

# RADIOCHEMISTRY

Matrices in soil, vegetation, air filters, and water for monitoring of radiochemicals.

## Radiochemistry PT Schedule 2020

	Scheme #	Opens	Closes
Q	RAD 120	Jan 6	Feb 20
Q	RAD 121	Apr 6	May 21
Q	RAD 122	Jul 6	Aug 20
Q	RAD 123	Oct 2	Nov 16

2021

	Scheme #	Opens	Closes
Q	RAD 124	Jan 11	Feb 25
Q	RAD 125	Apr 5	May 20
Q	RAD 126	Jul 12	Aug 26
Q	RAD 127	Oct 8	Nov 22

## MRAD PT Schedule 2020

Scheme #	Opens	Closes
MRAD 32	Mar 16	May 15
MRAD 33	Sep 14	Nov 13

2021

Scheme #	Opens	Closes
MRAD 34	Mar 22	May 21
MRAD 35	Sep 20	Nov 19

2 schemes per year – open for 60 days

Schedules are subject to change – see Waters ERA's website at [www.eraqc.com](http://www.eraqc.com)

# Contents

**CRM:** A reference material characterized by a metrologically valid procedure for one or more specified properties, accompanied by a reference material certificate that provides the value of the specified property, its associated uncertainty, and a statement of metrological traceability.

A complete listing of ERA's CRMs can be found on our Scope of Accreditation for general requirements for competence of reference material producers available at [www.eraqc.com/AboutERA/Accreditations](http://www.eraqc.com/AboutERA/Accreditations).

**PT:** A Proficiency Test (PT) is an analysis of what is often referred to as a blind sample or a sample with unknown concentrations of analytes for the purpose of evaluating a laboratory's analytical performance.

**QR:** Similar to a Proficiency Test, a QuiK Response (QR) is a sample with unknown concentrations. However, unlike a scheduled PT, QR is on-demand and available at any time. Plus, your results are returned within two business days. QuiK Response can be used as a bilateral PT as referenced in the IUPAC/CITAC guide: Selection and use of PT schemes for a limited number of participants – chemical analytical labs.

**RM:** A material, sufficiently homogeneous and stable with respect to one or more specified properties, which has been established to be fit for its intended use in a measurement process.

Description	CRM/ RM	PT	QR	Page
Air Filter Gross Alpha/Beta	607	801 *	607QR	62
Air Filter Radionuclides	606	800 *	606QR	62
Gamma Emitters	758	808 Q	758QR	60
Gross Alpha/Beta	759	809 Q	759QR	60
Iodine-131	750	810 Q	750QR	60
Naturals	751	811 Q	751QR	60
Radchem Lab Control & Matrix Spiking Solutions (LCS/MS)				61
Soil Radionuclides	608	802 *	608QR	62
Strontium-89/90	757	807 Q	757QR	60
Tritium	752	812 Q	752QR	60
Vegetation Radionuclides	609	803 *	609QR	62
Water Gross Alpha/Beta	615	805 *	615QR	63
Water Radionuclides	617	804 *	617QR	63
Water Tritium	616	806 *	616QR	63

Q All Waters ERA WS Radchem PTs open quarterly. Quarterly months are January, April, July, and October.

\* All Waters ERA MRAD PTs open in March and September.

# WS Radchem

All Radchem standards are provided as convenient, easy-to-prepare concentrates except for tritium, which is provided as a whole-volume sample.

## Gamma Emitters

CRM Cat. #758	PT Cat. #808	Q	QR Cat. #758QR
------------------	-----------------	---	-------------------

One 12 mL screw-top vial yields up to 2 liters after dilution.

Barium-133.....	10-100 pCi/L
Cesium-134.....	10-100 pCi/L
Cesium-137.....	20-240 pCi/L
Cobalt-60.....	10-120 pCi/L
Zinc-65.....	30-360 pCi/L

## Gross Alpha/Beta

CRM Cat. #759	PT Cat. #809	Q	QR Cat. #759QR
------------------	-----------------	---	-------------------

One 12 mL screw-top vial yields up to 1 liter after dilution.

Gross alpha as thorium-230.....	7-75 pCi/L
Gross beta as cesium-137.....	8-75 pCi/L

## Naturals

CRM Cat. #751	PT Cat. #811	Q	QR Cat. #751QR
------------------	-----------------	---	-------------------

One 12 mL screw-top vial yields up to 8 liters after dilution.

Radium-226.....	1-20 pCi/L
Radium-228.....	2-20 pCi/L
Uranium (Nat).....	2-70 pCi/L
Uranium (Nat) mass.....	3-104 µg/L

## Tritium

CRM Cat. #752	PT Cat. #812	Q	QR Cat. #752QR
------------------	-----------------	---	-------------------

One 250 mL whole-volume bottle is ready to analyze as received. Includes tritium at 1000-24000 pCi/L.

## Iodine-131

CRM Cat. #750	PT Cat. #810	Q	QR Cat. #750QR
------------------	-----------------	---	-------------------

One 12 mL screw-top vial yields up to 2 liters after dilution. Contains iodine-131 within the range 3-30 pCi/L. Due to short half-life, CRMs, PTs, and QRs are available only during January, April, July, and October.

## Strontium-89/90

CRM Cat. #757	PT Cat. #807	Q	QR Cat. #757QR
------------------	-----------------	---	-------------------

One 12 mL screw-top vial yields up to 2 liters after dilution.

Strontium-89.....	10-70 pCi/L
Strontium-90.....	3-45 pCi/L



CRM - Certified Reference Material  
PT - Proficiency Testing  
QR - Quik Response

Q All Waters ERA WS Radchem PTs open quarterly. Quarterly months are January, April, July, and October.

# Radchem Lab Control & Matrix Spiking (LCS/MS)

Radiochemistry LCS/MS standards are prepared according to your specifications at activity levels that enable you to directly fortify your batch laboratory control and matrix spike QC samples. These single-use spiking standards are verified, conveniently packaged in 2–20 mL glass vials, and very economical.

## The direct benefits:

- Easy-to-use – LCS/MS spiking standards are ready-to-use – no dilutions are required.
- Reliable and consistent – Eliminate the possibility of errors from the contamination or repeated multiple dilutions of your primary stock standards.
- Independently verified – LCS/MS standards are analytically verified and traced to NIST SRMs where available.
- Save money – You no longer need to pay for microcuries of activity when you only need picocuries. You also eliminate the cost of activity loss for short-lived isotopes.
- Reduce analytical cost – You no longer need to spend valuable instrument time re-verifying standard stability. Order what you expect to use on a quarterly or annual basis – we'll do the verification.

## The process is easy:

1. Select from any of the following carrier-free, single radionuclide standards.
2. Choose an activity up to the maximum listed in the table below.
3. Choose a convenient volume: 2 to 20 mL glass vials available.
4. For labs that analyze samples with more elevated activities, call for standard availability and pricing.

## Single Radionuclide Spiking Standards

Cat. #	Radionuclide	Maximum Activity/Vial
AM241	Americium-241	40 pCi
BA133	Barium-133	400 pCi
CS134	Cesium-134	200 pCi
CS137	Cesium-137	400 pCi
CO60	Cobalt-60	200 pCi
GAB	Gross alpha/beta	30/40 pCi
GA	Gross alpha (Th-230)	30 pCi
GB	Gross beta (Cs-137)	40 pCi
PU238	Plutonium-238	40 pCi
PU239	Plutonium-239	40 pCi
RA226	Radium-226	20 pCi
RA228	Radium-228	Call
SR89	Strontium-89	200 pCi
SR90	Strontium-90	40 pCi
H3	Tritium	2000 pCi
UNAT	Uranium, natural	40 pCi
ZN65	Zinc-65	600 pCi

## MRAD Solids

### Soil Radionuclides

RM Cat. #608	PT Cat. #802	QR Cat. #608QR
-----------------	-----------------	-------------------

One 500 cc standard includes the alpha, beta, and gamma emitting radionuclides listed below.

Actinium-228.....	500-5000 pCi/kg
Americium-241.....	.50-2000 pCi/kg
Bismuth-212.....	500-5000 pCi/kg
Bismuth-214.....	500-5000 pCi/kg
Cesium-134.....	1000-10,000 pCi/kg
Cesium-137.....	1000-10,000 pCi/kg
Cobalt-60.....	1000-10,000 pCi/kg
Lead-212.....	500-5000 pCi/kg
Lead-214.....	500-5000 pCi/kg
Plutonium-238.....	.50-2000 pCi/kg
Plutonium-239.....	.50-2000 pCi/kg
Potassium-40.....	5000-50,000 pCi/kg
Strontium-90.....	500-10,000 pCi/kg
Thorium-234.....	500-5000 pCi/kg
Uranium-234.....	500-5000 pCi/kg
Uranium-238.....	500-5000 pCi/kg
Uranium (Nat).....	1000-10,000 pCi/kg
Uranium (Nat) mass.....	1500-15,000 µg/kg
Zinc-65.....	1000-10,000 pCi/kg

### Vegetation Radionuclides

RM Cat. #609	PT Cat. #803	QR Cat. #609QR
-----------------	-----------------	-------------------

One 500 cc standard includes the alpha, beta, and gamma emitting radionuclides listed below.

Americium-241.....	50-5000 pCi/kg
Cesium-134.....	300-3000 pCi/kg
Cesium-137.....	300-3000 pCi/kg
Cobalt-60.....	300-3000 pCi/kg
Curium-244.....	50-5000 pCi/kg
Plutonium-238.....	50-5000 pCi/kg
Plutonium-239.....	50-5000 pCi/kg
Potassium-40.....	5000-50,000 pCi/kg
Strontium-90.....	500-10,000 pCi/kg
Uranium-234.....	50-5000 pCi/kg
Uranium-238.....	50-5000 pCi/kg
Uranium (Nat).....	100-10,000 pCi/kg
Uranium (Nat) mass.....	150-15,000 µg/kg
Zinc-65.....	300-3000 pCi/kg

**Chad Lane**  
Chemist/RSO

Years with Waters ERA: 11



## MRAD Air Filter

### Air Filter Radionuclides

RM Cat. #606	PT Cat. #800	QR Cat. #606QR
-----------------	-----------------	-------------------

One 47 mm diameter glass fiber filter contains the alpha, beta, and gamma emitting radionuclides listed below.

Americium-241.....	2-80 pCi/filter
Cesium-134.....	50-1500 pCi/filter
Cesium-137.....	50-1500 pCi/filter
Cobalt-60.....	50-1500 pCi/filter
Iron-55.....	50-1500 pCi/filter
Plutonium-238.....	2-80 pCi/filter
Plutonium-239.....	2-80 pCi/filter
Strontium-90.....	5-200 pCi/filter
Uranium-234.....	2-80 pCi/filter
Uranium-238.....	2-80 pCi/filter
Uranium (Nat).....	4-160 pCi/filter
Uranium (Nat) mass.....	6-240 µg/filter
Zinc-65.....	50-1500 pCi/filter

### Air Filter Gross Alpha/Beta

RM Cat. #607	PT Cat. #801	QR Cat. #607QR
-----------------	-----------------	-------------------

One acrylic treated 47 mm diameter glass fiber filter contains the radionuclides listed below.

Gross alpha as thorium-230.....	5-100 pCi/filter
Gross beta as cesium-137.....	5-100 pCi/filter


**Leo Muñoz**

Shipping Team Lead

Years with Waters ERA: 11




## Water Radionuclides

<b>RM</b> Cat. #617	<b>PT</b> Cat. #804		<b>QR</b> Cat. #617QR
------------------------	------------------------	---	--------------------------

One 12 mL screw-top vial yields up to 2 liters after dilution. Includes the alpha, beta, and gamma emitting radionuclides listed below.

Americium-241.....	10-200 pCi/L
Cesium-134.....	100-3000 pCi/L
Cesium-137.....	100-3000 pCi/L
Cobalt-60.....	100-3000 pCi/L
Iron-55.....	100-3000 pCi/L
Plutonium-238.....	10-200 pCi/L
Plutonium-239.....	10-200 pCi/L
Strontium-90.....	50-1000 pCi/L
Uranium-234.....	10-200 pCi/L
Uranium-238.....	10-200 pCi/L
Uranium (Nat).....	20-400 pCi/L
Uranium (Nat) mass.....	30-600 µg/L
Zinc-65.....	100-3000 pCi/L

## Water Gross Alpha/Beta

<b>RM</b> Cat. #615	<b>PT</b> Cat. #805		<b>QR</b> Cat. #615QR
------------------------	------------------------	---	--------------------------

One 12 mL screw-top vial yields up to 2 liters after dilution. Includes the radionuclides below.

Gross alpha as thorium-230.....	10-200 pCi/L
Gross beta as cesium-137.....	10-200 pCi/L

## Water Tritium

<b>RM</b> Cat. #616	<b>PT</b> Cat. #806		<b>QR</b> Cat. #616QR
------------------------	------------------------	---	--------------------------

One 125 mL whole-volume bottle is ready to analyze as received.

Tritium.....	3000-30,000 pCi/L
--------------	-------------------



CRM - Certified Reference Material  
 PT - Proficiency Testing  
 QR - QuiK Response

 All Waters ERA MRAD PTs open in March and September.