



Association pour le Contrôle de la Radioactivité dans l'Ouest
Laboratoire indépendant d'analyse de la radioactivité


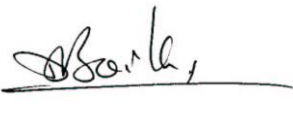
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Analysis Report

RAP110522-GPJ-01

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DEMAND	
	GREENPEACE INTERNATIONAL
CONTACT	MR. JAN VANDE PUTTE
OBJECT	EVALUATION ON THE ENVIRONMENTAL CONSEQUENCES IN JAPAN OF THE FUKUSHIMA NUCLEAR POWER PLANT ACCIDENT <u>ANALYSIS OF MATRICES OF THE MARINE ENVIRONMENT (SEAWEEDES)</u>
REPORT ID	
IDENTIFICATION	RAP110522-GPJ-01
DATE	22th of May, 2011
PAGE NB	4 (including appendices)
SAMPLES	
	7 SEAWEED SAMPLES
ANALYSES REALISEES	
TYPE	MEASUREMENT OF GAMMA EMMITERS RADIONUCLIDES BY GAMMA SPECTROMETRY SEARCH FOR ARTIFICIAL NUCLIDES

VISA		
	EDITOR	APPROVAL
		
	Name	Name
	Mylène JOSSET, Analysis supervisor	David BOILLEY, Chairman of ACRO

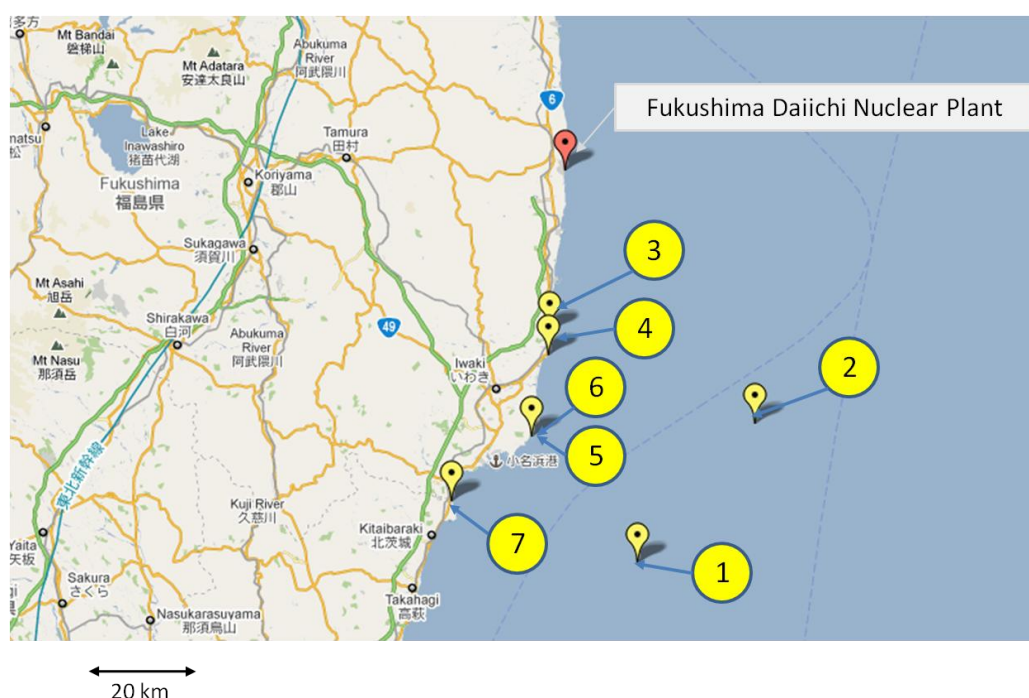
SAMPLE IDENTIFICATION

The samples were collected by Greenpeace and sent to ACRO laboratory by express mail in a cool box.

Reception date: May 17th, 2011

The samples characteristics are given in the table below.

N°	Greenpeace references		Sample type	Species	Collection Date (local)	Location	References
1	S2	RW_s2_20110504	Sea weed	Sargassum horneri	5/4/2011 10:47	Collected from RW, 65 km south of Daiichi NPP	110517-GPJ-01
2	S9	RW_s9_20110504	Sea weed	Sargassum horneri	5/4/2011 17:15	Collected from RW, 52 km south-east of Daiichi NPP	110517-GPJ-02
3	20	L_20_20110505	Sea weed	Gloiopeltis furcata	5/5/2011	Hisanohama Port	110517-GPJ-03
4	21	L_21a_20110505	Sea weed	Scytosiphon lomentaria	5/5/2011	Yotsukura Port	110517-GPJ-04
5	25	L_25_20110505	Sea weed	Grateloupia elliptica	5/5/2011	Ena Port	110517-GPJ-05
6	26	L_26_20110505	Sea weed	Sargassum horneri	5/5/2011	Ena Port	110517-GPJ-06
7	D	L_D_20110509	Sea weed	Sargassum horneri	5/9/2011	Nakoso Port, Fukushima	110517-GPJ-07



ANALYSIS METHOD

The analyses are performed by gamma spectrometry (see annex 1). The results are displayed in the following table.

RESULTS – MASS ACTIVITY OF SEAWEEDS (Bq/kg fresh weight)

Sample identification		110517-GPJ-01	110517-GPJ-02	110517-GPJ-03	110517-GPJ-04	110517-GPJ-05	110517-GPJ-06	110517-GPJ-07
Sample number registration		110517-GPJ-01	110517-GPJ-02	110517-GPJ-03	110517-GPJ-04	110517-GPJ-05	110517-GPJ-06	110517-GPJ-07
Sample Identification		S2	S9	20	21	25	26	D
Type		Seaweed	Seaweed	Seaweed	Seaweed	Seaweed	Seaweed	Seaweed
Species		<i>Sargassum horneri</i>	<i>Sargassum horneri</i>	<i>Gloiopeltis furcata</i>	<i>Scytosiphon lomentaria</i>	<i>Grateloupia elliptica</i>	<i>Sargassum horneri</i>	<i>Sargassum horneri</i>
Sampling								
Date		may 4 th , 2011	may 4 th , 2011	may 5 th , 2011	may 5 th , 2011	may 5 th , 2011	may 5 th , 2011	may 9 th , 2011
Place		collected from RW, 65 km south of Daiichi NPP	collected from RW, 52 km south-east of Daiichi NPP	Hisandhama Port	Yotsukura Port	Ena Port	Ena Port	Sargassum Horneri
Counting								
Geometry (ml)		61	61	61	61	61	61	61
Sample mass analysed (g)		59.6	59.9	41.9	43.8	64.2	56.9	54.3
age of the sample (days)		13.5	14.2	13.7	14.7	13.8	12.8	10
Fraction analysed		fresh	fresh	fresh	fresh	fresh	fresh	fresh
Results								
Reference date		may 4 th , 2011	may 4 th , 2011	may 5 th , 2011	may 5 th , 2011	may 5 th , 2011	may 5 th , 2011	may 9 th , 2011
Unit		Bq/kg fresh weight	Bq/kg fresh weight	Bq/kg fresh weight	Bq/kg fresh weight	Bq/kg fresh weight	Bq/kg fresh weight	Bq/kg fresh weight
ARTIFICIALS RADIONUCLIDES								
Ag-110m	250 days	< 8	< 6	130 ± 20	11 ± 6	< 6	< 8	< 3
Te-129m	33 days	< 55	< 210	< 340	< 330	420 ± 120	< 240	< 85
I-131	8 days	28.9 ± 4.2	119,000 ± 14,000	65,000 ± 8,000	17,000 ± 2,000	3,040 ± 390	127,000 ± 15,000	20,000 ± 2,400
Cs-134	2.1 years	< 2	348 ± 43	540 ± 70	1,390 ± 160	580 ± 70	800 ± 90	259 ± 31
Cs-136	13.2 days	< 2	< 11	< 20	23 ± 8	9,8 ± 4,4	< 10	< 4
Cs-137	30 years	< 2	364 ± 44	570 ± 70	1,450 ± 170	600 ± 70	840 ± 100	266 ± 31
Ba-140 / La-140	12.7 days	< 3	410 ± 60	< 12	180 ± 80	< 8	510 ± 70	222 ± 26

Note : Ba-140/La-140 are separate disintegration pairs and are observed at equilibrium. The indicated activity takes into account the presence of both elements.

APPENDIX 1

ANALYSIS	
TITLE	Measurement of gamma emitters nuclides by gamma spectrometry
TREATMENT	The fresh sample is homogenized. 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 cryostat. The samples are placed in a 10-cm thick lead shielding. Data are readout by a digital acquisition system (DSPEC-ORTEC). The energy range is taken as 27-2000 keV. The containers are plastic round boxes with a volume of 61ml (ref. 7215) adapted to the available quantity.
UNITS	The measured quantity is the mass activity in Becquerel (Bq) per kilogram of fresh weight (kg fresh weight).

RESULTS

IN GENERAL	<p>Measurements are performed with identical geometries as those 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 “<” 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>
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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 and quality procedures standards (ISO/CEI 17025).
QUALIFICATION	
The laboratory is qualified for radioactivity measurements in the environment by the French nuclear safety authority (ASN)	
Agreements n°DEP-DEU-0704-2009 du 8/12/09 by ASN	<ul style="list-style-type: none"> - Measurement of gamma-emitters radionuclides in biological matrices - Tritium measurement in waters
n°CODEP-DEU-2010-031543 du 15/06/10 by ASN (Autorité de Sûreté Nucléaire)	<ul style="list-style-type: none"> - Measurement of gamma-emitters radionuclides in waters - Uranium isotopes in soils - Thorium isotopes in soils - Radium-226/228 and decaying partners in soils.