

Results of the Radiation Monitoring of Soil in Fukushima Prefecture

April 6, 2012

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The results of the survey on strontium 90 and plutonium, which was conducted based on the “Plan for the Radiation Monitoring of Soil in Fukushima Prefecture,” were compiled as follows.

(The preliminary report on the results regarding plutonium was publicized on November 29, 2011.)

1. Objectives of the monitoring

In order to ascertain changes in deposition amounts of radioactive strontium and plutonium in soil in Fukushima prefecture before and after the occurrence of the accident at TEPCO’s Fukushima Dai-ichi NPP, the monitoring was conducted by selecting points for which past monitoring results are available for comparison.

2. Targeted radionuclides

Sr-90, Pu-238, and Pu-239+240

(For reference, radioactive cesium, etc. were also surveyed.)

3. Monitoring points and sampling dates

Soil samples were collected at seven points near the NPP, where a soil survey has been conducted every year under the Basic Plan for Environmental Radioactivity Measurement in Fukushima Prefecture, as well as at 48 points selected from among the 53 monitoring points targeted in the FY2005 prefectural survey covering the whole prefecture (55 points in total).

Points around the NPP (7 points): Collected from July 13 to July 14, 2011

Points selected from the targeted monitoring points in the prefectural survey (48 points):

Collected from August 10 to October 13, 2011

4. Results

The outline of the results is as shown in Table 1. (The results for each point are as shown in Attachment 1.)

Table 1: Outline of the Monitoring Results

(Unit: Bq/m²)

Region	Kenpoku	Kenchu	Kennnan	Aizu
No. of points	6	9 (incl. 1 in the restricted area)	6	11
Sr-90	57.6–202	Not detectable–104	55.3–163	Not detectable–258
Pu-238	Not detectable–1.76	Not detectable–0.858	Not detectable–2.03	Not detectable–1.87
Pu-239+240	2.69–45.9	Not detectable–31.2	1.13–63.3	Not detectable–57.3
Pu-238/ Pu-239+240	0.0268–0.0474	0.0248–0.0402	0.0256–0.0426	0.0291–0.0521

Region	Minami-aizu	Soso		Iwaki	Total
No. of points	8	(Near the NPP) 7 (incl. 6 in the restricted areas)	(Not near the NPP) 4 (incl. 1 in the restricted area and 2 in deliberate evacuation area)	4	55
Sr-90	Not detectable -447	76.5-3,070	74.9-240	57.3-169	Not detectable -3,070
Pu-238	Not detectable -2.18	Not detectable -1.61	Not detectable -0.856	Not detectable	Not detectable -2.18
Pu-239+240	Not detectable- 63.8	Not detectable -35.1	Not detectable -25.3	0.747-11.1	Not detectable -63.8
Pu-238/ Pu-239+240	0.0224-0.0532	0.214	0.0338	-	0.0224-0.214

* Sr: Strontium; Pu: Plutonium; Bq: Becquerel

* The ratio (Pu-238/Pu-239+240) was calculated only for points where both Pu-238 and Pu-239+240 were detected.

* Method for the analysis of plutonium

Radiochemical analysis is first conducted for around 50g of each of the soil samples, and then measurement is conducted using a silicon semiconductor detector for 80,000 seconds (22 hours and 13 minutes).

Detection limit: Around 0.8 Bq/m² for both Pu-238 and Pu239+240

* Method for the analysis of Sr-90

Radiochemical analysis is first conducted for around 30g of each of the soil samples, and then measurement is conducted using a low background beta-ray counter for 60 minutes.

Detection limit: Around 40 Bq/m²

5. Considerations

The comparison with the past monitoring results is as shown in Tables 2 and 3. (The comparison for each point is as shown in Attachment 2.)

Table 2: Comparison with the Past Maximum Values

(Unit: Bq/m²)

	Maximum in this monitoring		Maximum in last ten years		All-time maximum	
	Near the NPP (7 points)	Across Fukushima (48 points)	Nationwide	In Fukushima	Nationwide	In Fukushima
Sr-90	3,070	447	1,200	620	5,846	999
Pu-238	1.61	2.18	8.0	2.3	8.0	2.3
Pu-239+240	35.1	63.8	220	67	220	67

* The “maximum in last ten years” column shows the maximum value from FY1999 to FY2008.

* The “all-time maximum” column shows the maximum value in the results of domestic surveys (Environmental Radiation Monitoring around Nuclear Facilities and Monitoring of Environmental Radioactivity Levels) up to FY2008.

(Sr-90: From FY1963 to FY2008/ Pu-238: From FY1978 to FY2008/ Pu-239+240: From 1975 to FY2008)

Table 3: Sr-90 – Comparison with the Levels before the Accident (FY2005) (by region)

(Unit: Bq/kg-dry soil)

Region	Sr-90		
	This monitoring	Previous monitoring	Previous monitoring (considering decay)
Kenpoku	1.57-6.87	1.01-6.27	0.873-5.43
Kenchu	Not detectable-4.50	0.505-9.29	0.437-8.04
Kennan	2.09-7.27	0.735-5.56	0.636-4.81

Aizu	Not detectable–13.3	0.197–13.1	0.170–11.3
Minami-aizu	Not detectable–20.6	1.13–20.4	0.975–17.7
Soso	1.37–80.8	Not detectable–6.59	Not detectable–5.70
Iwaki	2.45–5.87	0.475–3.18	0.411–2.75

* The “previous monitoring” column shows the results of the monitoring conducted by the Environmental Radioactivity Monitoring Center of Fukushima in FY2005 in various areas in the prefecture.

* The “previous monitoring (considering decay)” column shows values estimated by taking into consideration attenuation due to the physical half-life period (as of the time when six years have passed since the measurement time (estimates as of June to July 2011)).

* As the unit for the FY2005 survey was Bq/kg-dry soil, values were compared by the unit of Bq/kg-dry soil.

Table 4: Plutonium – Comparison with the Levels before the Accident (FY2005) (by region)

(Unit: Bq/kg-dry soil)

Region	Pu-238		Pu-239+240	
	This monitoring	Previous monitoring	This monitoring	Previous monitoring
Kenpoku	Not detectable–0.0599	Not detectable–0.0376	0.0732–1.45	0.0416–1.31
Kenchu	Not detectable–0.0388	Not detectable–0.0484	Not detectable–1.56	Not detectable–1.59
Kennan	Not detectable–0.0931	Not detectable–0.0818	0.0360–3.63	0.0342–2.63
Aizu	Not detectable–0.139	Not detectable–0.0555	Not detectable–4.27	0.0416–2.00
Minami-aizu	Not detectable–0.0881	Not detectable–0.0511	Not detectable–2.69	0.142–2.10
Soso	Not detectable–0.0422	Not detectable–0.0433	Not detectable–0.773	Not detectable–1.54
Iwaki	Not detectable	Not detectable–0.0367	0.0260–0.431	0.0229–1.01

* The “previous monitoring” column shows the results of the monitoring conducted by the Environmental Radioactivity Monitoring Center of Fukushima in FY2005 in various areas in the prefecture.

* As the unit for the FY2005 survey was Bq/kg-dry soil, values were compared by the unit of Bq/kg-dry soil.

(1) Monitoring results for strontium-90

The maximum deposition amount of Sr-90 detected in Fukushima prefecture through this monitoring was 3,070 Bq/m² (80.8 Bq/kg-dry soil) at Ottozawa, Okuma town, followed by 502 Bq/m² (14.9 Bq/kg-dry soil) at Koriyama, Futaba town. These values fall within the range of the deposition amounts detected so far throughout Japan prior to the occurrence of the accident (all-time maximum: 5,846 Bq/m²), but significantly exceed the past maximums detected at the relevant points (the amount detected at Ottozawa, Okuma town even exceeds the past prefectural maximum), suggesting the influence of the latest accident (Attachment 3).

Deposition amounts of strontium detected at points other than Ottozawa, Okuma town were within the range of the monitoring results obtained in the prefecture in the last ten years prior to the accident.

Fig. 4-1 and Fig. 4-2 show relations between the concentration levels of radioactive cesium and changes in deposition amounts of Sr-90 from the results of the previous monitoring in FY2005. Changes in Sr-90 are within ± 10 Bq/kg-dry soil at all points other than the two in Okuma town and Futaba town, irrespective of the concentration levels of radioactive cesium, and are considered to be at the level of fluctuations due to past nuclear tests. However, the average of the deposition amounts detected this time at 34 points in Hamadori (Soso region (excluding Okuma town and Futaba town) and Iwaki region) and Nakadori (Kenpoku, Kenchu, and Kennan regions) exceeded the average of the previous monitoring results, showing a statistically significant difference.*¹ One of the reasons therefor may include the influence of this accident on deposition amounts of Sr-90

in some areas within these regions. The average of the deposition amounts detected this time at 19 points in Aizu and Minami-aizu regions also exceeded the average of the previous monitoring results, but the difference was not statistically significant.*1

The ratios of deposition amounts of Sr-90 to those of Cs-137 (Attachment 1-1) vary significantly from 0.00013 to 0.12 (average: 0.0095) (Fig. 7). It was confirmed that the distribution of Sr-90 is uneven because deposition amounts of Sr-90 are small compared to those of Cs-137 and due to the influences of past nuclear tests.

*1 We conducted a t-test (one-sided test; error rate: 5%) with regard to the results of this monitoring and those of the previous monitoring (under the assumption that only Sr-90 resulted from past nuclear tests, etc. are deposited, and taking into account the attenuation due to the physical half-life period).

(2) Monitoring results for plutonium

Deposition amounts of plutonium detected in Fukushima prefecture through this monitoring were all within the range of the deposition amounts detected in the last ten years prior to the occurrence of the accident in the prefecture, but at one point near the NPP (Ottozawa, Okuma town), the ratio of the deposition amount of Pu-238 to that of Pu-239+240 was 0.214, significantly higher than the national average prior to the accident (0.0261), which suggests the influence of this accident.

Compared with the results of the previous monitoring (in FY2005), changes in deposition amounts of plutonium are considered to be at levels within the scope of the changes due to past nuclear tests. Average deposition amounts for respective regions show no statistically significant differences from those for the previous monitoring.

(3) Assessment of exposure doses

For the monitoring point where the influence of this accident is suspected (Ottozawa, Okuma town), we assessed possible exposure doses when staying there for 50 years (estimated effective dose over 50 years) (means for the assessment is as shown in *2 below).

Table 5 shows the assessment results.

Table 5: Estimated effective dose over 50 years at Ottozawa, Okuma town (by radionuclide)

Monitoring point	Radionuclide	Estimated effective dose over 50 years (Unit: mSv)
Ottozawa, Okuma town	Sr-90	0.064
	Pu-238	0.011
	Pu-239+240	0.064

*2 Means for the assessment of exposure doses

Based on “E3 Ground Contamination” of the IAEA—TECDOC—1162 “Generic Procedures for Assessment and Response during a Radiological Emergency” (IAEA, August 2000)

Assuming that a person stays on the ground where radionuclides are deposited, accumulated effective doses for the period after the radionuclides were deposited on the ground surface (50 years) are assessed.

Obtained effective doses include external exposure doses caused by radionuclides deposited on the ground surface and internal exposure doses due to inhalation of resuspended radionuclides (committed doses).

6. Conclusion

Deposition amounts of Sr-90 detected through this monitoring at two points near TEPCO's Fukushima Dai-ichi NPP (Ottozawa, Okuma town, and Koriyama, Futaba town) significantly exceeded the past monitoring results at the same points, which is considered to have been caused by the influence of the latest accident. Deposition amounts detected at other points were all within the range of the changes due to past nuclear tests, but the average for the 34 points in Hamadori and Nakadori showed a significant difference from monitoring results prior to the accident, and one of the causes therefor is deemed to be the influence of this accident. The average for 19 points in Aizu did not show any significant difference from monitoring results prior to the accident.

Looking at deposition amounts of plutonium, the ratio of Pu-238 to Pu-239+240 at one point near the NPP (Ottozawa, Okuma town) suggests the influence of this accident, but deposition amounts detected at other points only showed changes within the range considered to be caused by the influence of past nuclear tests, and averages for respective regions showed no significant difference from monitoring results prior to the accident.

Monitoring of the deposition of radioactive strontium and radioactive plutonium in soil in Fukushima prefecture will be continued into the future.

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Attachment 1 - 1 Analysis results for radioactive substances in soil (individual list) part 1 Strontium (Reference: cesium iodine potassium)

No.	Sampling point			Sampling date	Sr-90				(Reference)Cs-134		(Reference)Cs-137		[Sr-90] / [Cs-137]	(Reference)I-131		(Reference)K-40(Natural radionuclides)	
	Region	City	Monitoring Points		Concentration [Bq/m ²]	Detection limits [Bq/m ²]	Concentration [Bq/kgDry soil]	Detection limits [Bq/kgDry soil]	Concentration [Bq/m ²]	Concentration [Bq/kgDry soil]	Concentration [Bq/m ²]	Concentration [Bq/kgDry soil]		Concentration [Bq/m ²]	Detection limits [Bq/m ²]	Detection limits [Bq/m ²]	Maximum of Concentration [Bq/m ²]
1	Kenpoku	Fukushima city	Fukushima city Iizaka town Nakano	Tatenoyama Park (Otori castle ruins	2011/8/10	1.95E+02	3.88E+00		2.35E+05	3.44E+03	2.89E+05	4.22E+03	0.000676	ND	3.35E+03	2.03E+04	
2		Kunimi town	Kunimi town Kosaka	Shozoji	2011/8/10	1.43E+02	2.49E+00		1.37E+05	1.78E+03	1.64E+05	2.12E+03	0.000874	ND	3.57E+03	1.70E+04	
3		Nihonmatsu city	Nihonmatsu city Harimich	Natsunashinuma	2011/8/10	2.02E+02	6.87E+00		7.86E+04	1.34E+03	9.64E+04	1.65E+03	0.002096	ND	2.39E+03	ND	9.65E+03
4		Otama village	Otama village Tamano	Forest Park Adatara	2011/8/10	5.76E+01	1.57E+00		5.89E+04	9.67E+02	7.04E+04	1.16E+03	0.000818	ND	2.66E+03	ND	1.00E+04
5		Nihonmatsu city	Nihonmatsu city Kakuna	Kasumigajo	2011/8/10	9.12E+01	2.13E+00		3.18E+05	5.27E+03	3.82E+05	6.34E+03	0.000239	ND	6.45E+03	2.41E+04	
6		Date city	Date city Ryozen town Ishide	Ryozen Kodomonomura	2011/8/10	1.26E+02	3.99E+00		3.93E+05	8.26E+03	4.80E+05	1.01E+04	0.000263	ND	5.14E+03	1.24E+04	
7		Koriyama city	Koriyama city Ose town Tadan	Near Yasumishi Hot Spring	2011/8/26	6.48E+01	3.25E+00		2.49E+04	7.68E+02	3.02E+04	9.31E+02	0.002148	ND	1.97E+03	1.10E+04	
8	Kenchu	Sukagawa city	Sukagawa city Ebana	Lake Fujinuma Natural Park	2011/8/17	1.04E+02	4.50E+00		1.98E+04	5.98E+02	2.28E+04	6.88E+02	0.004548	ND	2.11E+03	ND	9.78E+03
9		Tenei village	Tenei village Hator	Hatori Lakeside Auto Camping Grounc	2011/8/17	ND	4.22E+01	ND	1.07E+00	3.32E+04	5.64E+02	3.88E+04	6.59E+02	-	ND	3.77E+03	2.17E+04
10		Kagamishi town	Kagamishi town Kyurais	Oguriyama Kannondc	2011/8/26	9.76E+01	3.42E+00		1.27E+04	2.71E+02	1.48E+04	3.16E+02	0.006605	ND	1.85E+03	1.12E+04	
11		Ishikawa town	Ishikawa town Bobata	Near Bobata Hot Spring (Wakamiyahachiman Shrine)	2011/8/26	ND	4.16E+01	ND	1.12E+00	7.53E+02	1.47E+01	8.97E+02	1.75E+01	-	ND	1.02E+03	1.73E+04
12		Furudono town	Furudono town Oguta	Koshidai-no-sakura Park	2011/8/26	ND	4.68E+01	ND	8.80E-01	1.24E+04	1.76E+02	1.47E+04	2.09E+02	-	ND	2.27E+03	2.43E+04
13		Tamura city	Tamura city Tokiwa town Tokiwa	Tate Park	2011/8/24	9.55E+01	1.62E+00		2.89E+04	3.98E+02	3.65E+04	5.03E+02	0.002618	ND	3.28E+03	3.18E+04	
14		Tamura city	Tamura city Miyakoji town Furumichi	Koyasu Shrine	2011/10/13	9.10E+01	2.03E+00		5.02E+04	8.36E+02	6.41E+04	1.07E+03	0.001420	ND	1.64E+03	3.34E+04	
15	Kennan	Koriyama city	Koriyama city Tamura town Nukazaki	(Near Nakatsugawa Hot Spring) Zaku-no-magai Sanjusan Kannon	2011/8/26	9.39E+01	4.18E+00		1.38E+04	3.80E+02	1.76E+04	4.85E+02	0.005337	ND	1.83E+03	1.48E+04	
16		Sirakawa city	Sirakawa city Taishinkumad	Hijirigaiwa Furusato-no-mori Camping Site	2011/8/17	5.53E+01	3.17E+00		3.64E+04	1.21E+03	4.42E+04	1.48E+03	0.001250	ND	2.82E+03	ND	9.07E+03
17		Nishigo village	Nishigo village Mabunc	Chapo Land Saigo	2011/8/17	1.47E+02	7.27E+00		1.63E+04	4.43E+02	2.01E+04	5.46E+02	0.007290	ND	2.26E+03	ND	1.05E+04
18		Sirakawa city	Sirakawa city Kakunai	Komine castle ruins	2011/8/17	8.07E+01	2.82E+00		6.02E+04	1.58E+03	7.46E+04	1.96E+03	0.001081	ND	3.92E+03	1.11E+04	
19		Izumizaki village	Izumizaki village Izumizak	Izumizaki Yokoana	2011/8/17	7.01E+01	2.09E+00		1.00E+04	2.03E+02	1.14E+04	2.32E+02	0.006139	ND	2.04E+03	1.15E+04	
20		Sirakawa city	Sirakawa city Omotego Nakano	Izumishikibu-an ruins and Kesho-no-	2011/8/17	1.63E+02	3.98E+00		6.97E+04	1.05E+03	8.49E+04	1.28E+03	0.001918	ND	5.02E+03	2.90E+04	
21		Yamatsuri town	Yamatsuri town Uchikawa	Yamatsuriyama Park	2011/8/18	8.21E+01	2.62E+00		7.93E+03	1.77E+02	8.83E+03	1.97E+02	0.009305	ND	2.32E+03	4.50E+04	
22	Aizu	Inawashiro town	Inawashiro town Koga	Nakanosawa Hot Spring	2011/8/30	2.58E+02	1.33E+01		1.36E+04	4.31E+02	1.73E+04	6.00E+02	0.014862	ND	1.42E+03	ND	8.95E+03
23		Inawashiro town	Inawashiro town Okinazawa	Nagahama	2011/8/30	9.99E+01	5.97E+00		5.57E+03	1.91E+02	8.25E+03	2.83E+02	0.012114	ND	1.17E+03	ND	9.86E+03
24		Aizuwakamatsu city	Aizuwakamatsu city Minato town Akai	Seaburiyama Natural Resort Forest	2011/8/30	1.30E+02	9.64E+00		3.86E+03	1.44E+02	5.80E+03	2.17E+02	0.022323	ND	9.33E+02	ND	9.78E+03
25		Aizumisato town	Aizumisato town Miyabayashi	Isasumi Shrine	2011/8/30	1.11E+02	4.04E+00		2.14E+04	6.39E+02	2.53E+04	7.59E+02	0.004378	ND	1.94E+03	2.31E+04	
26		Kaneyama town	Kaneyama town Okuriyama	Lake Numazawa Camping Site	2011/8/30	8.21E+01	1.96E+00		5.40E+03	9.27E+01	7.16E+03	1.23E+02	0.011474	ND	1.29E+03	2.03E+04	
27		Yanaizu town	Yanaizu town Sunakohara	Near Nishiyama Hot Spring (Zeizan-so)	2011/8/30	ND	3.60E+01	ND	1.24E+00	8.56E+03	2.05E+02	1.12E+04	2.68E+02	-	ND	9.68E+02	1.03E+04
28		Aizubange town	Aizubange town Mimyc	Aizubange Municipal Ski Resor	2011/8/31	1.09E+02	3.70E+00		1.39E+04	3.72E+02	1.67E+04	4.46E+02	0.006529	ND	1.57E+03	2.14E+04	
29	Minamiaizu	Kitakata city	Kitakata city Yamato town Kofunaj	Senpukuji	2011/8/31	ND	5.78E+01	ND	1.02E+00	2.74E+04	4.12E+02	3.59E+04	5.40E+02	-	ND	2.46E+03	3.21E+04
30		Kitakata city	Kitakata city Atsushikano town Atsushio	Jigenji	2011/8/31	1.16E+02	3.07E+00		7.36E+03	1.13E+02	9.78E+03	1.50E+02	0.011904	ND	1.34E+03	1.74E+04	
31		Kitakata city	Kitakata city Iwatsuki town Miyats	Uenoyama Cemetery Park	2011/8/31	5.56E+01	2.56E+00		1.40E+04	4.93E+02	1.68E+04	5.90E+02	0.003319	ND	1.50E+03	8.16E+03	
32		Yugawa village	Yugawa village Shojc	Shojoji	2011/8/31	7.30E+01	6.29E+00		6.28E+03	2.55E+02	7.92E+03	3.21E+02	0.009228	ND	1.28E+03	ND	9.96E+03
33		Minamiaizu town	Minamiaizu town Tonyt	Usagi-no-mori Camping Site	2011/9/16	1.92E+02	5.69E+00		1.81E+03	3.26E+01	2.84E+03	5.10E+01	0.067581	ND	7.85E+02	2.03E+04	
34		Minamiaizu town	Minamiaizu town Tabe	Baba Park	2011/9/16	1.83E+02	5.93E+00		4.28E+03	8.25E+01	1.19E+03	1.19E+02	0.029617	ND	9.47E+02	1.82E+04	
35		Minamiaizu town	Minamiaizu town Furumachi	Shokokuji	2011/9/15	7.61E+01	1.70E+00		3.78E+04	7.29E+02	4.66E+04	9.00E+02	0.001632	ND	2.05E+03	4.74E+04	
36	zu	Shimogou town	Shimogou town Ouchi	Ouchijuku	2011/9/16	1.40E+02	5.64E+00		4.42E+03	9.39E+01	7.32E+03	1.55E+02	0.019091	ND	7.77E+02	1.06E+04	
37		Minamiaizu town	Minamiaizu town Igeta	Entrance of Takatsue Ski Resor	2011/9/16	ND	4.25E+01	ND	1.19E+00	1.11E+03	2.21E+01	1.67E+03	3.32E+01	-	ND	7.00E+02	2.10E+04
38		Hinoemata village	Hinoemata village Kuroiwayama	Kuroiwayama Observation Deck	2011/9/15	4.47E+02	2.06E+01		1.83E+03	3.98E+01	3.58E+03	7.78E+01	0.124775	ND	1.01E+03	1.70E+04	
39		Minamiaizu town	Minamiaizu town Izumita	Daisenji	2011/9/15	3.14E+02	9.64E+00		1.48E+04	2.66E+02	1.96E+04	3.53E+02	0.016007	ND	1.37E+03	2.27E+04	
40		Tadami town	Tadami town Tagokura	Tagokura Dam	2011/9/15	3.83E+01	1.55E+00		2.05E+03	6.84E+01	2.61E+03	8.73E+01	0.014640	ND	7.01E+02	1.84E+04	
41		Kawauchi village	Kawauchi village Kamikawauchi	Takayama Natural Park	2011/8/24	1.15E+02	3.51E+00		2.15E+04	5.45E+02	2.63E+04	6.68E+02	0.004389	ND	2.55E+03	2.71E+04	
42		Soma city	Soma city Nakamura Kitamachi	Nakamura castle ruins	2011/8/24	1.30E+02	2.88E+00		6.76E+04	1.13E+03	8.11E+04	1.35E+03	0.001605	ND	3.84E+03	1.82E+04	
43	Sousou	Minamisoma city	Minamisoma city Haramachi ward Tanakura	Kunimiyama	2011/8/24	2.40E+02	7.36E+00		3.17E+05	6.42E+03	3.67E+05	7.43E+03	0.000652	ND	7.92E+03	2.87E+04	
44		Katsurao village	Katsurao village Ochia	Katsurao village central park	2011/8/24	7.49E+01	1.77E+00		2.89E+05	5.41E+03	3.53E+05	6.60E+03	0.000212	ND	8.14E+03	5.73E+04	
45		Hirono town	Hirono town Shimokitabi	Shimokitaba	2011/7/14	1.09E+02	2.81E+00		1.02E+04	1.78E+02	9.49E+03	1.65E+02	0.011508	ND	1.00E+03	ND	1.32E+04
46		Naraha town	Naraha town Namikura	Namikura	2011/7/14	1.30E+02	2.19E+00		8.00E+04	1.81E+03	8.85E+04	2.00E+03	0.001469	ND	1.36E+03	1.24E+04	
47		Tomiooka town	Tomiooka town Kobama	Kobama	2011/7/14	9.09E+01	1.37E+00		6.10E+05	1.11E+04	6.87E+05	1.25E+04	0.000132	ND	4.47E+03	1.42E+04	
48		Okuma town	Okuma town Ottozawa	Ottozawa	2011/7/13	3.07E+03	8.08E+01		4.58E+06	9.01E+04	5.06E+06	9.97E+04	0.000607	ND	1.06E+04	ND	1.76E+04
49		Futaba town	Futaba town Koriyama	Koriyama	2011/7/13	5.02E+02	1.49E+01		1.22E+05	2.66E+03	1.41E+05	3.08E+03	0.003560	ND	1.65E+03	2.09E+04	
50	Iwaki	Namie town	Namie town Kitakiyohash	Kitakiyohashi	2011/7/13	1.01E+02	4.20E+00		5.09E+04	1.57E+03	6.15E+04	1.90E+03	0.001643	ND	1.30E+03	ND	8.71E+03
51		Minamisoma city	Minamisoma city Odaka ward Uraji	Uraji	2011/7/13	7.65E+01	1.69E+00		8.11E+03	1.27E+02	1.19E+04	1.86E+02	0.006437	ND	8.73E+02	1.44E+04	
52		Iwaki city	Iwaki city Onahama Shimokajiro	Misaki Park	2011/8/18	9.23E+01	4.97E+00		2.42E+04	5.79E+02	2.83E+04	6.77E+02	0.003266	ND	2.19E+03	9.16E+03	
53		Iwaki city	Iwaki city Nakoso town Sekit	Nakoso-no-seki	2011/8/18	1.08E+02	2.88E+00		4.83E+04	8.94E+02	5.72E+04	1.06E+03	0.001890	ND	3.77E+03	2.86E+04	
54		Iwaki city	Iwaki city Kawabe town Osawa	Shitoki Dam	2011/8/18	1.69E+02	5.87E+00		3.87E+04	9.85E+02	4.38E+04	1.11E+03	0.003855	ND	3.01E+03	1.55E+04	
55		Iwaki city	Iwaki city Miwa town Kamichigaya	Nagasawa Pass	2011/8/29	5.73E+01	2.45E+00		3.27E+04	8.15E+02	3.93E+04	9.80E+02	0.001457	ND	1.73E+03	ND	9.43E+03

(Legend)

ND indicates not detected.

E± indicates ×10[±](e.g.) 1.23E+02 = 1.23×10² = 123 1.23E+00 = 1.23×10⁰ = 1.23 1.23E-02 = 1.23×10⁻² = 0.0123

Samples were collected from a depth of 5cm.

Attachment 1 - 2 Analysis results for radioactive substances in soil (individual list) part 2 Plutonium

No.	Sampling point			Sampling date	Pu-239+240				Pu-238				[Pu-238] / [Pu-239+240]	Remarks	
	Region	City	Monitoring Points		Concentration [Bq/m ²]	Detection limits [Bq/m ²]	Concentration [Bq/kgDry soil]	Detection limits [Bq/kgDry soil]	Concentration [Bq/m ²]	Detection limits [Bq/m ²]	Concentration [Bq/kgDry soil]	Detection limits [Bq/kgDry soil]			
1	Kenpoku	Fukushima city	Fukushima city Iizaka town Nakano	Tatenoyama Park (Otori castle ruins)	2011/8/10	2.35E+01	4.67E-01		ND	1.37E+00	ND	2.73E-02	—		
2		Kunimi town	Kunimi town Kosaka	Shozoji	2011/8/10	6.52E+00	1.14E-01		ND	1.33E+00	ND	2.32E-02	—		
3		Nihonmatsu city	Nihonmatsu city Harimich	Natsunashinuma	2011/8/10	3.72E+01	1.26E+00		1.76E+00		5.99E-02		0.0474		
4		Otama village	Otama village Tamanoi	Forest Park Adatarara	2011/8/10	2.69E+00	7.32E-02		ND	8.68E-01	ND	2.36E-02	—		
5		Nihonmatsu city	Nihonmatsu city Kakuna	Kasumigajo	2011/8/10	4.46E+00	1.04E-01		ND	1.09E+00	ND	2.54E-02	—		
6		Date city	Date city Ryozen town Ishida	Ryozen Kodomonomura	2011/8/10	4.59E+01	1.45E+00		1.23E+00		3.90E-02		0.0268		
7	Kenchu	Koriyama city	Koriyama city Ose town Tadano	Near Yasumiishi Hot Spring	2011/8/26	3.12E+01	1.56E+00		7.75E-01		3.88E-02		0.0248		
8		Sukagawa city	Sukagawa city Ebana	Lake Fujinuma Natural Park	2011/8/17	1.43E+01	6.23E-01		5.37E-01		2.34E-02		0.0375		
9		Tenei village	Tenei village Hatori	Hatori Lakeside Auto Camping Ground	2011/8/17	1.37E+00	3.45E-02		ND	1.04E+00	ND	2.64E-02	—		
10		Kagamiishi town	Kagamiishi town Kyuraish	Oguriyama Kannondc	2011/8/26	2.13E+01	7.48E-01		8.58E-01		3.01E-02		0.0402		
11		Ishikawa town	Ishikawa town Bobata	Near Bobata Hot Spring (Wakamiyahachiman Shrine)	2011/8/26	8.13E-01	2.17E-02		ND	9.60E-01	ND	2.57E-02	—		
12		Furudono town	Furudono town Oguta	Koshidai-no-sakura Park	2011/8/26	ND	9.50E-01	ND	1.79E-02	ND	9.50E-01	ND	1.79E-02	—	
13	Kennan	Tamura city	Tamura city Tokiwa town Tokiwa	Tate Park	2011/8/24	3.00E+00	5.09E-02		ND	9.08E-01	ND	1.54E-02	—		
14		Tamura city	Tamura city Miyakoji town Furumichi	Koyasu Shrine	2011/10/13	1.34E+00	2.99E-02		ND	1.00E+00	ND	2.24E-02	—	The restricted areas	
15		Koriyama city	Koriyama city Tamura town Nukazaka	(Near Nakatsugawa Hot Spring) Zaku-no-magai Sanjusan Kannon	2011/8/26	1.49E+01	6.61E-01		ND	6.37E-01	ND	2.83E-02	—		
16		Sirakawa city	Sirakawa city Taishinkumadc	Hijirigaiwa Furusato-no-mori Camping Site	2011/8/17	6.33E+01	3.63E+00		1.62E+00		9.31E-02		0.0256		
17		Nishigo village	Nishigo village Mabun	Chapo Land Saigo	2011/8/17	2.60E+01	1.29E+00		ND	5.28E-01	ND	2.62E-02	—		
18		Sirakawa city	Sirakawa city Kakunai	Komine castle ruins	2011/8/17	1.17E+01	4.11E-01		ND	6.50E-01	ND	2.27E-02	—		
19	Aizu	Izumizaki village	Izumizaki village Izumizak	Izumizaki Yokoana	2011/8/17	6.48E+00	1.93E-01		ND	8.03E-01	ND	2.39E-02	—		
20		Sirakawa city	Sirakawa city Omotego Nakano	Izumishikibu-an ruins and Kesho-no-	2011/8/17	4.78E+01	1.17E+00		2.03E+00		4.97E-02		0.0426		
21		Yamatsuri town	Yamatsuri town Uchikawa	Yamatsuriyama Park	2011/8/18	1.13E+00	3.60E-02		ND	7.50E-01	ND	2.40E-02	—		
22		Inawashiro town	Inawashiro town Kogai	Nakanosawa Hot Spring	2011/8/30	3.67E+01	1.89E+00		1.07E+00		5.51E-02		0.0291		
23		Inawashiro town	Inawashiro town Okinazawa	Nagahama	2011/8/30	3.86E+01	2.30E+00		1.46E+00		8.72E-02		0.0379		
24		Aizuwakamatsu city	Aizuwakamatsu city Minato town Akai	Seaburiyama Natural Resort Forest	2011/8/30	5.73E+01	4.27E+00		1.87E+00		1.39E-01		0.0326		
25	Aizu	Aizumisato town	Aizumisato town Miyabayash	Isasumi Shrine	2011/8/30	ND	4.05E-01	ND	1.48E-02	ND	4.87E-01	ND	1.77E-02	—	
26		Kaneyama town	Kaneyama town Okuriyama	Lake Numazawa Camping Site	2011/8/30	5.47E+00	1.31E-01		ND	9.75E-01	ND	2.33E-02	—		
27		Yanaizu town	Yanaizu town Sunakohara	Near Nishiyama Hot Spring (Zeizan-so)	2011/8/30	1.10E+00	3.78E-02		ND	6.13E-01	ND	2.10E-02	—		
28		Aizubange town	Aizubange town Mimyc	Aizubange Municipal Ski Resor	2011/8/31	2.54E+01	8.61E-01		ND	5.97E-01	ND	2.03E-02	—		
29		Kitakata city	Kitakata city Yamato town Kofunaji	Senpukuji	2011/8/31	3.06E+00	5.38E-02		ND	1.09E+00	ND	1.92E-02	—		
30		Kitakata city	Kitakata city Atsushikano town Atsushio	Igenji	2011/8/31	4.02E+01	1.06E+00		1.57E+00		4.15E-02		0.0392		
31	Minamiaizu	Kitakata city	Kitakata city Iwatsuki town Miyatsu	Uenoyama Cemetery Park	2011/8/31	8.18E+00	3.77E-01		4.26E-01		1.97E-02		0.0521		
32		Yugawa village	Yugawa village Shojo	Shojoji	2011/8/31	1.50E+01	1.30E+00		7.57E-01		6.52E-02		0.0503		
33		Minamiaizu town	Minamiaizu town Tonyu	Usagi-no-mori Camping Site	2011/9/16	2.39E+01	7.10E-01		1.27E+00		3.77E-02		0.0532		
34		Minamiaizu town	Minamiaizu town Tabe	Baba Park	2011/9/16	3.07E+01	9.95E-01		ND	9.01E-01	ND	2.92E-02	—		
35		Minamiaizu town	Minamiaizu town Furumach	Shokokuji	2011/9/15	2.86E+00	6.39E-02		ND	8.86E-01	ND	1.98E-02	—		
36		Shimogou town	Shimogou town Ouchi	Ouchijuku	2011/9/16	6.38E+01	2.58E+00		2.18E+00		8.81E-02		0.0342		
37	Sousou	Minamiaizu town	Minamiaizu town Igeta	Entrance of Takatsue Ski Resort	2011/9/16	ND	7.43E-01	ND	2.08E-02	ND	8.92E-01	ND	2.50E-02	—	
38		Hinoemata village	Hinoemata village Kuroiwayama	Kuroiwayama Observation Deck	2011/9/15	5.85E+01	2.69E+00		1.77E+00		8.16E-02		0.0303		
39		Minamiaizu town	Minamiaizu town Izumit	Daisenji	2011/9/15	4.99E+01	1.53E+00		1.12E+00		3.43E-02		0.0224		
40		Tadami town	Tadami town Tagokura	Tagokura Dam	2011/9/15	1.61E+00	6.48E-02		ND	4.12E-01	ND	1.66E-02	—		
41		Kawauchi village	Kawauchi village Kamikawauchi	Takayama Natural Park	2011/8/24	2.53E+01	7.69E-01		8.56E-01		2.60E-02		0.0338	The restricted areas	
42		Soma city	Soma city Nakamura Kitamachi	Nakamura castle ruins	2011/8/24	1.82E+01	4.03E-01		ND	9.79E-01	ND	2.17E-02	—		
43	Iwaki	Minamisoma city	Minamisoma city Haramachi ward Takanokura	Kunimiyama	2011/8/24	3.84E+00	1.18E-01		ND	6.29E-01	ND	1.93E-02	—	Planned evacuation areas	
44		Katsurao village	Katsurao village Ochiai	Katsurao village Central Park	2011/8/24	ND	6.48E-01	ND	1.53E-02	ND	7.78E-01	ND	1.84E-02	—	Planned evacuation areas
45		Hirono town	Hirono town Shimokitaba	Shimokitaba	2011/7/14	2.61E+00	6.73E-02		ND	8.03E-01	ND	2.07E-02	—	Near the NPP	
46		Naraha town	Naraha town Namikura	Namikura	2011/7/14	ND	8.50E-01	ND	1.44E-02	ND	1.02E+00	ND	1.72E-02	—	Near the NPP The restricted areas
47		Tomioka town	Tomioka town Kobama	Kobama	2011/7/14	ND	9.85E-01	ND	1.48E-02	ND	1.28E+00	ND	1.92E-02	—	Near the NPP The restricted areas
48		Okuma town	Okuma town Ottozawa	Ottozawa	2011/7/13	7.52E+00	1.98E-01		1.61E+00		4.22E-02		0.214	Near the NPP The restricted areas	
49	Iwaki	Futaba town	Futaba town Koriyama	Koriyama	2011/7/13	7.28E+00	2.16E-01		ND	6.77E-01	ND	2.01E-02	—	Near the NPP The restricted areas	
50		Namie town	Namie town Kitakiyohashi	Kitakiyohashi	2011/7/13	9.74E+00	4.04E-01		ND	6.09E-01	ND	2.53E-02	—	Near the NPP The restricted areas	
51		Minamisoma city	Minamisoma city Odaka ward Urajiri	Urajiri	2011/7/13	3.51E+01	7.73E-01		ND	1.17E+00	ND	2.58E-02	—	Near the NPP The restricted areas	
52		Iwaki city	Iwaki city Onahama Shimokajiro	Misaki Park	2011/8/18	6.85E+00	3.69E-01		ND	6.91E-01	ND	3.72E-02	—		
53		Iwaki city	Iwaki city Nakoso town Sekita	Nakoso-no-seki	2011/8/18	1.11E+01	2.97E-01		ND	1.04E+00	ND	2.76E-02	—		
54		Iwaki city	Iwaki city Kawabe town Osawa	Shitoki Dam	2011/8/18	7.47E-01	2.60E-02		ND	7.47E-01	ND	2.60E-02	—		
55		Iwaki city	Iwaki city Miwa town Kamiichigaya	Nagasawa Pass	2011/8/29	1.01E+01	4.31E-01		ND	7.07E-01	ND	3.02E-02	—		

(Legend)

ND indicates not detected.

E± indicates ×10[±] (e.g.) 1.23E+02 = 1.23×10² = 123 1.23E+00 = 1.23×10⁰ = 1.23 1.23E-02 = 1.23×10⁻² = 0.0123

[Pu-238]/[Pu-239+240] is calculated for only locations at which both Pu-238 and Pu-239+240 were detected.

Samples were collected from a depth of 5cm.

Attachment 2—1 Comparison with the past monitoring results (FY2005) part 1 Strontium cesium

No.	Sampling point			Sr-90 [Bq/kgDry soil]						Cs-134 [Bq/kgDry soil]		Cs-137 [Bq/kgDry soil]			Remarks
	Region	City	Monitoring Points	This monitoring	Detection limits (This monitoring)	FY2005	Changes	FY2005 (Considering decay)	Changes (Considering decay)	This monitoring	FY2005	This monitoring	FY2005	Changes	
1	Kenpoku	Fukushima city	Fukushima city Iizaka town Nakanc	3.88E+00		3.57E+00	0.31	3.09E+00	0.79	3.44E+03	ND	4.22E+03	1.85E+01	4.20E+03	
2		Kunimi town	Kunimi town Kosaka	2.49E+00		2.52E+00	-0.03	2.18E+00	0.31	1.78E+03	ND	2.12E+03	8.84E+00	2.11E+03	
3		Nihonmatsu city	Nihonmatsu city Harimich	6.87E+00		6.27E+00	0.60	5.43E+00	1.44	1.34E+03	ND	1.65E+03	3.86E+01	1.61E+03	
4		Otama village	Otama village Tamano	1.57E+00		2.17E+00	-0.60	1.87E+00	-0.30	9.67E+02	ND	1.16E+03	4.54E+01	1.11E+03	
5		Nihonmatsu city	Nihonmatsu city Kakuna	2.13E+00		1.01E+00	1.12	8.73E-01	1.26	5.27E+03	ND	6.34E+03	1.26E+00	6.34E+03	
6		Date city	Date city Ryozen town Ishida	3.99E+00		2.53E+00	1.46	2.19E+00	1.80	8.26E+03	ND	1.01E+04	2.26E+01	1.01E+04	
7	Kenchu	Koriyama city	Koriyama city Ose town Tadano	3.25E+00		2.21E+00	1.04	1.91E+00	1.34	7.68E+02	ND	9.31E+02	3.92E+01	8.92E+02	
8		Sukagawa city	Sukagawa city Ebana	4.50E+00		7.26E+00	-2.76	6.28E+00	-1.78	5.98E+02	ND	6.88E+02	2.62E+01	6.62E+02	
9		Tenei village	Tenei village Hatori	ND	1.07E+00	9.29E+00	-8.22	8.04E+00	-6.97	5.64E+02	ND	6.59E+02	5.49E+01	6.04E+02	
10		Kagamiishi town	Kagamiishi town Kyuraish	3.42E+00		2.42E+00	1.00	2.09E+00	1.33	2.71E+02	ND	3.16E+02	1.66E+01	2.99E+02	
11		Ishikawa town	Ishikawa town Bobata	ND	1.12E+00	2.19E+00	-1.07	1.89E+00	-0.77	1.47E+01	ND	1.75E+01	3.34E+00	1.42E+01	
12		Furudono town	Furudono town Oguta	ND	8.80E-01	5.05E-01	0.37	4.37E-01	0.44	1.76E+02	ND	2.09E+02	ND	2.09E+02	
13		Tamura city	Tamura city Tokiwa town Tokiwa	1.62E+00		1.71E+00	-0.09	1.48E+00	0.14	3.98E+02	ND	5.03E+02	9.79E+00	4.93E+02	
14		Tamura city	Tamura city Miyakoji town Furumichi	2.03E+00		6.43E-01	1.39	5.56E-01	1.47	8.36E+02	ND	1.07E+03	ND	1.07E+03	The restricted areas
15	Kennan	Koriyama city	Koriyama city Tamura town Nukazuka	4.18E+00		3.11E+00	1.07	2.69E+00	1.49	3.80E+02	ND	4.85E+02	2.45E+01	4.60E+02	
16		Sirakawa city	Sirakawa city Taishinkumad	3.17E+00		1.90E+00	1.27	1.64E+00	1.53	1.21E+03	ND	1.48E+03	2.81E+01	1.45E+03	
17		Nishigo village	Nishigo village Mabun	7.27E+00		5.56E+00	1.71	4.81E+00	2.46	4.43E+02	ND	5.46E+02	8.88E+01	4.57E+02	
18		Sirakawa city	Sirakawa city Kakunai	2.82E+00		2.54E+00	0.28	2.20E+00	0.62	1.58E+03	ND	1.96E+03	1.93E+01	1.94E+03	
19		Izumizaki village	Izumizaki village Izumizak	2.09E+00		7.35E-01	1.36	6.36E-01	1.45	2.03E+02	ND	2.32E+02	1.16E+01	2.20E+02	
20		Sirakawa city	Sirakawa city Omotego Nakano	3.98E+00		1.20E+00	2.78	1.04E+00	2.94	1.05E+03	ND	1.28E+03	1.50E+01	1.27E+03	
21		Yamatsuri town	Yamatsuri town Uchikawa	2.62E+00		9.42E-01	1.68	8.15E-01	1.81	1.77E+02	ND	1.97E+02	ND	1.97E+02	
22		Inawashiro town	Inawashiro town Kogai	1.33E+01		4.55E+00	8.75	3.94E+00	9.36	4.31E+02	ND	6.00E+02	3.41E+01	5.66E+02	
23	Aizu	Inawashiro town	Inawashiro town Okinazawa	5.97E+00		3.40E+00	2.57	2.94E+00	3.03	1.91E+02	ND	2.83E+02	3.38E+01	2.49E+02	
24		Aizuwakamatsu city	Aizuwakamatsu city Minato town Akai	9.64E+00		1.31E+01	-3.46	1.13E+01	-1.69	1.44E+02	ND	2.17E+02	7.56E+01	1.41E+02	
25		Aizumisato town	Aizumisato town Miyabayash	4.04E+00		5.11E+00	-1.07	4.42E+00	-0.38	6.39E+02	ND	7.59E+02	4.68E+01	7.12E+02	
26		Kaneyama town	Kaneyama town Okuriyama	1.96E+00		2.10E+00	-0.14	1.82E+00	0.14	9.27E+01	ND	1.23E+02	9.24E+00	1.14E+02	
27		Yanaizu town	Yanaizu town Sunakohara	ND	1.24E+00	2.13E+00	-0.89	1.84E+00	-0.60	2.05E+02	ND	2.68E+02	1.24E+01	2.56E+02	
28		Aizubange town	Aizubange town Mimyc	3.70E+00		4.09E+00	-0.39	3.54E+00	0.16	3.72E+02	ND	4.46E+02	3.81E+01	4.08E+02	
29		Kitakata city	Kitakata city Yamato town Kofunaji	ND	1.02E+00	4.57E+00	-3.55	3.95E+00	-2.93	4.12E+02	ND	5.40E+02	2.53E+00	5.37E+02	
30		Kitakata city	Kitakata city Atsushikano town Atsushio	3.07E+00		1.97E-01	2.87	1.70E-01	2.90	1.13E+02	ND	1.50E+02	3.92E+01	1.11E+02	
31		Kitakata city	Kitakata city Iwatsuki town Miyatsu	2.56E+00		1.26E+00	1.30	1.09E+00	1.47	4.93E+02	ND	5.90E+02	3.63E+00	5.86E+02	
32		Yugawa village	Yugawa village Shoj	6.29E+00		9.37E-01	5.35	8.11E-01	5.48	2.55E+02	ND	3.21E+02	3.07E+01	2.90E+02	
33		Minamiaizu town	Minamiaizu town Tony	5.69E+00		9.75E+00	-4.06	8.43E+00	-2.74	3.26E+01	ND	5.10E+01	3.78E+01	1.32E+01	
34	Minamiaizu	Minamiaizu town	Minamiaizu town Tabe	5.93E+00		4.49E+00	1.44	3.89E+00	2.04	8.25E+01	ND	1.19E+02	4.35E+01	7.56E+01	
35		Minamiaizu town	Minamiaizu town Furumach	1.70E+00		1.13E+00	0.57	9.75E-01	0.72	7.29E+02	ND	9.00E+02	4.13E+00	8.96E+02	
36		Shimogou town	Shimogou town Ouchi	5.64E+00		4.46E+00	1.18	3.86E+00	1.78	9.39E+01	ND	1.55E+02	5.62E+01	9.88E+01	
37		Minamiaizu town	Minamiaizu town Igeta	ND	1.19E+00	4.23E+00	-3.04	3.66E+00	-2.47	2.21E+01	ND	3.32E+01	3.38E+01	-5.90E-01	
38		Hinoemata village	Hinoemata village Kuroiwayami	2.06E+01		2.04E+01	0.18	1.77E+01	2.94	3.98E+01	ND	7.78E+01	6.82E+01	9.61E+00	
39		Minamiaizu town	Minamiaizu town Izumit	9.64E+00		8.86E+00	0.78	7.66E+00	1.98	2.66E+02	ND	3.53E+02	5.06E+01	3.02E+02	
40		Tadami town	Tadami town Tagokura	1.55E+00		1.69E+00	-0.14	1.46E+00	0.09	6.84E+01	ND	8.73E+01	1.41E+01	7.32E+01	
41		Kawauchi village	Kawauchi village Kamikawauch	3.51E+00		1.66E+00	1.85	1.44E+00	2.07	5.45E+02	ND	6.68E+02	2.37E+01	6.44E+02	The restricted areas
42	Sousou	Soma city	Soma city Nakamura Kitamach	2.88E+00		2.61E+00	0.27	2.26E+00	0.62	1.13E+03	ND	1.35E+03	1.24E+01	1.34E+03	
43		Minamisoma city	Minamisoma city Haramachi ward Takanokura	7.36E+00		6.59E+00	0.77	5.70E+00	1.66	6.42E+03	ND	7.43E+03	5.03E+01	7.38E+03	Planned evacuation areas
44		Katsurao village	Katsurao village Ochiai	1.77E+00		2.15E-01	1.55	1.86E-01	1.58	5.41E+03	ND	6.60E+03	ND	6.60E+03	Planned evacuation areas
45		Hirono town	Hirono town Shimokitaba	2.81E+00		1.68E+00	1.13	1.45E+00	1.36	1.78E+02	ND	1.65E+02	4.51E+00	1.60E+02	Near the NPP
46		Naraha town	Naraha town Namikura	2.19E+00		1.89E+00	0.30	1.64E+00	0.55	1.81E+03	ND	2.00E+03	3.85E+01	1.96E+03	Near the NPP The restricted areas
47		Tomioka town	Tomioka town Kobama	1.37E+00		ND	1.37	ND	1.37	1.11E+04	ND	1.25E+04	7.17E+00	1.25E+04	Near the NPP The restricted areas
48		Okuma town	Okuma town Ottozawa	8.08E+01		ND	80.8	ND	80.80	9.01E+04	ND	9.97E+04	ND	9.97E+04	Near the NPP The restricted areas
49		Futaba town	Futaba town Koriyama	1.49E+01		3.04E+00	11.9	2.63E+00	12.27	2.66E+03	ND	3.08E+03	1.73E+01	3.06E+03	Near the NPP The restricted areas
50	Iwaki	Namie town	Namie town Kitakiyohash	4.20E+00		2.99E+00	1.21	2.58E+00	1.62	1.57E+03	ND	1.90E+03	ND	1.90E+03	Near the NPP The restricted areas
51		Minamisoma city	Minamisoma city Odaka ward Urajir	1.69E+00		4.49E+00	-2.80	3.89E+00	-2.20	1.27E+02	ND	1.86E+02	8.81E+00	1.77E+02	Near the NPP The restricted areas
52		Iwaki city	Iwaki city Onahama Shimokajir	4.97E+00		2.72E+00	2.25	2.35E+00	2.62	5.79E+02	ND	6.77E+02	1.67E+01	6.60E+02	
53		Iwaki city	Iwaki city Nakoso town Sekita	2.88E+00		3.18E+00	-0.30	2.75E+00	0.13	8.94E+02	ND	1.06E+03	5.76E+01	1.00E+03	
54		Iwaki city	Iwaki city Kawabe town Osawa	5.87E+00		4.75E-01	5.40	4.11E-01	5.46	9.85E+02	ND	1.11E+03	1.87E+00	1.11E+03	
55		Iwaki city	Iwaki city Miwa town Kamiichigay	2.45E+00		1.24E+00	1.21	1.07E+00	1.38	8.15E+02	ND	9.80E+02	8.72E+00	9.71E+02	

(Legend)

① As the unit for the FY2005 survey was Bq/kg-dry soil, values were compared by the unit of Bq/kg-dry soil.

② ND indicates not detected.

③ 〇.〇〇E±Δ indicates 〇.〇〇×10^{±Δ} (e.g.) 1.23E+02 = 1.23×10² = 123 1.23E+00 = 1.23×10⁰ = 1.23 1.23E-02 = 1.23×10⁻² = 0.0123

④ When the result of this monitoring is “ND,” changes were calculated conservatively by using the detection limit.

⑤ The column for “FY2005 (Considering decay)” for Sr-90 shows the estimates as of the time when six years have passed since the measurement date (equal to 86.5% of the original values).

Attachment 2-2 Comparison with the past monitoring results (FY2005) part 2 Plutonium

No.	Sampling point			Pu-239+240 [Bq/kgDry soil]			Pu-238 [Bq/kgDry soil]			[Pu-238]/[Pu-239+240]		Remarks
	Region	City	Monitoring Points	This monitoring	FY2005	This monitoring/FY2005 (ratio)	This monitoring	FY2005	This monitoring/FY2005 (ratio)	This monitoring	FY2005	
1	Kenpoku	Fukushima city	Fukushima city Iizaka town Nakane	4.67E-01	5.69E-01	0.82	ND	ND	—	—	—	
2		Kunimi town	Kunimi town Kosaka	1.14E-01	2.50E-01	0.46	ND	ND	—	—	—	
3		Nihonmatsu city	Nihonmatsu city Harimich	1.26E+00	1.14E+00	1.11	5.99E-02	2.92E-02	2.05	0.0474	0.0257	
4		Otama village	Otama village Tamanoi	7.32E-02	1.31E+00	0.06	ND	3.76E-02	—	—	0.0286	
5		Nihonmatsu city	Nihonmatsu city Kakunai	1.04E-01	4.16E-02	2.50	ND	ND	—	—	—	
6		Date city	Date city Ryozen town Ishida	1.45E+00	7.04E-01	2.06	3.90E-02	2.65E-02	1.47	0.0268	0.0376	
7	Kenchu	Koriyama city	Koriyama city Ose town Tadano	1.56E+00	9.16E-01	1.71	3.88E-02	3.28E-02	1.18	0.0248	0.0358	
8		Sukagawa city	Sukagawa city Ebana	6.23E-01	1.11E+00	0.56	2.34E-02	4.84E-02	0.48	0.0375	0.0436	
9		Tenei village	Tenei village Hatori	3.45E-02	1.59E+00	0.02	ND	3.01E-02	—	—	0.0190	
10		Kagamiishi town	Kagamiishi town Kyuraish	7.48E-01	4.69E-01	1.59	3.01E-02	ND	—	0.0402	—	
11		Ishikawa town	Ishikawa town Bobata	2.17E-02	8.26E-02	0.26	ND	ND	—	—	—	
12		Furudono town	Furudono town Oguta	ND	2.60E-02	—	ND	ND	—	—	—	
13		Tamura city	Tamura city Tokiwa town Tokiwa	5.09E-02	2.87E-01	0.18	ND	ND	—	—	—	
14		Tamura city	Tamura city Miyakoji town Furumichi	2.99E-02	ND	—	ND	ND	—	—	—	The restricted areas
15	Kennen	Koriyama city	Koriyama city Tamura town Nukazuka	6.61E-01	7.95E-01	0.83	ND	ND	—	—	—	
16		Sirakawa city	Sirakawa city Taishinkumade	3.63E+00	1.36E+00	2.67	9.31E-02	3.34E-02	2.79	0.0256	0.0246	
17		Nishigo village	Nishigo village Mabun	1.29E+00	2.63E+00	0.49	ND	8.18E-02	—	—	0.0312	
18		Sirakawa city	Sirakawa city Kakunai	4.11E-01	4.36E-01	0.94	ND	ND	—	—	—	
19		Izumizaki village	Izumizaki village Izumizak	1.93E-01	6.12E-01	0.32	ND	ND	—	—	—	
20		Sirakawa city	Sirakawa city Omotego Nakano	1.17E+00	3.19E-01	3.66	4.97E-02	ND	—	0.0426	—	
21	Aizu	Yamatsuri town	Yamatsuri town Uchikawa	3.60E-02	3.42E-02	1.05	ND	ND	—	—	—	
22		Inawashiro town	Inawashiro town Kogai	1.89E+00	1.02E+00	1.86	5.51E-02	2.83E-02	1.95	0.0291	0.0279	
23		Inawashiro town	Inawashiro town Okinazawa	2.30E+00	2.00E+00	1.15	8.72E-02	5.55E-02	1.57	0.0379	0.0277	
24		Aizuwakamatsu city	Aizuwakamatsu city Minato town Akai	4.27E+00	1.60E+00	2.66	1.39E-01	4.05E-02	3.44	0.0326	0.0253	
25		Aizumisato town	Aizumisato town Miyabayash	ND	8.96E-01	—	ND	2.84E-02	—	—	0.0317	
26		Kaneyama town	Kaneyama town Okuriyama	1.31E-01	2.03E-01	0.65	ND	ND	—	—	—	
27		Yanaizu town	Yanaizu town Sunakohara	3.78E-02	3.67E-01	0.10	ND	3.12E-02	—	—	0.0850	
28		Aizubange town	Aizubange town Mimyo	8.61E-01	1.05E+00	0.82	ND	3.09E-02	—	—	0.0295	
29		Kitakata city	Kitakata city Yamato town Kofunaji	5.38E-02	4.16E-02	1.29	ND	ND	—	—	—	
30		Kitakata city	Kitakata city Atsushiohara town Atsushio	1.06E+00	1.33E+00	0.79	4.15E-02	5.11E-02	0.81	0.0392	0.0383	
31	Minamiaizu	Kitakata city	Kitakata city Iwatsuki town Miyatsu	3.77E-01	1.61E-01	2.34	1.97E-02	ND	—	0.0521	—	
32		Yugawa village	Yugawa village Shoji	1.30E+00	8.30E-01	1.56	6.52E-02	3.79E-02	1.72	0.0503	0.0457	
33		Minamiaizu town	Minamiaizu town Tonyu	7.10E-01	1.17E+00	0.61	3.77E-02	4.79E-02	0.79	0.0532	0.0410	
34		Minamiaizu town	Minamiaizu town Tabe	9.95E-01	1.33E+00	0.75	ND	5.11E-02	—	—	0.0384	
35		Minamiaizu town	Minamiaizu town Furumach	6.39E-02	1.42E-01	0.45	ND	ND	—	—	—	
36		Shimogou town	Shimogou town Ouchi	2.58E+00	1.19E+00	2.16	8.81E-02	3.68E-02	2.39	0.0342	0.0309	
37		Minamiaizu town	Minamiaizu town Igeta	ND	1.03E+00	—	ND	3.41E-02	—	—	0.0331	
38		Hinoemata village	Hinoemata village Kuroiwayama	2.69E+00	2.10E+00	1.28	8.16E-02	5.07E-02	1.61	0.0303	0.0242	
39		Minamiaizu town	Minamiaizu town Izumit	1.53E+00	1.39E+00	1.10	3.43E-02	3.94E-02	0.87	0.0224	0.0283	
40		Tadami town	Tadami town Tagokura	6.48E-02	2.36E-01	0.27	ND	ND	—	—	—	
41	Sousou	Kawauchi village	Kawauchi village Kamikawauch	7.69E-01	6.82E-01	1.13	2.60E-02	ND	—	0.0338	—	The restricted areas
42		Soma city	Soma city Nakamura Kitamach	4.03E-01	2.87E-01	1.41	ND	ND	—	—	—	
43		Minamisoma city	Minamisoma city Haramachi ward Takanokura	1.18E-01	1.54E+00	0.08	ND	4.33E-02	—	—	0.0280	Planned evacuation areas
44		Katsurao village	Katsurao village Ochiai	ND	ND	—	ND	ND	—	—	—	Planned evacuation areas
45		Hirono town	Hirono town Shimokitaba	6.73E-02	6.60E-02	1.02	ND	ND	—	—	—	Near the NPP
46		Naraha town	Naraha town Namikura	ND	2.06E-01	—	ND	ND	—	—	—	Near the NPP The restricted areas
47		Tomioka town	Tomioka town Kobama	ND	ND	—	ND	ND	—	—	—	Near the NPP The restricted areas
48		Okuma town	Okuma town Ottozawa	1.98E-01	ND	—	4.22E-02	ND	—	0.214	—	Near the NPP The restricted areas
49		Futaba town	Futaba town Koriyama	2.16E-01	4.44E-01	0.49	ND	1.67E-02	—	—	0.0376	Near the NPP The restricted areas
50		Namie town	Namie town Kitakyohash	4.04E-01	3.74E-01	1.08	ND	ND	—	—	—	Near the NPP The restricted areas
51		Minamisoma city	Minamisoma city Odaka ward Urajir	7.73E-01	9.67E-01	0.80	ND	ND	—	—	—	Near the NPP The restricted areas
52		Iwaki city	Iwaki city Onahama Shimokajir	3.69E-01	4.03E-01	0.92	ND	ND	—	—	—	
53		Iwaki city	Iwaki city Nakoso town Sekita	2.97E-01	1.01E+00	0.30	ND	3.67E-02	—	—	0.0364	
54		Iwaki city	Iwaki city Kawabe town Osawa	2.60E-02	2.29E-02	1.14	ND	ND	—	—	—	
55		Iwaki city	Iwaki city Miwa town Kamiichigay	4.31E-01	2.46E-01	1.75	ND	ND	—	—	—	

(Legend)

① As the unit for the FY2005 survey was Bq/kg-dry soil, values were compared by the unit of Bq/kg-dry soil.

② ND indicates not detected.

③ $0.00E \pm \Delta$ indicates $0.00 \times 10^{\pm \Delta}$ (e.g.) $1.23E+02 = 1.23 \times 10^2 = 123$ $1.23E+00 = 1.23 \times 10^0 = 1.23$ $1.23E-02 = 1.23 \times 10^{-2} = 0.0123$

④ The ratio (this monitoring/FY2005 monitoring) was calculated only for points where plutonium was detected both in this monitoring and the FY2005 monitoring.

⑤ [Pu-238]/[Pu-239+240] is calculated for only locations at which both Pu-238 and Pu-239+240 were detected.

Attachment 3 Results of the Monitoring based on the Plan for the Radiation Monitoring of Soil in Fukushima Prefecture (Sr-90 and Plutonium in Soil: FY1996 to FY2009)

Fiscal year	Sr-90 [Bq/kg Dry soil]				Pu-239+240 [Bq/kg Dry soil]				Pu-238 [Bq/kg Dry soil]			
	Namikura	Kobama	Ottozawa	Koriyama	Namikura	Kobama	Ottozawa	Koriyama	Namikura	Kobama	Ottozawa	Koriyama
1996	3.7	-	3.2	-	0.20	-	0.05	-	ND	-	ND	-
1997	1.4	-	2.4	-	0.13	-	0.08	-	ND	-	ND	-
1998	1.4	-	4.4	-	0.18	-	0.03	-	ND	-	ND	-
1999	2.2	-	2.2	-	0.09	-	0.03	-	ND	-	ND	-
2000	1.6	-	0.90	-	0.12	-	0.07	-	ND	-	ND	-
2001	2.0	0.41	1.4	2.9	0.20	0.04	0.07	0.30	ND	ND	ND	ND
2002	2.1	ND	1.5	3.5	0.18	ND	0.04	0.28	ND	ND	ND	ND
2003	1.7	ND	2.6	3.0	0.16	ND	0.05	0.33	ND	ND	ND	0.0277
2004	1.0	0.99	ND	2.7	0.12	0.09	ND	0.37	ND	ND	ND	ND
2005	1.9	ND	ND	3.0	0.21	ND	ND	0.44	ND	ND	ND	0.0167
2006	1.6	ND	0.83	2.7	0.19	ND	0.08	0.34	ND	ND	ND	ND
2007	1.9	ND	2.6	3.0	0.11	ND	ND	0.34	ND	ND	ND	ND
2008	1.5	ND	0.37	2.9	0.19	ND	0.02	0.31	ND	ND	ND	ND
2009	1.3	ND	0.34	1.8	0.21	ND	0.09	0.18	ND	ND	ND	ND
Maximum value	3.7	0.99	4.4	3.5	0.21	0.09	0.09	0.44	ND	ND	ND	0.0277
Minimum value	1.0	ND	ND	1.8	0.09	ND	ND	0.18	ND	ND	ND	ND

*Monitoring Points: Namikura, Naraha town; Kobama, Tomioka town; Ottozawa, Okuma town; Koriyama, Futaba town

*ND indicates not detected.

*“—” shows the points where the monitoring was not conducted.

Figure 1. Analysis Results of Strontium 90 (Soil)

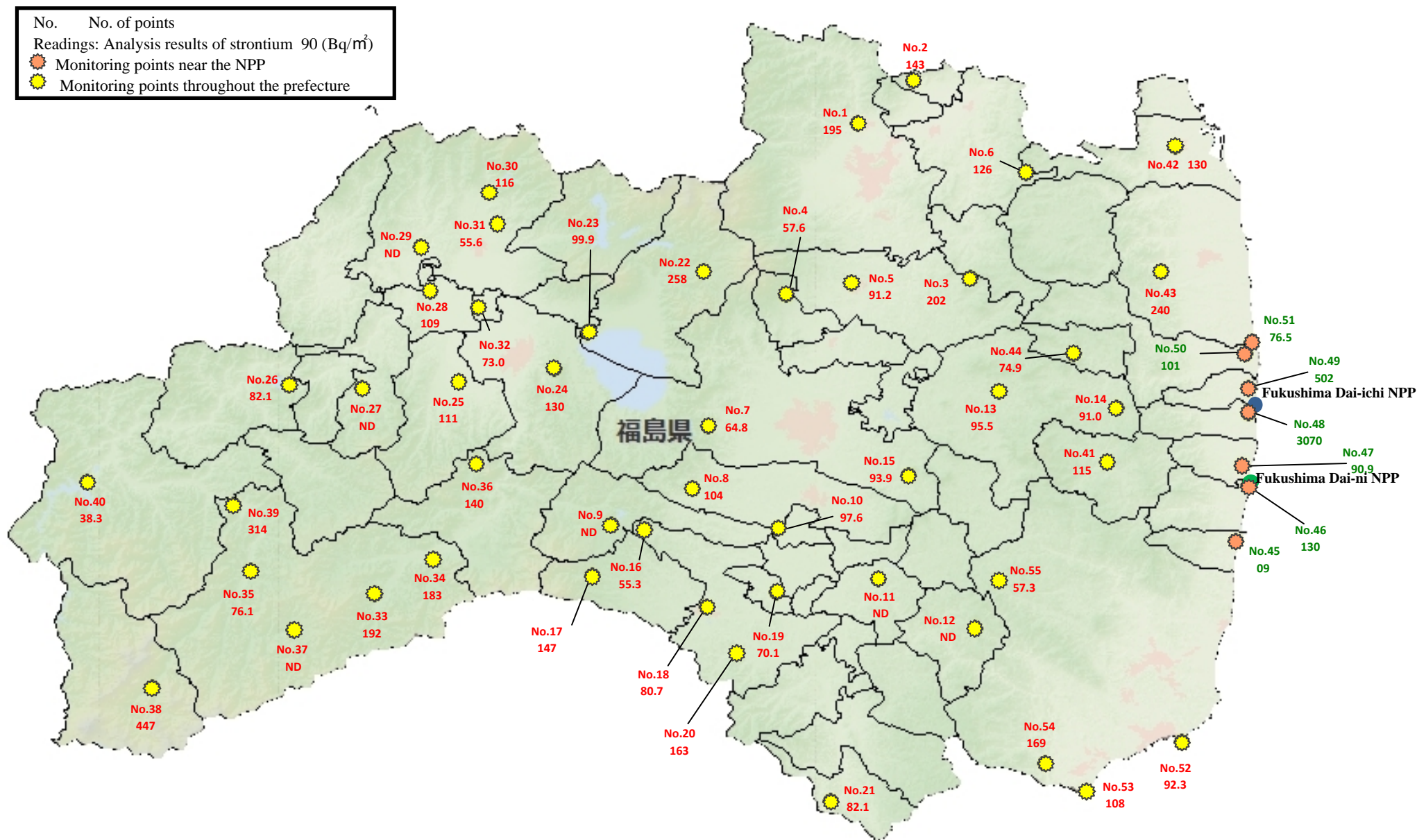


Figure 2. Analysis Results of Plutonium 238, 239+240 (Soil)

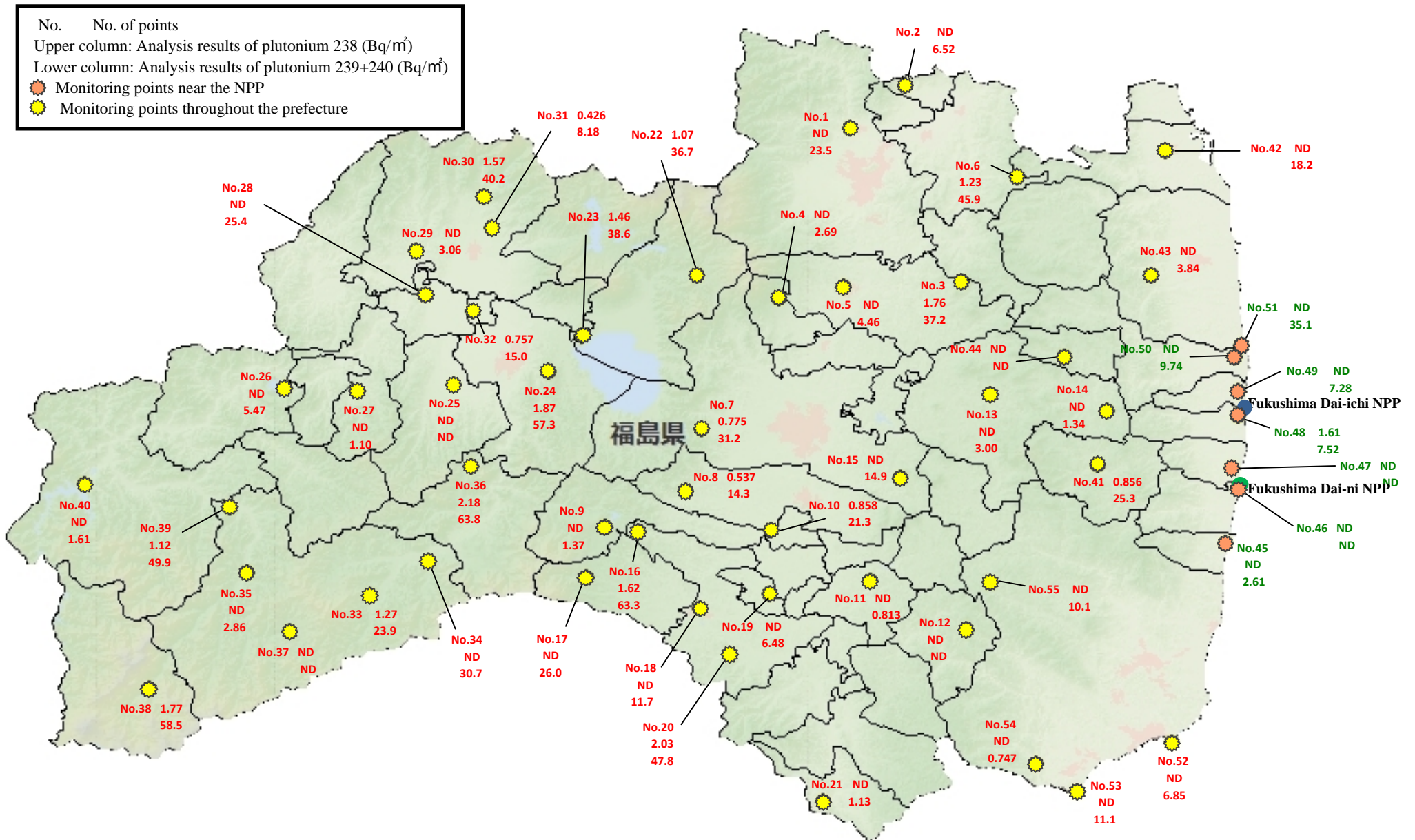


Figure 3. Analysis Results of Cesium 134, 137 (Soil)

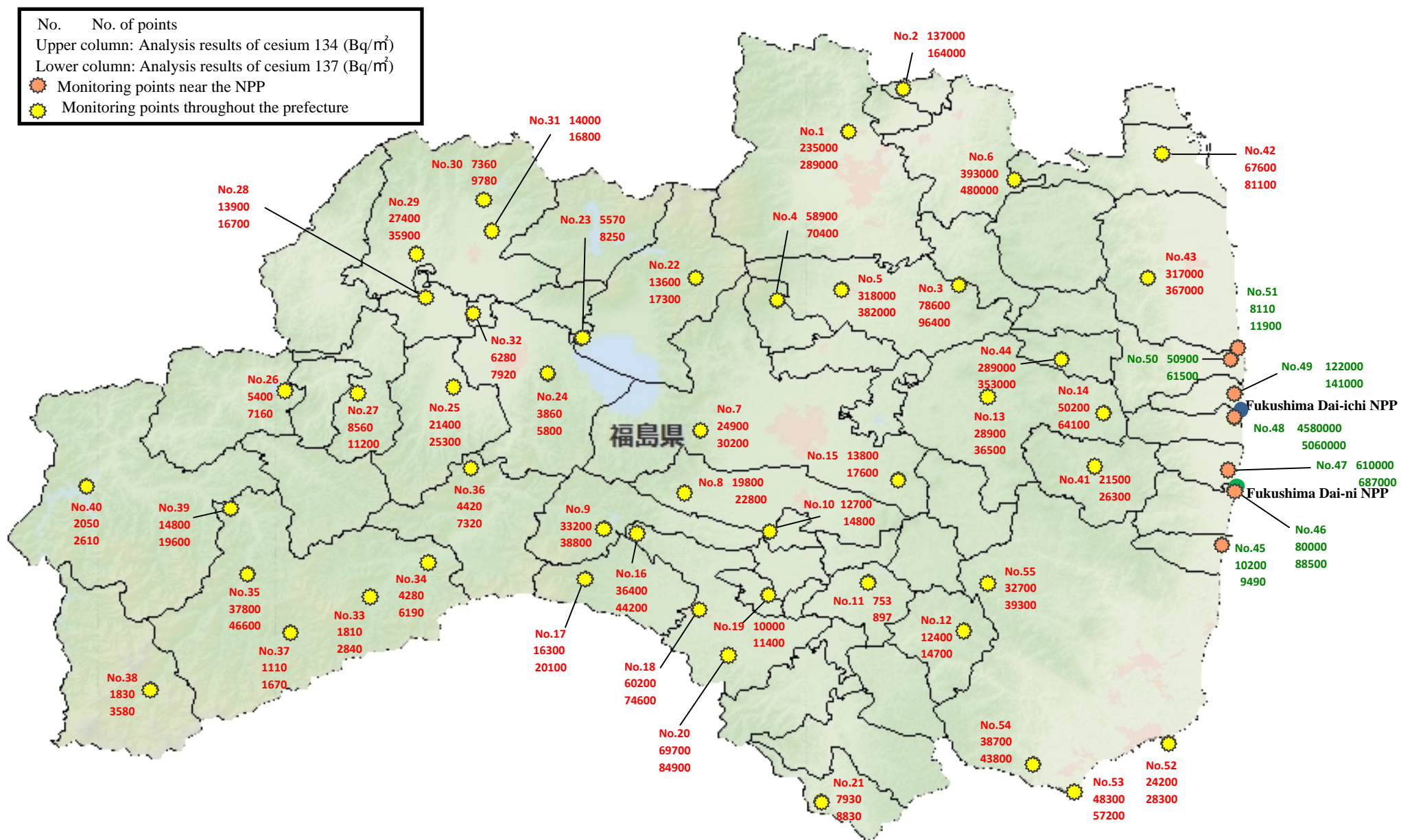


Figure 4-1. Changes in Cesium and Sr-90

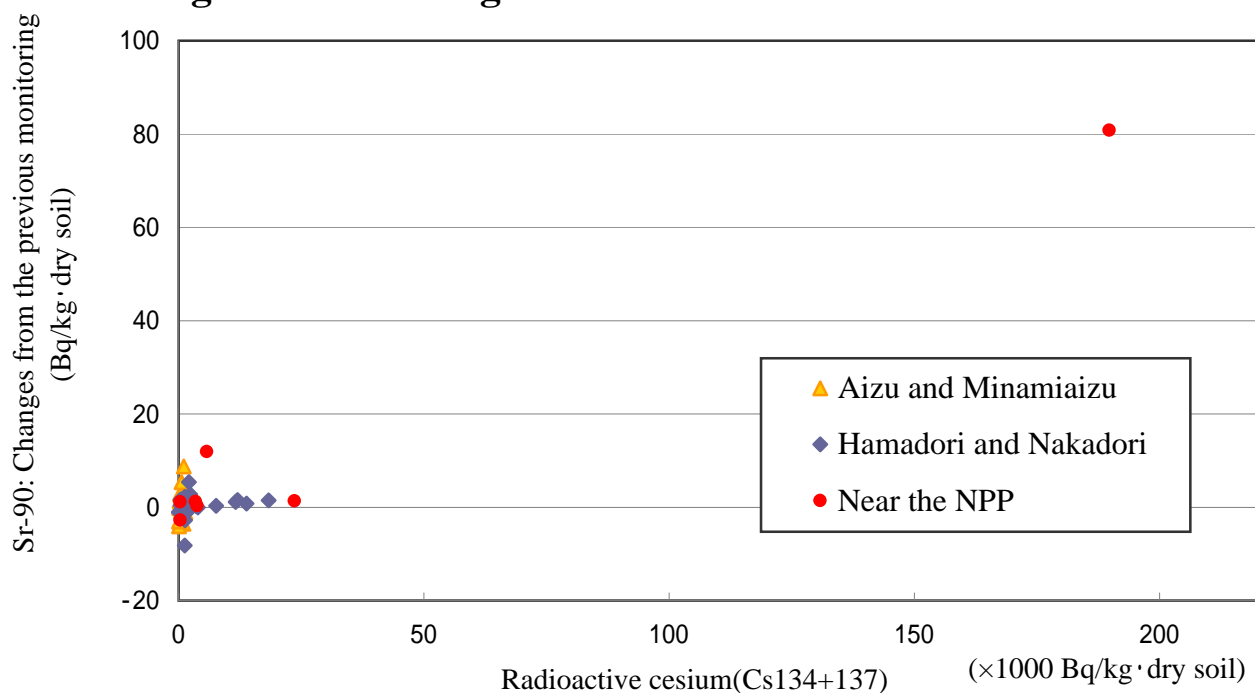
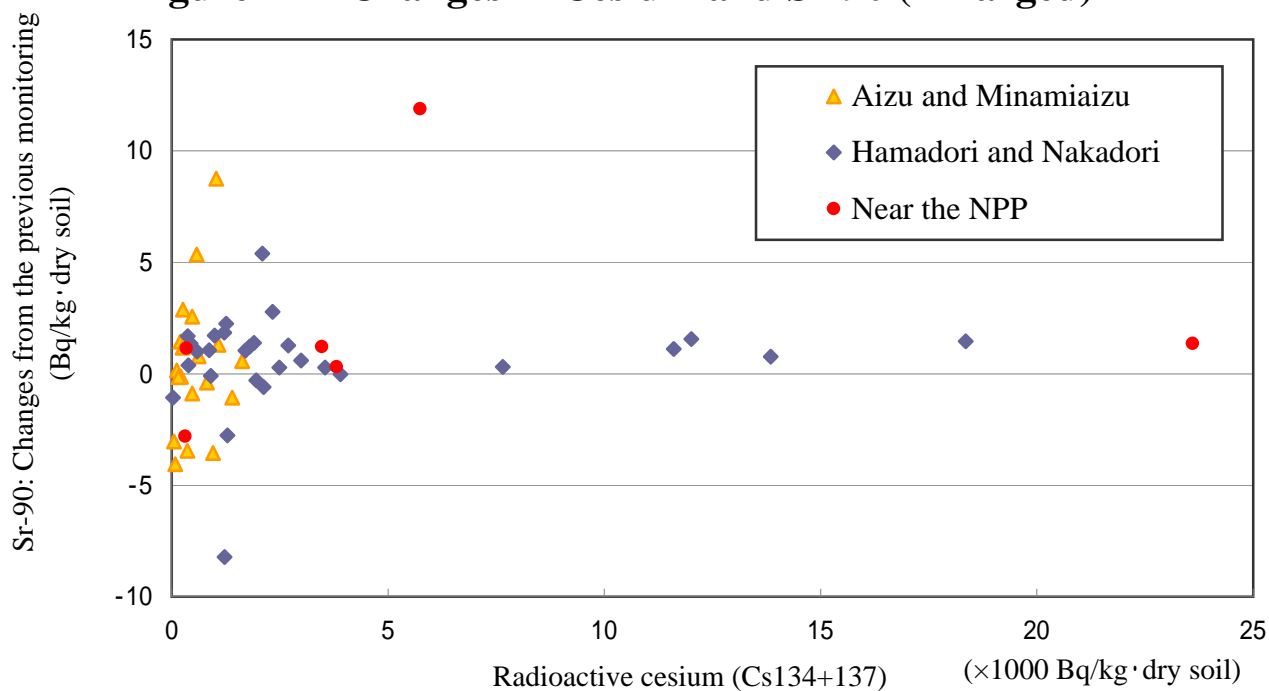


Figure 4-2 Changes in Cesium and Sr-90 (Enlarged)



*As deposition amounts of radioactive cesium have increased significantly at all points since the FY2005 monitoring, the results of this monitoring are deemed to be the amounts increased.

Figure 5. Histogram for Concentrations of Sr-90 Hamadori and Nakadori
(Except for Ottozawa, Okuma town and Koriyama, Futaba town)

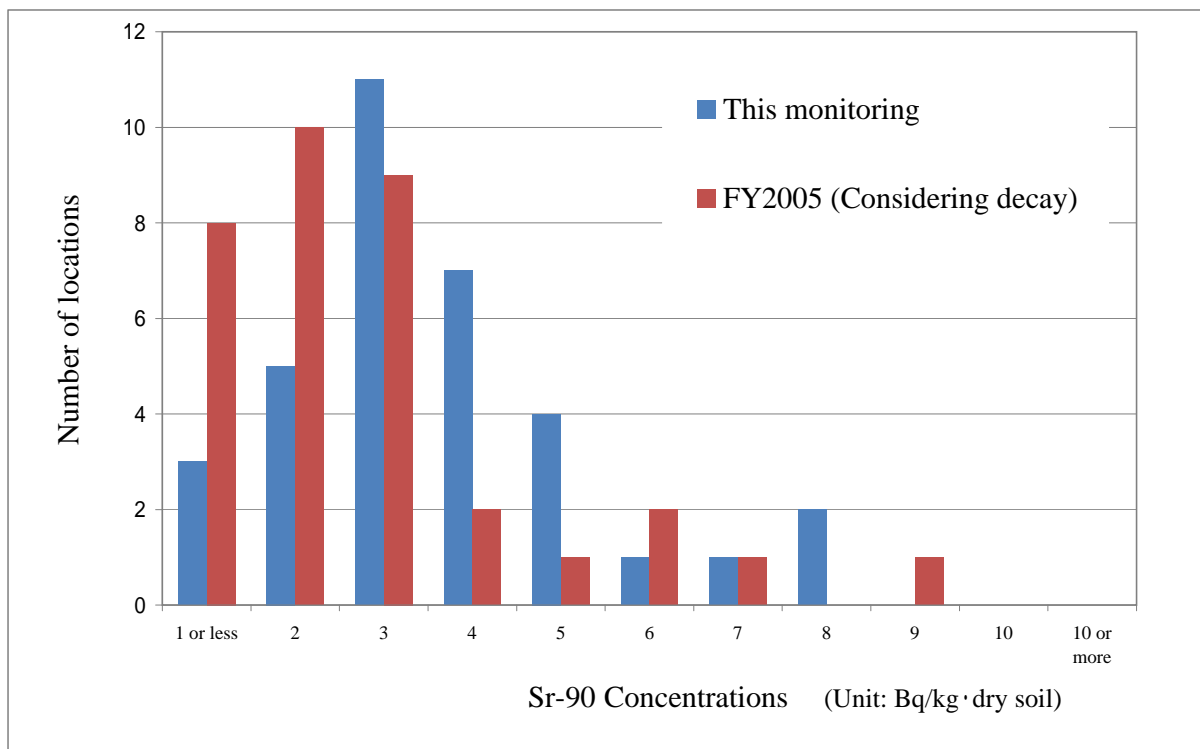
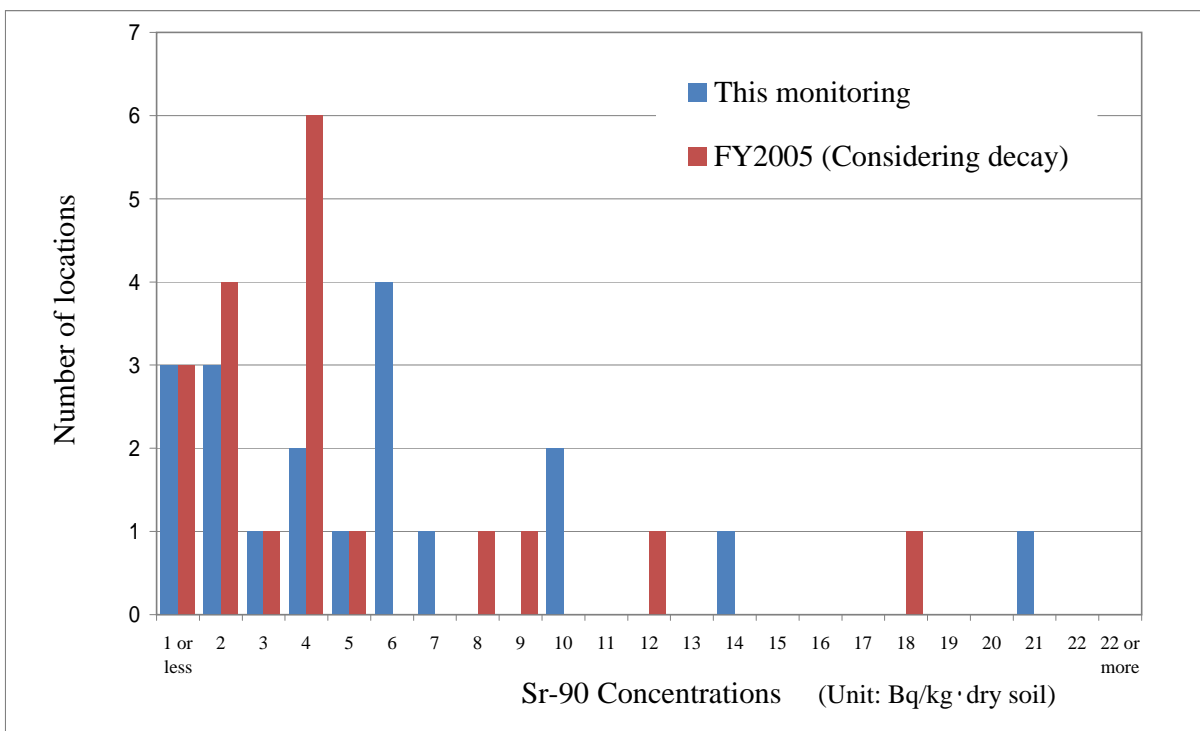


Figure 6. Histogram for Concentrations of Sr-90 Aizu Region



(Unit: Bq/kg · dry soil)

	Hamadori and Nakadori (Except for Ottozawa, Okuma town and Koriyama, Futaba town)		Aizu Area (Aizu and Minamiaizu regions)	
	This monitoring	FY2005 survey (Considering decay)	This monitoring	FY2005 survey (Considering decay)
Average	3.11	2.29	5.33	4.39
Standard deviation	1.85	1.85	5.14	4.29
Variation coefficient	59.5%	81.0%	96.5%	97.6%

Figure 7. Correlation between Cs-137 and Sr-90 (Results of This Monitoring)

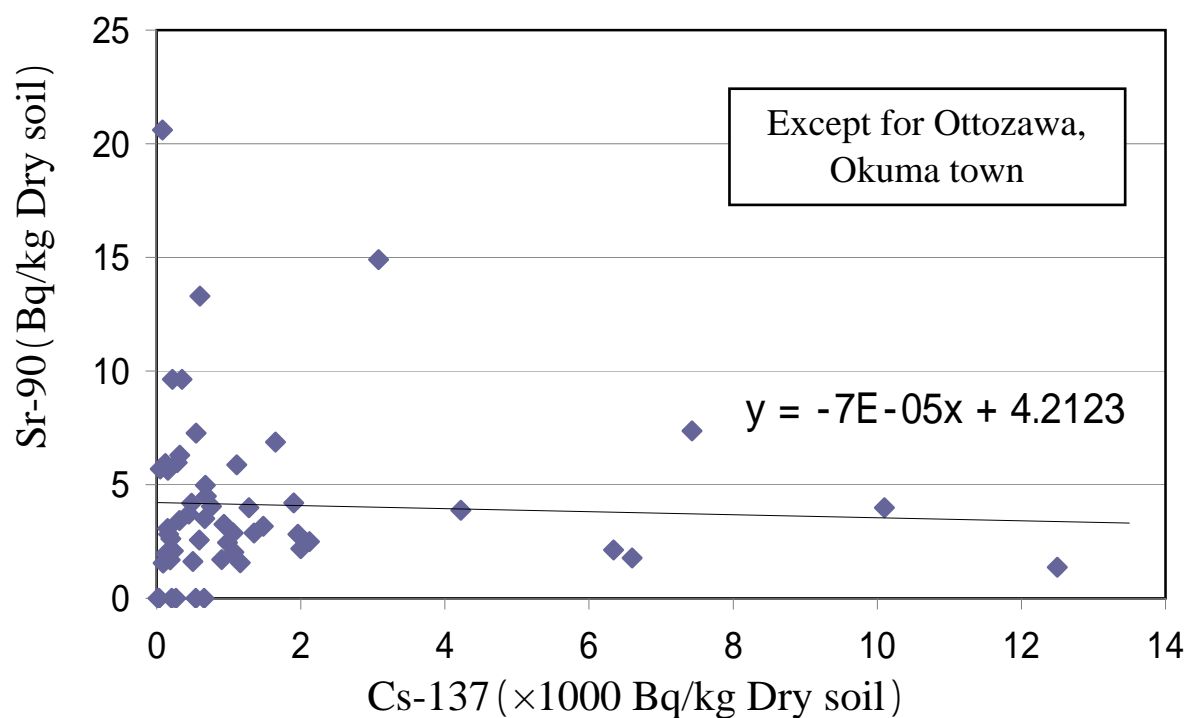


Figure 8. Correlation between Cs-137 and Sr-90 (Results of FY2005)

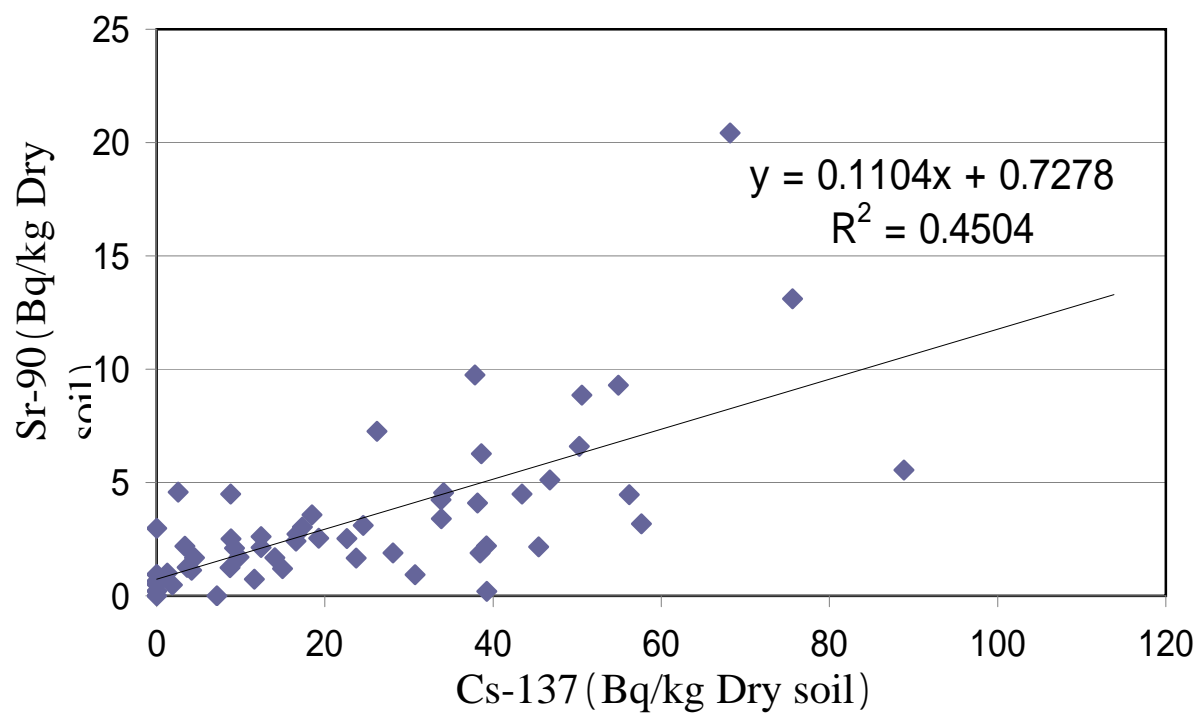
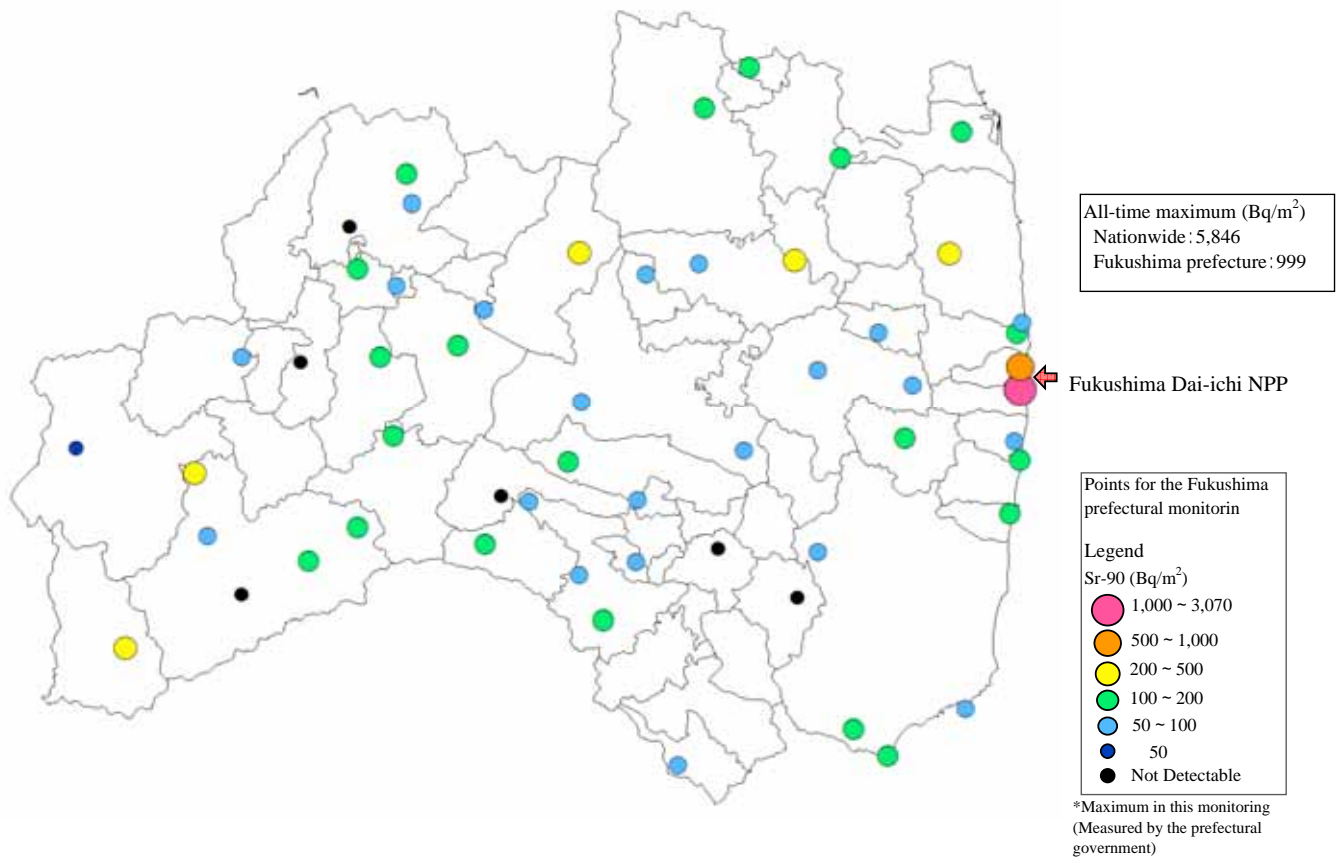


Figure 9. Map of Sr-90 Concentration in Soil

(Measured by the prefectural government)



(Measured by the national and prefectural governments)

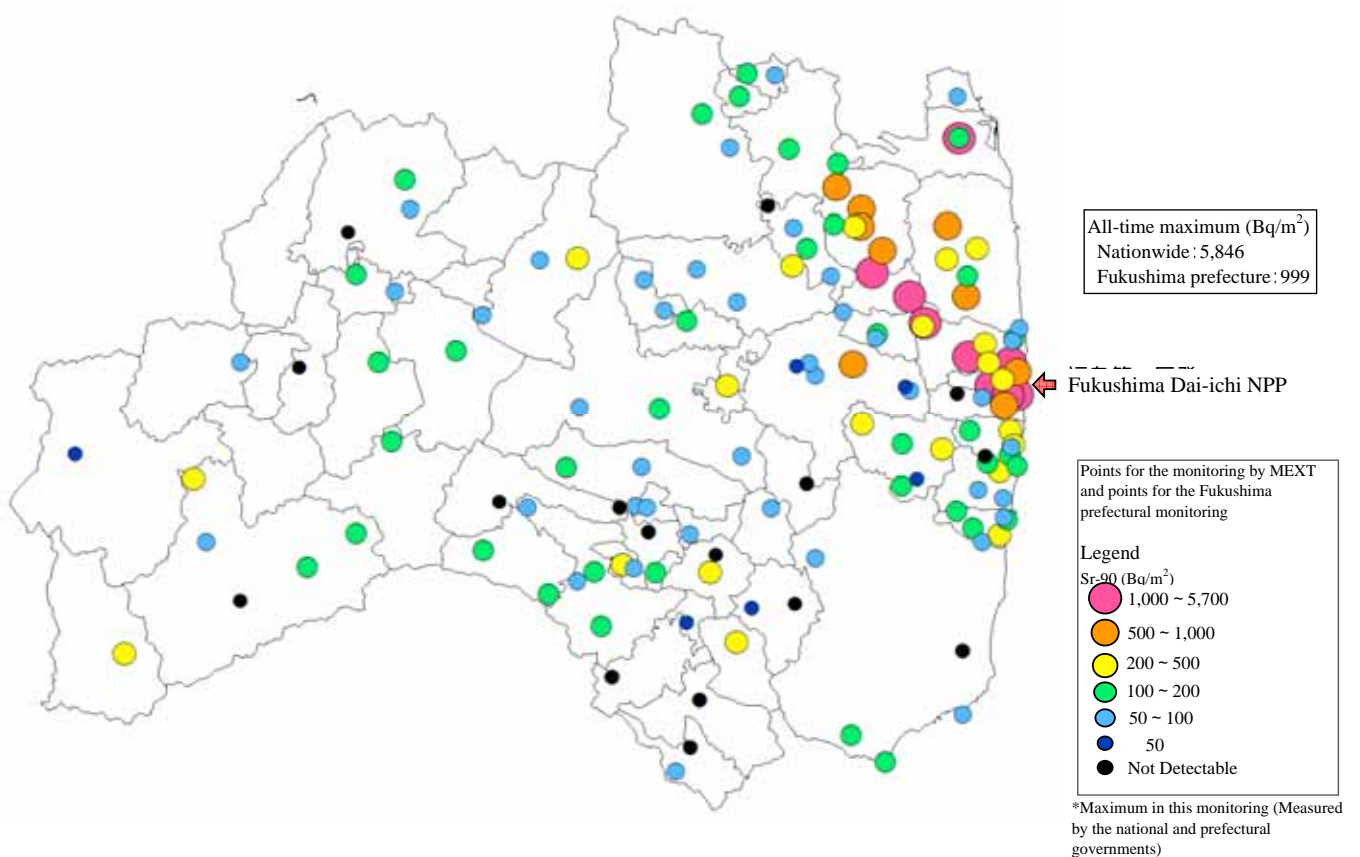
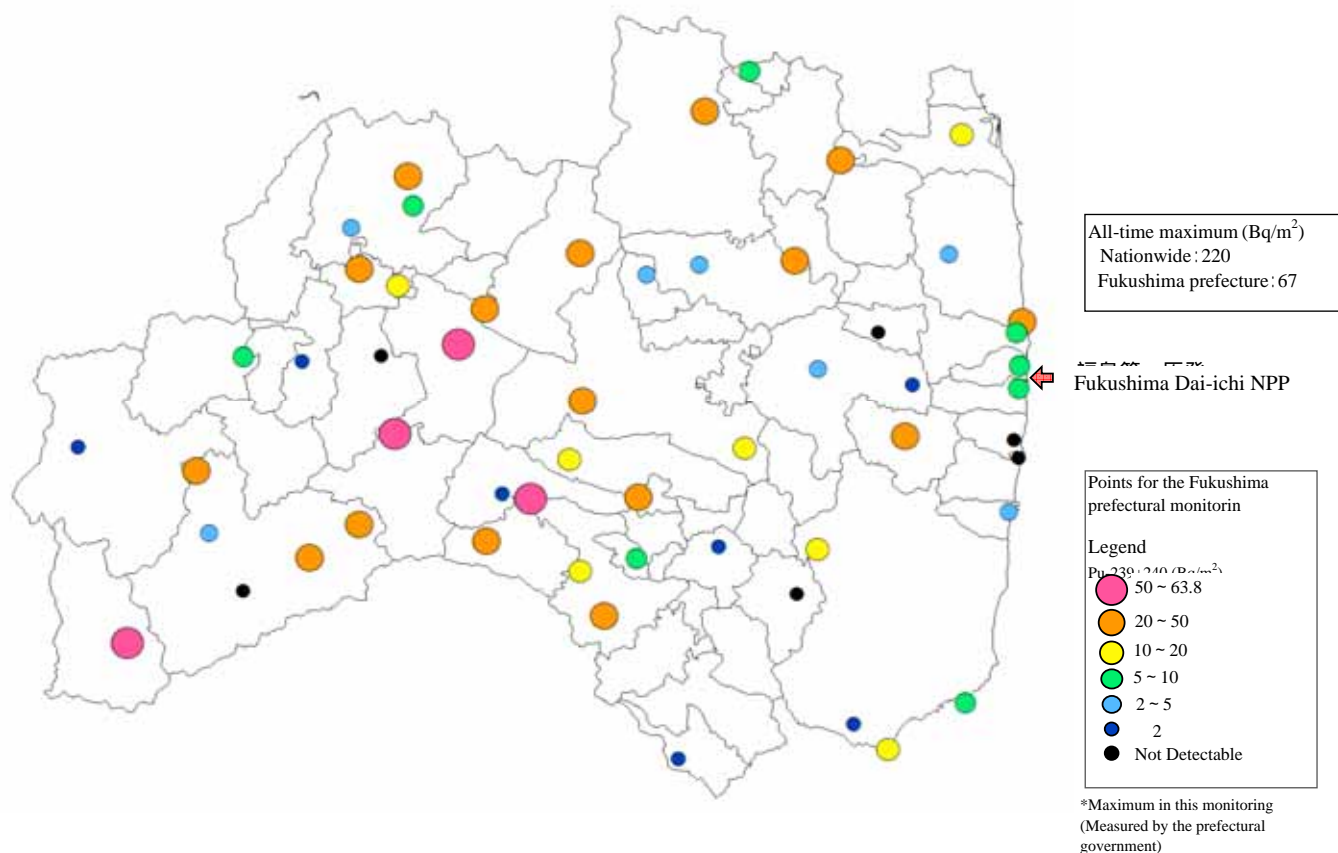


Figure 10. Map of Pu-239+240 Concentration in Soil

(Measured by the prefectural government)



(Measured by the national and prefectural governments)

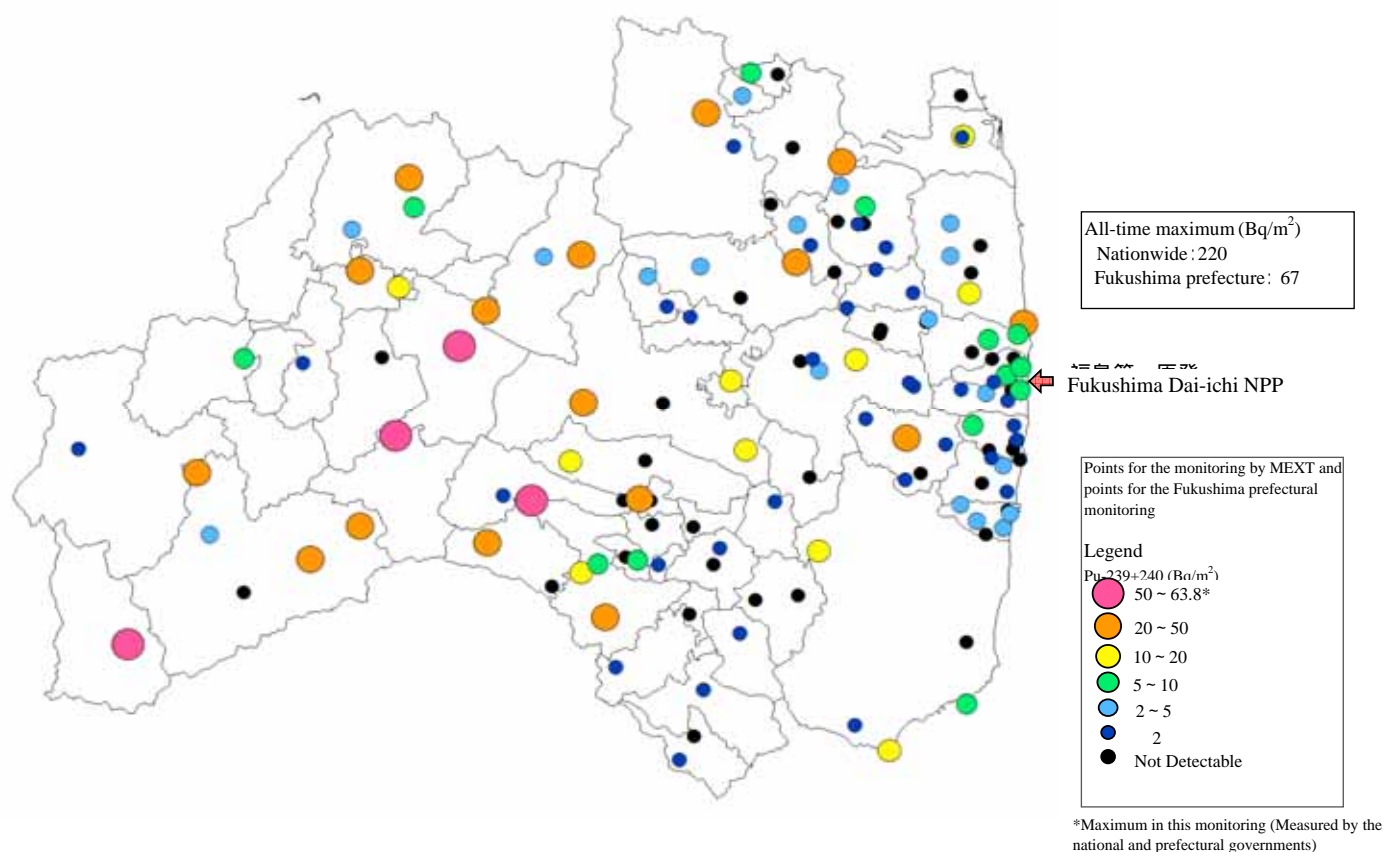
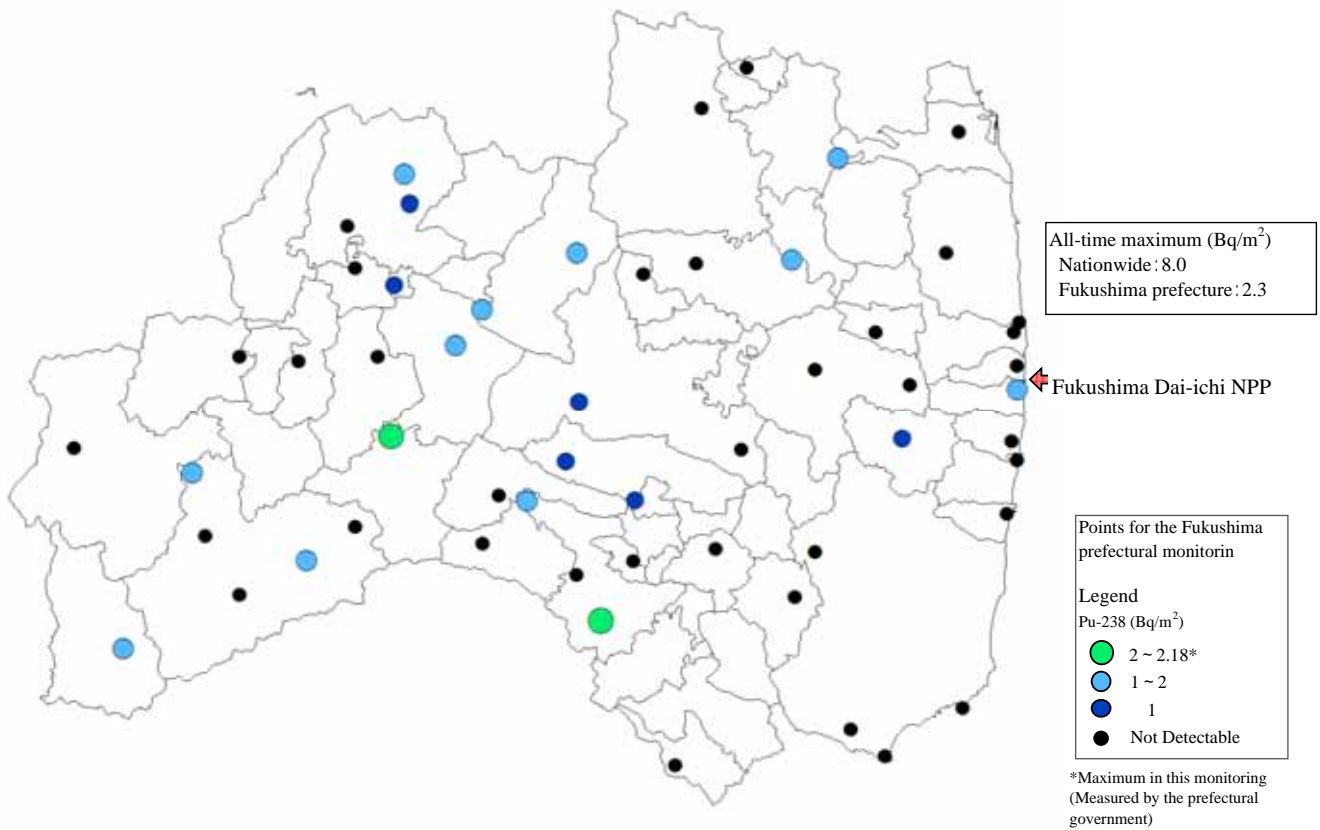
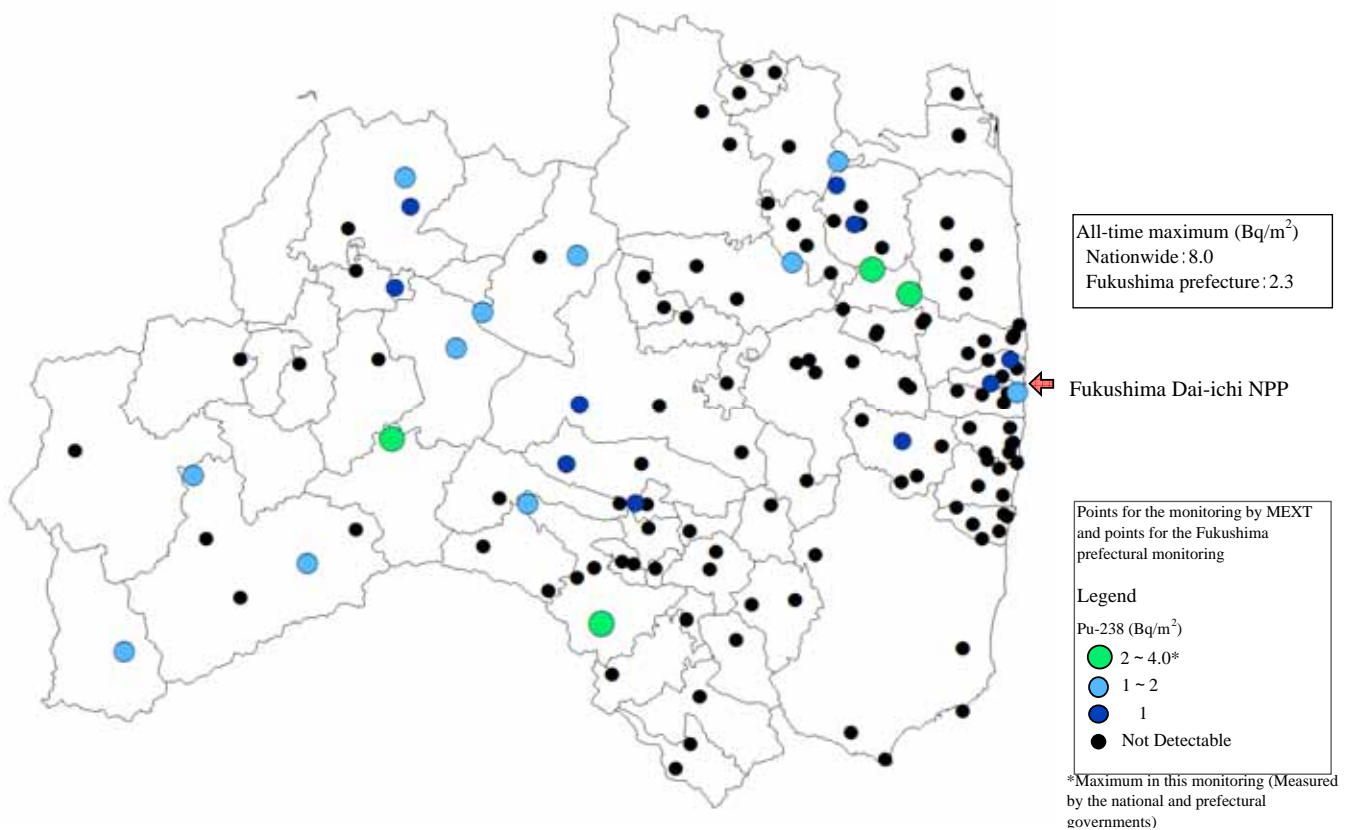


Figure 11. Map of Plutonium 238 Concentration in Soil

(Measured by the prefectural government)

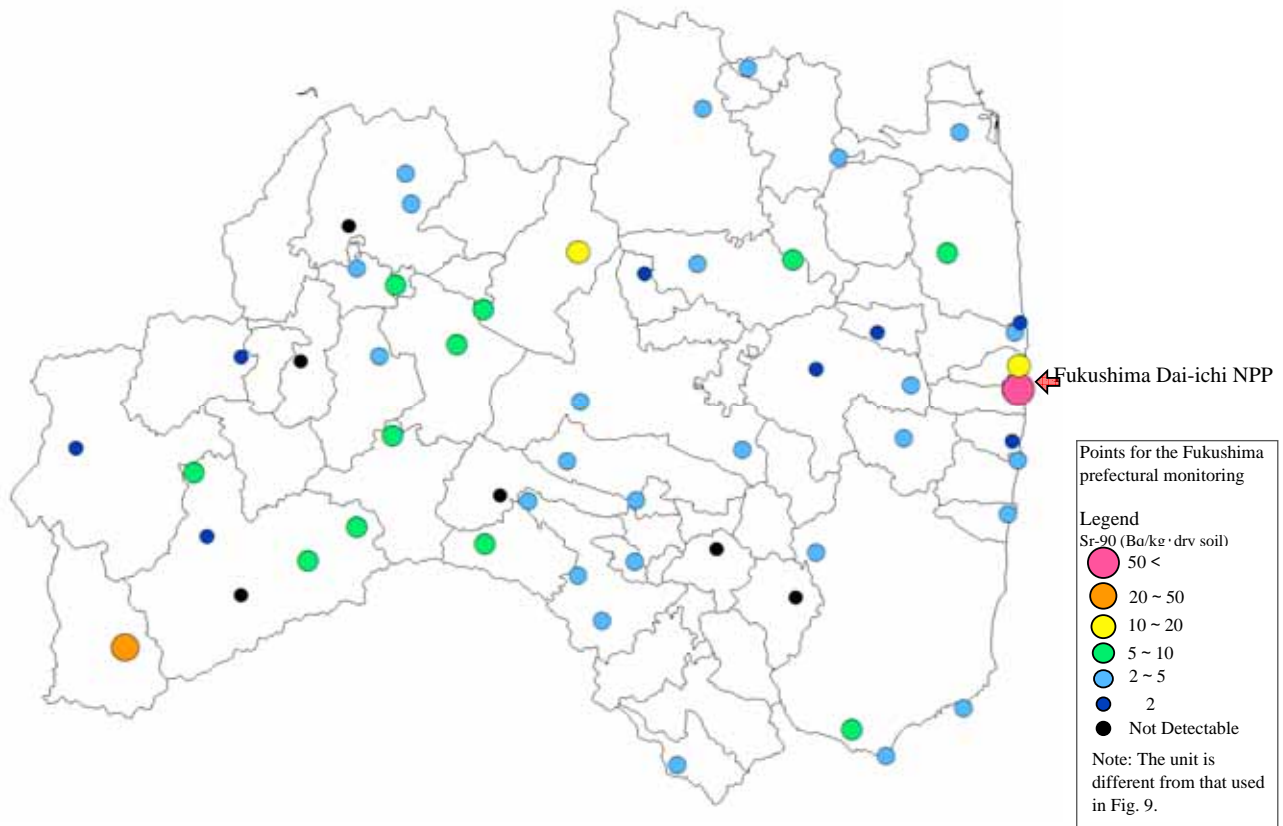


(Measured by the national and prefectural governments)

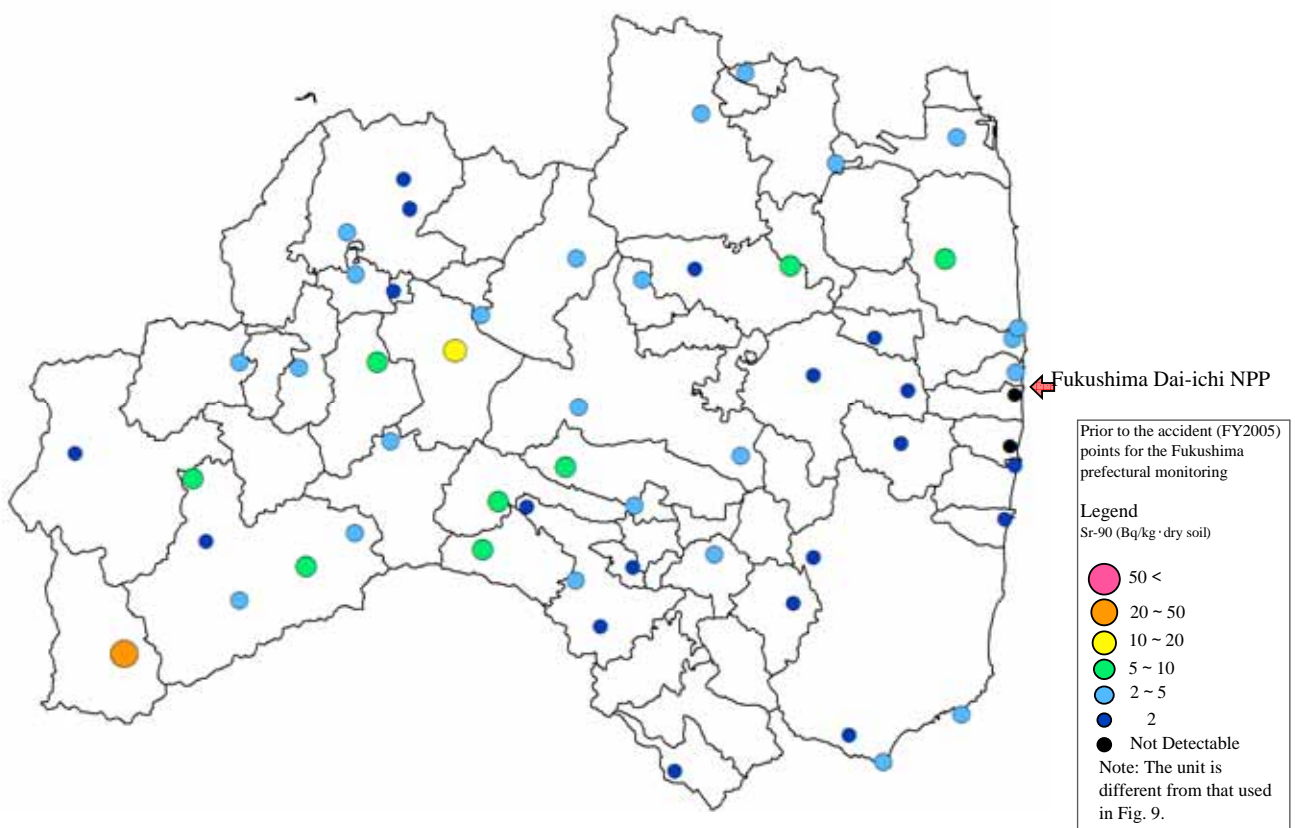


Reference 1 Map of Sr-90 Concentration in Soil (On a weight basis)

(This monitoring)

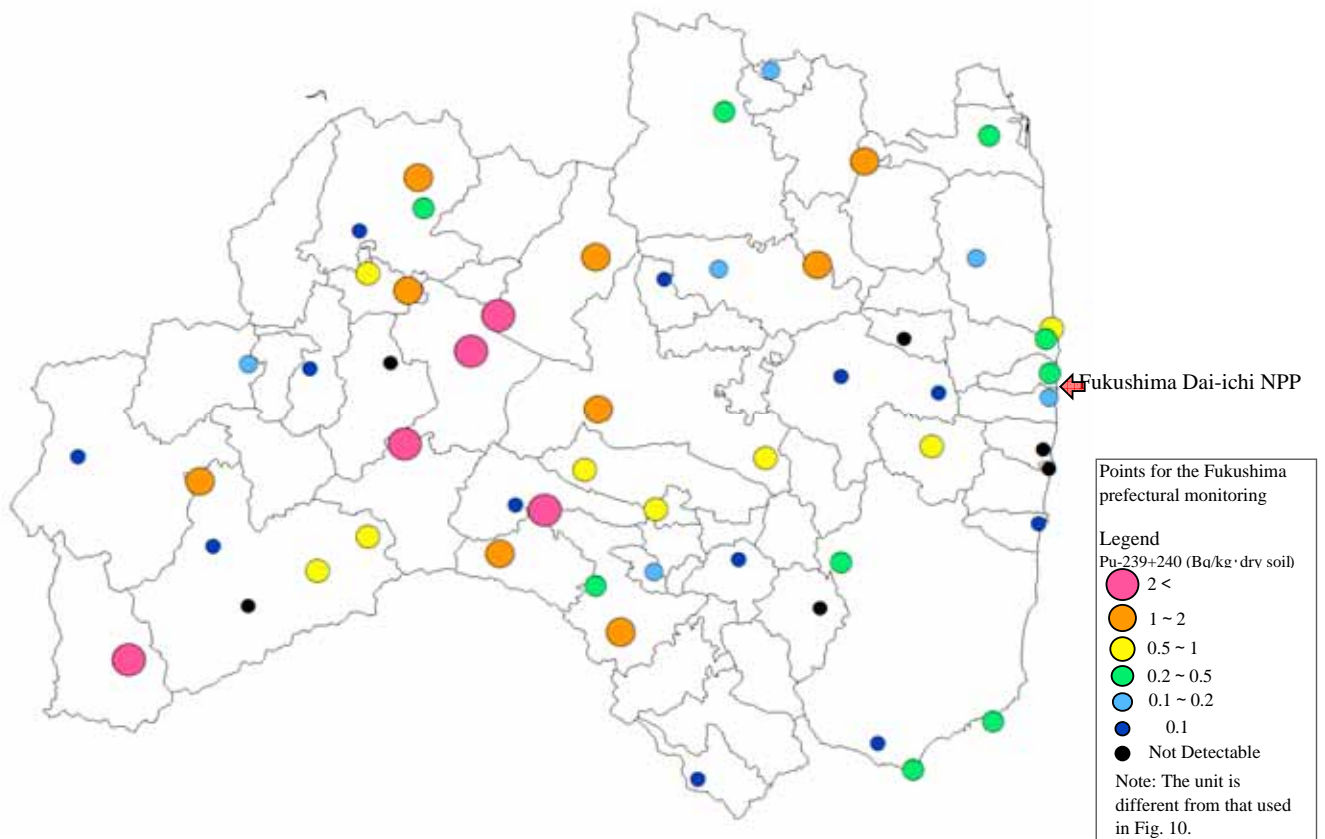


Monitoring prior to the accident (FY2005)

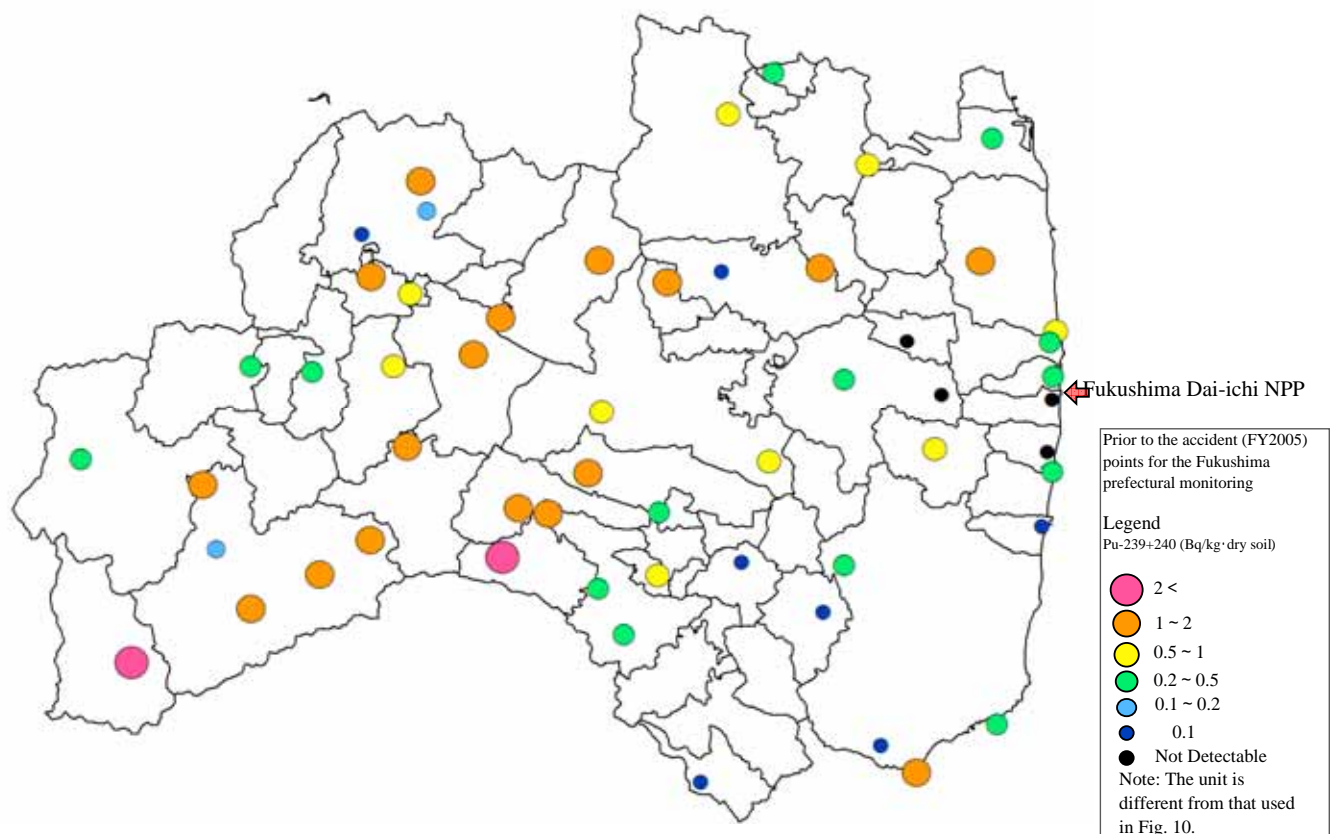


Reference 2 Map of Pu-239+240 Concentration in Soil (On a weight basis)

(This monitoring)

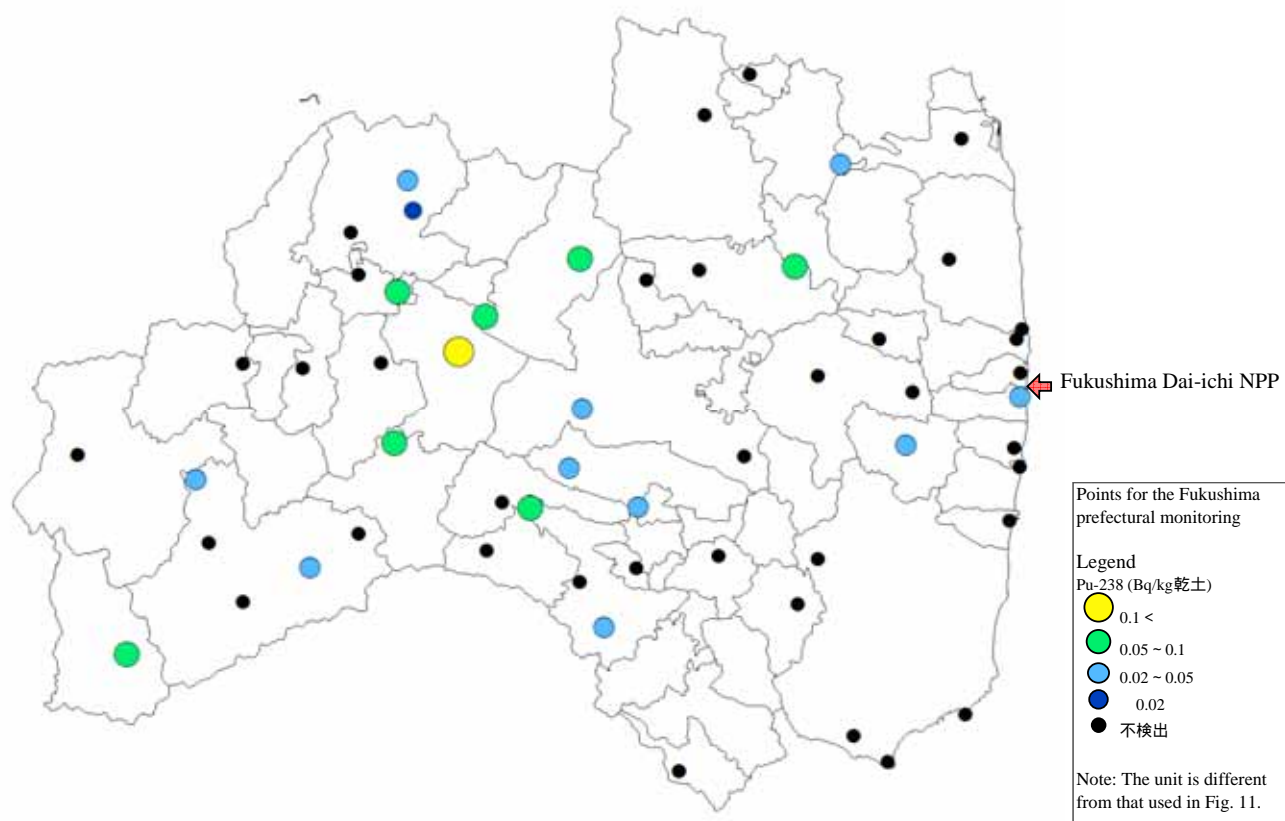


Monitoring prior to the accident (FY2005)



Reference 3 Map of Plutonium 238 Concentration in Soil (On a weight basis)

(This monitoring)



Monitoring prior to the accident (FY2005)

