

Environmental Radioactivity Report 2018/2019

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1. SUMMARY

Samples were analysed for radioactivity from the following locations:

- Atmosphere – Kaitaia, Chatham Island, Rarotonga
- Rainwater – Hokitika
- Milk powder – Waikato, Taranaki and Westland
- Seawater - Christchurch

Artificial radioactivity continued to be at levels that are below detection limits in most cases and significantly below levels that would give rise to health concerns. No significant change in the status of environmental radioactivity occurred during the period.

No radioactive contamination from the Fukushima Daiichi nuclear accident was observed in the New Zealand environment.

2. RESULTS

Radioactivity units used throughout this report are becquerels (Bq), millibecquerels (mBq = 10^{-3} Bq) and microbecquerels (μ Bq = 10^{-6} Bq). One becquerel is defined as one nuclear transformation per second.

The uncertainties reported are standard deviations of mean or total annual values, including natural, daily and seasonal variations. The measurement uncertainties of individual results are significantly smaller.

2.1 ATMOSPHERE

Daily atmospheric samples were collected at Kaitaia, Chatham Islands and Rarotonga and analysed by high-resolution gamma spectrometry. Concentrations of artificial radionuclides were below detection limits, which were in the range of 1 to 4 μ Bq/m³ for I-131, Cs-134 and Cs-137. Average results for the naturally occurring radionuclides Be-7 and Pb-212 are given in Table 1.

TABLE 1: Annual averages of daily activity concentrations of Be-7 and Pb-212

Sampling site	Be-7 (mBq/m ³)	Pb-212 (mBq/m ³)
Kaitaia (RN47)	4.1 ± 1.9	12 ± 11
Chatham Islands (RN46)	3.5 ± 1.9	6.0 ± 4.7
Rarotonga (RN23)	3.8 ± 1.9	49 ± 38

2.2 RAINWATER

Weekly rainwater samples were collected at Hokitika. The samples were analysed for total beta-activity concentration using a liquid scintillation counter and for artificial nuclides using gamma spectrometry. Be-7 measurements were used as a quality control for the performance of the sampling system.

No artificial radionuclides were detected. Based on the Minimal Detectable Activity, the upper limit for weekly deposition of Cs-137 was determined to be 0.3 Bq/m². The total annual deposition of beta emitters was 321 ± 14 Bq/m² with 2580 mm of total collected rainfall. The average weekly beta activity from deposition was 6.4 ± 4.5 Bq/m². This activity is almost entirely due to naturally occurring radionuclides such as K-40 and Pb-210.

2.3 MILK POWDER

Monthly milk powder samples (in some cases liquid milk samples) were obtained from the Waikato, Taranaki and Westland regions. These were analysed for I-131, Cs-134 and Cs-137 by gamma spectrometry. Cs-137 was the only detectable artificial radionuclide. Milk powders from the Taranaki region remain the ones with the highest Cs-137 concentration. For Waikato and Westland regions, Cs-137 levels are commonly below detection limits.

TABLE 2: Averages of Cs-137 activity concentrations in milk powder, when detected

Region	Cs-137 (Bq/kg)	Number of detections (of 12)
Waikato	0.45 ± 0.19	7
Taranaki	0.84 ± 0.38	11
Westland	0.225 ± 0.062	4

2.4 SEAWATER

Monthly seawater samples were obtained from Lyttelton Harbour and analysed by gamma spectrometry for the presence of artificial nuclides. None of the analysed samples showed results for Cs-137 or Cs-134 above the detection level of 0.2 Bq/L. No other artificial gamma emitters have been detected.



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