April 22, 2011

Seychelle Water Filtration Products
32963 Calle Perfecto
San Juan Capistrano, CA 92675

Lab ID : SP 1103577
Customer : 2-23748

Laboratory Report

Introduction: This report package contains total of 5 pages divided into 3 sections:

Case Narrative	(2 pages)	: An overview of the work performed at FGL.
Sample Results	(2 pages)	: Results for each sample submitted.
Quality Control	(1 page)	: Supporting Quality Control (QC) results.

Case Narrative

This Case Narrative pertains to the following samples:

Sample Description	Date Sampled	Date Received	FGL Lab ID #	Matrix
Bottle 1st Uranium Portion	04/07/2011	04/11/2011	SP 1103577-001	DW
Bottle 2nd Uranium Portion	04/07/2011	04/11/2011	SP 1103577-002	DW

Sampling and Receipt Information: All samples were received, prepared and analyzed within the method specified holding times. All samples arrived at room temperature. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the attached Chain of Custody and Condition Upon Receipt Form.

Quality Control: All samples were prepared and analyzed according to the following tables:

Radio QC

900.0	04/20/2011:205836 All analysis quality controls are within established criteria.
	04/19/2011:204213 All preparation quality controls are within established criteria, except: The following note applies to Gross Beta: 435 Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.
903.0	04/19/2011:205787 All analysis quality controls are within established criteria.
	04/18/2011:204162 All preparation quality controls are within established criteria.
908.0	04/16/2011:205547 All analysis quality controls are within established criteria.
	04/16/2011:205548 All analysis quality controls are within established criteria.
	04/15/2011:204077 All preparation quality controls are within established criteria.

April 22, 2011

Lab ID : SP 1103691-001
Customer ID : 2-23748

Seychelle Water Filtration Products
32963 Calle Perfecto
San Juan Capistrano, CA 92675

Sampled On : April 12, 2011-00:00
Sampled By : Not Available
Received On : April 12, 2011-10:30
Matrix : Drinking Water

Description : Pitcher Plus
Project : Seychelle

Sample Result - Radio

Constituent	Result ± Error	MDA	Units	MCL/AL	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
Radio Chemistry[P]								
Gross Beta	0.697 ± 1.64	2.51	pCi/L	50	900.0	04/19/11:204213	900.0	04/20/11:205836
Total Alpha Radium (226)	0.000 ± 0.398	0.824	pCi/L	3	903.0	04/18/11:204162	903.0	04/19/11:205787
Uranium	0.000 ± 0.681	0.475	pCi/L	20	908.0	04/15/11:204077	908.0	04/16/11:205548

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (P) Plastic Preservatives: N/A * PQL adjusted for dilution.

MDA = Minimum Detectable Activity (Calculated at the 95% confidence level) = Data utilized by DHS to determine matrix interference.
MCL / AL = Maximum Contamination Level / Action Level. Alpha's Action Level of 5 pCi/L is based on the Assigned Value (AV).
AV = (Gross Alpha Result + (0.84 x Error)). CCR Section 64442: Drinking Water Compliance Note: Do the following
If Gross Alpha's (AV) exceeds 5 pCi/L run Uranium. If Gross Alpha's (AV) minus Uranium exceeds 5 pCi/L run Radium 226.

Drinking Water Compliance:
Gross Alpha (AV) minus Uranium is less than or equal to 15 pCi/L
Uranium is less than or equal to 20 pCi/L
Radium 226 + Radium 228 is less than or equal to 5 pCi/L

Note: Samples are held for 3-6 months prior to disposal.

Note: Cs-137 utilized in Gross Beta Radioactivity removal test.
In each portion of Cs-137 added 100% was removed.
Michel M. Franco, Radiochemistry Technical Advisor

April 22, 2011

Lab ID : SP 1103577-002
Customer ID : 2-23748

Seychelle Water Filtration Products
32963 Calle Perfecto
San Juan Capistrano, CA 92675

Sampled On : April 7, 2011-00:00
Sampled By : Not Available
Received On : April 11, 2011-10:15
Matrix : Drinking Water

Description : Bottle 2nd Uranium Portion
Project : Seychelle

Sample Result - Radio

Constituent	Result ± Error	MDA	Units	MCL/AL	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
Radio Chemistry [P:1]								
Gross Beta	0.000 ± 0.991	1.86	pCi/L	50	900.0	04/19/11:204213	900.0	04/20/11:205836
Total Alpha Radium (226)	0.000 ± 0.877	1.65	pCi/L	3	903.0	04/18/11:204162	903.0	04/19/11:205787
Uranium	0.000 ± 2.19	1.90	pCi/L	20	908.0	04/15/11:204077	908.0	04/16/11:205548

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (P) Plastic Preservatives: HNO3 pH < 2 * PQL adjusted for dilution.

MDA = Minimum Detectable Activity (Calculated at the 95% confidence level) = Data utilized by DHS to determine matrix interference.
MCL / AL = Maximum Contamination Level / Action Level. Alpha's Action Level of 5 pCi/L is based on the Assigned Value (AV).
AV = (Gross Alpha Result + (0.84 x Error)). CCR Section 64442: Drinking Water Compliance Note: Do the following
If Gross Alpha's (AV) exceeds 5 pCi/L run Uranium. If Gross Alpha's (AV) minus Uranium exceeds 5 pCi/L run Radium 226.

Drinking Water Compliance:
Gross Alpha (AV) minus Uranium is less than or equal to 15 pCi/L
Uranium is less than or equal to 20 pCi/L
Radium 226 + Radium 228 is less than or equal to 5 pCi/L

Note: Samples are held for 3-6 months prior to disposal.

Note: Cs-137 utilized in Gross Beta Radioactivity removal test.
In each portion of Cs-137 added 100% was removed.
Michel M. Franco, Radiochemistry Technical Advisor

April 22, 2011 Lab ID : SP 1103577

Seychelle Water Filtration Products Customer : 2-23748

Quality Control - Radio

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Radio								
Beta	900.0	04/20/2011:205836	CCV	cpm	10150	92.9 %	87 - 106	
			CCB	cpm		0.3400	0.56	
Gross Beta	900.0	04/19/2011:204213	Blank	pCi/L		0.93	4	
			LCS	pCi/L	46.13	107 %	75-125	
			MS	pCi/L	92.26	47.6 %	80-130	435
		(SP 1103747-001)	MSD	pCi/L	92.26	53.3 %	80-130	435
			MSRPD	pCi/L	300.7	10.5%	≤30	
Alpha	903.0	04/19/2011:205787	CCV	cpm	10150	39.8 %	38 - 46	
			CCB	cpm		0.0500	0.15	
Total Alpha Radium (226)	903.0	04/18/2011:204162	RgBlk	pCi/L		0.1	2	
			LCS	pCi/L	18.16	66.3 %	52-89	
			BS	pCi/L	20.89	55.1 %	43-92	
			BSD	pCi/L	20.89	44.6 %	43-92	
			BSRPD	pCi/L	20.89	21.1%	≤35.5	
Alpha	908.0	04/16/2011:205547	CCV	cpm	10160	41.5 %	38 - 47	
			CCB	cpm		0.100	0.19	
	908.0	04/16/2011:205548	CCV	cpm	10160	43.7 %	38 - 47	
			CCB	cpm		0.100	0.15	
Uranium	908.0	04/15/2011:204077	RgBlk	pCi/L		0.32	1	
			LRS	pCi/L	20.86	74.8 %	54-105	
			BS	pCi/L	20.86	93.3 %	75-125	
			BSD	pCi/L	20.86	90.2 %	75-125	
			BSRPD	pCi/L	20.86	3.4%	≤20	

Definition

CCV	: Continuing Calibration Verification - Analyzed to verify the instrument calibration is within criteria.
CCB	: Continuing Calibration Blank - Analyzed to verify the instrument baseline is within criteria.
Blank	: Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples.
RgBlk	: Method Reagent Blank - Prepared to correct for any reagent contributions to sample result.
LCS	: Laboratory Control Standard/Sample - Prepared to verify that the preparation process is not affecting analyte recovery.
MS	: Matrix Spikes - A random sample is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery.
MSD	: Matrix Spike Duplicate of MS/MSD pair - A random sample duplicate is spiked with a known amount of analyted. The recoveries are an indication of how that sample matrix affects analyte recovery.
BS	: Blank Spikes - A blank is spiked with a known amount of analyte. It is prepared to verify that the preparation process is not affecting analyte recovery.
BSD	: Blank Spike Duplicate of BS/BSD pair - A blank duplicate is spiked with a known amount of analyte. It is prepared to verify that the preparation process is not affecting analyte recovery.
MSRPD	: MS/MSD Relative Percent Difference (RPD) - The MS relative percent difference is an indication of precision for the preparation and analysis.
BSRPD	: BS/BSD Relative Percent Difference (RPD) - The BS relative percent difference is an indication of precision for the preparation and analysis.
DQO	: Data Quality Objective - This is the criteria against which the quality control data is compared.

Explanation

435	: Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.

FGL ENVIRONMENTAL

ANALYTICAL CHEMISTS

GENERAL MINERAL, PHYSICAL, INORGANIC, & RADIOLOGICAL CHEMICAL ANALYSES

Date of Report: July 3, 1996 Sample ID No. SP 605173-01
Laboratory Name: FGL Environmental Signature Lab Director:
Name of Sampler: Paul Mead Employed By: Environmental Svcs
Date/time Sample Collected: 06/26/1996-1000 Date/Time Sample Rec. @ Lab: 06/21/1996-1000 Date Analyses Completed: 06/28/1996

System Name: CTL ENVIRONMENTAL SERVICES System Number:

Name or Number of Sample Source: 49606151-3 (Un-Filtered)

User ID: Station Number:
Date/Time of Sample: 9 6 0 6 2 6 1 0 0 0 (Y Y M M D D T T T T) Laboratory Code: 5 8 6 7
Submitted by: FGL Environmental Phone #(805) 659-0910

RADIOLOGICAL CHEMICALS

MCL	UNITS	CHEMICAL	ENTRY	RESULT	DLR
	pCi/L	Radon 222	82303	540	
	pCi/L	Radon 222 Counting Error	82302	± 30	

BEFORE

Name or Number of Sample Source: 49606151-4 (Filtered)

User ID: Station Number:
Date/Time of Sample: 9 6 0 6 2 6 1 0 0 0 (Y Y M M D D T T T T) Laboratory Code: 5 8 6 7
Submitted by: FGL Environmental Phone #(805) 659-0910

RADIOLOGICAL CHEMICALS

MCL	UNITS	CHEMICAL	ENTRY	RESULT	DLR
	pCi/L	Radon 222	82303	0.0	
	pCi/L	Radon 222 Counting Error	82302	± 10	

AFTER

MCL - Maximum Contaminate Level DLR - Detection Limit for Reporting purposes ND - Not Detected at or above DLR
+ Indicates Secondary Drinking Water Standards

Corporate Offices & Laboratory
PO Box 272 / 853 Corporation Street
Santa Paula, CA 93061-0272
TEL: 805/659-0910
FAX: 805/525-4172

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: 209/942-0181
FAX: 209/942-0423

Field Office
Visalia, CA
TEL: 209/734-9473
FAX: 209/734-9435
Mobile: 209/737-2399

JAPAN

Seychelle Radiological Water Pitcher

B-WELL CO.,LTD

● Pitcher Specification

Height	270mm	Pitcher	ABS resin	Reference:
Width	280mm	Lit	ABS resin	■EPA / ANSI Approval
Depth	135mm	Handle	ABS resin	■NSF Standard #42 and #53
Weight	810.5g	Filter	See below	
Capacity	3.78L	Origin	USA	
Filtering Capability	567L			

● Filter Specification

Water Filtration Capability		1000L
Pitcher Size		3.78L
Filter Cartridge Capacity		? L
Mineral Addition		None
Cartridge Size	Height	90mm
	OD	96mm
	Depth	–
Cartridge Mass	Dry	146g
	Wet	156g
Water Temp.		70 degree C
Filtration Water Flow Rate		1L/6 min.
Filtration Time		10–15 Min.
Filtration Life		5 Mo.
Material	Pitcher	ABS resin
	Lid	ABS resin
Mineral Addition		None
Filtration Method		Ionic–Adsorption Micro–Filtration System ™ (Charcoal, Ionic–Adsorption, Natural Mineral)
Unfiltrable Element		Dissolved Iron, heavy metals (silver, copper etc.), salt water (seawater)

Filtration Capability

National Regulated Element※A	Filtration Capability	Filtration Volume	Remarks
Free Residual Chlorine	BDL	567L	% Equivalent to JIS S3201 test results
Cloud	85.60%		50% of JIS S3201 test results
Trihalomethane	99.80%		% equivalent to JIS S3201 test results ※B
Chloroform	98.52%		
Bromodichloromethane	99.80%		
Dibromochloropropane	98.08%		
Bromoform	99.80%		
tetrachloroethylene	>99.60%		
Trichloroethylene	99.20%		
1.1.1 Trichloroethane	99.76%		
CAT(Pesticide) ※C	N/A		
2-MIB(Mold Odor)※D	N/A		
Dissoluble Lead	97.50%		
Iron(particle)	98.20%		
Aluminum (neutral)	90.00%		

※1日3.78L使用時

※A "Household Goods Quality Labeling Act" designated 13 substances and Japan Water Purifier Association designated 2 substances
※B JIS designated test number
※C CAT (Pesticide), Simazine ※C7H12ClN5
※D 2-MIB(Mold Odor) ・・・2-Methylisoborneol

Check above contents and make corrections if necessary

●If you find any mistake or incorrect information, please revise it.
●JIS3201 test number could be the same test with what you asked JFRL
(Please check)

放射能分析結果報告書

No. NC1202-015G
平成24年2月22日

有限会社ヴォーテックス　　様

試料名	原水（水源2）
原水採取者	横山精一（浪江町議会議員） 永島貞治
採取場所	福島県双葉郡浪江町大堀地区
採取日	平成24年2月5日　午前10時
受取日時	平成24年2月13日

株式会社 環境管理研究所
計量証明事業登録（濃度）栃木県第 0180 号
〒320-0071 宇都宮市野沢町602番地9
TEL. 028-665-3153 FAX. 028-665-3154
環境計量士　　松島 輝幸

原水

貴依頼による濃度に係る分析の結果は下記の通りであることを報告します。

核種		単位	放射能濃度	検出下限濃度
放射性セシウム	Cs-134	Bq/kg	460	3
	Cs-137	Bq/kg	640	2.6
	Cs合計	Bq/kg	1100	-

【測定方法】
平成4年 文部科学省　ゲルマニウム半導体検出器によるγ線スペクトロメトリー
平成23年11月　廃棄物等の放射能調査・測定法研究会　廃棄物等の放射能調査・測定法暫定マニュアル
平成23年12月　環境省　放射能濃度等測定方法ガイドライン 第五部

【備　考】
気象条件：晴れ、気温0度、微風
不検出とは検出下限濃度未満を示します。

セシウム134・137テスト結果

放射能分析結果報告書

No. NC1202-022G
平成24年2月22日

有限会社ヴォーテックス　様

試料名	原水(水源2)のボトル1による処理水
原水採取者	横山精一（浪江町議会議員） 永島貞治
採取場所	福島県双葉郡浪江町大堀地区
採取日	平成24年2月5日　午前10時
受取日時	平成24年2月13日

株式会社 環境管理研究所
計量証明事業登録（濃度）栃木県第0180号
〒320-0071 宇都宮市野沢町602番地9
TEL. 028-665-3153 FAX. 028-665-3154
環境計量士　松島 輝幸

浄水後

貴依頼による濃度に係る分析の結果は下記の通りであることを報告します。

核種		単位	放射能濃度	検出下限濃度
放射性セシウム	Cs-134	Bq/kg	0.8	0.43
	Cs-137	Bq/kg	1.4	0.58
	Cs合計	Bq/kg	2.2	-

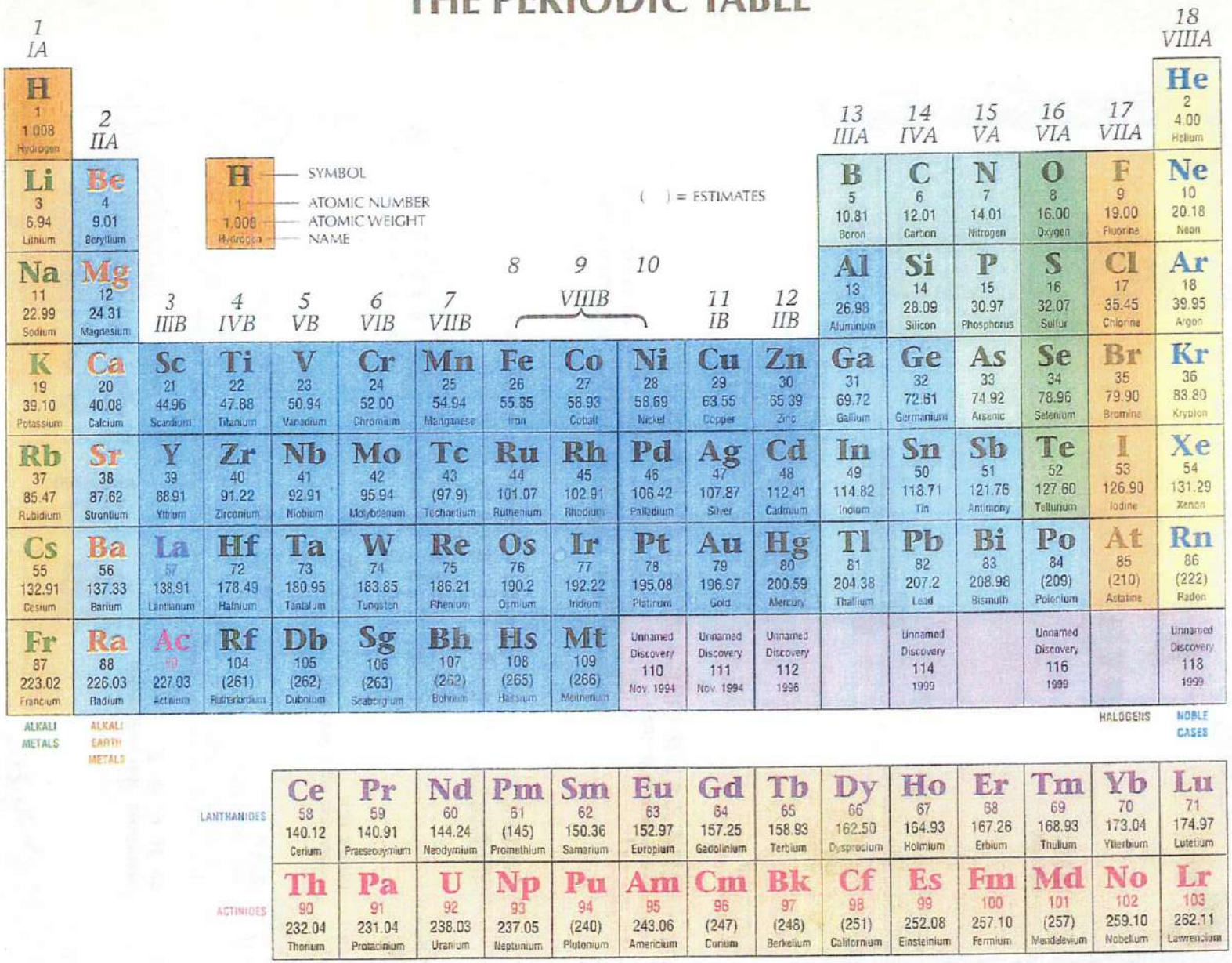
【測定方法】
平成4年 文部科学省　ゲルマニウム半導体検出器によるγ線スペクトロメトリー
平成23年11月　廃棄物等の放射能調査・測定法研究会　廃棄物等の放射能調査・測定法暫定マニュアル
平成23年12月　環境省　放射能濃度等測定方法ガイドライン 第五部

【備　考】
気象条件：晴れ、気温0度、微風
不検出とは検出下限濃度未満を示します。

除去率 ボトル1 Cs-134 99.83%

除去率 ボトル1 Cs-137 99.78%

RAD Test Results



商標登録証
(CERTIFICATE OF TRADEMARK REGISTRATION)

国際登録第１０１４４６１号
(INTERNATIONAL REGISTRATION NUMBER)

商標
(THE MARK)

Seychelle

指定商品又は指定役務並びに商品及び役務の区分
(LIST OF GOODS AND SERVICES)

11 Drinking water filtration and purification units, sold together with an empty water bottle, for personal use.

商標権者
(OWNER OF THE TRADEMARK RIGHT)

Seychelle Environmental Technologies, Inc.

33012 Calle Perfecto San Juan Capistrano, CA 92675 (United States of America)

国際登録日
(INTERNATIONAL REGISTRATION DATE)
17.08.2009

登録日
(REGISTRATION DATE)
平成２３年 １月 ７日 (January 7,2011)

この商標は、登録するものと確定し、商標原簿に登録されたことを証する。
(THIS IS TO CERTIFY THAT THE TRADEMARK IS REGISTERED ON THE REGISTER OF THE JAPAN PATENT OFFICE.)
平成２３年 １月 ７日 (January 7,2011)

特許庁長官
(COMMISSIONER, JAPAN PATENT OFFICE)
岩井良行

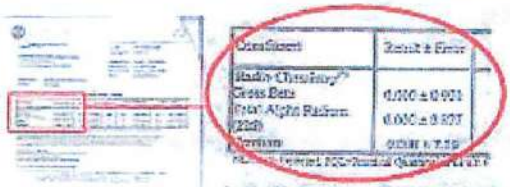
Seychelle water filtration

放射性物質を99.999%除去！

世界最高水準の浄水器 放射能除去ポット

放射能除去ポットは、米国セイシェル社の「イオン吸着マイクロフィルター™」に
放射性物質を除去する特殊技術を採用した新型フィルターを装備。
ご家庭でも安全な水を安心してお使いいただけます。

専門機関が証明した放射性物質の除去能力



セシウム137、ラジウム222、
ウラニウム、グロスβを
99.999%除去

米国の環境研究所FGL(Fruit Growers Laboratory, Inc.)の
セイシェル浄水フィルターによる「放射性物質の除去試験」
でも、その実力の高さが証明されました。

セシウム137を99%以上除去

京都大学原子炉実験所による、セイシェル浄水フィルターの
放射性セシウム除去能力テストでも、放射性セシウム137を
99%以上除去することが実証されました。

世界で認められた高い安全性と最高の品質

セイシェルのイオン吸着マイクロフィルターは、放射性物質も水質基準がある米国で、EPA(米国国立環境保護局)
ANSI(米国規格協会)、NSF(米国衛生財団)の規格基準をクリアし、世界16カ国の政府認証機関で認められています。
また、NATO(北大西洋条約機構)、GSA(米国連邦調達局)、国際赤十字などを通じ、紛争地域の特殊部隊への使用や
水環境が劣悪な地域の人道支援のために使われています。

NSF　EPA　ANSI　GSA U.S. General Services Administration

Seychelle water filtration

大容量

1Lのペットボトル約4本分もタンクに貯水できます。
継ぎ足す回数が減り、便利にお使いいただけます。

経済的

1日3L使っても、約6ヶ月間はフィルター交換が不要。
ペットボトルやレンタル水と比較しても断然お得です。

高性能

放射性物質はもちろん、JIS規格で定められた塩素や
農薬などの13物質のほかに重金属、バクテリアなど
多くの有害物質を99%除去します。

【販売元】　株式会社ビーウェル　大阪市浪速区日本橋3-1-20　【お問合せ】TEL 06-6648-7220

京都大学原子炉実験所によるセイシェル RAD フィルターを使用した
「多孔質吸着剤の吸着特性に関する研究」の結果報告書

受託試験結果報告書

京都大学原子炉実験所
大阪府泉南郡熊取町朝代西２丁目

平成 24 年 1 月 11 日に受託した研究題目について試験した結果は以下の通りです。

依頼者　㈱ビーウェル

1．試供品名　：　水筒型 RAD フィルター　ピッチャー型 RAD フィルター
2．研究題目　：　多孔質吸着剤の吸着特性に関する研究
3．試験方法及び結果　：

水筒型
容器に約 250mL のセシウム溶液を入れ、ストロー口から処理水を流出させ、約 20mL をポリ瓶に採取。

	Cs 濃度(mg/L)		除去率(%)
	原液中	処理水中	
フィルター1	0.989	0.001	99.9
フィルター2	0.860	<0.000005	>99.9

ピッチャー型
最初、純水で充分カートリッジに通水しておく。その後セシウム溶液約 1L を作成し、まず 500mL 通水させ、処理水は廃棄する。残りの 500mL を通水し、これを処理水サンプルとする。

	Cs 濃度(mg/L)		除去率(%)
	原液中	処理水中	
ピッチャー1	0.955	0.001	99.9
ピッチャー2	0.928	0.003	99.6

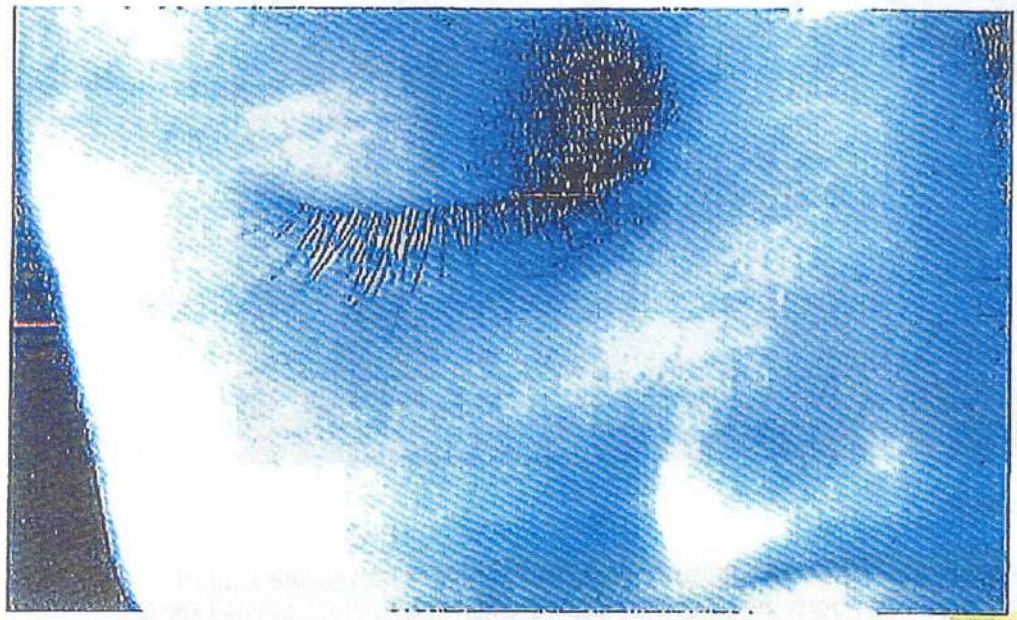
測定は Yokogawa 社製 ICP-MS(HP-4500)で行った。

測定者：福谷哲（京都大学原子炉実験所）

ボトル型、ピッチャー型とも放射性セシウム 137 の除去率は 99%以上の結果

4 April, 11:54 0

Fukushima radiation could cause thyroid cancer in children on US West Coast



Child. © Photo: SXC.hu

Children born in the US States of California, Hawaii, Alaska, Oregon and Washington in the period between March 17 and June 30 of 2011 when the Fukushima nuclear disaster happened, have a 28 percent risk of acquiring hyperthyroidism or thyroid cancer than those born before March or after December, 2011, according to researchers from the New York-based Radiation and Health Project.

Shortly after the tragedy I-131 concentration levels in California, Hawaii, Alaska, Oregon and Washington were registered up to 211 times above the normal level. At the same time, the number of congenital hypothyroid cases registered between March 17 and June 30 gave evidence to conclude that children born in the mentioned period have a 28 percent greater risk of acquiring hyperthyroidism than those born beyond this period.

Because of radiation exposure a child's body and brain can stop developing due to the affected thyroid, which cannot release growth hormones properly any longer.

The researchers draw a parallel between the Fukushima meltdown and the one happened in 1986 at the Chernobyl nuclear power plant. Higher absorption of I-131 radiation has led to an increased risk for thyroid cancer among victims of Chernobyl radiation, a 2011 study by the National Institutes of Health has claimed.

Voice of Russia, RT

Third of US West Coast Children Hit with Thyroid Problems Following Fukushima

By Anthony Gucciardi

Still think that the Fukushima nuclear meltdown of 2011 never affected the United States public? Young children born in the United States West Coast, right in the line of fire for radioactive isotopes, have been found to be 28 percent more likely to develop congenital hypothyroidism than infants born the year before the incident.

The study followed children born in California, Alaska, Washingto, Hawaii, and Oregon between 1 and 16 weeks after the horrific meltdown at Fukushima back in March 2011. Published in the *Open Journal of Pediatrics* by researchers affiliated with the Radiation and Public Health Project, the information further lends credence to previous documentation regarding the way in which radioactive fallout ended up on US soil.

The researchers explained how radioactive fallout affected the entirety of the US in varying degrees:

"Fukushima fallout appeared to affect all areas of the U.S., and was especially large in some, mostly in the western part of the nation," they wrote.

Fukushima's Effects on The US

The findings are likely no surprise to those who have been following the effects of Fukushima closely, as back in 2011 numerous reports surfaced regarding the ways in which Fukushima's radioactive waste had made its way to the US geography in a big

Third of US West Coast Children Hit with Thyroid Problems Following Fukushima

way. Despite Japanese officials downplaying the incident and its real devastating health consequences, even so much as to ignore the fact that Fukushima radiation was detected in Tokyo far beyond the evacuation zone, US scientists were quick to reveal their own measurements to the scientific community.

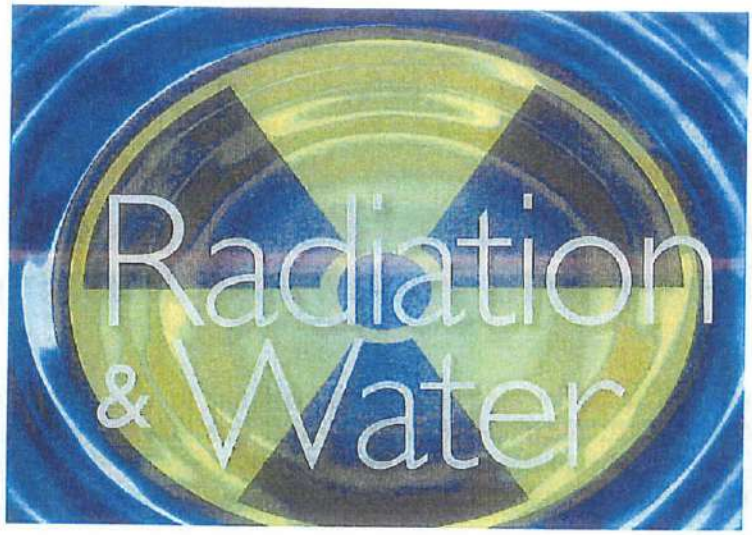
Read: How to Boost Your Thyroid Naturally

Even as far away as Boston, highly radioactive objects known as 'hot particles' were detected by 2 out of 3 monitoring stations.

Scientists from UC Berkley detailed even more concerning reports following the disaster, finding the highest cesium content in topsoil for each California location was consistent. The recordings were posted online along with the date of finding:

- Sacramento, CA Topsoil on Aug. 16, 2011: Total Cesium @ 2.737 Bq/kg
- Oakland, CA Topsoil on Sept. 8, 2011: Total Cesium @ 2.55 Bq/kg
- Alameda, CA Topsoil on Apr. 6, 2011: Total Cesium @ 2.52 Bq/kg
- San Diego, CA Topsoil on June 29, 2011: Total Cesium @ 2.51 Bq/kg
- Sonoma, CA Topsoil on Apr. 27, 2011: Total Cesium @ 2.252 Bq/kg

But the levels were nothing compared to what Marco Kaltofen, PE, of the Department of Civil & Environmental Engineering at Worcester Polytechnic Institute (WPI) recorded from his research. In his report presentation, entitled 'Radiation Exposure to the Population in Japan After the Earthquake', Kaltofen found samples on US soil that were 108 times greater than what UC Berkley researchers were reporting.



Risks, testing & treatment of radionuclides in drinking water

Radiological contamination of water is due to the presence of radionuclides, which are defined as atoms with unstable nuclei. In an effort to become more stable, a radionuclide emits energy in the form of rays or high-speed particles. This is called ionizing radiation because it displaces electrons, which creates ions. The three major types of ionizing radiation are alpha particles, beta particles and gamma rays.

One of the biggest differences between these types of radiation is level of penetration. Alpha particles, for example, are not able to penetrate human skin, beta particles can penetrate the top layer of skin, and gamma rays are easily able to penetrate several layers of human tissue. The size of each particle also plays a part.

Humans are exposed to radiation in a variety of ways, including from air, food, water and medicine. When people are exposed to radiation in the air, alpha particles are not problematic because they do not penetrate skin, and clothing can provide protection from beta particles, but not gamma rays. People are exposed every day to background levels of radiation in the air, mostly in the form of radon gas. Radon is an alpha particle, so it presents a low risk to skin; however, it does pose a health risk when inhaled because it can cause lung cancer.

Many building materials also emit radiation if they are made from natural rock that contains radioactive elements. For example, granite contains natural radiation and can cause low-level exposure. Grand Central Station in New York City contains so much granite that radiation levels there can be measured at levels higher than the standards for nuclear facilities.

Cosmic radiation comes from outside the Earth's atmosphere and contributes smaller amounts of radiation to the air. Exposure increases with altitude, so, for example, people who live in Denver are exposed to twice as much cosmic radiation as those who live at sea level. People also can be exposed to greater levels of cosmic radiation when flying, depending on frequency of flying, the length of the flight and flight altitude.

While the previously described exposures come from natural sources, medicine provides exposure to manmade radiation. Procedures that diagnose disease, including X-rays, CT scans and mammograms, all use radiation and result in low levels of exposure. Radiation also is used in the treatment of diseases such as cancer, and these treatments can contribute to higher levels of radiation exposure. The benefits of using radiation in medicine typically outweigh the risks associated with exposure.

Radionuclides in water and food can present a greater health risk because the radiation is actually ingested, meaning it can damage internal tissue. All plants and animals contain some level of radiation, mostly in the form of potassium-40 and radium-226. Foods that contain 3,000 picocuries per kg or more of potassium-40 include bananas, Brazil nuts, carrots, lima beans, white potatoes and red meat. Brazil nuts also contain a significant level of radium-226, so they are considered the most radioactive food.

Radionuclides also are present in water in varying amounts from natural sources within the Earth or due to releases from nuclear power plants or laboratories. Water from wells, for example, can be exposed to rock formations that can contribute radiologicals like uranium, radium and thorium. All water on Earth contains some level of radiation. In recent years, there has been increased concern over radiation levels in oceans following the Fukushima Daiichi nuclear disaster that occurred in Japan in 2011, as cesium-134 is now being found in the Pacific Ocean.

Radiation in Drinking Water

Although all water contains some level of radiation, the type and amount are dependent on a variety of factors. The most common naturally occurring alpha particles in rocks and soil are radium-226, uranium-238, radon-222, polonium-210 and lead-206. The primary beta particles typically are manmade, like strontium-90, but some are naturally occurring, like potassium-40. Some of the decay products from radon also emit beta particles. Higher levels of radiological contaminants can be found in groundwater near mining operations or areas where rock and soil have been disturbed.

Alpha particle emitters are more dangerous when inhaled or ingested, as they can expose human organs and tissues to radiation, causing biological damage that increases the risk of cancer. Beta particles can penetrate the skin and actually cause burns. They also can be detrimental when ingested, causing more damage because they are smaller and can penetrate tissues more deeply, resulting in more damage at the cellular level.

Public water supplies are tested and treated to meet U.S. Environmental Protection Agency (EPA) standards for radiologicals under the Safe Drinking Water Act. Homeowners who use private wells as their water sources may not know what level of radiation is present in their water, because most do not test for radiological contaminants. There are several reasons why people do not test their private wells — one of the foremost being that they do not even know they could be at risk. Some states require radon testing for real estate transactions and provide detailed information on the risks of radon; however, there is a lack of information about other radiological contaminants in general.

As water quality and treatment professionals, we have a responsibility to educate private well owners about the possible presence of radiologicals in their well water. One great source of information on radiological contaminants in groundwater is the U.S. Geological Survey (USGS), which has conducted several studies about radiologicals in groundwater and has a variety of resources available on its website (www.usgs.gov). State USGS educational centers also may offer more geographic-based information.

Knowing which radionuclides are present and at what levels is helpful in determining the best water treatment solution. Some treatment options, such as carbon, actually can adsorb radon and become a disposal concern if not changed out at the proper frequency, based on the level of radon. Those who do not change out carbon filters and tanks on a regular basis can increase not only their exposure to radiological contaminants, but also the exposure of workers who handle used filters and re-bed carbon tanks.

Ion exchange media also can be used to treat certain radiological contaminants. Cation exchange resin can remove radium and strontium, while anion resin can treat uranium. Removing radiologicals using ion exchange, however, creates waste streams that include spent resin, liquid brine and backwash that contain radiological contaminants. Disposal can become a concern, especially for spent resin that may

have been used for too long and presents radiological exposure to the homeowner, as well as for the water treatment professional replacing the resin. Treating water with no idea of radiological levels can lead to higher radiation exposure for the homeowner as well as technicians who work on the water treatment equipment.

Testing for Radiologicals

There are multiple radioactive isotopes, and it is not practical or economical to test for all of them. When concerned about radiological contaminants, there are some less expensive screening tests that can be done, rather than looking for specific isotopes. A screening test looks for alpha and beta particles, and is cost-effective. If levels are elevated, additional tests to determine which contaminants are present may be done, and these tests may be more expensive. Some common additional tests might include uranium, tritium, strontium-90, radium-226 and radium-228.

Knowing which radiologicals are present in water is essential to safe and proper treatment solutions. Knowing the potential contaminants in your area can be helpful when explaining radiologicals to customers and potential customers. There are many resources for information on the presence of radiological contaminants from EPA and USGS (see "Resources on Radiologicals," below). If radiologicals are known to be present in your territory, educate your clients about each treatment option and the impact each has on radiologicals if present. Testing should be recommended if no testing has been done previously so that treatment systems can be properly sized and safe replacement frequency can be determined. When radiologicals are concerned, know what you are dealing with so you can protect customers and employees.

The Washington Post

Morning Mix

For the first time, Fukushima recovery worker diagnosed with cancer

By Yuki Oda and Justin Wm. Moyer October 20

TOKYO — When meltdowns struck Japan's Fukushima Daiichi nuclear power plant in the wake of a devastating tsunami in 2011, more than 44,000 workers were deployed to take the facility safely offline. The job was messy: Millions of gallons of radioactive water had to be stored on site as the plant's operator, Tokyo Electric Power Co., known as Tepco, faced a clean-up some priced at $100 billion.

And for the first time, one of the workers involved in that cleanup has been diagnosed with cancer related to his job, as Japan's NHK reported.

[*For Tepco and Japan's Fukushima Daiichi nuclear plant, toxic water stymies cleanup*]

Japan's ministry of health, labor and welfare announced Tuesday that a recovery worker — a man unnamed in news reports — has been diagnosed with leukemia. The ministry confirmed the man's cancer was related to his work at Fukushima after he filed a worker's compensation claim.

Asahi Shimbun, a major Japanese daily newspaper, reported the man, from Kitakyushu, is now 41. He worked at the Daiichi plant near the No. 3 and No. 4 reactors from 2012 to 2013. He was diagnosed with acute myelogenous leukemia — a cancer of the blood and bone marrow, according to the Mayo Clinic — in January 2014. The word "acute" indicates "the disease's rapid progression," according to Mayo. The man quit after working at Fukushima Daiichi and developed leukemia, NHK reported.

"We are aware that a case of a cooperating company's worker who worked at [Fukushima Daiichi] was recognized for worker's compensation through reports," Satoshi Togawa, a Tepco spokesman, said in a statement. "As applying for worker's compensation is done by each employee or each employer, and recognizing this is handled by a labor standards supervision office, we are not in a position to make a comment. We offer our sincere sympathy for the cooperating company's worker."

On its Web site, Tepco extensively documents its efforts to shield recovery workers from radiation. The company differentiates between its employees and contractors — who far outnumber the company's workers at Fukushima. In August, for example, there were more than 9,000 contractors on site, but just about 1,000 employees. Contractors also received more than double the average dose of radiation employees received.

"Keeping firmly in mind that the safety of the workers and employees who are involved in the decommissioning operation is the highest priority," the Web site reads, "we are addressing the improvement of their work environment to increase efficiency through the reduction of exposure via decontamination, etc., and the reduction of their workload by simplifying protective equipment, and ensuring the thorough provision of facilities to support their physical and mental well being."

Tepco also provides monthly updates on recovery workers' radiation exposure to the ministry of health. The dose limit at the site is 1.71 mSv per month; in August, Tepco reported that the average worker was well below that, at .31 mSv. For comparison, people living in the United States receive about 6.2 mSv per year, most "from radon in the air, with smaller amounts from cosmic rays and the Earth itself," according to the Nuclear Regulatory Commission.

The Fukushima worker diagnosed with cancer experienced accumulation of exposed doses of 16 mSv, according to Asahi Shimbun.

Earlier this month, radiation associated with the Fukushima meltdowns was linked to thyroid cancer in children living near the area.

"This is more than expected and emerging faster than expected," lead author Toshihide Tsuda told the Associated Press. "This is 20 times to 50 times what would be normally expected."

This post has been updated.

Justin Wm. Moyer is a reporter for The Washington Post's Morning Mix. Follow him on Twitter: @justinwmmoyer.

Area of contamination: RADIOLOGICAL

Radionuclides

Contaminant	MCLG[1] (mg/L)[2]	MCL or TT[1] (mg/L)[2]	Potential Health Effects from Long-Term Exposure Above the MCL (unless specified as short-term)	Sources of Contaminant in Drinking Water
Alpha particles	none[7] ---------- zero	15 picocuries per Liter (pCi/L)	Increased risk of cancer	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation
Beta particles and photon emitters	none[7] ---------- zero	4 millirems per year	Increased risk of cancer	Decay of natural and man-made deposits of certain minerals that are radioactive and may emit forms of radiation known as photons and beta radiation
Radium 226 and Radium 228 (combined)	none[7] ---------- zero	5 pCi/L	Increased risk of cancer	Erosion of natural deposits
Uranium	zero	30 ug/L as of 12/08/03	Increased risk of cancer, kidney toxicity	Erosion of natural deposits

20 Signs That the West Coast is being Absolutely Fried with Nuclear Radiation from Fukushima

The map below comes from the Nuclear Emergency Tracking Center. It shows that radiation levels at radiation monitoring stations all over the country are elevated. As you will notice, this is particularly true along the west coast of the United States. Every single day, 300 tons of radioactive water from Fukushima enters the Pacific Ocean. That means that the total amount of radioactive material released from Fukushima is constantly increasing, and it is steadily building up in our food chain.

Ultimately, all of this nuclear radiation will outlive all of us by a very wide margin. They are saying that it could take up to 40 years to clean up the Fukushima disaster, and meanwhile countless innocent people will develop cancer and other health problems as a result of exposure to high levels of nuclear radiation. We are talking about a nuclear disaster that is absolutely unprecedented, and it is constantly getting worse. The following are 28 signs that the west coast of North America is being absolutely fried with nuclear radiation from Fukushima...

1. Polar bears, seals and walruses along the Alaska coastline are suffering from fur loss and open sores...

> Wildlife experts are studying whether fur loss and open sores detected in nine polar bears in recent weeks is widespread and related to similar incidents among seals and walruses.

> The bears were among 33 spotted near Barrow, Alaska, during routine survey work along the Arctic coastline. Tests showed they had "alopecia, or loss of fur, and other skin lesions," the U.S. Geological Survey said in a statement.

2. There is an epidemic of sea lion deaths along the California coastline...

> At island rookeries off the Southern California coast, 45 percent of the pups born in June have died, said Sharon Melin, a wildlife biologist for the National Marine Fisheries Service based in Seattle. Normally, less than one-third of the pups would die. It's gotten so bad in the past two weeks that the National Oceanic and Atmospheric Administration declared an "unusual mortality event."

3. Along the Pacific coast of Canada and the Alaska coastline, the population of sockeye salmon is at a historic low. Many are blaming Fukushima.

4. Something is causing fish all along the west coast of Canada to bleed from their gills, bellies and eyeballs.

5. A vast field of radioactive debris from Fukushima that is approximately the size of California has crossed the Pacific Ocean and is starting to collide with the west coast.

6. It is being projected that the radioactivity of coastal waters off the U.S. west coast could double over the next five to six years.

7. Experts have found very high levels of cesium-137 in plankton living in the waters of the Pacific Ocean between Hawaii and the west coast.

8. One test in California found that 15 out of 15 bluefin tuna were contaminated with radiation from Fukushima.

9. Back in 2012, the Vancouver Sun reported that cesium-137 was being found in a very high percentage of the fish that Japan was selling to Canada...

- 73 percent of mackerel tested
- 91 percent of the halibut
- 92 percent of the sardines
- 93 percent of the tuna and eel
- 94 percent of the cod and anchovies
- 100 percent of the carp, seaweed, shark and monkfish

10. Canadian authorities are finding extremely high levels of nuclear radiation in certain fish samples...

> Some fish samples tested to date have had very high levels of radiation: one sea bass sample collected in July, for example, had 1,000 becquerels per kilogram of cesium.

11. Some experts believe that we could see very high levels of cancer along the west coast just from people eating contaminated fish...

> "Look at what's going on now: They're dumping huge amounts of radioactivity into the ocean — no one expected that in 2011," Daniel Hirsch, a nuclear policy lecturer at the University of California-Santa Cruz, told *Global Security Newswire*. "We could have large numbers of cancer from ingestion of fish."

12. BBC News recently reported that radiation levels around Fukushima are "18 times higher" than previously believed.

13. An EU-funded study concluded that Fukushima released up to 210 quadrillion becquerels of cesium-137 into the atmosphere.

14. Atmospheric radiation from Fukushima reached the west coast of the United States within a few days back in 2011.

15. At this point, 300 tons of contaminated water is pouring into the Pacific Ocean from Fukushima every single day.

16. A senior researcher of marine chemistry at the Japan Meteorological Agency's Meteorological Research Institute says that "30 billion becquerels of radioactive cesium and 30 billion becquerels of radioactive strontium" are being released into the Pacific Ocean from Fukushima every single day.

17. According to Tepco, a total of somewhere between 20 trillion and 40 trillion becquerels of radioactive tritium have gotten into the Pacific Ocean since the Fukushima disaster first began.

18. According to a professor at Tokyo University, 3 gigabecquerels of cesium-137 are flowing into the port at Fukushima Daiichi every single day.

19. It has been estimated that up to 100 times as much nuclear radiation has been released into the ocean from Fukushima than was released during the entire Chernobyl disaster.

20. One recent study concluded that a very large plume of cesium-137 from the Fukushima disaster will start flowing into U.S. coastal waters early next year...

The Washington Post

WorldViews

Japanese nuclear plant just recorded an astronomical radiation level. Should we be worried?

By Anna Fifield and Yuki Oda February 8 at 2:08 AM

A worker takes notes in front of storage tanks for radioactive water at Tokyo Electric Power Co's (TEPCO) tsunami-crippled Fukushima Daiichi nuclear power plant in Japan. (Reuters/Toru Hanai)

TOKYO — The utility company that operated the Fukushima Daiichi nuclear plant in Japan — the one that went into triple meltdown after the enormous 2011 earthquake and tsunami — has released some jaw-dropping figures.

The radiation level in the containment vessel of reactor 2 has reached as high as 530 sieverts per hour, Tokyo Electric Power Co. — or Tepco, as it's known — said last week. This far exceeds the previous high of 73 sieverts per hour recorded at the reactor following the March 2011 disaster.

That was the world's worst nuclear disaster since the one at Chernobyl, in Ukraine, in 1986. Almost 16,000 people were killed along Japan's northeastern coast in the tsunami, and 160,000 more lost their homes and livelihoods. The cleanup is taking much longer than expected.

At this level of radioactivity, a person could die from the briefest of exposures.

Tepco recorded the radiation near the reactor core, suggesting that some melted fuel had escaped, using a long, remote-controlled camera and radiation measurement device. It was the first time this kind of device has been able to get into this part of the reactor. There it found a three-foot-wide hole in a metal grate in the reactor's primary containment vessel.

So, how dangerous is this?

At this level of radiation, a robot would be able to operate for less than two hours before it was destroyed, Tepco said.

And Japan's National Institute of Radiological Sciences said medical professionals had never even thought about encountering this level of radiation in their work.

According to the Kyodo news agency, the institute estimates that exposure to one sievert of radiation could lead to infertility, loss of hair and cataracts, while four sieverts would kill half the people exposed to it.

This measuring device hasn't even gone into reactors 1 and 3 yet — that's still in the works.

So should the people who live in Japan, who live on the Pacific basin be freaking out? Yes!!

Not yet, some analysts say.

Although the radiation level is "astoundingly high," says Azby Brown of Safecast, a citizen science organization that monitors radiation levels, it doesn't necessarily signify any alarming change in radiation levels at Fukushima. It's simply the first time they have been measured that far inside the reactor.

Here's what Brown wrote on Safecast's website:

It must be stressed that radiation in this area has not been measured before, and it was expected to be extremely high. While 530 Sv/hr is the highest measured so far at Fukushima Daiichi, it does not mean that levels there are rising, but that a previously unmeasurable high-radiation area has finally been measured. Similar remote investigations are being planned for Daiichi Units 1 and 3. We should not be surprised if even higher radiation levels are found there, but only actual measurements will tell.

Hiroshi Miyano, nuclear expert and visiting professor at Hosei University, also warned against overreacting. He said the radiation reading might not be particularly reliable since it was only an estimation based on the image analysis. (Tepco said there was a margin of error of 30 percent.)

"It's not something new to worry about," he said, although he added that it underscored how difficult the next steps would be.

But some think there is cause for concern.

Fumiya Tanabe, nuclear safety expert and former chief research scientist at the Japan Atomic Energy Research Institute, said while experts expected the radiation reading inside the Daiichi reactors to be high, it was still "shocking" to learn how high it was six years on.

"It will be very difficult to operate robots in there for a long time to come, and to remove the melted fuel. So the finding might greatly affect the decommissioning time schedule," he said.

Tepco had been hoping to start taking out the fuel out in 2021.

Could the radiation level be even higher?

Possibly. The 530 sievert reading was recorded some distance from the melted fuel, so in reality it could be 10 times higher than recorded, said Hideyuki Ban, co-director of Citizens' Nuclear Information Center.

He agreed with Tanabe, saying that the findings underscore how difficult the decommissioning process will be.

"It definitely shows the path towards decommissioning will be very difficult, and the time frame to start taking out the fuel in 2021 will most likely be delayed as more investigations will be necessary," Ban said.

Still, he cautioned against overreacting, saying, like Brown, that Tepco had simply not been able to measure this close to the fuel before.

So what does this news portend?

Tanabe said that the level of the reading should give pause to proponents of nuclear power in Japan, including Prime Minister Shinzo Abe, who has been pushing to restart reactors shut down after the 2011 disaster.

"It's unbelievable that anyone would want to restart nuclear plants when Japan hasn't learned how and why the Fukushima Daiichi accident happened, or learned lessons from it," he said.

Indeed, Ai Kashiwagi, an energy campaigner at Greenpeace Japan, said the findings showed how little the government and Tepco knew about what was happening inside the reaction.

"The prime minister said everything was under control and has been pushing to restart nuclear plants, but no one knew the actual state of the plant and more serious facts could come out in the future," she said. "It's important to keep an eye on radiation-monitoring data and how Tepco's investigations go."