matric No. UK 18312 have been examined and all errors identified have been corrected.  
This report is submitted to the Department of Marine Science as partial fulfillment  
towards obtaining the Degree of Bachelor of Science (Marine Science), Faculty of  
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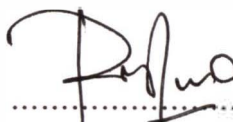
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## LIST OF ABBREVIATION

### SYMBOLS

PH	petroleum hydrocarbon
HC	hydrocarbon
TAH	total aliphatic hydrocarbon
PAH	polycyclic aromatic hydrocarbon
EPA	Environmental Protection Agency
Km	kilometer
KIPC	Kerteh Integrated Petrochemical Complex
PPIC	PETRONAS Petroleum Industrial Complex
MIDA	Malaysian Industrial Development Authority
DCM	dichloromethane
°C	Degree Celsius
mL	milliliter
g	gram
cm	centimeter
v/v	volume over volume
GC/FID	Gas Chromatography/Flame Ionization Detector
μL	microliter
TEQ	Toxicity Equivalency
Mg/kg	milligram per kilogram
Ppm	parts per million
μg/g	microgram per gram

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## ABSTRACT

The concentrations of PAHs in core sediments collected from 6 stations along Kerteh River were measured in unit equivalent to benzo[a]pyrene, BaP and the profile of PAHs in the core is constructed. The core samples were collected starting from river mouth heading towards upstream, where core A4 was collected nearest to the river mouth while A10 the furthest upstream. From these six core samples, core A7 and A10 were collected from direct outlet of industrial area. Maximum concentrations for overall core was found in core A10, while highest concentration of PAHs in a layer was found in core A10, layer 0-5 cm. The overall lowest concentration of PAHs in a core is core A4 which is situated near to river mouth, where tide system and wave actions may have diluted the PAHs from upstream before they have the time to settle down in the sediment. For all six cores, none of them has exceeded the direct exposure limit for industrial area set by Florida Soil Cleanup Targets, which is 0.700 mg/kg. However, the direct exposure limit for residential area is exceeded are core A7, A8 and A10. In general, the recent trend is towards a decrease of PAHs concentration, except for station A7 and A10 which show increase of PAHs concentration. Based on the findings in this study, Kerteh River is slightly contaminated with PAHs concentration ranging from zero to 0.296 mg/kg. It is advisable that the water from Kerteh River is not applied for residential use as the concentration in sediment has already exceeded the limit allowed for residential use.



ABSTRAK

Kepekatan hidrokarbon aromatic di dalam sediment teras tanah dari 6 stesen di sepanjang Sungai Kerteh telah diukur di dalam unit bersamaan dengan benzo[a]pyrene, BaP dan profil hidrokarbon aromatic di dalam sampel teras tanah telah dibuat. Sampel teras tanah itu telah disampel bermula dari muara sungai menuju ke hulu sungai, di mana teras tanah A4 disampel di kawasan paling dekat dengan muara sungai, manakala teras tanah A10 disampel di kawasan hulu sungai. Dari keenam-enam sampel teras tanah ini, teras A7 dan A10 disampel dari kawasan pembuangan sisa air buangan dari kawasan industry. Kepekatan maksimum untuk keseluruhan sampel teras tanah ditemui di teras A10, manakala kepekatan hidrokarbon aromatic di antara lapisan tanah dalam teras ditemui di teras A10, pada lapisan dari 0-5 cm. Kepekatan paling rendah untuk keseluruhan teras tanah ialah teras A4 yang disampel di kawasan paling dekat dengan muara sungai, di mana arus pasang surut dan tindakan ombak mungkin telah mencairkan kepekatan hidrokarbon aromatic yang dibawa dari hulu sebelum ia mempunyai masa yang cukup untuk mendap dalam sedimen. Antara keenam-enam sampel teras tanah, tiada yang telah melebihi had pendedahan yang dibenarkan untuk kawasan industry yang telah ditetapkan oleh Florida Soil Cleanup Target, iaitu 0.700 mg/kg. Walau bagaimanapun, kepekatan hidrokarbon aromatic dalam teras A7, A8 dan A10 telah melebihi had pendedahan yang dibenarkan untuk kawasan perumahan iaitu 0.100 mg/kg. Secara keseluruhannya, trend yang terkini ialah pengurangan kepekatan hidrokarbon

aromatic dalam sampel teras tanah, kecuali bagi sampel teras di A7 dan A10. Berdasarkan keputusan dalam kajian ini, Sungai Kerteh mengalami pencemaran yang ringan dengan julat kepekatan dari kosong sehingga 0.269 mg/kg. Adalah dinasihatkan agar air dari Sungai Kerteh tidak digunakan untuk kegunaan harian disebabkan oleh kandungan hidrokarbon aromatik dalam tanah telah melebihi had pendedahan yang dibenarkan di kawasan perumahan.