UNIVERSITI TEKNOLOGI MARA

NITRATES IN RURAL DRINKING WATER SUPPLY AND ITS POTENTIAL HEALTH RISK

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Project paper submitted in partial fulfillment of the requirements for the degree of Bachelor in Environmental Health and Safety (Hons.)

Faculty of Health Sciences

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Declaration by Student

Project entitled "Nitrates In Rural Drinking Water Supply and Its Potential Health Risk" is a presentation of my original research work.Wherever contributions of others are involved, every effort ismade to indicate this clearly, with due reference to the literature,and acknowledgement of collaborative research and discussions. The project was done under the guidance of Mr. Hashim Bin Ahmad as Project Supervisor and Mr. Samsudin Bin Zawawi as Co-supervisor. It has been submitted to the Faculty of Health Sciences in partial fulfillment of the requirement for the Degree of Bachelor in Environmental Health and Safety (Hons).

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ABSTRACT

NITRATES IN RURAL DRINKING WATER SUPPLY AND ITS POTENTIAL HEALTH RISK

A case study in Kampung Raso 1, Lundu Sarawak

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Introduction: *Nitrates In Rural Drinking Water Supply andIts Potential Health Risk* had been chosen as the topic for this study to explore the status of water supply in terms of its quality and suitability for human consumption. This study takes place at Kampung Raso 1, located at Lundu District, Kuching Division, Sarawak. Kampung Raso 1 is among the villages that still rely on surface water directed over Gravity Fed System pipe to every house within the village. **Objective:** The general objective of the study is to examine the nitrate level in rural GFS drinking water supply. The specific objectives are 1) to compare the nitrates level with the standard set in the Malaysian National Drinking Water Quality Standard (NDWQS), conduct health risk assessment and 3) identify the practices, devices and condition that can contribute to high level of nitrates in drinking water. **Methodology:**32 water sampling points have been selected to test for nitrate level. These 32 samples represent each house in the village, 100% of total houses in Kampung Raso 1. The water samples were brought the laboratory for analysis of nitrate. Method 8039 using HACH DR2800 instrument was applied in this study to test for nitrate level. **Results:** The mean ± SD of nitrate level in drinking water supply of this study was 7.939 ± 1.194 mg L^{-1}. It ranged between 7.509 to 8.370 mg L^{-1}. Statistical analysis using SPSS One Sample T-Test was used to compare nitrate levels in Kampung Raso 1 with standard set in the Malaysian National Drinking Water Quality Standard (NDWQS).The health risk exposure of nitrate was calculated as Chronic Daily Intake (CDI) and Hazard Index (HI) in this study. The Mean ± SD for CDI was 0.336 ± 0.101 mg kg day^{-1}, with the average body weight of 61 and daily water intake of 2.594 L day^{-1}. Hazard Index (HI) was calculated by dividing the CDI value with Reference Dose (RfD). US EPA (2013) state that the reference Dose (RfD) for nitrate is 1.6 mg kg^{-1}. According to New Jersey Department of Environmental Protection 2007 (as cited in Jamaludin *et al.*, 2013), the HI value greater than 1 indicated a potential for an adverse health effect to occur. The HI values for all respondents in this study were less than 1, with the Mean ± SD was 0.210 ± 0.063. **DISCUSSION:**The Mean ± SD for nitrate level, 7.939 ± 1.194 mg L^{-1} shows that the level was still considered as normal value. Nitrate concentrations in all water sampling points were below the maximum allowable limit of the Malaysian National Drinking Water Standard (10 mg L^{-1}). **CONCLUSION:**Nitrate level in rural drinking water supply, particularly in the form of gravity feed system pipe at Kampung Raso 1 Lundu, Sarawak is within the acceptable limit. Although nitrate level was low in this study, buteffort to minimize any further exposure of nitratetowards human as well as ecosystem and environmentshould be put as vital concern. Monitoring should be done as frequent as possible. Villages must learnt how to manage or minimize the use of fertilizer containing high level of nitrate.