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# Analysis Report

RAP110620-OCJ(01)-v1

## ANALYSIS

**Object : Evaluation of the environmental consequences in Japan caused by the Fukushima nuclear power plant accident**

## REPORT ID

**RAP110620-OCJ(01)-v1** FROM : **June-20, 2011** version : **01**

Number of pages : 12 (including appendix)

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## SAMPLES TYPES

ENVIRONMENT MATRICES : SOILS, VEGETABLES, GRASS, MOSS, WATER

## QUANTITY

**25** Samples

received : May-30 & May-31 2011

## ANALYSES PERFORMED

MEASUREMENT OF GAMMA EMITTERS RADIONUCLIDES BY GAMMA SPECTROMETRY

SEARCH FOR ARTIFICIAL NUCLIDES

## VISA

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APPROVAL

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## 1. SAMPLES IDENTIFICATION

Reception date: May 30 & 31, 2011

The samples were collected by Japanese citizens according to the regular instructions and methodology provided by ACRO. The samples characteristics are given in the table below.

N°	Nature	Collection Date (local)	Location	Origin or species	Mass/Volume collected	References
1	Soil	17 May 2011	Southern part of Miyagi Prefecture A 宮城県南部A	10 cm x 10 cm ; 2 cm depth	240 g	110530-OCJ-01
2	Vegetable	17 May 2011	Southern part of Miyagi Prefecture A 宮城県南部A	Spinach		110530-OCJ-02
03	water	18 May 2011	Southern part of Miyagi Prefecture A 宮城県南部A	Tap water	500 ml	110530-OCJ-03
04	Soil	16 May 2011	Southern part of Miyagi Prefecture B 宮城県南部B	10 cm x 10 cm ; 2 cm depth	280 g	110530-OCJ-04
06	Soil	17 May 2011	Southern part of Miyagi Prefecture C 宮城県南部C	10 cm x 10 cm ; 2 cm depth	305 g	110530-OCJ-06
07	Vegetable	17 May 2011	Southern part of Miyagi Prefecture C 宮城県南部C	cabbage		110530-OCJ-07
08	Soil	16 May 2011	Southern part of Miyagi Prefecture D 宮城県南部D	10 cm x 10 cm ; 2 cm depth	200 g	110530-OCJ-08
09	Vegetable	16 May 2011	Southern part of Miyagi Prefecture D 宮城県南部D	Young pea		110530-OCJ-09
10	herb	16 May 2011	Southern part of Miyagi Prefecture D 宮城県南部D	Mugwort		110530-OCJ-10
11	Soil	16 May 2011	Southern part of Miyagi Prefecture E 宮城県南部E	10 cm x 10 cm ; 2 cm depth	270 g	110530-OCJ-11
13	water	18 May 2011	Southern part of Miyagi Prefecture E 宮城県南部F	From a pond		110530-OCJ-13
14	Soil	18 May 2011	Southern part of Miyagi Prefecture F 宮城県南部F	10 cm x 10 cm ; 2 cm depth	240 g	110530-OCJ-14
15	Vegetable	18 May 2011	Southern part of Miyagi Prefecture F 宮城県南部F	Cabbage		110530-OCJ-15
16	water	18 May 2011	Southern part of Miyagi Prefecture F 宮城県南部F	Stream water		110530-OCJ-16
17	Soil	16 May 2011	Umegaoka Tsukuba Ibaraki Prefecture 茨城県つくば市梅ヶ丘	10 cm x 10 cm ; 2 cm depth	217 g	110530-OCJ-17
18	Soil	15 May 2011	Ishidou Minami-bousou City Chiba Prefecture 千葉県南房総市石堂	10 cm x 10 cm ; 5 cm depth	447 g	110530-OCJ-18
19	Soil	15 May 2011	Iwaito Minami-bousou City Chiba Prefecture 千葉県南房総市岩糸	10 cm x 10 cm ; 5 cm depth	380 g	110530-OCJ-19
20	Dry grass	22 May 2011	Sin-suna Koutou-Ku Tokyo 東京都江東区新砂	Road side near the Sludge Plant		110530-OCJ-20

21	Moss	22 May 2011	Higashi-suna Koutou-Ku Tokyo 東京都江東区東砂			110530-OCJ-21
22	Soil	22 May 2011	Higashi-suna Koutou-Ku Tokyo 東京都江東区東砂	Soil under the moss 10 cm x 10 cm ; 5 cm depth	459 g	110530-OCJ-22
23	Soil	22 May 2011	Tsukazaki Kashiwa City Chiba Prefecture 千葉県柏市塚崎	Soil under the moss 10 cm x 10 cm ; 5 cm depth	320 g	110530-OCJ-23
24	Soil	25 May 2011 9:25	3-7 Sinsuna Koutou-Ku Tokyo 東京都江東区新砂 3丁目 7	Ground beside Tobu Sludge Plant 東部スラッジプラント 横、運動場	320 g	110530-OCJ-24
25	Soil	25 May 2011 15:00	9-2 Ohshima Koutou-Ku Tokyo 東京都江東区大島 9丁目 2	Ohshima Komatugawa Park 大島小松川公園わんさ か広場	404 g	110530-OCJ-25

**OBSERVATION** : 2 vegetable samples (#5 and #12) could not be analyzed because they were rotten at their arrival.

## 2. ANALYSIS METHOD

The analyses are performed by Gamma spectrometry (see annex 1) on raw samples.  
The results are displayed in the 8 following tables.

### 3. RESULTS FOR SOUTHERN PART OF MYAGI : MASS ACTIVITY OF Soils in Bq/kg

Sample identification		110530-OCJ-01		110530-OCJ-04		110530-OCJ-06		110530-OCJ-08		110530-OCJ-11		110530-OCJ-14						
Samples number registration		110530-OCJ-01		110530-OCJ-04		110530-OCJ-06		110530-OCJ-08		110530-OCJ-11		110530-OCJ-14						
Kind - species		Soil		Soil		Soil		Soil		Soil		Soil						
Sample																		
Date		05.17.2011 5:00 PM		05.16.2011 9:00 AM		05.14.2011 6:00 PM		05.16.2011 5:00 PM		05.18.2011 10:00 AM		05.18.2011 9:30 AM						
Place		Southern part of Miyagi Prefecture A 宮城県南部A		Southern part of Miyagi Prefecture B 宮城県南部B		Southern part of Miyagi Prefecture C 宮城県南部C		Southern part of Miyagi Prefecture D 宮城県南部D		Southern part of Miyagi Prefecture E 宮城県南部E		Southern part of Miyagi Prefecture F 宮城県南部F						
surface area collected		100 cm2		100 cm2		100 cm2		100 cm2		100 cm2		100 cm2						
total mass collected (g)		286 g		280 g		305 g		200 g		269 g		240 g						
Counting																		
Geometry or volume (cm <sup>3</sup> )		61		61		61		61		61		61						
analysed sample mass (g)		70.1		69.0		73.9		63.6		65		66.3						
age of the sample (days)		15.2		24.5		23.2		24		21.4		22.3						
state analysed		raw		raw		raw		raw		raw		raw						
Result																		
Reference date		05.17.2011 5:00 PM		05.16.2011 9:00 AM		05.14.2011 6:00 PM		05.16.2011 5:00 PM		05.18.2011 10:00 AM		05.18.2011 9:30 AM						
Unit		<b>Bq/kg</b>		<b>Bq/kg</b>		<b>Bq/kg</b>		<b>Bq/kg</b>		<b>Bq/kg</b>		<b>Bq/kg</b>						
ARTIFICIALS RADIONUCLIDES																		
<b>Ag-110m</b>	249.8 days	<	5.2	<	6	<	8	<	7	<	6	<b>12</b>	±	<b>5</b>				
<b>Te-129m</b>	33,6 days	<b>270</b>	±	<b>100</b>	<	200	<b>266</b>	±	184	<b>370</b>	±	180	<b>430</b>	±	<b>120</b>			
<b>I-131</b>	8 days	<b>48</b>	±	<b>12</b>	<	33	<b>53</b>	±	37	<b>58</b>	±	37	<b>75</b>	±	<b>22</b>			
<b>Cs-134</b>	2,1 years	<b>634</b>	±	<b>77</b>	<b>74</b>	±	<b>11</b>	<b>798</b>	±	<b>98</b>	<b>1,115</b>	±	<b>120</b>	<b>1,028</b>	±	<b>120</b>		
<b>Cs-136</b>	13,2 days	<	8	<	12	<	20	<	24	<	12	<	12	<	24			
<b>Cs-137</b>	30 year	<b>680</b>	±	<b>80</b>	<b>88</b>	±	<b>12</b>	<b>850</b>	±	<b>100</b>	<b>1,200</b>	±	<b>140</b>	<b>1,100</b>	±	<b>130</b>		
																<b>2,300</b>	±	<b>270</b>

4. RESULTS FOR SOUTHERN PART OF MIYAGI : SURFACE ACTIVITY OF Soils (Bq/m<sup>2</sup>)

Sample identification	110530-OCJ-01	110530-OCJ-04	110530-OCJ-06	110530-OCJ-08	110530-OCJ-11	110530-OCJ-14	
Samples number registration	110530-OCJ-01	110530-OCJ-04	110530-OCJ-06	110530-OCJ-08	110530-OCJ-11	110530-OCJ-14	
Kind - species	Soil	Soil	Soil	Soil	Soil	Soil	
<b>Sample</b>							
Date	05.17.2011 5:00 PM	05.16.2011 9:00 AM	05.14.2011 6:00 PM	05.16.2011 5:00 PM	05.18.2011 10:00 AM	05.18.2011 9:30 AM	
Place	Southern part of Miyagi Prefecture A 宮城県南部A	Southern part of Miyagi Prefecture B 宮城県南部B	Southern part of Miyagi Prefecture C 宮城県南部C	Southern part of Miyagi Prefecture D 宮城県南部D	Southern part of Miyagi Prefecture E 宮城県南部E	Southern part of Miyagi Prefecture F 宮城県南部F	
surface area collected	100 cm <sup>2</sup>	100 cm <sup>2</sup>	100 cm <sup>2</sup>	100 cm <sup>2</sup>	100 cm <sup>2</sup>	100 cm <sup>2</sup>	
total mass collected (g)	286 g	280 g	305 g	200 g	269 g	240 g	
<b>Counting</b>							
Geometry or volume (cm <sup>3</sup> )	61	61	61	61	61	61	
analysed sample mass (g)	70.1	69.0	73.9	63.6	65	66.3	
age of the sample (days)	15.2	24.5	23.2	24	21.4	22.3	
Part analysed	whole	whole	whole	whole	whole	whole	
state analysed	raw	raw	raw	raw	raw	raw	
<b>Result</b>							
Reference date	05.17.2011 5:00 PM	05.16.2011 9:00 AM	05.14.2011 6:00 PM	05.16.2011 5:00 PM	05.18.2011 10:00 AM	05.18.2011 9:30 AM	
Unit	Bq/m <sup>2</sup>	Bq/m <sup>2</sup>	Bq/m <sup>2</sup>	Bq/m <sup>2</sup>	Bq/m <sup>2</sup>	Bq/m <sup>2</sup>	
<b>ARTIFICIALS RADIONUCLIDES</b>							
Ag-110m	249.8 days	< 149	< 6	< 8	< 140	< 6	288 ± 120
Te-129m	33,6 days	7,722 ± 2860	< 200	8,113 ± 5,612	7,400 ± 3600	11,567 ± 3,228	21,672 ± 624
I-131	8 days	1,373 ± 343	< 33	1,617 ± 1,129	1,160 ± 740	2,018 ± 592	3,600 ± 1152
Cs-134	2,1 years	18,132 ± 2188	2,081 ± 306	24,338 ± 3,001	22,299 ± 2400	27,640 ± 3,234	50,632 ± 6,034
Cs-136	13,2 days	< 229	< 12	< 610	< 480	< 323	< 576
Cs-137	30 year	19,448 ± 2288	2,464 ± 336	25,925 ± 3,050	24,000 ± 2800	29,590 ± 3,497	55,200 ± 6,480

5. RESULTS FOR SOUTHERN PART OF MYAGI : MASS ACTIVITY OF Vegetable in Bq/kg

Sample identification		110530-OCJ-02	110530-OCJ-07	110530-OCJ-09	110530-OCJ-10	110530-OCJ-15
Samples number registration		110530-OCJ-02	110530-OCJ-07	110530-OCJ-09	110530-OCJ-10	110530-OCJ-15
Kind - species		spinach	cabbage	young peas	<i>Mugwort (Artemisia vulgaris)</i>	cabbage
Sample						
Date		05.17.2011 5:00 PM	05.17.2011 6:00 PM	05.16.2011 5:00 PM	05.16.2011 5:00 PM	05.18.2011 9:30 AM
Place		Southern part of Miyagi Prefecture A 宮城県南部A	Southern part of Miyagi Prefecture C 宮城県南部C	Southern part of Miyagi Prefecture D 宮城県南部D	Southern part of Miyagi Prefecture D 宮城県南部D	Southern part of Miyagi Prefecture F 宮城県南部F
Counting						
Geometry or volume (cm <sup>3</sup> )		50	500	50	50	50
analysed sample mass (g)		43.9	191.5	50.9	32.2	49.3
age of the sample (days)		13.7	16	15	16	13.4
Part analysed		whole	whole	whole	whole	whole
state analysed		fresh	fresh	fresh	fresh	fresh
Result						
Reference date		05.17.2011 5:00 PM	05.17.2011 6:00 PM	05.16.2011 5:00 PM	05.16.2011 5:00 PM	05.18.2011 9:30 AM
Unit		<b>Bq/kg</b>	<b>Bq/kg</b>	<b>Bq/kg</b>	<b>Bq/kg</b>	<b>Bq/kg</b>
ARTIFICIALS RADIONUCLIDES						
<b>Nb-95</b>	34.9 days					
<b>Te-129m</b>	33,6 days	< 150	< 34	< 150	< 220	< 96
<b>I-131</b>	8 days	< 12	< 3	< 12	<b>29 ± 10</b>	< 6
<b>Cs-134</b>	2,1 years	<b>37 ± 6</b>	<b>5.8 ± 0.9</b>	<b>27.2 ± 4.8</b>	<b>36 ± 6</b>	<b>12.0 ± 2.1</b>
<b>Cs-136</b>	13,2 days	< 8	< 8	< 8	< 10	< 4
<b>Cs-137</b>	30 year	<b>39 ± 6</b>	<b>6.7 ± 1.0</b>	<b>31 ± 5</b>	<b>42 ± 7</b>	<b>11.3 ± 2.1</b>

6. RESULTS FOR SOUTHERN PART OF MIYAGI : VOLUME ACTIVITY OF Waters in Bq/L

<b>Sample identification</b>				
Samples number registration		<b>110530-OCJ-03</b>	<b>110530-OCJ-13</b>	<b>110530-OCJ-16</b>
Kind - species		tap water	water of a pond	stream water
<b>Sample</b>				
<b>Date</b>		05.18.2011 9:00 AM	05.18.2011 10:00 AM	05.18.2011 9:15 AM
<b>Place</b>		Southern part of Miyagi Prefecture A 宮城県南部A	Southern part of Miyagi Prefecture E 宮城県南部E	Southern part of Miyagi Prefecture F 宮城県南部F
<b>Counting</b>				
analysed volume (cm <sup>3</sup> )		500	500	500
age of the sample (days)		30	31	33
Part analysed		whole	whole	whole
state analysed		raw	raw	raw
<b>Result</b>				
Reference date		05.18.2011 9:00 AM	05.18.2011 10:00 AM	05.18.2011 9:15 AM
Unit		<b>Bq/l</b>	<b>Bq/l</b>	<b>Bq/l</b>
<b>ARTIFICIALS RADIONUCLIDES</b>				
<b>Te-129m</b>	33,6 days	< 24	< 15	< 20
<b>I-131</b>	8 days	< 5	< 3	< 6
<b>Cs-134</b>	2,1 years	< 0.4	< 0.2	< 0.4
<b>Cs-136</b>	13,2 days	< 2	< 1.5	< 2.0
<b>Cs-137</b>	30 year	< 0.4	< 0.2	< 0.4

7. RESULTS FOR TOKYO : Soils and biologic samples near Sin-Suna koutou-Ku : mass activity (Bq/kg)

Sample identification		110530-OCJ-22	110530-OCJ-24	110530-OCJ-25	110530-OCJ-20	110530-OCJ-21
Samples number registration		110530-OCJ-22	110530-OCJ-24	110530-OCJ-25	110530-OCJ-20	110530-OCJ-21
Kind - species		Soil under moss	Soil	Soil	dry grass	moss
Sample						
Date		05.22.2011 2:30 PM	05.25.2011 9:25 AM	05.25.2011 3:00 PM	05.22.2011 2:00 PM	05.22.2011 2:30 PM
Place		Higashi-suna Koutou-Ku Tokyo 東京都江東区東砂	3-7 Sinsuna Koutou-Ku Tokyo 東京都江東区新砂3丁目7	9-2 Ohshima Koutou-Ku Tokyo 東京都江東区大島9丁目2	Higashi-suna Koutou-Ku Tokyo 東京都江東区東砂	Higashi-suna Koutou-Ku Tokyo 東京都江東区東砂
Counting						
Geometry or volume (cm <sup>3</sup> )		61	61	61	61	61
analysed sample mass (g)		75.0	75.0	61.2	9.2	35.2
age of the sample (days)		10	10	12	19.3	10.5
state analysed		raw	raw	raw	dry	fresh
Result						
Reference date		05.22.2011 2:30 PM	05.25.2011 9:25 AM	05.25.2011 3:00 PM	05.22.2011 2:00 PM	05.22.2011 2:30 PM
Unit		<b>Bq/kg</b>	<b>Bq/kg</b>	<b>Bq/kg</b>	<b>Bq/kg</b>	<b>Bq/kg</b>
ARTIFICIALS RADIONUCLIDES						
<b>Te-129m</b>	33,6 days	< 80	< 33	<b>580 ± 190</b>	<b>1,600 ± 700</b>	<b>490 ± 110</b>
<b>I-131</b>	8 days	< 13	<b>45 ± 16</b>	<b>171 ± 29</b>	<b>370 ± 13</b>	<b>116 ± 17</b>
<b>Cs-134</b>	2,1 years	<b>21.1 ± 4.5</b>	<b>1,780 ± 210</b>	<b>2,850 ± 330</b>	<b>11,100 ± 1200</b>	<b>2,680 ± 310</b>
<b>Cs-136</b>	13,2 days	< 8	< 14	<b>27 ± 8</b>	< 60	<b>16,6 ± 4,5</b>
<b>Cs-137</b>	30 year	<b>25.9 ± 4.9</b>	<b>1,920 ± 230</b>	<b>3,050 ± 360</b>	<b>11,800 ± 1 400</b>	<b>3,100 ± 360</b>



8. RESULTS FOR TOKYO : Soils near Sin-Suna koutou-Ku : surface activity (Bq/m<sup>2</sup>)

Sample identification		110530-OCJ-22		110530-OCJ-24		110530-OCJ-25	
Samples number registration		<b>110530-OCJ-22</b>		<b>110530-OCJ-24</b>		<b>110530-OCJ-25</b>	
Kind - species		<b>Soil under moss</b>		Soil		Soil	
Sample							
Date		05.22.2011 2:30 PM		05.25.2011 9:25 AM		05.25.2011 3:00 PM	
Place		Higashi-suna Koutou-Ku Tokyo 東京都江東区東砂		3-7 Sinsuna Koutou-Ku Tokyo 東京都江東区新砂3丁目7		9-2 Ohshima Koutou-Ku Tokyo 東京都江東区大島9丁目2	
surface area collected		100 cm2		100 cm2		100 cm2	
total mass collected (g)		459 g		320 g		400 g	
Counting							
Geometry or volume (cm <sup>3</sup> )		61		61		61	
analysed sample mass (g)		62.4		75.0		61.2	
age of the sample (days)		16.4		10		12	
state analysed		raw		raw		raw	
Result							
Reference date		05.22.2011 2:30 PM		05.25.2011 9:25 AM		05.25.2011 3:00 PM	
Unit		<b>Bq/m<sup>2</sup></b>		<b>Bq/m<sup>2</sup></b>		<b>Bq/m<sup>2</sup></b>	
ARTIFICIALS RADIONUCLIDES							
<b>Te-129m</b>	33,6 days	<	3,672	<	1,056	<b>23,200</b>	± 7,600
<b>I-131</b>	8 days	<	597	<b>1,440</b>	± 512	<b>6,840</b>	± 1,160
<b>Cs-134</b>	2,1 years	<b>968</b>	± 206	<b>56,736</b>	± 6,646	<b>114,000</b>	± 13,200
<b>Cs-136</b>	13,2 days	<	367	<	448	<b>1,080</b>	± 320
<b>Cs-137</b>	30 year	<b>1,189</b>	± 225	<b>61,440</b>	± 7,360	<b>122,000</b>	± 14,400

9. RESULTS FOR OTHER REGIONS : mass activity of soils (Bq/kg)

Sample identification		110530-OCJ-17	110530-OCJ-18	110530-OCJ-19	110530-OCJ-23
Samples number registration		110530-OCJ-17	110530-OCJ-18	110530-OCJ-19	110530-OCJ-23
Kind - species		Soil	Soil	Soil	Soil
Sample					
Date		05.16.2011 10:00 AM	05.15.2011 10:00 AM	05.15.2011 11:00 AM	05.17.2011 8:00 AM
Place		Umegaoka Tsukuba Ibaraki Prefecture 茨城県つくば市梅ヶ丘	Ishidou Minami-bousou City Chiba Prefecture 千葉県南房総市石堂	Iwaito Minami-bousou City Chiba Prefecture 千葉県南房総市岩糸	Tsukazaki Kashiwa City Chiba Prefecture 千葉県柏市塚崎
surface area collected		100 cm <sup>2</sup>	100 cm <sup>2</sup>	100 cm <sup>2</sup>	100 cm <sup>2</sup>
total mass collected (g)		217 g	447 g	380 g	320 g
Counting					
Geometry or volume (cm <sup>3</sup> )		61	61	61	61
analysed sample mass (g)		57.5	93.2	79.9	76.0
age of the sample (days)		23.2	26.3	23.2	24.5
state analysed		raw	raw	raw	raw
Result					
Reference date		05.16.2011 10:00 AM	05.15.2011 10:00 AM	05.15.2011 11:00 AM	05.17.2011 8:00 AM
Unit		Bq/kg	Bq/kg	Bq/kg	Bq/kg
ARTIFICIALS RADIONUCLIDES					
Ag-110m	249.8 days	< 6	< 4	< 5	< 8
Te-129m	33,6 days	< 250	< 120	< 180	< 320
I-131	8 days	< 44	< 20	< 20	< 80
Cs-134	2,1 years	296 ± 37	21.0 ± 3.8	27.8 ± 4.9	1,312 ± 153
Cs-136	13,2 days	< 18	< 8	< 9	< 8
Cs-137	30 year	338 ± 42	19.3 ± 3.6	26.6 ± 5	1,390 ± 160

10. RESULTS FOR OTHER REGIONS : surface activity of soils (Bq/m<sup>2</sup>)

<b>Sample identification</b>					
Samples number registration		<b>110530-OCJ-17</b>	<b>110530-OCJ-18</b>	<b>110530-OCJ-19</b>	<b>110530-OCJ-23</b>
Kind - species		Soil	Soil	Soil	Soil
<b>Sample</b>					
<b>Date</b>		05.16.2011 10:00 AM	05.15.2011 10:00 AM	05.15.2011 11:00 AM	05.17.2011 8:00 AM
<b>Place</b>		Umegaoka Tsukuba Ibaraki Prefecture 茨城県つくば市梅ヶ丘	Ishidou Minami-bousou City Chiba Prefecture 千葉県南房総市石堂	Iwaito Minami-bousou City Chiba Prefecture 千葉県南房総市岩糸	Tsukazaki Kashiwa City Chiba Prefecture 千葉県柏市塚崎
<b>surface area collected</b>		100 cm <sup>2</sup>	100 cm <sup>2</sup>	100 cm <sup>2</sup>	100 cm <sup>2</sup>
<b>total mass collected (g)</b>		217 g	447 g	380 g	320 g
<b>Counting</b>					
Geometry or volume (cm <sup>3</sup> )		61	61	61	61
analysed sample mass (g)		57.5	93.2	79.9	76.0
age of the sample (days)		23.2	26.3	23.2	24.5
state analysed		raw	raw	raw	raw
<b>Result</b>					
Reference date		05.16.2011 10:00 AM	05.15.2011 10:00 AM	05.15.2011 11:00 AM	05.17.2011 8:00 AM
Unit		<b>Bq /m<sup>2</sup></b>	<b>Bq/m<sup>2</sup></b>	<b>Bq/m<sup>2</sup></b>	<b>Bq/m<sup>2</sup></b>
<b>ARTIFICIALS RADIONUCLIDES</b>					
<b>Ag-110m</b>	249.8 days	< 130	< 179	< 190	< 256
<b>Te-129m</b>	33,6 days	< 5,425	< 5,364	< 6840	< 10,240
<b>I-131</b>	8 days	< 955	< 894	< 760	< 2,560
<b>Cs-134</b>	2,1 years	<b>6,428</b> ± 806	<b>938</b> ± 171	<b>1,055</b> ± 187	<b>41,975</b> ± 4,897
<b>Cs-136</b>	13,2 days	< 391	< 358	< 342	< 256
<b>Cs-137</b>	30 year	<b>7,335</b> ± 911	<b>863</b> ± 161	<b>1,011</b> ± 175	<b>44,480</b> ± 5,120

## APPENDIX 1

ANALYSIS	GAMMA
TITLE	<b>Measurement of gamma emitters nuclides by gamma spectrometry</b>
TREATMENT	The raw sample is homogenised. A representative part is taken to be conditioned in a geometry adapted to the gamma measurement.
MATERIAL	High-Purity Germanium (HPGe), type N coaxial , 32% efficiency, mounted in a vertical cryostate. The samples are placed in a 10-cm thick lead shielding. Data are readout by a digital acquisition system (DSPEC-ORTECH). The energy range is taken as 27-2000 keV. The containers are plastic round boxes with a fiducial volume of 61ml (ref. 7215) and standard geometries of 500ml.
UNITS	The measured quantity is the activity in becquerel (Bq) per kilogram of raw or fresh material (kg), in becquerel (Bq) per liter (L) and becquerel (Bq) per square meter (m <sup>2</sup> )

RESULTS	
IN GENERAL	<p>Measurements are performed with identical geometries as thoses of the standard (calibrated) sources. They concern gamma-emitters radionuclides displaying one or several emission peaks within the reference energy range. Among all the radionuclides detected in the samples, only the most abundant are displayed in the tables, without any specific demand from the client. In all cases, the tables display at least all detected artificial radionuclides.</p> <p>Only elements with activity larger than the decision threshold are given. On the contrary, for the specified radionuclides, the detection limit –LD- (detection limit) is indicated, with the inferior “&lt;” sign. When it is not possible to deduce a satisfying detection limit LD, the data are replaced by the sign “-“. When an element has been detected but cannot be quantified properly, the mention “Identified but Not Quantified” (INQ) is reported. The measured activity of each radioelement is given with its absolute uncertainty calculated within a 95% interval of confidence (2 times the standard deviation). Each expressed activity, including the detection limit, is calculated at the reference date indicated in the table (collection date and time).</p>

## APPENDIX 2

INFORMATION ABOUT THE LABORATORY ACRO	
Measurements capacities	The ACRO laboratory can measure radon concentration in the air, tritium (HTO) in liquids and gamma radionuclides in all kind of matrices. Other measurements are under development. The measurement protocols are in accordance to the actual French and International standards (ISO/CEI 17025).
<b>QUALIFICATION</b> The laboratory is qualified for radioactivity measurements in the environment by the French nuclear safety authority (ASN)	
Decision n°DEP-DEU-0704-2009 du 8/12/09 Of French nuclear safety authority (ASN)	<ul style="list-style-type: none"> <li>- Measurement of gamma-emitters radionuclides in biological matrices</li> <li>- Tritium measurement in waters</li> </ul>
Decision n°DEP-DIS-346-2008	<ul style="list-style-type: none"> <li>- Radon concentration (volume activity) in public places</li> </ul>
Decision n°CODEP-DEU-2010-031543 du 15/06/10	<ul style="list-style-type: none"> <li>- Measurement of gamma-emitters radionuclides in waters and soils</li> <li>- Uranium isotopes in soils</li> <li>- Thorium isotopes in soils</li> </ul>
Decision CODEP-DEU-2011-031763 du 15/06/11	<ul style="list-style-type: none"> <li>- Radium-226/228 and decaying partners in soils.</li> <li>- Measurement of gamma-emitters radionuclides in soils</li> </ul>