

**Technical Report No. 26 on
Environmental Radiation Monitoring in Hong Kong**

**Summary of
Environmental Radiation Monitoring
in Hong Kong
2005**

K.C. Hui and S.W. Li

Hong Kong Observatory

© Hong Kong Special Administrative Region Government

Published July 2006

Prepared by:
Hong Kong Observatory
134A Nathan Road
Kowloon, Hong Kong

This publication is prepared and disseminated in the interest of promoting information exchange. The Government of the Hong Kong Special Administrative Region (including its servants and agents) makes no warranty, statement or representation, expressed or implied, with respect to the accuracy, completeness, or usefulness of the information contained herein, and in so far as permitted by law, shall not have any legal liability or responsibility (including liability for negligence) for any loss, damage, or injury (including death) which may result, whether directly or indirectly, from the supply or use of such information.

Mention of product of manufacturer does not necessarily constitute or imply endorsement or recommendation.

Permission to reproduce any part of this publication should be obtained through the Hong Kong Observatory.

ABSTRACT

As the Environmental Radiation Monitoring Programme entered its nineteenth year in 2005, the monitoring work by the Hong Kong Observatory has become well established. This annual report incorporates only salient features of the programme during 2005, including summaries of measurement method and results, highlights of new work, changes and new measures introduced.

The ambient radiation levels in Hong Kong in 2005 as measured by the Observatory radiation monitoring network were within the normal background range. As in the past years, traces of artificial radionuclides, namely caesium-137, tritium, strontium-90 and plutonium-239, were detected in various environmental and food samples. The levels of all these radionuclides were not significantly different from those recorded before the Guangdong Nuclear Power Station and Lingao Nuclear Power Station came into operation. Their existence could be attributed to atmospheric nuclear weapon tests from 1945 to 1980.

Based on the results, it is concluded that there was no measurable increase in 2005 in ambient radiation levels and artificial radionuclides in the Hong Kong environment and foodstuffs consumed by Hong Kong people, compared with those before the operation of the nuclear power stations.

CONTENTS

	page
FIGURES	5
TABLES	6
1. INTRODUCTION	7
2. SAMPLING, MEASUREMENT AND QUALITY ASSURANCE	8
2.1 Direct measurement of ambient radiation level	8
2.2 Collection of food and environmental samples	10
2.3 Measurement of food and environmental samples in laboratory	12
2.4 Quality assurance	13
3. RESULTS AND CONCLUSION	14
3.1 Results	14
3.2 Conclusion	17
ACKNOWLEDGEMENT	18
REFERENCES	19

FIGURES

	Page
1. Locations for real-time direct measurement of ambient gamma radiation	20
2. Thermoluminescent dosimeter network and locations for collection of environmental samples in 2005	21
3. Background radiation levels of Potassium-40 (naturally occurring) over Ping Chau, as measured by the Aerial Monitoring System on 30 May 2005	22
4. Background gamma radiation level over Soko Islands, as measured by the Aerial Monitoring System on 12 August 2005 at about 500 meters above mean sea level	23
5. Average vertical profiles of atmospheric radioactivity in 2005	24

TABLES

	Page
1. Summary of the sampling and analysis programme in 2005	25
2. Summary of food samples collected in 2005	29
3. Summary of key measurement parameters	31
4. Results of the IAEA inter-laboratory comparison exercise on a Irish Sea sediment sample (IAEA-385)	33
5. Ambient gamma dose rates recorded by the radiation monitoring network and thermoluminescent dosimeter network in 2005	34
6. Radiation measurement results of the Automatic Gamma Spectrometry System at Ping Chau in 2005	35
7. Measurement results of gamma dose rates due to cosmic radiation	35
8. Measurement results of gamma activities in food and environmental samples in 2005	36
9. Measurement results of tritium activities in food and environmental samples in 2005	37
10. Measurement results of strontium-90 activities in food and environmental samples in 2005	40
11. Measurement results of plutonium-239 activities in food and environmental samples in 2005	43
12. Overall summary of measurement results in 2005	44

1. INTRODUCTION

Since 1961, the Hong Kong Observatory (HKO) has been monitoring environmental radiation levels in Hong Kong and participating in international programmes on environmental radiation monitoring organised by the International Atomic Energy Agency (IAEA) and the World Meteorological Organization (WMO). In response to the construction of nuclear power stations at Daya Bay in Guangdong, the HKO embarked in 1983 on a comprehensive Environmental Radiation Monitoring Programme (ERMP) to monitor the radiation levels in Hong Kong before and after the power plants commenced operation. The monitoring results for the years 1987 to 1991 can be found in the report on the Background Radiation Monitoring Programme (HKO 1992). Those from 1992 to 2002 were published in annual reports of the programme (HKO 2003).

Starting from 2003, the annual report only includes the most salient features of the programme, including summaries of measurement methods and results, highlights of new work, changes and measures introduced during the year (HKO 2005). Readers may refer to the previous reports for details of the sampling, measurement and quality assurance work.

The first phase of the ERMP, known as the Background Radiation Monitoring Programme (BRMP), was conducted from 1987 to 1991 to establish the baseline radiation levels in Hong Kong prior to the operation of the Guangdong Nuclear Power Station (GNPS) in 1994 (see [Figure 1](#) for location). These baseline levels would enable the detection of changes arising from the operation of GNPS if any. The second phase of the ERMP (ERMP-II) commencing in 1992 contains all the essential features of the BRMP, with adjustments in sampling and measurement to take advantage of the experience gained. ERMP-II is an on-going programme to determine long-term changes in environmental radiation levels in Hong Kong if any, particularly those arising from the operation of the GNPS and the Lingao Nuclear Power Station (LNPS)*.

Chapter 2 in this report describes the sampling schedule, the instruments and methods used for measuring ambient radiation levels, as well as radioactivity in food and environmental samples. A summary of the quality assurance system is also given. Measurement results and conclusion are presented in Chapter 3.

[* LNPS (see [Figure 1](#) for location) is located next to GNPS at Daya Bay. It came into operation in mid-2002.]

2. SAMPLING, MEASUREMENT AND QUALITY ASSURANCE

Under the ERMP, three major exposure pathways are monitored, namely the atmospheric pathway, the terrestrial pathway and the aquatic pathway. In respect of measurement, the ERMP consists of two major components. The first component is the direct measurement of ambient gamma radiation levels in Hong Kong. The second is the detection of any artificial radioactive material, arising from the operation of GNPS and LNPS, in the environment of Hong Kong and in the foodstuff commonly consumed by Hong Kong people. The locations for real-time direct measurement of ambient gamma radiation are shown in [Figure 1](#). The locations for other direct measurement of ambient gamma radiation and collection of environmental samples in 2005 are shown in [Figure 2](#). A summary of the sampling and analysis programmes of the ERMP in 2005 is given in [Table 1](#).

2.1 Direct measurement of ambient radiation level

Radiation Monitoring Network

Since the commencement of ERMP-II, the ambient gamma dose rates have been monitored by a radiation monitoring network (RMN) consisting of 10 fixed stations ([Figure 1](#)). The dose rates are measured at each station continuously by a high pressure ionization chamber (HPIC) (Reuter-Stokes Model RSS-131 environmental radiation monitor). Data are transmitted to the Observatory Headquarters once every minute.

Thermoluminescent Dosimeter Network

To achieve a wide spatial coverage of ambient radiation monitoring economically, a thermoluminescent dosimeter (TLD) network has been in operation since the late 1980s to measure ambient gamma doses accumulated over a long period. In ERMP-II, the network comprises 27 monitoring points over the territory ([Figure 2](#)). The TLDs are of the lithium fluoride (LiF:Mg,Ti) type (Harshaw Type 8807). A batch of five TLDs is placed at each site to ensure statistical accuracy. The TLDs are replaced and read once every quarter.

Aerial Monitoring System

The Aerial Monitoring System (AMS) has been put into operation since 1998.

The system is mounted on board a helicopter of the Government Flying Service when in operation. It has the capability to determine the existence and extent of any radioactive plume over Hong Kong when operating in the plume tracking mode. After passage of the plume, the system can be used to identify surface areas contaminated by deposited radionuclides using the ground contamination measurement mode. The system has two assemblies of sodium iodide (NaI) detectors, one for each of the two operation modes. Gamma spectra, spectroscopic analysis results and location information are displayed on board the helicopter in real time and archived at regular intervals.

Starting from 2003, a Super Puma L2 helicopter of the Government Flying Service has been employed to carry the system during operation.

Automatic Gamma Spectrometry System

Hong Kong Observatory has been operating the Automatic Gamma Spectrometry System (AGSS) at Ping Chau, Mirs Bay since 1996 ([Figure 1](#)) for providing early alert to any releases of artificial radionuclides from the nuclear power stations. The system consists of a zinc sulphide (ZnS) coated plastic scintillator, a high purity germanium detector and a NaI detector. It continuously collects airborne particulates on a rotating filter drum and gaseous iodine in a carbon cartridge. The ZnS scintillator directly above the filter drum measures the alpha and beta activities of the particulates collected. Inside the filter drum, the germanium detector measures gamma rays emitted by the particulates and gamma spectrometry analysis is carried out automatically. The NaI detector measures the iodine-131 concentration in the carbon cartridge which is replaced automatically at weekly intervals. Data of alpha and beta activities, as well as results of gamma spectrometry analysis are transmitted to a central station at the Observatory Headquarters at 15-minute intervals, while the iodine-131 activity data is sent back every 10 minutes.

Mobile Radiation Monitoring Station

The Mobile Radiation Monitoring Station (MRMS) was converted from a commercial van. It is equipped with portable and specially designed instruments for use in routine and emergency radiological surveys. In addition, the MRMS is equipped with a mechanical arm to enable positioning of the Portable Gamma Spectroscopic Analysis Module (PGSAM) over specific survey points for measurement. Together

with an external gamma probe and an air inlet on the vehicle roof, environmental samples and survey data can be obtained without the survey team members going outside the vehicle, resulting in better protection to the operator during radiological surveys.

Upper-air Radioactivity Soundings

Radioactivity in the upper atmosphere is measured by means of balloon-borne radiosondes (Vaisala Model RS80) since 1994. Each radiosonde carries a radioactivity sensor (Vaisala Model NSS14A) which comprises two Geiger-Müller (GM) tubes, one measuring only gamma radiation ('gamma-only tube') while the other both gamma and high energy (> 0.25 MeV) beta radiation ('gamma-plus-beta tube'). The ground station is a Vaisala DigiCORA MW11 upper-air sounding system which receives and processes data from the radiosonde. The sounding was suspended in 2004 to enable a review and analysis of the measurement results collected between 1994 and 2003. In 2005, regular radioactivity soundings resumed so as to collect more data under different weather conditions and ensure readiness of the system.

2.2 Collection of food and environmental samples

Atmospheric Samples

As in past years, atmospheric samples, including airborne particulates, wet deposition (precipitation), total deposition (wet plus dry deposition), gaseous iodine and water vapour, are collected under the ERMP. Airborne particulates and wet deposition are regularly collected at King's Park, Sha Tau Kok and Yuen Ng Fan ([Figure 2](#)) at weekly intervals. In addition, equipment is also installed at the other seven radiation monitoring stations for collecting atmospheric samples during emergency. Airborne particulates are captured by a filter paper installed inside a high volume air sampler (General Metal Works Model UV-2H-1). Wet deposition is collected by a carboy fitted with a top funnel. During the dry season, three sets of carboys and funnels are used at each location for collection of sufficient amount of rain for measurement.

Total deposition, gaseous iodine and water vapour are also collected at King's Park. The sampler for total deposition is a stainless-steel pan partially filled with distilled water to collect samples at weekly intervals. Gaseous iodine is sampled using a radioiodine sampler (Hi-Q Environmental Products Model CMP-14CV) with a silver impregnated zeolite cartridge. The cartridge is collected and replaced weekly. Water vapour is collected using a gaseous effluent sampler (Science Applications

International Corporation Model ACT-100) with a drierite cartridge intermittently for a total time of 36 hours within a randomly selected week each month.

Food Samples

Both terrestrial and aquatic foodstuffs typical of the diet of the local population are collected at main distribution points, wholesale markets and from enlisted suppliers. Particular attention has been given to food produced locally and in Shenzhen. Food samples collected in 2005 are listed in [Table 2](#).

Drinking Water, Underground Water and Sea Water

As in past years, treated drinking water is collected from distribution taps at Kowloon and Tuen Mun as well as the treatment works at Shatin, Tuen Mun and Yau Kom Tau ([Figure 2](#)). Raw or untreated drinking water is collected from the High Island Reservoir, the Plover Cove Reservoir, the Muk Wu B Pumping Station and the treatment works at Shatin, Tuen Mun and Yau Kom Tau ([Figure 2](#)). Both untreated drinking water and treated drinking water are collected once every three months by staff of the Water Supplies Department.

With assistance from the Housing Department and the estate management, underground water is collected once every year at six locations ([Figure 2](#)), namely Siu Hong Court (Tuen Mun), Cheung Hong Estate (Tsing Yi), Kwan Lok San Tsuen (Yuen Long), Wan Tsui Estate (East Hong Kong Island), Wah Fu Estate (Pokfulam) and Fu Shan Estate (East Kowloon).

As in past years, sea water is sampled at three depths - the upper level (2.5 metres underneath the surface), the middle level and the lower level (2.5 metres above the seabed) at four locations in the eastern part of the coastal waters of Hong Kong ([Figure 2](#)), namely waters off Waglan Island, Basalt Island, Tai Long Wan and Port Island. Sampling is carried out annually with the assistance of the Environmental Protection Department. Suspended particulates in sea water at the three depths are collected by filtering the corresponding sea water samples through a membrane filter.

Land Soil and Sediments

Land soil is sampled at 39 designated sites throughout the territory every five years. In 2005, land soil samples were collected from King's Park, Sha Tin, Sai Kung, Clear Water Bay, High Island West, High Island East, Pak Tam Au and Pak Sha O

(Figure 2). At each site, samples were collected from two layers, the upper layer from the surface to 15 cm deep and the lower layer from 15 cm to 30 cm deep.

As in past years, intertidal sediments are sampled quarterly at three locations along the coast of Hong Kong (Figure 2), namely Pak Sha Wan, Tsim Bei Tsui and Sha Tau Kok. Two layers are taken at each sampling point, the upper layer from the surface to 15 cm deep and the lower layer from 15 cm to 30 cm deep. Sampling of seabed sediments is carried out annually with the assistance of the Civil Engineering and Development Department at four locations in the coastal waters of Hong Kong (Figure 2), namely, Tai Tan Hoi, Lung Ha Wan, Picnic Bay and Western Anchorage.

2.3 Measurement of food and environmental samples in laboratory

All radioactivity measurements of food and environmental samples are carried out at the radiation laboratories at King's Park. A list of the major artificial radionuclides routinely monitored in the ERMP is given in Table 1. Each sample, depending on the sample type and measurement objective, would go through one or more of the following analyses:

- (a) gamma spectrometry analysis to determine the activity concentrations of gamma-emitting radionuclides;
- (b) liquid scintillation counting to determine the activity concentration of tritium[†];
- (c) low-level gross beta counting to determine the activity concentration of strontium-90; and
- (d) alpha spectrometry analysis to determine the activity concentration of plutonium-239.

[[†]Tritium is primarily produced naturally by cosmic rays entering the atmosphere or generated during atmospheric nuclear tests conducted from 1945 until 1980. A small amount is also produced during operation of nuclear power stations. (UNSCEAR 2000)]

A summary of key measurement parameters, including sample size, counting time and detection limits, are given in Table 3.

2.4 Quality assurance

Since 1989, the Observatory has been participating in inter-laboratory comparison exercises and proficiency tests organized by major international and national organizations, namely the International Atomic Energy Agency (IAEA), the World Health Organization (WHO) and the China Institution for Radiation Protection (CIRP). Other than inter-laboratory comparison exercises and proficiency tests, the quality of the measurements in the ERMP is also assured through internal quality assurance procedures.

IAEA published in 2005 the results of an inter-laboratory comparison exercise on an Irish Sea sediment sample (IAEA-385) conducted in 2002. A summary of the Observatory's measurement results is given in [Table 4](#). The values reported by the Observatory were all within the acceptable ranges promulgated by IAEA.

A report for an inter-laboratory comparison exercise on strontium-90 measurement of a water sample conducted earlier in the same year was released by the CIRP in December 2005. The result obtained by the HKO, 14.2 ± 1.1 Bq/L, was close to the reference value released by CIRP with a difference of less than 2 %. The results indicated that the equipment and analytical methods used by the Observatory conformed to emergency monitoring requirements.

3. RESULTS AND CONCLUSION

3.1 Results

Radiation Monitoring Network

The annual average ambient gamma dose rates and ranges of 1-minute averages recorded by the RMN in 2005 are tabulated in [Table 5](#).

Since the operation of the RMN, temporal changes in the radiation level recorded at the stations are typically a few percent in seasonal variations. However, during episodes of heavy rain or tropical cyclones affecting Hong Kong, the variations can be significantly larger and may even double the normal level.

The most significant change in the ambient gamma dose rates in 2005 was recorded when heavy rain associated with a trough of low pressure affected Hong Kong on 20 August. The 1-minute average dose rates at Ping Chau rose to about 100% above the mean value of the year.

Thermoluminescent Dosimeter Network

The annual average, standard deviation and range of gamma dose rates measured at each of the TLD stations in 2005 are listed in [Table 5](#). The gamma dose rates recorded at all stations were found to be within the BRMP range.

Aerial Monitoring System

In May 2005, a background measurement in the ground contamination measurement mode was conducted over Ping Chau. No artificial radionuclides were detected. [Figure 3](#) shows the background activity concentration of potassium-40 (naturally occurring) over the area. It was observed that the activity of potassium-40 was higher over land, from 300 up to about 550 Bq kg⁻¹, than over water where it was relatively constant at around 50 Bq kg⁻¹.

In August 2005, measurement flights in the plume tracking mode were carried out over Soko Islands at 500 metres above mean sea level to obtain background data over that area. [Figure 4](#) presents the results obtained. No artificial radionuclides were detected. While the count rates over the sea were relatively constant at around 250 cps, those over the land surface ranged from about 280 for flat terrain, to up to about 300 cps

when close to the hills.

Automatic Gamma Spectrometry System

Results obtained by the AGSS in 2005 are given in [Table 6](#). No artificial radionuclides were detected, and all results were within their respective ranges of variation from 1997 to 2004.

Mobile Radiation Monitoring

Four measurements of cosmic radiation were carried out at Plover Cove in 2005. The average gamma dose rates due to cosmic radiation were from 0.030 to 0.034 $\mu\text{Gy h}^{-1}$ ([Table 7](#)), close to those obtained in previous years.

The territory-wide survey of ambient gamma absorbed dose rates were suspended in 2004 and 2005. After analysis and correction for the cosmic component, data from surveys conducted between 2000 and 2003 indicated that the average gamma absorbed dose rates in air at the street level and open field were respectively 0.177 and 0.091 $\mu\text{Gy h}^{-1}$, with a ratio of about 2. These results were consistent with those obtained in an earlier survey in 1999 (Wong *et al.* 1999).

Upper-air Radioactivity Soundings

Four radioactivity soundings were made in 2005. The weather conditions during these soundings were: light rain with light northerly winds on 18 February, light rain with light west to southwesterly winds on 12 April, fine with light to moderate west to southwesterly winds on 5 July, and fine with light to moderate easterly winds on 16 September. [Figure 5](#) shows the average vertical profiles of atmospheric radioactivity in 2005. The results were consistent with the data obtained in previous years.

Food and Environmental Samples

A total of 387 food and environmental samples were collected in 2005. Samples with measurable activity are tabulated in [Tables 8, 9, 10 and 11](#), showing the results of gamma spectrometry analyses, tritium measurements, strontium-90 measurements and plutonium-239 measurements respectively. Only results pertaining to artificial radionuclides are included. For ease of reference, a summary of measurement results in 2005 for the major sample types according to different pathways is given in [Table 12](#).

a) Caesium-137

As in past years, traces of caesium-137, an artificial gamma-emitting radionuclide, were detected in some food and soil samples in 2005, including seafood, land soil, seabed sediment, and intertidal sediment. The measured activities in these samples were all within the corresponding ranges of BRMP values.

Caesium-137 was detected in the above sample types in both BRMP and the ERMP-II so far (Wong *et al.* 2003). The presence of the radionuclide in environmental and food samples could be attributed to remnants of the fallout of atmospheric nuclear tests conducted from 1945 until 1980 (UNSCEAR 2000).

b) Tritium

As in past years, very low amounts of tritium were detected in atmospheric, water and food samples in 2005, including wet deposition, total deposition, water vapour, drinking water, underground water, sea water, rice, milk, vegetables, fruits, poultry, meat, seafood and seaweed. The measured activities in these samples were all within the corresponding ranges of BRMP values. As such, the source of tritium in the samples is primarily attributable to the natural cosmogenic process and remnants of atmospheric nuclear tests.

c) Strontium-90

As in past years, traces of strontium-90 were detected in atmospheric, food and soil samples in 2005, including air particulates, wet deposition, total deposition, rice, milk, vegetables, fruits, poultry, meat, suspended particulate in sea water, seafood, seaweed and land soil. The measured activities in these samples were all within the corresponding ranges of BRMP values. The radionuclide was detected in the above types of samples in both BRMP and the ERMP-II so far. The radionuclide's presence is attributable to atmospheric nuclear tests (UNSCEAR 2000).

d) Plutonium-239

As in past years, minute amounts of plutonium-239 were detected in some food and soil samples in 2005, including seaweed, land soil, seabed sediment and intertidal sediment. The measured activities in these samples were all within the corresponding ranges of BRMP values. It is believed that fallout of atmospheric nuclear tests was again the major source of the radionuclide (UNSCEAR 2000).

3.2 Conclusion

The ambient gamma dose rates recorded over various parts of the territory in 2005 were within the BRMP range. The activities of all artificial radionuclides in the samples collected in 2005 were found to be within the corresponding ranges of baseline values obtained in BRMP. It is concluded that in 2005 there was no measurable increase in ambient radiation levels and in artificial radionuclides in the Hong Kong environment and foodstuffs consumed by Hong Kong people, compared with those before the operation of GNPS and LNPS.

ACKNOWLEDGEMENT

The Hong Kong Observatory wishes to express its gratitude to the Agriculture, Fisheries and Conservation Department, Civil Engineering and Development Department, Environmental Protection Department, Water Supplies Department and Housing Department for their assistance in sample collection; the Government Laboratory for chemical treatment of samples; and the Department of Health for providing and reading thermoluminescent dosimeters. We would also like to express our appreciation to the Government Flying Service for operation of the Aerial Monitoring System; and the Hong Kong Police Force for providing accommodation at police stations to a number of radiation monitoring stations and the Automatic Gamma Spectrometry System. Special thanks also go to those organisations for their permission on the installation of thermoluminescent dosimeters and the collection of land soil samples within their premises.

REFERENCES

1. Currie, L.A. 1968 Limits for Qualitative Detection and Quantitative Determination, *Analytical Chemistry*, v.40, no.3, pp.586-593.
2. Hong Kong Observatory 1992 *Environmental Radiation Monitoring in Hong Kong: Background Radiation Monitoring Programme 1987-1991*.
3. Wong, M.C., Y.K. Chan, H.T. Poon, W.M. Leung, H.Y. Mok and C.K. So 1999 *Environmental Gamma Absorbed Dose Rate in Air in Hong Kong 1999*, Technical Report No. 17, Hong Kong Observatory.
4. United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) 2000 *Sources and Effects of Ionizing Radiation, Volume I: Sources*.
5. Wong, M.C., H.T. Poon, H.Y. Mok and Y.S. Li 2003 *Environmental Radiation Monitoring in Hong Kong – 1987 to 2002*, Technical Note No. 106, Hong Kong Observatory.
6. Hong Kong Observatory 2005 *Summary of Environmental Radiation Monitoring in Hong Kong 2004*.

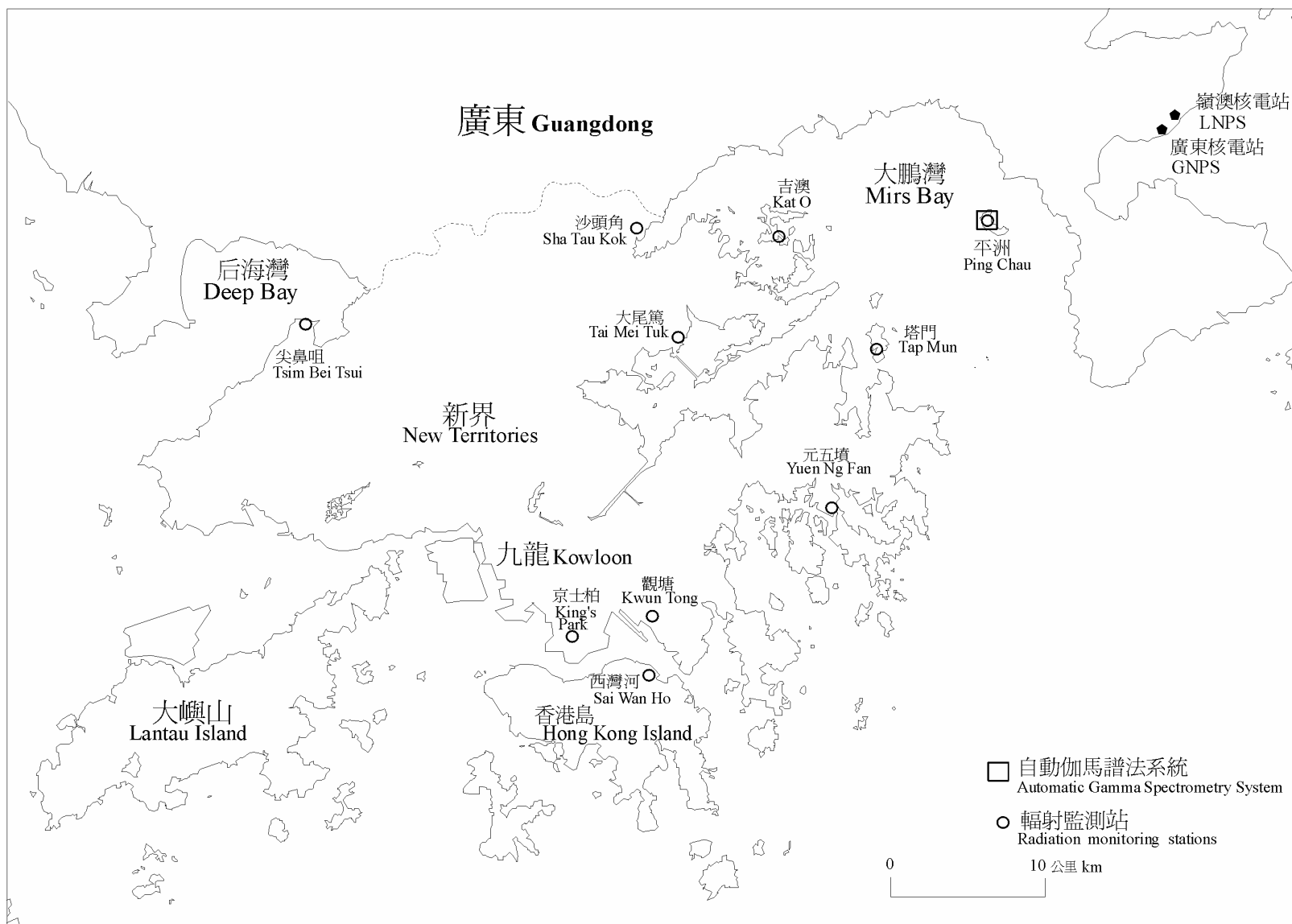


圖 1. 環境伽馬輻射的實時直接測量點。

Figure 1. Locations for real-time direct measurement of ambient gamma radiation.

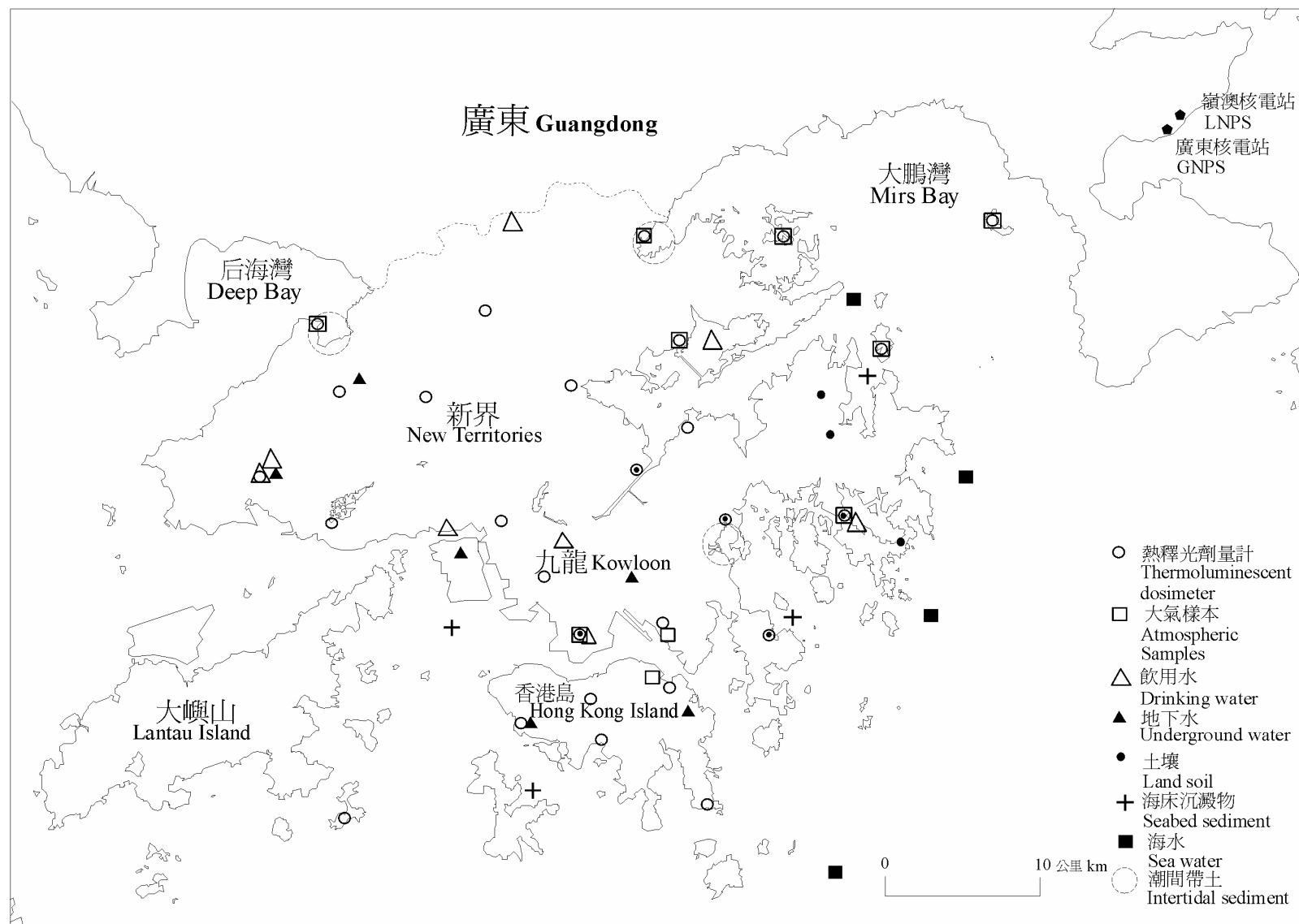


圖 2. 熱釋光劑量計網絡及二零零五年的環境樣本收集點。

Figure 2. Thermoluminescent dosimeter network and locations for collection of environmental samples in 2005.

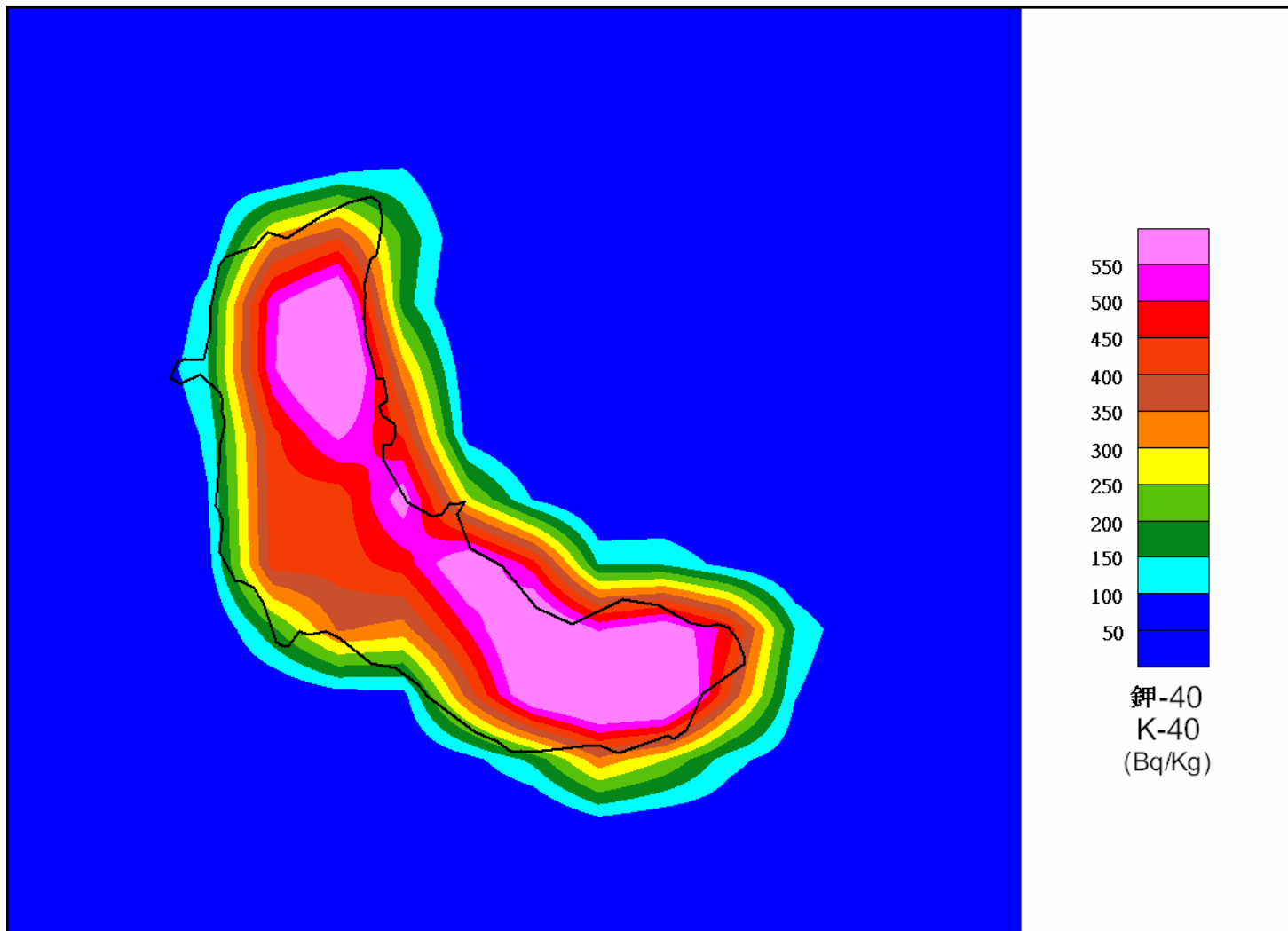


圖 3. 二零零五年五月三十日利用空中輻射監測系統在平洲測量到的鉀-40(自然存在)本底輻射水平。

Figure 3. Background radiation levels of Potassium-40 (naturally occurring) over Ping Chau, as measured by the Aerial Monitoring System on 30 May 2005.

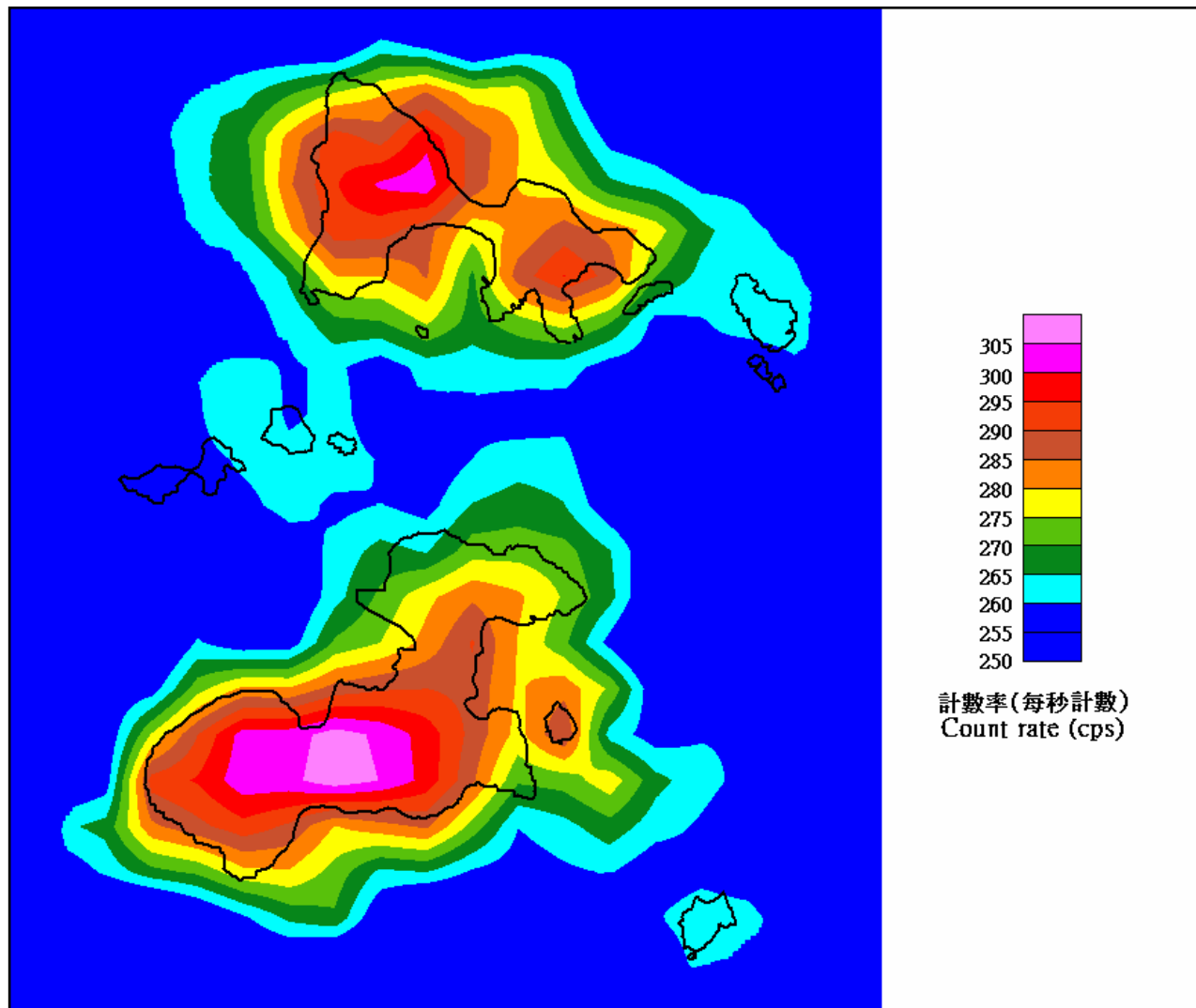


圖 4. 二零零五年八月十二日利用空中輻射監測系統在索罟群島測量到的本底伽馬輻射水平，測量高度為海平面上500米。

Figure 4. Background gamma radiation level over Soko Islands, as measured by the Aerial Monitoring System on 12 August 2005 at about 500 meters above mean sea level.

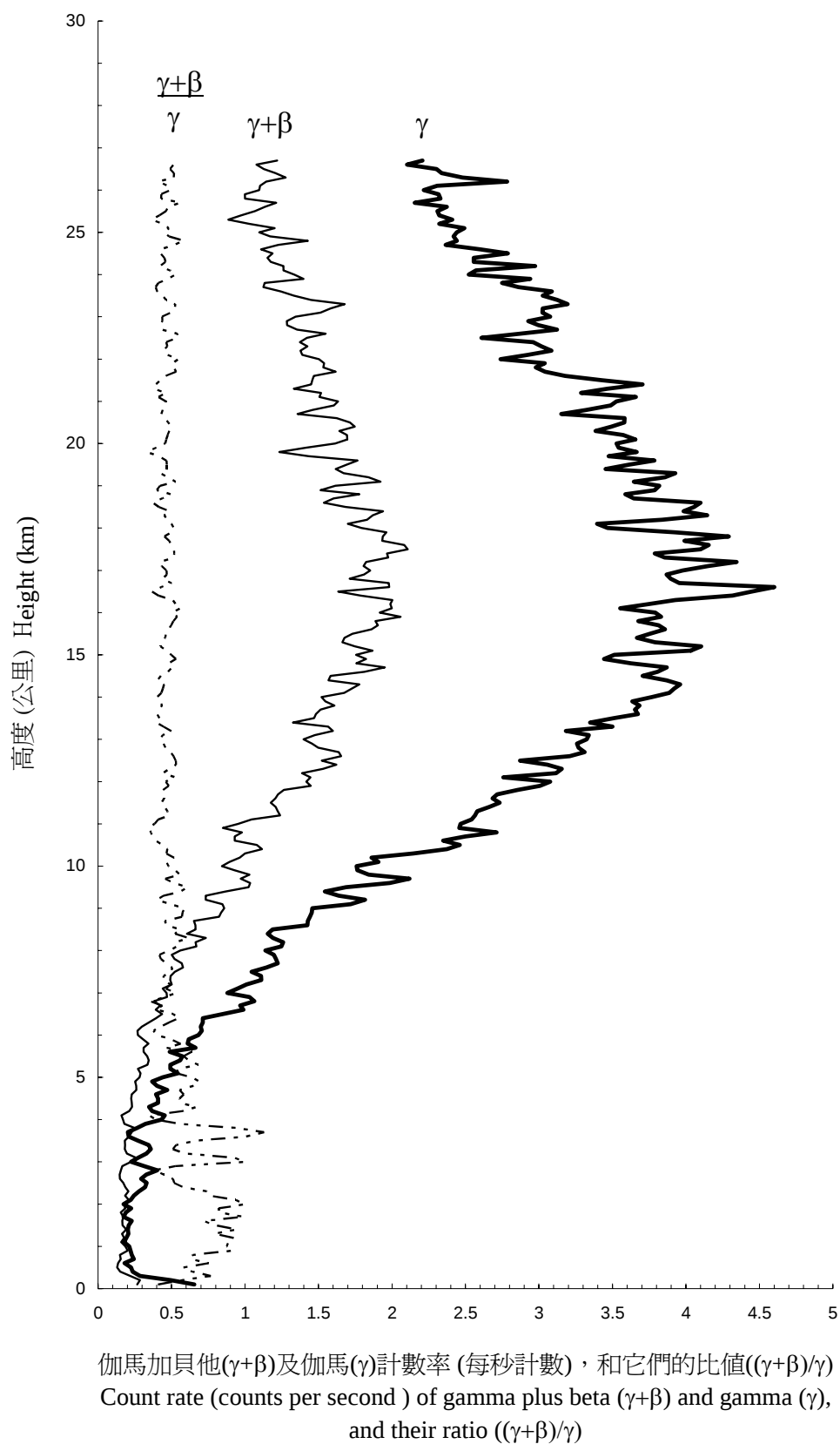


圖 5. 二零零五年大氣放射性的平均垂直廓線 (數據源自二月十八日、四月十二日、七月五日及九月十六日的四次高空輻射探測)。

Figure 5. Average vertical profiles of atmospheric radioactivity in 2005 (data based on the four radioactivity soundings on 18 Feb, 12 Apr, 5 Jul and 16 Sep).

表 1. 二零零五年樣本取樣及分析概要

Table 1. Summary of the sampling and analysis programme in 2005

樣本類別 Sample type	取樣地點 Sampling location	地點數目 Number of location	分析類別 Type of analysis	取樣頻率 Sampling frequency
環境伽馬輻射 Ambient Gamma Radiation				
伽馬劑量率 Gamma dose rates	平洲 Ping Chau, 塔門 Tap Mun, 吉澳 Kat O, 沙頭角 Sha Tau Kok, 元五墳 Yuen Ng Fan, 大尾篤 Tai Mei Tuk, 尖鼻咀 Tsim Bei Tsui, 觀塘 Kwun Tong, 西灣河 Sai Wan Ho, 京士柏 King's Park	10	伽馬 γ	一分鐘 1-minute interval
累積伽馬劑量 Cumulative gamma doses	平洲 Ping Chau, 塔門 Tap Mun, 吉澳 Kat O, 元五墳 Yuen Ng Fan, 清水灣 Clear Water Bay, 西貢 Sai Kung, 大尾篤 Tai Mei Tuk, 烏溪沙 Wu Kai Sha, 鶴咀 Cape D'Aguilar, 沙頭角 Sha Tau Kok, 沙田 Shatin, 觀塘 Kwun Tong, 筲箕灣 Shau Kei Wan, 大埔 Tai Po, 京士柏 King's Park, 跑馬地 Happy Valley, 深水灣 Deep Water Bay, 蘇屋 So Uk, 置富花園 Chi Fu Fa Yuen, 粉嶺 Fanling, 荃灣 Tsuen Wan, 石崗 Shek Kong, 長洲 Cheung Chau, 元朗 Yuen Long, 大欖涌 Tai Lam Chung, 尖鼻咀 Tsim Bei Tsui, 屯門 Tuen Mun	27	伽馬 γ	每季 quarterly
大氣樣本 Atmospheric Samples				
大氣飄塵 Airborne particulate	京士柏 King's Park, 沙頭角 Sha Tau Kok, 元五墳 Yuen Ng Fan	3	伽馬 γ , 銻-90 Sr-90, 釷-239 Pu-239	每週 (累積一月) weekly (bulk monthly)
濕沉積物(降雨) Wet deposition (precipitation)	京士柏 King's Park, 沙頭角 Sha Tau Kok, 元五墳 Yuen Ng Fan	3	伽馬 γ , 氚 H-3, 銻-90 Sr-90, 釷-239 Pu-239	每週 (累積一月) weekly (bulk monthly)
總沉積物 Total deposition	京士柏 King's Park	1	伽馬 γ , 氚 H-3, 銻-90 Sr-90, 釷-239 Pu-239	每週 (累積一月) weekly (bulk monthly)
氣態碘 Airborne radioiodine	京士柏 King's Park	1	伽馬 γ	每週 weekly
大氣水蒸氣 Water vapour in air	京士柏 King's Park	1	氚 H-3	每月 monthly

表 1. (續)

Table 1. (cont'd)

樣本類別 Sample type	取樣地點 Sampling location	地點數目 Number of location	分析類別 Type of analysis	取樣頻率 Sampling frequency
地面樣本 Terrestrial Samples				
食米 Rice	內地 Mainland	1	伽馬 γ , 氚 H-3, 銨-90 Sr-90	每季 quarterly
牛奶(經消毒) Pasteurized milk	深圳 Shenzhen, 沙頭角 Sha Tau Kok	2	伽馬 γ , 氚 H-3, 銨-90 Sr-90	每季 quarterly
菜心 Choi sum	內地 Mainland, 本地 Local	2	伽馬 γ , 氚 H-3, 銨-90 Sr-90	每季 quarterly
白菜 Pak choi	內地 Mainland, 本地 Local	2	伽馬 γ , 氚 H-3, 銨-90 Sr-90	每季 quarterly
香蕉 Banana	內地 Mainland	1	伽馬 γ , 氚 H-3, 銨-90 Sr-90	每季 quarterly
荔枝 Lychee	內地 Mainland	1	伽馬 γ , 氚 H-3, 銨-90 Sr-90	夏季 summer
柑橘 Mandarin	內地 Mainland	1	伽馬 γ , 氚 H-3, 銨-90 Sr-90	秋季及冬季 autumn and winter
甘蔗 Sugar cane	內地 Mainland	1	伽馬 γ , 氚 H-3, 銨-90 Sr-90	春季 spring
雞 Chicken	內地 Mainland, 本地 Local	2	伽馬 γ , 氚 H-3, 銨-90 Sr-90	每季 quarterly
鴨 Duck	內地 Mainland, 本地 Local	2	伽馬 γ , 氚 H-3, 銨-90 Sr-90	每季 quarterly
牛肉 Beef	內地 Mainland	1	伽馬 γ , 氚 H-3, 銨-90 Sr-90	每季 quarterly
豬肝 Pig's liver	內地 Mainland, 本地 Local	2	伽馬 γ , 氚 H-3, 銨-90 Sr-90	每季 quarterly
豬肉 Pork	內地 Mainland, 本地 Local	2	伽馬 γ , 氚 H-3, 銨-90 Sr-90	每季 quarterly
土壤(上層及下層) Land soil (upper and lower level)	京士柏 King's Park, 沙田 Sha Tin, 西貢 Sai Kung, 清水灣 Clear Water Bay, 萬宜水庫西 High Island West, 萬宜水庫東 High Island East, 北潭凹 Pak Tam Au, 白沙澳 Pak Sha O	8	伽馬 γ , 銨-90 Sr-90, 釷-239 Pu-239	每 5 年一次 once every 5 years

表 1. (續)
Table 1. (cont'd)

樣本類別 Sample type	取樣地點 Sampling location	地點數目 Number of location	分析類別 Type of analysis	取樣頻率 Sampling frequency
水體樣本 Aquatic Samples				
飲用水(經處理) Drinking water (treated)	九龍配水管 Kowloon distribution tap, 屯門配水管 Tuen Mun distribution tap, 沙田濾水廠 Shatin Treatment Works, 油柑頭濾水廠 Yau Kom Tau Treatment Works, 屯門濾水廠 Tuen Mun Treatment Works	5	伽馬 γ , 氡 H-3	每季 quarterly
飲用水(未經處理) Drinking water (untreated)	沙田濾水廠 Shatin Treatment Works, 油柑頭濾水廠 Yau Kom Tau Treatment Works, 屯門濾水廠 Tuen Mun Treatment Works, 木湖 B 抽水站 Muk Wu B Pumping Station, 萬宜水庫 High Island Reservoir, 船灣淡水湖 Plover Cove Reservoir	6	伽馬 γ , 氡 H-3	每季 quarterly
地下水 Underground water	兆康苑 Siu Hong Court, 長康邨 Cheung Hong Estate, 鈞樂新村 Kwan Lok San Tsuen, 環翠邨 Wan Tsui Estate, 華富邨 Wah Fu Estate, 富山邨 Fu Shan Estate	6	伽馬 γ , 氡 H-3	每年 yearly
海水(上層、中層及低層) Sea water (upper, middle and lower level)	赤洲 Port Island, 大浪灣 Tai Long Wan, 火石洲 Basalt Island, 橫瀾島 Waglan Island	4	伽馬 γ , 氡 H-3	每年 yearly
海水中懸浮粒子 (上層、中層及低層) Suspended particulate in sea water (upper, middle and lower level)	赤洲 Port Island, 大浪灣 Tai Long Wan, 火石洲 Basalt Island, 橫瀾島 Waglan Island	4	伽馬 γ , 銻-90 Sr-90, 釷-239 Pu-239	每年 yearly
大魚 Aristichthys nobilis (Big-head carp)	深圳 Shenzhen, 元朗 Yuen Long	2	伽馬 γ , 氡 H-3, 銻-90 Sr-90, 釷-239 Pu-239	每季 quarterly
瓜三 Nemipterus japonicus (Melon coat)	大亞灣 Daya Bay, 香港以西海域 Seas west of Hong Kong, 香港水域 Hong Kong Waters	3	伽馬 γ , 氡 H-3, 銻-90 Sr-90, 釷-239 Pu-239	每季 quarterly
牛鰱 Platycephalus indicus (Bartail flathead)	大亞灣 Daya Bay, 香港以西海域 Seas west of Hong Kong, 香港水域 Hong Kong Waters	3	伽馬 γ , 氡 H-3, 銻-90 Sr-90, 釷-239 Pu-239	每季 quarterly

表 1. (續)
Table 1. (cont'd)

樣本類別 Sample type	取樣地點 Sampling location	地點數目 Number of location	分析類別 Type of analysis	取樣頻率 Sampling frequency
水體樣本 Aquatic Samples				
牙帶 Trichiurus haumela (Hair tail)	大亞灣 Daya Bay, 香港以西海域 Seas west of Hong Kong, 香港水域 Hong Kong Waters	3	伽馬 γ , 氚 H-3, 銨-90 Sr-90, 釷-239 Pu-239	每季 quarterly
三點蟹 Portunus sanguinolentus (Three-spotted crab)	香港以西海域 Seas west of Hong Kong, 香港水域 Hong Kong Waters	2	伽馬 γ , 氚 H-3, 銨-90 Sr-90, 釷-239 Pu-239	每季 quarterly
赤米蝦 Metapenaeopsis barbata (Fire prawn)	香港以西海域 Seas west of Hong Kong, 香港水域 Hong Kong Waters	2	伽馬 γ , 氚 H-3, 銨-90 Sr-90, 釷-239 Pu-239	每季 quarterly
魷魚 Loligo edulis (Squid)	大亞灣 Daya Bay, 香港以西海域 Seas west of Hong Kong, 香港水域 Hong Kong Waters	3	伽馬 γ , 氚 H-3, 銨-90 Sr-90, 釷-239 Pu-239	每季 quarterly
墨魚 Sepia spp (Cuttlefish)	香港水域 Hong Kong Waters	1	伽馬 γ , 氚 H-3, 銨-90 Sr-90, 釷-239 Pu-239	每季 quarterly
蜆 Tapes philippinarum (Clam)	長洲 Cheung Chau, 吐露港 Tolo Harbour	2	伽馬 γ , 氚 H-3, 銨-90 Sr-90, 釷-239 Pu-239	每季 quarterly
青口 Perna viridis (Green-lipped mussel)	長洲 Cheung Chau, 吐露港 Tolo Harbour, 大亞灣 Daya Bay	3	伽馬 γ , 氚 H-3, 銨-90 Sr-90, 釷-239 Pu-239	每季 quarterly
東風螺 Babylonia formosae (Gastropod)	香港水域 Hong Kong Waters	1	伽馬 γ , 氚 H-3, 銨-90 Sr-90, 釷-239 Pu-239	每季 quarterly
石莖 Ulva lactuca (Sea lettuce)	布袋澳 Po Toi O	1	伽馬 γ , 氚 H-3, 銨-90 Sr-90, 釷-239 Pu-239	冬季及春季 winter and spring
漚荳 Enteromorpha prolifera (Sea hair)	吐露港 Tolo Harbour	1	伽馬 γ , 氚 H-3, 銨-90 Sr-90, 釷-239 Pu-239	冬季 winter
長紫菜 Porphyra dentata (Red algae)	蒲台島 Po Toi Island	1	伽馬 γ , 氚 H-3, 銨-90 Sr-90, 釷-239 Pu-239	冬季 winter
半葉馬尾藻 Sargassum hemiphyllum (Brown algae)	布袋澳 Po Toi O	1	伽馬 γ , 氚 H-3, 銨-90 Sr-90, 釷-239 Pu-239	冬季及春季 winter and spring
潮間帶土(上層及下層) Intertidal sediment (upper and lower level)	白沙灣 Pak Sha Wan, 尖鼻咀 Tsim Bei Tsui, 沙頭角 Sha Tau Kok	3	伽馬 γ , 釷-239 Pu-239	每季 quarterly
海床沉澱物 Seabed sediment	大灘海 Tai Tan Hoi, 龍蝦灣 Lung Ha Wan, 索罟灣 Picnic Bay, 西區碇泊處 Western Anchorage	4	伽馬 γ , 釷-239 Pu-239	每年 yearly

表 2. 二零零五年收集到的食物樣本概要

Table 2. Summary of food samples collected in 2005

類別 Type	地點 Location	收集樣本總數 Total no. of sample collected
食米 Rice	內地(珠江三角洲) Mainland (Pearl River Delta)	4
牛奶(經消毒) Pasteurized milk	深圳 Shenzhen	4
	沙頭角 Sha Tau Kok	4
菜心 Choi sum	內地(深圳) Mainland (Shenzhen)	4
	本地 Local	4
白菜 Pak choi	內地(深圳) Mainland (Shenzhen)	4
	本地 Local	4
香蕉 Banana	內地(廣東) Mainland (Guangdong)	4
荔枝 Lychee	內地 Mainland	1
柑橘 Mandarin	內地(廣東) Mainland (Guangdong)	2
甘蔗 Sugar cane	內地(廣東) Mainland (Guangdong)	1
雞 Chicken	內地(深圳) Mainland (Shenzhen)	4
	本地 Local	4
鴨 Duck	內地(深圳) Mainland (Shenzhen)	4
	本地 Local	4
牛肉 Beef	內地 Mainland	4
豬肝 Pig's Liver	內地(廣東) Mainland (Guangdong)	4
	本地 Local	4
豬肉 Pork	內地(廣東) Mainland (Guangdong)	4
	本地 Local	4
大魚 <i>Aristichthys nobilis</i> (Big-head carp)	深圳 Shenzhen	4
	元朗 Yuen Long	4
瓜三 <i>Nemipterus japonicus</i> (Melon coat)	大亞灣 Daya Bay	0
	香港以西海域 Seas west of Hong Kong	0
	香港水域 Hong Kong Waters	4
牛鰱 <i>Platycephalus indicus</i> (Bartail flathead)	大亞灣 Daya Bay	0
	香港以西海域 Seas west of Hong Kong	0
	香港水域 Hong Kong Waters	4
牙帶 <i>Trichiurus haumela</i> (Hair tail)	大亞灣 Daya Bay	0
	香港以西海域 Seas west of Hong Kong	0
	香港水域 Hong Kong Waters	4
三點蟹 <i>Portunus sanguinolentus</i> (Three-spotted crab)	香港以西海域 Seas west of Hong Kong	0
	香港水域 Hong Kong Waters	4

表 2. (續)

Table 2. (cont'd)

類別 Type	地點 Location	收集樣本總數 Total no. of sample collected
赤米蝦 Metapenaeopsis barbata (Fire prawn)	香港以西海域 Seas west of Hong Kong	0
	香港水域 Hong Kong Waters	4
魷魚 Loligo edulis (Squid)	大亞灣 Daya Bay	0
	香港以西海域 Seas west of Hong Kong	0
	香港水域 Hong Kong Waters	4
墨魚 Sepia spp (Cuttlefish)	香港水域 Hong Kong Waters	4
蜆 Tapes philippinarum (Clam)	長洲 Cheung Chau	0
	吐露港 Tolo Harbour	4
青口 Perna viridis (Green-lipped mussel)	長洲 Cheung Chau	3
	吐露港 Tolo Harbour	4
	大亞灣 Daya Bay	3
東風螺 Babylonia formosae (Gastropod)	香港水域 Hong Kong Waters	3
石莖 Ulva lactuca (Sea lettuce)	布袋澳 Po Toi O	2
浒苔 Enteromorpha prolifera (Sea hair)	吐露港 Tolo Harbour	1
長紫菜 Porphyra dentata (Red algae)	蒲台島 Po Toi Island	1
半葉馬尾藻 Sargassum hemiphyllum (Brown algae)	布袋澳 Po Toi O	2

表 3. 主要量度參數概要 *

Table 3. Summary of key measurement parameters *

測量類別 Measurement type		樣本大小 Sample size	計數 時間(秒) Counting time (second)	本底 Background (CPM)	計數 效率 Counting efficiency (%)	化學 復得率 Chemical recovery (%)	探測下限 [#] Minimum Detection Activity [#] (MDA)	
伽馬放射性 核素 Gamma emitting radionuclides	大氣飄塵 Airborne particulate	20000 m ³	55000	-	-	-	碘-131 I-131	銻-137 Cs-137
							10 µBq m ⁻³	10 µBq m ⁻³
	氣態碘 Airborne radioiodine	400 m ³	55000	-	-	-	300 µBq m ⁻³	-
	濕沉積物 Wet deposition	4 L	55000	-	-	-	0.1 Bq L ⁻¹	0.1 Bq L ⁻¹
	總沉積物 Total deposition	0.03 m ²	55000	-	-	-	12 Bq m ⁻²	15 Bq m ⁻²
	食米 Rice	4 kg	20000	-	-	-	0.1 Bq kg ⁻¹	0.2 Bq kg ⁻¹
	牛奶 Milk	1 L	20000	-	-	-	0.3 Bq L ⁻¹	0.4 Bq L ⁻¹
	蔬菜 Vegetable	1 kg	20000	-	-	-	0.3 Bq kg ⁻¹	0.4 Bq kg ⁻¹
	水果 Fruit	2 kg	20000	-	-	-	0.2 Bq kg ⁻¹	0.3 Bq kg ⁻¹
	家禽 Poultry	2 kg	20000	-	-	-	0.1 Bq kg ⁻¹	0.2 Bq kg ⁻¹
	肉類 Meat	1 kg	20000	-	-	-	0.3 Bq kg ⁻¹	0.4 Bq kg ⁻¹
	土壤 Land soil	1 kg	10000	-	-	-	2 Bq kg ⁻¹	2 Bq kg ⁻¹
	水樣本 Water samples	4 L	55000	-	-	-	0.1 Bq L ⁻¹	0.1 Bq L ⁻¹
	海水中懸浮粒 子 Suspended particulate	4 L	55000	-	-	-	0.01 Bq L ⁻¹	0.02 Bq L ⁻¹
	海產 Seafood	2 kg	72000	-	-	-	0.07 Bq kg ⁻¹	0.1 Bq kg ⁻¹
	海藻 Seaweed	0.5 kg	20000	-	-	-	1 Bq kg ⁻¹	2 Bq kg ⁻¹
	潮間帶土/ 海床沉澱物 Sediment	2 kg	20000	-	-	-	0.4 Bq kg ⁻¹	0.5 Bq kg ⁻¹
氚 Tritium	濕沉積物 Wet deposition	0.007 L	36000	10	25	-	6 Bq L ⁻¹	
	總沉積物 Total deposition	0.0001 m ²	36000	10	25	-	400 Bq m ⁻²	
	水蒸氣 Water vapour	0.0008 m ³	36000	10	25	-	70 Bq m ⁻³ ^	
	食米 Rice	0.07 kg	36000	10	25	-	1 Bq kg ⁻¹	
	牛奶 Milk	0.007 L	36000	10	25	-	6 Bq L ⁻¹	
	蔬菜 Vegetable	0.008 kg	36000	10	25	-	5 Bq kg ⁻¹	
	水果 Fruit	0.01 kg	36000	10	25	-	4 Bq kg ⁻¹	
	家禽 Poultry	0.01 kg	36000	10	25	-	4 Bq kg ⁻¹	
	肉類 Meat	0.01 kg	36000	10	25	-	4 Bq kg ⁻¹	
	水樣本 Water samples	0.007 L	36000	10	25	-	6 Bq L ⁻¹	
	地下水 Underground water	0.1 L	36000	10	25	-	0.4 Bq L ⁻¹	
	海產 Seafood	0.01 kg	36000	10	25	-	4 Bq kg ⁻¹	
	海藻 Seaweed	0.02 kg	36000	10	25	-	2 Bq kg ⁻¹	

表 3. (續)
Table 3. (cont'd)

測量類別 Measurement type		樣本大小 Sample size	計數 時間(秒) Counting time (second)	本底 Background (CPM)	計數 效率 Counting efficiency (%)	化學 復得率 Chemical recovery (%)	探測下限 [#] Minimum Detection Activity [#] (MDA)
銻-90 Strontium-90	大氣飄塵 Airborne particulate	5000 m ³	30000	1	75	90	1 µ Bq m ⁻³
	濕沉積物 Wet deposition	4 L	30000	1	75	100	0.001 Bq L ⁻¹
	總沉積物 Total deposition	0.01 m ²	30000	1	75	100	0.5 Bq m ⁻²
	米 Rice	3 kg	30000	1	75	90	0.002 Bq kg ⁻¹
	牛奶 Milk	1 L	30000	1	75	90	0.005 Bq L ⁻¹
	蔬菜 Vegetable	1 kg	30000	1	75	90	0.005 Bq kg ⁻¹
	水果 Fruit	2 kg	30000	1	75	90	0.003 Bq kg ⁻¹
	家禽 Poultry	2 kg	30000	1	75	90	0.003 Bq kg ⁻¹
	肉類 Meat	1 kg	30000	1	75	90	0.005 Bq kg ⁻¹
	土壤 Land soil	0.005 kg	30000	1	75	90	1 Bq kg ⁻¹
	海水中懸浮粒 子 Suspended particulate	3 L	30000	1	75	90	0.002 Bq L ⁻¹
	海產 Seafood	2 kg	30000	1	75	90	0.003 Bq kg ⁻¹
	海藻 Seaweed	0.1 kg	30000	1	75	90	0.05 Bq kg ⁻¹
釷-239 Plutonium-239	大氣飄塵 Airborne particulate	5000 m ³	220000	0.003	20	40	0.2 µ Bq m ⁻³
	濕沉積物 Wet deposition	3 L	220000	0.003	20	60	0.0002 Bq L ⁻¹
	總沉積物 Total deposition	0.02 m ²	220000	0.003	20	60	0.04 Bq m ⁻²
	土壤 Land soil	0.004 kg	220000	0.003	20	60	0.2 Bq kg ⁻¹
	海水中懸浮粒 子 Suspended particulate	3 L	220000	0.003	20	50	0.0003 Bq L ⁻¹
	海產 Seafood	0.5 kg	220000	0.003	20	40	0.002 Bq kg ⁻¹
	海藻 Seaweed	0.05 kg	220000	0.003	20	60	0.01 Bq kg ⁻¹
	潮間帶土 / 海床沉澱物 Sediment	0.005 kg	220000	0.003	20	50	0.2 Bq kg ⁻¹

註:

- * - 表內所列為典型數值，僅供參考之用。視乎實際操作情況，量度參數可能有變化。在特別情況下，部份樣本會使用與上表頗為不同的參數進行量度。
- # - 測量的探測下限是指一個測量系統在該次測量時實際能測量到的最低活度水平。探測下限的數值取決於多個因數，包括個別測量系統的特質、測量方法、樣本的特質及測量的情況，所以探測下限會隨著個別樣本和測量而改變。表內所示的探測下限為在一般測量情況下的典型數值，僅供在理解此報告的結果時作簡易參考之用。
- △ - 此表列出水蒸氣採樣器的靈敏度作為參考。該靈敏度數值較由 Currie(1968) 方程計算出的探測下限為高，因此應是 ERMP 的水蒸氣樣本中，氚的測量下限的一個較佳代表值。

Note:

- * - The values given in the table are typical values and may vary in practice, and should thus be used as reference only. Under special circumstances, some samples may be measured under substantially different conditions.
- # - The minimum detection activity (MDA) of a measurement is the lowest activity level that is practically achievable by the counting system for that measurement. MDA values depend on the characteristics of the measurement system, method of measurement, sample characteristics and measurement conditions, and thus vary with individual samples and measurements. The listed MDAs are typical values under "typical" measurement conditions and serve as a quick reference in interpreting results in this report.
- △ - The sensitivity of the water vapour sampler is quoted here for reference. This sensitivity value is higher than the typical MDA calculated using a formula developed by Currie (1968), and thus should give a better representation of the limit of detection of tritium in water vapour samples in ERMP.

表 4. 國際原子能機構主辦的愛爾蘭海床沉澱物樣本(IAEA-385)測量比對結果
 Table 4. Results of the IAEA inter-laboratory comparison exercise on a Irish Sea sediment sample (IAEA-385)

參考日期: 一九九六年一月一日, 單位: Bq kg⁻¹

Reference Date: 1 January 1996, unit: Bq kg⁻¹

放射性核素 Radionuclides	天文台 HKO	國際原子能機構 IAEA	
	報告數值 Reported value	參考數值 Reference value	可接受的數值範圍 Range of accepted value
銫-137 Cs-137	42.3 ± 2.8	33.7	24.5 – 44.0
鈾-239/240 Pu-239/240	3.30 ± 0.04	2.98	2.31 – 3.68
鉀-40 K-40	681 ± 44	611	540 – 691

表 5. 二零零五年輻射監測網絡及熱釋光劑量計網絡錄得的環境伽馬劑量率。
單位為 $\mu\text{Gy h}^{-1}$

Table 5. Ambient gamma dose rates recorded by the radiation monitoring network and thermoluminescent dosimeter network in 2005.

Dose rate in $\mu\text{Gy h}^{-1}$

輻射監測網絡

Radiation Monitoring Network (RMN)

監測站 Station	年平均值 Annual Average	標準差 Standard Deviation	一分鐘平均值範圍 Range of 1-min data
吉澳 Kat O	0.108	0.004	0.094 – 0.142
京士柏 King's Park	0.140	0.004	0.125 – 0.228
觀塘 Kwun Tong	0.131	0.002	0.117 – 0.184
平洲 Ping Chau	0.094	0.005	0.079 – 0.190
西灣河 Sai Wan Ho	0.102	0.002	0.092 – 0.151
沙頭角 Sha Tau Kok	0.101	0.003	0.089 – 0.169
大尾篤 Tai Mei Tuk	0.120	0.003	0.103 – 0.182
塔門 Tap Mun	0.087	0.003	0.077 – 0.152
尖鼻咀 Tsim Bei Tsui	0.130	0.003	0.118 – 0.234
元五墳 Yuen Ng Fan	0.118	0.004	0.105 – 0.206

熱釋光劑量計網絡

Thermoluminescent Dosimeter Network (TLD)

監測點 Location	年平均值 Annual Average	標準差 Standard Deviation	範圍 Range
鶴咀 Cape D'Aguilar	0.12	0.03	0.11 – 0.13
長洲 Cheung Chau	0.12	0.01	0.11 – 0.12
置富花園 Chi Fu Fa Yuen	0.14	0.02	0.13 – 0.15
清水灣 Clear Water Bay	0.10	0.02	0.10 – 0.12
深水灣 Deep Water Bay	0.12	0.02	0.11 – 0.13
粉嶺 Fanling	0.10	0.01	0.09 – 0.11
跑馬地 Happy Valley	0.08	0.02	0.07 – 0.09
吉澳 Kat O	0.11	0.02	0.09 – 0.11
京士柏 King's Park	0.15	0.04	0.12 – 0.17
觀塘 Kwun Tong	0.13	0.02	0.11 – 0.14
平洲 Ping Chau	0.12	0.02	0.11 – 0.13
西貢 Sai Kung	0.12	0.02	0.11 – 0.14
沙頭角 Sha Tau Kok	0.09	0.02	0.08 – 0.10
沙田 Shatin	0.13	0.03	0.11 – 0.15
筲箕灣 Shau Kei Wan	0.13	0.02	0.12 – 0.14
石崗 Shek Kong	0.11	0.01	0.10 – 0.12
蘇屋 So Uk	0.11	0.02	0.11 – 0.13
大欖涌 Tai Lam Chung	0.21	0.02	0.20 – 0.22
大尾篤 Tai Mei Tuk	0.14	0.03	0.12 – 0.16
大埔 Tai Po	0.10	0.02	0.09 – 0.11
塔門 Tap Mun	0.09	0.02	0.08 – 0.11
尖鼻咀 Tsim Bei Tsui	0.13	0.02	0.12 – 0.14
荃灣 Tsuen Wan	0.14	0.02	0.13 – 0.14
屯門 Tuen Mun	0.16	0.04	0.14 – 0.18
烏溪沙 Wu Kai Sha	0.12	0.03	0.11 – 0.14
元朗 Yuen Long	0.10	0.01	0.09 – 0.10
元五墳 Yuen Ng Fan	0.12	0.02	0.10 – 0.13

表 6. 二零零五年平洲自動伽馬譜法系統的輻射測量結果

Table 6. Radiation measurement results of the Automatic Gamma Spectrometry System at Ping Chau in 2005

	年平均值* Annual Average*	標準差 Standard Deviation	日平均值範圍 Range of Daily Average	一九九七至二零零四年範圍* Range from 1997 to 2004*
阿爾法粒子Alpha (Bq m ⁻³)	< 1 ^{\$}	N/A &	N/A	1.0 – 5.8
貝他粒子Beta (Bq m ⁻³)	1.7 ^{\$}	0.6	1.0 – 3.8	1.0 – 10.1
碘-131 I-131 (mBq m ⁻³)	< 4	N/A	N/A	< 4
銫-137 Cs-137 (mBq m ⁻³)	< 4	N/A	N/A	< 4
氣態碘-131 Gaseous I-131 (Bq m ⁻³)	< 1	N/A	N/A	< 1

註:

- * - 測量結果低於探測下限以“< xx”表示，xx是該類測量的典型探測下限值。
- & - 不適用以N/A表示。
- \$ - 在二零零六年三月進行維修時，發現阿爾法/貝他探測器的前端保護蓋上的麥拉層已經磨損。在審閱二零零五年的數據及徵詢系統供應商的意見後，自十月二十三日後得到的數據沒有包括在平均值及其範圍的計算內。

Note:

- * - Results below the minimum detectable activity (MDA) are reported as “< xx” where xx is the typical MDA value for that type of measurement.
- & - N/A - not applicable.
- \$ - The Mylar layer of the endcap of the alpha/beta detector was found eroded during maintenance in March 2006. After reviewing the data obtained in 2005 and on the advice of the system vendor, the alpha and beta data obtained since 23 October were not included in calculating the averages and ranges.

表 7. 宇宙輻射引致的伽馬劑量率測量結果

Table 7. Measurement results of gamma dose rates due to cosmic radiation

測量日期 Date of measurement	平均伽馬劑量率(每小時微戈) Average gamma dose rate (μGy h ⁻¹)
二零零五年三月七日 7 Mar 2005	0.032
二零零五年六月十日 10 Jun 2005	0.030
二零零五年九月九日 9 Sep 2005	0.031
二零零五年十二月六日 6 Dec 2005	0.034

表 8. 二零零五年食物及環境樣本的伽馬活度測量結果

Table 8. Measurement results of gamma activities in food and environmental samples in 2005

放射性核素: 銫-137 Radionuclide: Cs-137

類別 Type	地點 Location	含有可測量活度的 樣本總數 Total no. of samples with measurable activity	範圍 Range	活度濃度* Activity Concentration*	BRMP 範圍# BRMP range#	單位 Unit
牛鯪 Platycephalus indicus (Bartail flathead)	香港水域 Hong Kong Waters	4	0.04 – 0.08	0.06	≤ 0.2	Bq kg ⁻¹
牙帶 Trichiurus haumela (Hair tail)	香港水域 Hong Kong Waters	1	-	0.04	≤ 0.2	Bq kg ⁻¹
土壤(上層) Land soil (upper)	見表 1. Please see Table 1.	5	0.5 – 3.1	2.1	≤ 10.0	Bq kg ⁻¹
土壤(下層) Land soil (lower)	見表 1. Please see Table 1.	2	1.3 – 1.9	1.6	≤ 4.0	Bq kg ⁻¹
潮間帶土(上層) Intertidal sediment (upper)	白沙灣 Pak Sha Wan	4	0.4 – 0.5	0.5	≤ 2.4	Bq kg ⁻¹
	尖鼻咀 Tsim Bei Tsui	4	0.7 – 0.9	0.8		
	沙頭角 Sha Tau Kok	4	0.5 – 0.8	0.7		
潮間帶土(下層) Intertidal sediment (lower)	白沙灣 Pak Sha Wan	4	0.3 – 0.6	0.4	≤ 3.1	Bq kg ⁻¹
	尖鼻咀 Tsim Bei Tsui	4	0.7 – 1.0	0.8		
	沙頭角 Sha Tau Kok	4	0.4 – 0.7	0.6		
海床沉澱物 Seabed sediment	龍蝦灣 Lung Ha Wan	1	-	0.7	≤ 1.9	Bq kg ⁻¹
	索罟灣 Picnic Bay	1	-	0.6		
	大灘海 Tai Tan Hoi	1	-	0.8		

註: * - 如有多過一個樣本發現可測量活度，此欄則報告平均值。

- 測量結果低於探測下限以“< xx”表示，xx 是該類測量的典型探測下限值。如只在部份樣本中探測到該放射性核素，結果將報告為“≤ xx”，xx則為測量到的活度最大值。

Note: * - The mean activity concentration is reported if there are more than one samples with measurable activities.

- Results that are below the minimum detectable activity (MDA) are reported as “< xx” where xx is the typical MDA value for that type of measurement. When a particular radionuclide was detected only in some of the samples in a certain sample type, the results will be reported as “≤ xx” where xx is the maximum measured activity value.

表 9. 二零零五年食物及環境樣本的氚活度測量結果

Table 9. Measurement results of tritium activities in food and environmental samples in 2005

類別 Type	地點 Location	含有可測量活度的 樣本總數 Total no. of samples with measurable activity	範圍 Range	活度濃度 * Activity Concentration *	BRMP 範圍 # BRMP range #	單位 Unit
食米 Rice	內地 Mainland	2	0.1 – 0.3	0.2	< 1	Bq kg ⁻¹
牛奶(經消毒) Pasteurized milk	深圳 Shenzhen	3	0.7 – 4.3	2.6	< 6	Bq L ⁻¹
	沙頭角 Sha Tau Kok	4	0.4 – 3.7	2.6		
菜心 Choi sum	內地 Mainland	3	1.1 – 3.2	2.0	≤ 7.4	Bq kg ⁻¹
	本地 Local	2	1.6 – 2.1	1.8		
白菜 Pak choi	內地 Mainland	3	1.1 – 5.4	2.7	< 6	Bq kg ⁻¹
	本地 Local	2	1.3 – 5.9	3.6		
香蕉 Banana	內地 Mainland	2	1.5 – 1.9	1.7	< 3	Bq kg ⁻¹
柑橘 Mandarin	內地 Mainland	1	-	2.9	< 4	Bq kg ⁻¹
甘蔗 Sugar cane	內地 Mainland	1	-	1.0	< 2	Bq kg ⁻¹
雞 Chicken	內地 Mainland	2	0.7 – 1.1	0.9	≤ 2.2	Bq kg ⁻¹
	本地 Local	2	0.4 – 1.5	1.0		
鴨 Duck	內地 Mainland	1	-	0.5	≤ 3.5	Bq kg ⁻¹
牛肉 Beef	內地 Mainland	3	1.0 – 1.3	1.2	≤ 5.3	Bq kg ⁻¹
豬肝 Pig's liver	內地 Mainland	2	1.2 – 2.0	1.6	< 4	Bq kg ⁻¹
	本地 Local	3	0.6 – 2.1	1.3		
豬肉 Pork	內地 Mainland	2	1.2 – 1.5	1.4	< 4	Bq kg ⁻¹
	本地 Local	3	0.1 – 1.3	0.8		
大魚 Aristichthys nobilis (Big-head carp)	深圳 Shenzhen	2	0.8 – 1.5	1.2	< 2	Bq kg ⁻¹
	元朗 Yuen Long	2	0.3 – 1.6	0.9		
瓜三 Nemipterus japonicus (Melon coat)	香港水域 Hong Kong Waters	1	-	0.9	< 2	Bq kg ⁻¹
牛鯪 Platycephalus indicus (Bartail flathead)	香港水域 Hong Kong Waters	2	0.7 – 1.5	1.1	< 2	Bq kg ⁻¹
牙帶 Trichiurus haumela (Hair tail)	香港水域 Hong Kong Waters	3	1.2 – 1.4	1.3	< 2	Bq kg ⁻¹
三點蟹 Portunus sanguinolentus (Three-spotted crab)	香港水域 Hong Kong Waters	2	0.5 – 1.2	0.8	< 2	Bq kg ⁻¹
赤米蝦 Metapenaeopsis barbata (Fire prawn)	香港水域 Hong Kong Waters	1	-	1.0	≤ 4.9	Bq kg ⁻¹
墨魚 Sepia spp (Cuttlefish)	香港水域 Hong Kong Waters	1	-	0.2	≤ 2.7 &	Bq kg ⁻¹
魷魚 Loligo edulis (Squid)	香港水域 Hong Kong Waters	1	-	0.7	< 3	Bq kg ⁻¹

表 9. (續)

Table 9. (cont'd)

類別 Type	地點 Location	含有可測量活度的 樣本總數 Total no. of samples with measurable activity	範圍 Range	活度濃度 * Activity Concentration *	BRMP 範圍 # BRMP range #	單位 Unit
蜆 Tapes philippinarum (Clam)	吐露港 Tolo Harbour	2	1.1 – 1.3	1.2	< 2	Bq kg ⁻¹
青口 Perna viridis (Green-lipped mussel)	長洲 Cheung Chau	2	1.1 – 1.9	1.5	< 2	Bq kg ⁻¹
	吐露港 Tolo Harbour	3	0.6 – 0.9	0.8		
	大亞灣 Daya Bay	3	0.6 – 1.8	1.1		
東風螺 Babylonia formosae (Gastropod)	香港水域 Hong Kong Waters	2	0.1 – 0.1	0.1	< 1	Bq kg ⁻¹
石莖 Ulva lactuca (Sea lettuce)	布袋澳 Po Toi O	1	-	0.5	< 2	Bq kg ⁻¹
長紫菜 Porphyra dentata (Red algae)	蒲台島 Po Toi Island	1	-	0.3	< 1	Bq kg ⁻¹
半葉馬尾藻 Sargassum hemiphyllum (Brown algae)	布袋澳 Po Toi O	1	-	0.6	< 2	Bq kg ⁻¹
濕沉積物 (降雨) Wet deposition (precipitation)	京士柏 King's Park	4	0.4 – 6.1	2.8	≤ 12	Bq L ⁻¹
	沙頭角 Sha Tau Kok	5	1.5 – 5.7	3.3		
	元五墳 Yuen Ng Fan	5	0.4 – 5.6	3.0		
總沉積物 Total deposition	京士柏 King's Park	5	148 – 788	525	≤ 2210 ^{\$}	Bq m ⁻²
大氣水蒸氣 Water vapour in air	京士柏 King's Park	7	22 – 102	50	≤ 242	Bq m ⁻³
飲用水 (經處理) Drinking water (treated)	九龍配水管 Kowloon distribution tap	3	0.7 – 3.8	2.0	< 6	Bq L ⁻¹
	屯門配水管 Tuen Mun distribution tap	3	1.4 – 5.0	3.2		
	沙田濾水廠 Shatin Treatment Works	2	1.0 – 4.3	2.6		
	油柑頭濾水廠 Yau Kom Tau Treatment Works	1	-	2.1		
	屯門濾水廠 Tuen Mun Treatment Works	4	1.0 – 5.9	3.9		

表 9. (續)

Table 9. (cont'd)

類別 Type	地點 Location	含有可測量活度的 樣本總數 Total no. of samples with measurable activity	範圍 Range	活度濃度* Activity Concentration*	BRMP 範圍# BRMP range#	單位 Unit
飲用水 (未經處理) Drinking water (untreated)	沙田濾水廠 Shatin Treatment Works	1	-	5.5	< 6	Bq L ⁻¹
	油柑頭濾水廠 Yau Kom Tau Treatment Works	3	0.7 – 3.8	2.2		
	木湖 B 抽水站 Muk Wu B Pumping Station	4	2.1 – 3.1	2.6		
	屯門濾水廠 Tuen Mun Treatment Works	4	1.9 – 5.0	3.7		
	萬宜水庫 High Island Reservoir	3	0.2 – 4.3	2.9		
	船灣淡水湖 Plover Cove Reservoir	4	1.2 – 3.6	2.4		
地下水 Underground water	兆康苑 Sui Hong Court	1	-	0.3	≤ 2.8	Bq L ⁻¹
	長康邨 Cheung Hong Estate	1	-	0.4		
	華富邨 Wah Fu Estate	1	-	0.4		
	鈞樂新村 Kwan Lok San Tsuen	1	-	0.4		
	環翠邨 Wan Tsui Estate	1	-	0.2		
海水(上層) Sea water (upper)	大浪灣 Tai Long Wan	1	-	2.3	< 6	Bq L ⁻¹

註: * - 如有多過一個樣本發現可測量活度，此欄則報告平均值。

- 測量結果低於探測下限以“< xx”表示，xx 是該類測量的典型探測下限值。如只在部份樣本中探測到該放射性核素，結果將報告為“≤ xx”，xx則為測量到的活度最大值。

& - 該樣本沒有在BRMP測量。這裡顯示的測量範圍包含一九九七年至二零零四年的樣本測量數值。

\$ - 該樣本沒有在BRMP測量。這裡顯示的測量範圍包含一九九六年至二零零四年的樣本測量數值。

Note: * - The mean activity concentration is reported if there are more than one samples with measurable activities.

- Results that are below the minimum detectable activity (MDA) are reported as “< xx” where xx is the typical MDA value for that type of measurement. When a particular radionuclide was detected only in some of the samples in a certain sample type, the results will be reported as “≤ xx” where xx is the maximum measured activity value.

& - The sample was not measured in BRMP. The indicated range refers to results from 1997 to 2004 sample measurement.

\$ - The sample was not measured in BRMP. The indicated range refers to results from 1996 to 2004 sample measurement.

表 10. 二零零五年食物及環境樣本的銨-90 活度測量結果

Table 10. Measurement results of strontium-90 activities in food and environmental samples in 2005

類別 Type	地點 Location	含有可測量活度的 樣本總數 Total no. of samples with measurable activity	範圍 Range	活度濃度* Activity Concentration*	BRMP 範圍# BRMP range#	單位 Unit
食米 Rice	內地 Mainland	3	5 – 6	5	≤ 56	mBq kg ⁻¹
牛奶(經消毒) Pasteurized milk	深圳 Shenzhen	4	5 – 13	9	8 – 81	mBq L ⁻¹
	沙頭角 Sha Tau Kok	4	12 – 15	13		
菜心 Choi sum	內地 Mainland	4	90 – 231	152	≤ 266	mBq kg ⁻¹
	本地 Local	3	17 – 53	30		
白菜 Pak choi	內地 Mainland	4	31 – 209	116	≤ 570	mBq kg ⁻¹
	本地 Local	4	15 – 64	36		
香蕉 Banana	內地 Mainland	1	-	6	≤ 27	mBq kg ⁻¹
荔枝 Lychee	內地 Mainland	1	-	6	5 – 14	mBq kg ⁻¹
柑橘 Mandarin	內地 Mainland	2	23 – 81	52	10 – 84	mBq kg ⁻¹
甘蔗 Sugar cane	內地 Mainland	1	-	2	2 – 14	mBq kg ⁻¹
雞 Chicken	內地 Mainland	1	-	3	≤ 37	mBq kg ⁻¹
	本地 Local	1	-	4		
鴨 Duck	內地 Mainland	1	-	3	≤ 53	mBq kg ⁻¹
	本地 Local	1	-	2		
牛肉 Beef	內地 Mainland	1	-	18	≤ 35	mBq kg ⁻¹
豬肝 Pig's liver	內地 Mainland	1	-	5	≤ 43	mBq kg ⁻¹
海水中懸浮粒 子(上層) Suspended particulate in sea water (upper)	赤洲 Port Island	1	-	3	< 7	mBq L ⁻¹
海水中懸浮粒 子(中層) Suspended particulate in sea water (middle)	赤洲 Port Island	1	-	3	< 7	mBq L ⁻¹
海水中懸浮粒 子(下層) Suspended particulate in sea water (lower)	赤洲 Port Island	1	-	4	< 7	mBq L ⁻¹
大魚 Aristichthys nobilis (Big-head carp)	深圳 Shenzhen	3	6 – 6	6	≤ 94	mBq kg ⁻¹
	元朗 Yuen Long	3	3 – 27	12		
瓜三 Nemipterus japonicus (Melon coat)	香港水域 Hong Kong Waters	4	5 – 7	6	≤ 21	mBq kg ⁻¹
牛鯪 Platycephalus indicus (Bartail flathead)	香港水域 Hong Kong Waters	2	3 – 8	6	≤ 25	mBq kg ⁻¹
牙帶 Trichiurus haumela (Hair tail)	香港水域 Hong Kong Waters	2	3 – 7	5	≤ 49	mBq kg ⁻¹

表 10. (續)
Table 10. (cont'd)

類別 Type	地點 Location	含有可測量活度的 樣本總數 Total no. of samples with measurable activity	範圍 Range	活度濃度* Activity Concentration*	BRMP 範圍# BRMP range#	單位 Unit
三點蟹 Portunus sanguinolentus (Three-spotted crab)	香港水域 Hong Kong Waters	2	8 – 12	10	≤ 105	mBq kg ⁻¹
赤米蝦 Metapenaeopsis barbata (Fire prawn)	香港水域 Hong Kong Waters	1	-	7	≤ 66	mBq kg ⁻¹
魷魚 Loligo edulis (Squid)	香港水域 Hong Kong Waters	3	5 – 8	6	≤ 43	mBq kg ⁻¹
蜆 Tapes philippinarum (Clam)	吐露港 Tolo Harbour	2	4 – 6	5	≤ 32	mBq kg ⁻¹
青口 Perna viridis (Green-lipped mussel)	長洲 Cheung Chau	1	-	4	≤ 47	mBq kg ⁻¹
	吐露港 Tolo Harbour	2	5 – 25	15		
	大亞灣 Daya Bay	1	-	11		
浒苔 Enteromorpha prolifera (Sea hair)	吐露港 Tolo Harbour	1	-	91	< 100	mBq kg ⁻¹
長紫菜 Porphyra dentata (Red algae)	蒲台島 Po Toi Island	1	-	134	≤ 260	mBq kg ⁻¹
半葉馬尾藻 Sargassum hemiphyllum (Brown algae)	布袋澳 Po Toi O	1	-	297	46 – 1440	mBq kg ⁻¹
大氣飄塵 Airborne particulate	京士柏 King's Park	6	0.8 – 1.5	1.2	≤ 5	μBq m ⁻³
	沙頭角 Sha Tau Kok	3	1.4 – 1.6	1.5		
	元五墳 Yuen Ng Fan	3	0.8 – 1.8	1.4		
濕沉積物(降雨) Wet deposition (precipitation)	京士柏 King's Park	3	1.5 – 7.6	4.3	≤ 39	mBq L ⁻¹
	沙頭角 Sha Tau Kok	2	2.5 – 3.5	3.0		
	元五墳 Yuen Ng Fan	3	2.0 – 4.2	3.2		
總沉積物 Total deposition	京士柏 King's Park	3	0.7 – 1.4	1.2	≤ 3.9 ^{\$}	Bq m ⁻²

表 10. (續)
Table 10. (cont'd)

類別 Type	地點 Location	含有可測量活度的 樣本總數 Total no. of samples with measurable activity	範圍 Range	活度濃度* Activity Concentration *	BRMP 範圍# BRMP range #	單位 Unit
土壤(上層) Land soil (upper)	見表 1. Please see Table 1.	7	1.0 – 3.3	2.0	≤ 27.3	Bq kg ⁻¹
土壤(下層) Land soil (lower)	見表 1. Please see Table 1.	5	1.2 – 4.1	2.5	≤ 19.9	Bq kg ⁻¹

註: * - 如有多過一個樣本發現可測量活度，此欄則報告平均值。

- 測量結果低於探測下限以“< xx”表示，xx 是該類測量的典型探測下限值。如只在部份樣本中探測到該放射性核素，結果將報告為“≤ xx”，xx則為測量到的活度最大值。

\$ - 該樣本沒有在BRMP測量。這裡顯示的測量範圍包含一九九六年至二零零四年的樣本測量數值。

Note: * - The mean activity concentration is reported if there are more than one samples with measurable activities.

- Results that are below the minimum detectable activity (MDA) are reported as “< xx” where xx is the typical MDA value for that type of measurement. When a particular radionuclide was detected only in some of the samples in a certain sample type, the results will be reported as “≤ xx” where xx is the maximum measured activity value.

\$ - The sample was not measured in BRMP. The indicated range refers to results from 1996 to 2004 sample measurement.

表 11. 二零零五年食物及環境樣本的鈾-239活度測量結果

Table 11. Measurement results of plutonium-239 activities in food and environmental samples in 2005

類別 Type	地點 Location	含有可測量活度的 樣本總數 Total no. of samples with measurable activity	範圍 Range	活度濃度* Activity Concentration *	BRMP 範圍# BRMP range #	單位 Unit
半葉馬尾藻 Sargassum hemiphyllum (Brown algae)	布袋澳 Po Toi O	1	-	0.05	0.03 – 0.07	Bq kg ⁻¹
土壤(下層) Land soil (lower)	見表 1. Please see Table 1.	1	-	0.17	< 0.2	Bq kg ⁻¹
潮間帶土(上層) Intertidal sediment (upper)	尖鼻咀 Tsim Bei Tsui	3	0.12 – 0.17	0.14	≤ 0.19	Bq kg ⁻¹
	沙頭角 Sha Tau Kok	2	0.18 – 0.19	0.18		
潮間帶土(下層) Intertidal sediment (lower)	尖鼻咀 Tsim Bei Tsui	2	0.14 – 0.14	0.14	≤ 0.14	Bq kg ⁻¹
	沙頭角 Sha Tau Kok	2	0.15 – 0.19	0.17	≤ 0.24 ^{\$}	
海床沉澱物 Seabed sediment	龍蝦灣 Lung Ha Wan	1	-	0.25	≤ 0.57	Bq kg ⁻¹
	索罟灣 Picnic Bay	1	-	0.22		
	大灘海 Tai Tan Hoi	1	-	0.48		
	西區碇泊處 Western Anchorage	1	-	0.35		

註:

* - 如有多過一個樣本發現可測量活度，此欄則報告平均值。

- 測量結果低於探測下限以“< xx”表示，xx 是該類測量的典型探測下限值。如只在部份樣本中探測到該放射性核素，結果將報告為“≤ xx”，xx則為測量到的活度最大值。

\$ - 沙頭角的取樣地點在一九九五年曾經更改。這裡顯示的測量範圍包含一九九五年至二零零四年的樣本測量數值。

Note:

* - The mean activity concentration is reported if there are more than one samples with measurable activities.

- Results that are below the minimum detectable activity (MDA) are reported as “< xx” where xx is the typical MDA value for that type of measurement. When a particular radionuclide was detected only in some of the samples in a certain sample type, the results will be reported as “≤ xx” where xx is the maximum measured activity value.

\$ - A change in the sampling site at Sha Tau Kok had been made in 1995. The indicated range refers to results from 1995 to 2004 sample measurement.

表 12. 二零零五年整體測量結果概要

Table 12. Overall summary of measurement results in 2005

途徑 Pathway	樣本類別 Sample Type	測量結果/ 參考數值 [#] Mea. results / ref. values ^{*,#}	碘-131 I-131	銫-137 Cs-137	氚 H-3	銻-90 Sr-90	鈾-239 Pu-239	單位Unit
大氣 Atmo- spheric	大氣飄塵 Airborne Particulate	範圍 % Range % BRMP	< 10 ≤ 328	< 10 ≤ 10	--- ^{\$}	0.8 – 1.8 ≤ 5	< 0.2 ≤ 0.2	μBq m ⁻³
地面 Terrestrial	食米 Rice	範圍 Range BRMP	< 0.1 ≤ 0.1	< 0.2 ≤ 0.9	0.1 – 0.3 ≤ 1	0.005 – 0.006 ≤ 0.056	---	Bq kg ⁻¹
	牛奶 Milk	範圍 Range BRMP	< 0.3 ≤ 0.2	< 0.4 ≤ 0.3	0.4 – 4.3 ≤ 6	0.005 – 0.015 0.008 – 0.081	---	Bq L ⁻¹
	蔬菜 Vegetable	範圍 Range BRMP	< 0.3 ≤ 0.3	< 0.4 ≤ 0.4	1.1 – 5.9 ≤ 7.4	0.015 – 0.231 ≤ 0.570	---	Bq kg ⁻¹
水Aquatic	魚Fish	範圍 Range BRMP	< 0.07 ≤ 0.1	0.04 – 0.08 ≤ 0.2	0.3 – 1.6 ≤ 2	0.003 – 0.027 ≤ 0.094	< 0.002 ≤ 0.002	Bq kg ⁻¹
	經處理的 飲用水 Treated Drinking Water	範圍 Range BRMP	< 0.1 ≤ 0.1	< 0.1 ≤ 0.1	0.7 – 5.9 ≤ 6	---	---	Bq L ⁻¹

註:

[#] - 測量結果低於探測下限以“< xx”表示，xx 是該類測量的典型探測下限值。如只在部份樣本中探測到該放射性核素，結果將報告為“≤ xx”，xx則為測量到的活度最大值。

% - 二零零五年各樣本類別的輻射測量結果範圍以粗體列印。

^{\$} - “---”表示沒有在ERMP進行此項測量。

Notes:

* - “mea.” – measurement; “ref.” – reference.

[#] - Results that are below the minimum detectable activity (MDA) are reported as “< xx” where xx is the typical MDA value for that type of measurement. When a particular radionuclide was detected only in some of the samples in a certain sample type, the results will be reported as “≤ xx” where xx is the maximum measured activity value.

% - The range of measurement results in 2005 for each of the listed sample types is shown in bold.

^{\$} - Measurements not included under ERMP are reported as “---” in the table.