

Environmental Radioactivity Report 2017/18

09 July 2018

Peer reviewer



Oksana Golovko

Scientist

Author



Michelle Thomas

Scientist

PREPARED FOR: Ministry of Health

CLIENT REPORT No: TR 2018-716

CONTENTS

1. SUMMARY	1
2. Results	2
2.1 ATMOSPHERE	2
2.2 RAINWATER.....	2
2.3 MILK POWDER.....	2
2.4 SEAWATER	2

LIST OF TABLES

TABLE 1: ANNUAL AVERAGE CONCENTRATIONS OF BE-7 AND PB-212	2
TABLE 2: ANNUAL AVERAGE CS-137 CONCENTRATIONS IN MILK POWDER	2

DISCLAIMER

The Institute of Environmental Science and Research Limited (ESR) has used all reasonable endeavours to ensure that the information contained in this client report is accurate. However, ESR does not give any express or implied warranty as to the completeness of the information contained in this client report or that it will be suitable for any purposes other than those specifically contemplated during the Project or agreed by ESR and the Client.

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

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.

2. Results

2.1 ATMOSPHERE

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 $\mu\text{Bq}/\text{m}^3$ 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 ($\mu\text{Bq}/\text{m}^3$)	Pb-212 ($\mu\text{Bq}/\text{m}^3$)
Kaitaia	4154 \pm 153	6.38 \pm 0.21
Chatham Islands	3138 \pm 70	5.8 \pm 0.12
Rarotonga	3905 \pm 89	49.5 \pm 1.0

2.2 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 305 \pm 13 Bq/m^2 with 2911.9 mm of rainfall. The average weekly deposition was 6.2 \pm 1.2 Bq/m^2 . This radioactivity is almost entirely due to naturally occurring radionuclides such as K-40 and Pb-210.

2.3 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	0.47 \pm 0.18 (6 detections)
Taranaki	1.10 \pm 0.27 (8 detections)
Westland	0.276 \pm 0.085 (6 detections)

2.4 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 0.30 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



**INSTITUTE OF ENVIRONMENTAL
SCIENCE AND RESEARCH LIMITED**

▀ **Kenepuru Science Centre**
34 Kenepuru Drive, Kenepuru, Porirua 5022
PO Box 50348, Porirua 5240
New Zealand
T: +64 4 914 0700 F: +64 4 914 0770

▀ **Mt Albert Science Centre**
120 Mt Albert Road, Sandringham, Auckland 1025
Private Bag 92021, Auckland 1142
New Zealand
T: +64 9 815 3670 F: +64 9 849 6046

▀ **NCBID – Wallaceville**
66 Ward Street, Wallaceville, Upper Hutt 5018
PO Box 40158, Upper Hutt 5140
New Zealand
T: +64 4 529 0600 F: +64 4 529 0601

▀ **Christchurch Science Centre**
27 Creyke Road, Ilam, Christchurch 8041
PO Box 29181, Christchurch 8540
New Zealand
T: +64 3 351 6019 F: +64 3 351 0010

www.esr.cri.nz