Environmental Radioactivity Report 2016/17

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

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

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

Results

Atmosphere: Air samples were collected daily from 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 $\mu Bq/m^3$ for I-131, Cs-134 and Cs-137. Results for the naturally occurring radionuclides Be-7 and Pb-212 are given in Table 1.

Table 1: Annual average concentrations of Be-7 and Pb-212

Sampling site	Be-7 (μBq/m3)	Pb-212 (mBq/m3)
Kaitaia	4340 ± 160	9.11 ± 0.30
Chatham Islands	3117 ± 70	5.51 ± 0.11
Rarotonga	3917 ± 78	59.13 ± 0.91

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Rainwater: Samples were collected weekly from Hokitika and 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. The upper limit for weekly deposition of Cs-137 was determined as 0.3 Bq/m^2 (corresponding to an average Cs-137 activity in rainwater of 0.005 Bq/L). The deposition of beta emitters was 311 ± 14 Bq/m^2 with 2998.6 mm of rainfall. The average weekly deposition was 6.2 ± 1.3 Bq/m2. This radioactivity is almost entirely due to naturally occurring radionuclides such as K-40 and Pb-210.

Milk powder: Dairy milk powders were collected from Waikato, Taranaki and Westland. These were analysed monthly for I-131, Cs-134 and Cs-137 by gamma spectrometry. Cs-137 was the only detectable artificial radionuclide. For Waikato and Westland, levels are now more commonly below detection limits.

Table 2: Annual average Cs-137 concentrations in milk powder

Region	Cs-137 (Bq/kg)
Waikato	0.55 ± 0.17 (4 detections)
Taranaki	0.87 ± 0.23 (9 detections)
Westland	0.114 ± 0.091 (2 detections)

Seawater:
Seawater was collected monthly from Lyttleton 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 0.15 Bq/L.

To put this number into perspective. The WHO guideline level for Cs-137 in drinking waters is 10 Bq/L, e.g. a source of drinking water containing 10 Bq/L of Cs-137 is regarded as safe.