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Inhalation Dose Assessment of Natural Radionuclide using Data of IMS RN65

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ABSTRACT

Between December 2018 and January 2019, the capital of Thailand and several provinces in the central part of the country were covered by high pressure caused by a seasonal Monsoon. This leads to a poor air ventilation in vertical transportation causing serious air pollution in those areas. Particulate Matter 2.5 (PM2.5) and 10 (PM10) with concentrations exceeding the safety level were detected by the Pollution Control Department. Air pollution severely occurring in Bangkok was horizontally dispersed to neighbor provinces including Nakhon Pathom where RN65 is located. An increase of health problem due to the inhalation of the Particulate Matter was found in local people. Internal exposure dose from inhalation of dust attached with natural radionuclides was also expected to increase in the area of dust pollution. Activity concentrations of natural radionuclides including ^{7}Be, ^{212F}Pb and ^{40}K reported in RRR during a period of pollution are used for assessing inhalation dose in people living near the RN65 station received from surface air. Finally, Statistical analysis of ^{7}Be, ^{212F}Pb and ^{40}K activity concentrations with interesting factors were analysed and reported in this study.

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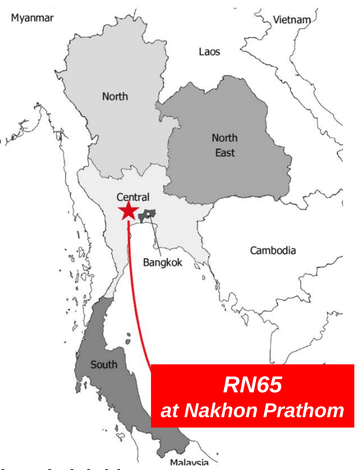
BACKGROUND

Station Information

- THP65 Location: Kasetsart University, Nakhon-Prathom, Thailand
- Installation: Feb 2017
- Location coordination
  Latitude: 14 01 42.5 N
  Longitude: 99 58 12.1 E
- Certification date: 14 Dec 2018



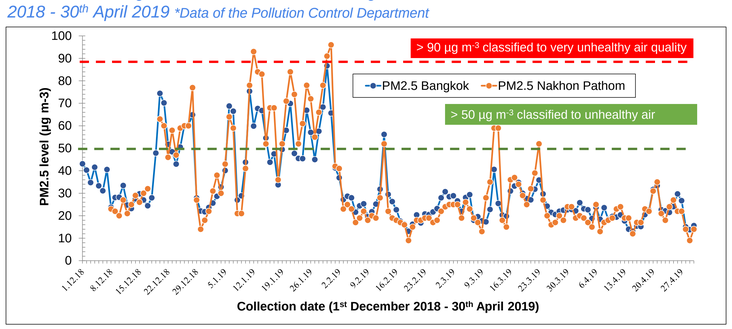
Local Climate Information

- Ambient temperature: 20-37 °C
- Humidity: 50-95%
- Dust pollution: Dec 2018 - Jan 2019

Particulate Matter Pollution in Bangkok and vicinities

Recent years Bangkok and its vicinity have been polluted by PM2.5 during dry season between December and February. PM2.5 and PM10 concentrations higher than healthy level were reported by the Pollution Control Department.

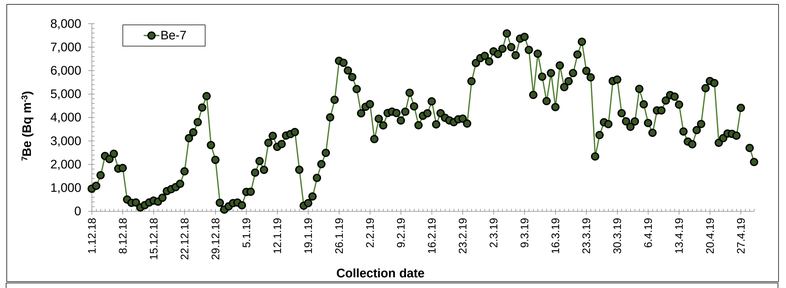
*The 24 hrs average PM2.5 concentration in Bangkok and Nakhon Pathom from 1st December 2018 - 30th April 2019 *Data of the Pollution Control Department*

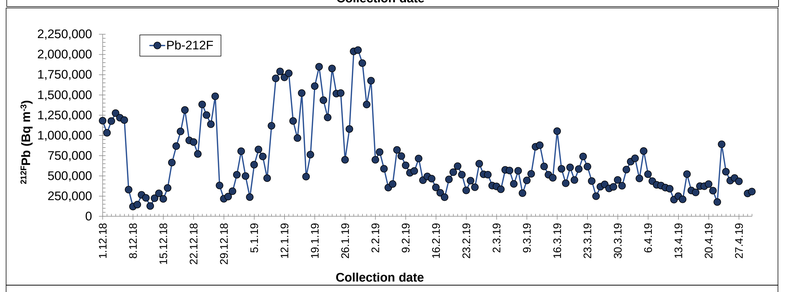


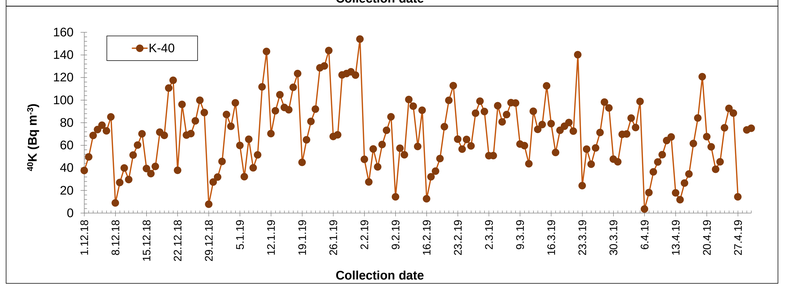
^{7}Be, ^{212F}Pb and ^{40}K Concentrations of Particular Matter in Surface Air at RN65

Natural radionuclides concentrations reported in Reviewed Radionuclide Report (RRR) are reliable and qualified for technical study. At RN65 ^{7}Be, ^{212F}Pb and ^{40}K have been continuously reported daily.

^{7}Be, ^{212F}Pb and ^{40}K Concentrations in surface air at RN65 between 1st December 2018 and 30th April 2019







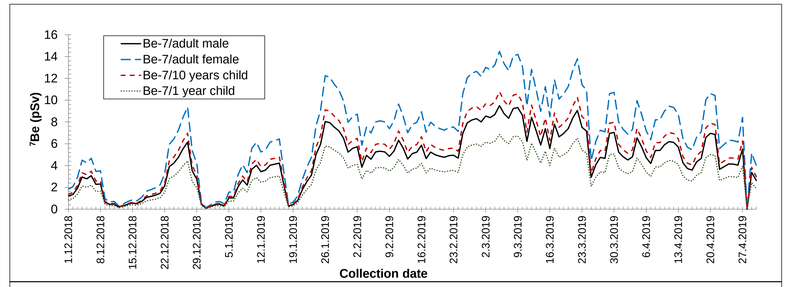
CONCLUSION

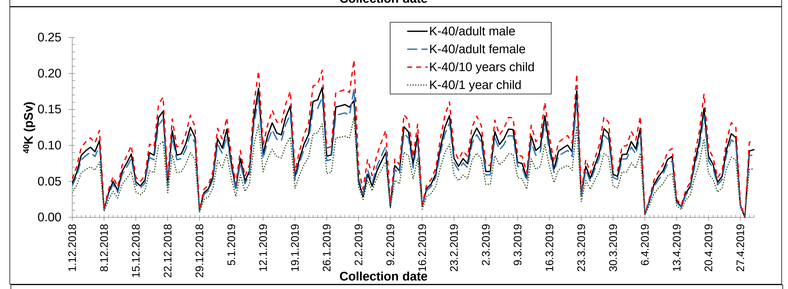
Dust pollution due to high concentration of PM2.5 and PM10 occurring between December 2018 and January 2019 in Bangkok and several provinces in the central part of Thailand were well above the healthy level. Calculated inhalation doses in human received from ^{7}Be, ^{212F}Pb and ^{40}K throughout two months of the dust pollution were much higher than doses human received in the next three months (February – April 2019). This was mainly because of growing up of ^{212}Pb and its daughters in surface air. However, the calculated inhalation doses were well below the ICRP dose limit for public calculated equally for five months (ICRP annual dose limit for public is 1 mSv).

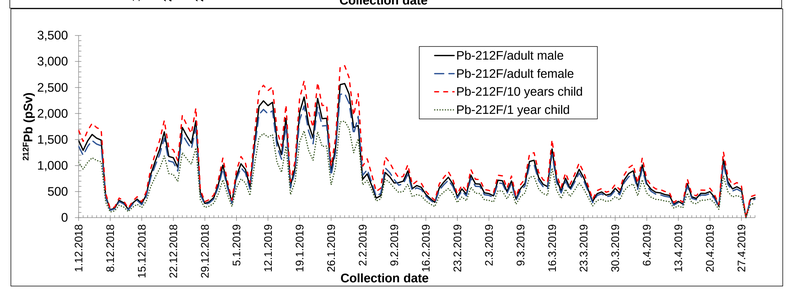
Estimations of Inhalation Dose of ^{7}Be, ^{212F}Pb and ^{40}K at RN65

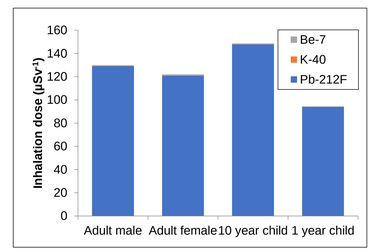
Inhalation dose from ^{7}Be, ^{212F}Pb and ^{40}K found in Total Suspended Particulates (TSP) of surface air at RN65 were calculated using conversion factors recommended by the International Commission on Radiological Protection (ICRP) for four groups of people.

Radiation dose of inhaled ^{7}Be, ^{212F}Pb and ^{40}K in Total Suspended Particulates (TSP) of surface air at RN65 for adult male, adult female, one year child and ten years child between 1st December 2018 and 30th April 2019

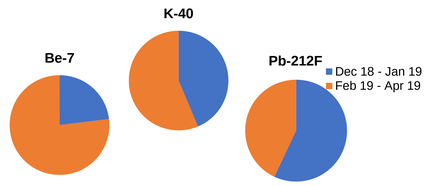








Calculated total dose of four groups of public received from inhalation of ^{7}Be, ^{40}K and ^{212F}Pb in air surface at RN65 between 1st December 2018 and 30th April 2019.



Calculated dose of public adult man received from inhalation of ^{7}Be, ^{40}K and ^{212F}Pb in air surface at RN65 between 1st December 2018 to 31st January 2019 (during dust pollution) and 1st February to 30th April 2019.

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