Ministry for Primary Industries
Manatū Ahu Matua

Radionuclide testing in Imported Foods Survey

Imported Foods Monitoring Programme

MPI Technical Paper No: 2013/26

ISBN No: 978-0-478-42019-7 (online)
ISSN No: 2253-3923 (online)

June 2013

New Zealand Government

Growing and Protecting New Zealand

Disclaimer

Every effort has been made to ensure the information in this report is accurate.

MPI does not accept any responsibility or liability whatsoever for any error of fact, omission, interpretation or opinion that may be present, however it may have occurred.

Requests for further copies should be directed to:

Publications Logistics Officer
Ministry for Primary Industries
PO Box 2526
WELLINGTON 6140

Email: brand@mpi.govt.nz
Telephone: 0800 00 83 33
Facsimile: 04-894 0300

This publication is also available on the Ministry for Primary Industries website at http://www.mpi.govt.nz/news-resources/publications.aspx

Contents

Page

1 Executive Summary

The objectives of this survey were to determine if there was any sentinel Radionuclide accumulation in fish harvested from the Northern Pacific region and imported into New Zealand, since the Fukushima-daiichi incident in March 2011 and to determine if sentinel radionuclides were present in other food imported from Japan post the Fukushima-daiichi event.

Ninety-two fish product samples from the Northern Pacific region and fifty tea samples from Japan were collected in the duration of this survey. Samples were collected at the border and tested for radionuclides recognised as indicative of fallout from a nuclear reactor, these being Caesium-134(^{134}Cs), Caesium-137(^{137}Cs), by gamma spectrometry, and Strontium-90(^{90}Sr) by Liquid scintillation counting (LSC).

All results were well within Codex limits, with the highest results being 76.7Bq/kg for ^{137}Cs and 57.4Bq/kg for ^{134}Cs. The codex limit for these radionuclides is 1000Bq/kg, which apply to foods for a year following a nuclear incident. ^{90}Sr was not detected in any of the fish samples and was not tested for in the tea samples.

This survey concludes MPI's monitoring of imported food that may have been affected from the Fukushima incident.

2 Background

MPI has been closely monitoring and testing food imported into New Zealand from Japan for contamination by radioactive material since the Fukushima-daiichi incident. Import testing requirements was split into two phases of testing. The objective of phase 1 testing was to test foods of interest from selected Japanese prefectures for the presence of Iodine-131(^{131}I), Caesium-134 and Caesium-137. Test results were assessed against the Codex limits for radioactivity. Samples and results from phase 1 testing can be found on MPI's website http://www.foodsafety.govt.nz/elibrary/industry/japanese-earthquake/test-result-japanese-food-imports.htm
Radioactivity levels from phase 1 were indistinguishable from background levels for 104 samples. The remaining seven samples were (slightly) above background levels but well below Codex levels.

Phase 2 (this survey) was a step-wise reduction in border interception and testing following the conclusion of phase 1.

This survey tested for ^{134}Cs and ^{137}Cs. ^{131}I was excluded from the scope of the survey as at least 20 half-lives for this radionuclide would have occurred since the Fukushima-daiichi incident, and ^{131}I will no longer be present in food products from Japan.
^{90}Sr is included in this survey as it is a β-emitter that has a half life of 28.8 years. ^{90}Sr is less mobile in the environment than caesium however it is of concern as it is readily absorbed and can accumulate over time into bone following ingestion.

Large bony fish species are susceptible to the accumulation of radionuclides such as Caesium-137 and Strontium-90 if they are present in the marine environment in significant level. Due to uncertainty about the migration pattern of these species and also the fishing paths of large

fishing vessels, MPI widened the scope of intercepted products to include fish from the North Pacific region and not just Japan (including: China, Russia, Korea, Vietnam, United States of America, Philippines, Thailand and Taiwan). Fresh and processed mackerel and tuna were sampled and used as proxies for the population of large bony sea species which have similar diets. MPI is interested in determining if there is a long-term trend of potential contamination.

Additionally other products specifically imported from Japan were included in the scope of this survey. The only imported product tested within scope (other than fish) was tea. Japanese reporting of results for Caesium radionuclides in tea showed a number of higher results from a range of prefectures outside of Fukushima, including the main tea growing prefecture of Shizuoka, MPI considered that tea has the potential to represent a good marker commodity for Caesium 134 and 137 levels in land based agriculture and thus testing for it gave an indication of the trends in levels across the country. MPI is interested in determining that there is no possible health risk due to contamination of food products imported into New Zealand.

3 Survey

The two objectives of this survey were:

1. To test large bony fish for the presence of ^{134}Cs, ^{137}Cs and ^{90}Sr to establish if there is any sentential radionuclide nucleotide trend.
2. Scan products of interest from Japan for ^{134}Cs, ^{137}Cs and ^{90}Sr to establish if there is any sentential radionuclide contamination.

4 Material and Methods

4.1 SURVEY SCOPE

The scope was fish from the Northern Pacific region including Japan, China, Russia, Korea, Viet Nam, United States of America, Philippines, Thailand and Taiwan for the presence of sentinel Radionuclides ^{134}Cs, ^{137}Cs and ^{90}Sr.

Fresh and processed mackerel and tuna were sampled at the border immediately upon importation and used as a proxy of the population of large bony sea species which have similar diets. MPI is interested in determining if there is a long-term trend of potential contamination, following the Fukushima-daiichi incident.

4.2 SAMPLE COLLECTION

The sampling for this survey is split into two parts, sampling mackerel and tuna from the Northern Pacific region at the border (100 samples) and sampling products of interest from Japan also at the border (50 samples). Samples were collected during February 2012 through to March 2013.

5 Methodology

5.1 ANALYTICAL TESTING

All fish samples were tested for ^{134}Cs, ^{137}Cs and ^{90}Sr. Tea samples were tested for ^{134}Cs and ^{137}Cs. ^{90}Sr was not tested in tea as it was considered unlikely to have significantly contaminated any land based agriculture and Caesium was considered a better marker. Contamination in fish would be due to contaminated water from the nuclear plant.

Methods used for analysis were:

- ^{134}Cs, ^{137}Cs -Gamma Spectrometry
- ^{90}Sr – Radiochemical separation and Liquid scintillation counting

5.2 DATA ANALYSIS

Results for the radionuclide were assessed against Codex limits for radioactive particles.

The Codex limits are:

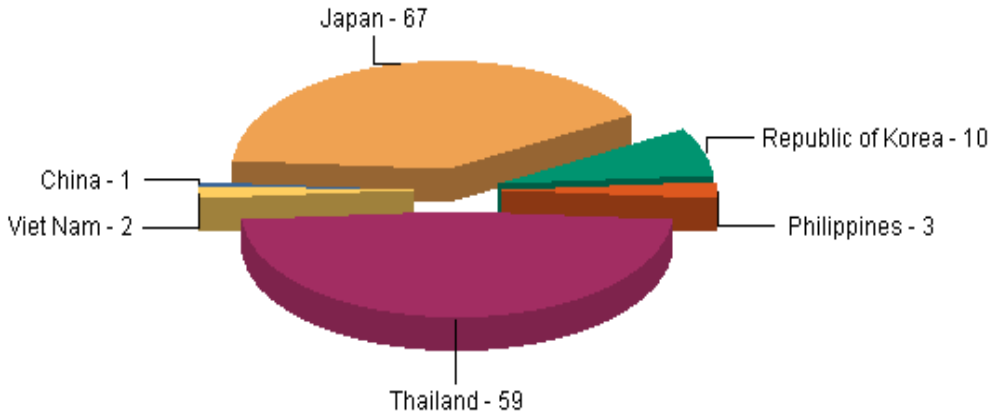
- 1000 Bq/kg combined ^{134}Cs, ^{137}Cs
- 100 Bq/kg ^{90}Sr

6 Results and Discussion

6.1 SAMPLES AND COUNTRY OF ORIGIN

A total of 142 samples were collected for this survey. Samples were collected at the border. During the survey no imports of Tuna or Mackerel were received from Russia, United States of America or Taiwan. A total of 92 fish imports and 50 tea imports were tested.

Figure 1: Country of origin for samples collected in this survey



6.2 ANALYTICAL RESULTS

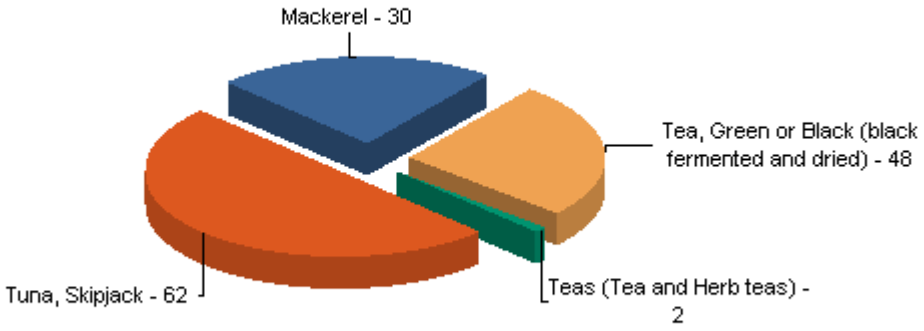
The survey results are included in Appendix 1.

Results are summarised in the Table below. Although radionuclides were absent in most of the samples tested, a few samples contained levels of 134Cs and ^{137}Cs below the Codex limits.

Table 1: Summary of results

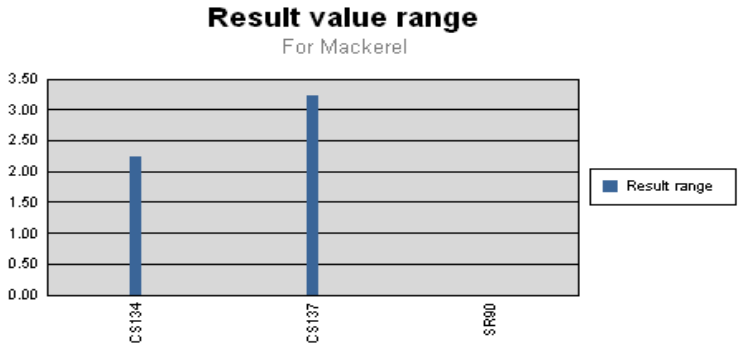
Country of Origin	**Commodity**	**Number of samples tested**	**Levels of ^{137}Cs found (Bq/kg)** (Limit 1000Bq/kg)	**Levels of ^{134}Cs found (Bq/kg)** (Limit 1000Bq/kg)	**Levels of ^{90}Sr found (Bq/kg)** (Limit 100Bq/kg)
Japan	Green/black tea	48	0.88-76.7 (13 samples)	1.95-57.4 (7 samples)	NA
	Herbal tea	2	0	0	NA
	Mackerel	10	1.93-3.23 (3 samples)	1.45-2.23 (3 samples)	0
	Tuna, Skipjack	7	0	0	0
Thailand	Mackerel	12	0	0	0
	Tuna, Skipjack	47	0	0	0
Korea	Mackerel	5	0	0	0
	Tuna, Skipjack	5	0	0	0
Philippines	Tuna, Skipjack	3	0.2 (1 sample)	0	0
Viet Nam	Mackerel	2	0	0	0
China	Mackerel	1	0	0	0

Figure 2: Distribution of samples by product type



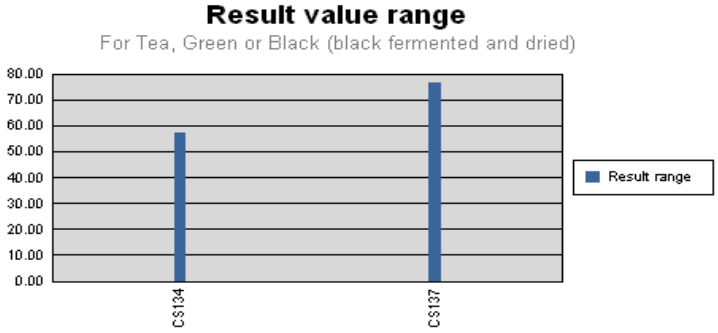
6.2.1 Levels of ^{134}Cs, ^{137}Cs and ^{90}Sr found per commodity (Bq/kg)

Figure 3: Levels of Radionuclides found in mackerel



Stontium-90 was not detected in any Mackerel sample. The highest value of ^{134}Cs detected was 2.23Bq/kg. The highest level of ^{137}Cs detected in Mackerel was 3.23Bq/kg. The Codex limit for Caesium is 1000Bq/kg

Figure 4: Levels of Radionuclides found in tea



Stontium-90 was not tested for in tea. The highest value of ^{134}Cs detected was 57.4Bq/kg. The highest level of ^{137}Cs detected in tea was 76.7Bq/kg.

Figure 5: Trend analysis for Radionuclides found in tea

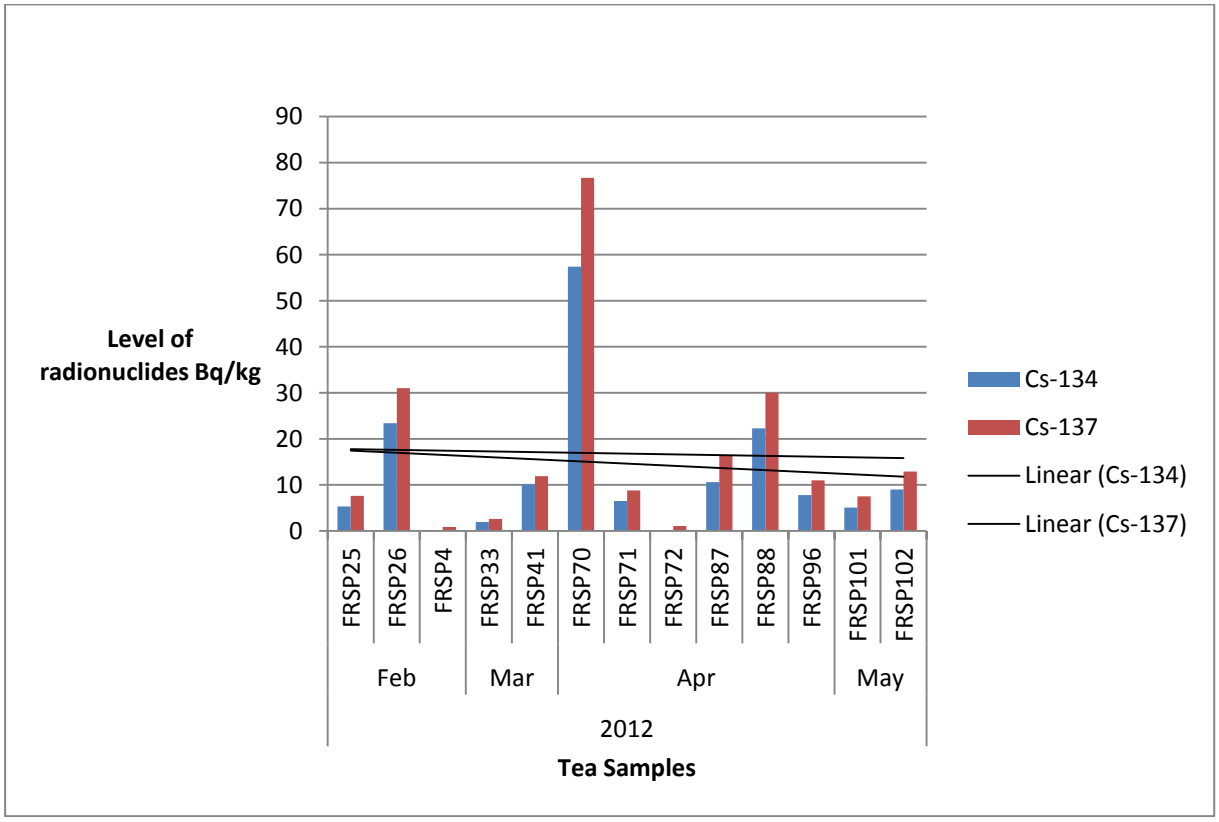


Figure 5 illustrates that there has been no fresh fall out contaminating tea produced in Japan and levels found illustrate the deterioration of levels over time. Peak levels are late March, early April. All results since May 2012 are below background level. Samples were obtained from various prefectures within Japan and therefore there is different uptake levels of radioactivity among the samples tested, however the trend definitely shows a decline in levels over time as expected.

Note – No detections of radioactivity above background were found in herbal teas. 0.21Bq/kg ^{137}Cs was found in a Tuna sample, as this was the only detect in Tuna. As this was the only detect in Tuna, this result has not been graphed.

7 Summary

- All samples tested for this survey were found to be compliant with Codex limits.
- No Strontium-90 was detected in any of the 92 fish samples.
- Caesium-134 was detected in 15 out of 142 samples and Caesium-137 was detected in 17 out of 142 samples.
- Detected levels were only slightly above background levels and well below Codex levels, therefore no additional action was required.

8 Conclusion

- MPI is confident that at this point in time there is no health risk associated with radionuclide contamination in large bony fish from the Northern Pacific region.
- The tea samples tested indicates that there is no concerning levels of radionuclide contamination in food products exported from Japan to New Zealand.
- MPI will continue to monitor overseas results and may repeat this survey in a few years time to ensure that the situation has not changed

9 Reference

- Codex General Standard for contaminants and toxins in food and feed (CODEX STAN 193-1995) - http://www.codexalimentarius.org/download/standards/17/CXS_193e.pdf

10 Appendix

10.1 APPENDIX 1 – RAW DATA-RESULTS FROM THE RADIONUCLIDE TESTING OF IMPORTED FOOD

Sample Number	Commodity	Country of Origin	Radionuclide Level (Bq/Kg)* ^{134}Cs	^{137}Cs	^{90}Sr
FRSP1	Tea, Green, Black	Japan	0	0	N/A
FRSP2	Tea, Green, Black	Japan	0	0	N/A
FRSP3	Tea, Green, Black	Japan	0	0	N/A
FRSP4	Tea, Green, Black	Japan	0	0.88	N/A
FRSP5	Tea, Green, Black	Japan	0	0	N/A
FRSP6	Tea, Green, Black	Japan	0	0	N/A
FRSP7	Tuna, Skipjack	Thailand	0	0	0
FRSP8	Mackerel	Korea	0	0	0
FRSP9	Tuna, Skipjack	Korea	0	0	0
FRSP10	Mackerel	Korea	0	0	0
FRSP11	Mackerel	Korea	0	0	0
FRSP12	Tea, Green, Black	Japan	0	0	N/A
FRSP13	Tea, Green, Black	Japan	0	0	N/A
FRSP14	Tuna, Skipjack	Thailand	0	0	0
FRSP15	Teas (Tea and Herb teas)	Japan	0	0	N/A
FRSP16	Mackerel	Japan	0	0	0
FRSP17	Tuna, Skipjack	Japan	0	0	0
FRSP18	Tea, Green, Black	Japan	0	0	N/A
FRSP19	Tuna, Skipjack	Japan	0	0	0
FRSP20	Mackerel	Japan	0	0	0
FRSP21	Tuna, Skipjack	Japan	0	0	0
FRSP22	Tuna, Skipjack	Thailand	0	0	0
FRSP23	Tuna, Skipjack	Thailand	0	0	0
FRSP24	Tea, Green, Black	Japan	0	0	N/A
FRSP25	Tea, Green, Black	Japan	5.37	7.6	N/A
FRSP26	Tea, Green, Black	Japan	23.4	31	N/A
FRSP27	Tea, Green, Black	Japan	0	0	N/A
FRSP28	Tea, Green, Black	Japan	0	0	N/A
FRSP29	Tea, Green, Black	Japan	0	0	N/A
FRSP30	Tuna, Skipjack	Thailand	0	0	0
FRSP31	Tuna, Skipjack	Thailand	0	0	0
FRSP32	Mackerel	Thailand	0	0	0
FRSP33	Tea, Green, Black	Japan	1.95	2.6	N/A
FRSP34	Tuna, Skipjack	Thailand	0	0	0
FRSP35	Tuna, Skipjack	Thailand	0	0	0
FRSP36	Tuna, Skipjack	Thailand	0	0	0
FRSP37	Mackerel	Thailand	0	0	0
FRSP38	Mackerel	Thailand	0	0	0
FRSP39	Mackerel	Thailand	0	0	0
FRSP40	Tuna, Skipjack	Thailand	0	0	0
FRSP41	Tea, Green, Black	Japan	11.9	10.1	N/A
FRSP42	Tuna, Skipjack	Korea	0	0	0
FRSP43	Tea, Green, Black	Japan	0	0	N/A
FRSP44	Tea, Green, Black	Japan	0	0	N/A
FRSP45	Tea, Green, Black	Japan	0	0	N/A

FRSP46	Tea, Green, Black	Japan	0	0	N/A
FRSP47	Tea, Green, Black	Japan	0	0	N/A
FRSP48	Tuna, Skipjack	Japan	0	0	0
FRSP49	Tuna, Skipjack	Thailand	0	0	0
FRSP50	Tuna, Skipjack	Thailand	0	0	0
FRSP51	Tuna, Skipjack	Thailand	0	0	0
FRSP52	Tuna, Skipjack	Thailand	0	0	0
FRSP53	Tuna, Skipjack	Philippines	0	0	0
FRSP54	Tuna, Skipjack	Thailand	0	0	0
FRSP55	Tuna, Skipjack	Thailand	0	0	0
FRSP56	Tuna, Skipjack	Japan	0	0	0
FRSP57	Tea, Green, Black	Japan	0	0	N/A
FRSP58	Tea, Green, Black	Japan	0	0	N/A
FRSP59	Mackerel	Thailand	0	0	0
FRSP60	Mackerel	Japan	1.66	2.33	0
FRSP61	Tea, Green, Black	Japan	0	0	N/A
FRSP62	Mackerel	Thailand	0	0	0
FRSP63	Tuna, Skipjack	Thailand	0	0	0
FRSP64	Tuna, Skipjack	Thailand	0	0	0
FRSP65	Tea, Green, Black	Japan	0	0	N/A
FRSP66	Tea, Green, Black	Japan	0	0	N/A
FRSP67	Tea, Green, Black	Japan	0	0	N/A
FRSP68	Tea, Green, Black	Japan	0	0	N/A
FRSP69	Tuna, Skipjack	Thailand	0	0	0
FRSP70	Tea, Green, Black	Japan	57.4	76.3	N/A
FRSP71	Tea, Green, Black	Japan	6.5	8.8	N/A
FRSP72	Tea, Green, Black	Japan	0	1.09	N/A
FRSP73	Tea, Green, Black	Japan	0	0	N/A
FRSP74	Tea, Green, Black	Japan	0	0	N/A
FRSP75	Tuna, Skipjack	Philippines	0	0.2	0
FRSP76	Tea, Green, Black	Japan	0	0	N/A
FRSP77	Tuna, Skipjack	Thailand	0	0	0
FRSP78	Tuna, Skipjack	Thailand	0	0	0
FRSP79	Mackerel	Japan	0	0	0
FRSP80	Mackerel	Japan	1.45	1.93	0
FRSP81	Mackerel	Thailand	0	0	0
FRSP82	Tuna, Skipjack	Thailand	0	0	0
FRSP83	Tea, Green, Black	Japan	0	0	N/A
FRSP84	Tea, Green, Black	Japan	0	0	N/A
FRSP85	Tuna, Skipjack	Thailand	0	0	0
FRSP86	Tuna, Skipjack	Thailand	0	0	0
FRSP87	Tea, Green, Black	Japan	10.6	16.3	N/A
FRSP88	Tea, Green, Black	Japan	22.3	30	N/A
FRSP89	Tuna, Skipjack	Thailand	0	0	0
FRSP90	Tuna, Skipjack	Thailand	0	0	0
FRSP91	Tuna, Skipjack	Thailand	0	0	0
FRSP92	Tuna, Skipjack	Korea	0	0	0
FRSP93	Tuna, Skipjack	Korea	0	0	0
FRSP94	Tea, Green, Black	Japan	0	0	N/A
FRSP95	Mackerel	Thailand	0	0	0
FRSP96	Tea, Green, Black	Japan	7.8	0	N/A
FRSP97	Tea, Green, Black	Japan	0	0	N/A
FRSP98	Tea, Green, Black	Japan	0	0	N/A
FRSP99	Tuna, Skipjack	Thailand	0	0	0

FRSP100	Teas (Tea and Herb teas)	Japan	0	0	N/A
FRSP101	Tea, Green, Black	Japan	5.07	7.5	N/A
FRSP102	Tea, Green, Black	Japan	9	12.9	N/A
FRSP103	Tuna, Skipjack	Thailand	0	0	0
FRSP104	Tea, Green, Black	Japan	0	0	N/A
FRSP105	Mackerel	Japan	0	0	0
FRSP106	Tuna, Skipjack	Japan	0	0	0
FRSP107	Tuna, Skipjack	Thailand	0	0	0
FRSP108	Mackerel	Thailand	0	0	0
FRSP109	Tuna, Skipjack	Thailand	0	0	0
FRSP110	Tuna, Skipjack	Philippines	0	0	0
FRSP111	Tuna, Skipjack	Thailand	0	0	0
FRSP112	Tuna, Skipjack	Japan	0	0	0
FRSP113	Mackerel	Japan	0	0	0
FRSP114	Mackerel	Japan	0	0	0
FRSP115	Mackerel	Japan	2.23	3.23	0
FRSP116	Tuna, Skipjack	Thailand	0	0	0
FRSP117	Mackerel	Korea	0	0	0
FRSP118	Tuna, Skipjack	Thailand	0	0	0
FRSP119	Mackerel	Korea	0	0	0
FRSP120	Mackerel	China	0	0	0
FRSP121	Tuna, Skipjack	Thailand	0	0	0
FRSP122	Tuna, Skipjack	Thailand	0	0	0
FRSP123	Tuna, Skipjack	Korea	0	0	0
FRSP124	Tuna, Skipjack	Thailand	0	0	0
FRSP125	Tuna, Skipjack	Thailand	0	0	0
FRSP126	Mackerel	Japan	0	0	0
FRSP127	Mackerel	Thailand	0	0	0
FRSP128	Tuna, Skipjack	Thailand	0	0	0
FRSP129	Mackerel	Thailand	0	0	0
FRSP130	Tuna, Skipjack	Thailand	0	0	0
FRSP131	Mackerel	Thailand	0	0	0
FRSP132	Tuna, Skipjack	Thailand	0	0	0
FRSP133	Tuna, Skipjack	Thailand	0	0	0
FRSP134	Tuna, Skipjack	Thailand	0	0	0
FRSP135	Tuna, Skipjack	Thailand	0	0	0
FRSP136	Tuna, Skipjack	Thailand	0	0	0
FRSP137	Tuna, Skipjack	Thailand	0	0	0
FRSP138	Tuna, Skipjack	Thailand	0	0	0
FRSP139	Tea, Green, Black	Japan	0	0	N/A
FRSP140	Tea, Green, Black	Japan	0	0	N/A
FRSP141	Mackerel	Viet Nam	0	0	0
FRSP142	Mackerel	Viet Nam	0	0	0

**Note "0" is not an absolute value, and only represents that the radionuclide tested was present at levels considered to be below background noise*