

[72 FR 389, Jan. 4, 2007, as amended at 77 FR 26096, May 2, 2012; 81 FR 92684, Dec. 20, 2016]

Subpart E—Special Regulations, Including Monitoring Regulations and Prohibition on Lead Use

§ 141.40 Monitoring requirements for unregulated contaminants.

(a) *General applicability.* This section specifies the monitoring and quality control requirements that must be followed if you own or operate a public water system (PWS) that is subject to the Unregulated Contaminant Monitoring Regulation (UCMR), as specified in paragraphs (a)(1) and (2) of this section. In addition, this section specifies the UCMR requirements for State and Tribal participation. For the purposes of this section, PWS “population served,” “State,” “PWS Official,” “PWS Technical Contact,” and “finished water” apply as defined in § 141.35(a). The determination of whether a PWS is required to monitor under this rule is based on the type of system (e.g., community water system, non-transient non-community water system, etc.), and its retail population, as indicated by SDWIS/Fed on December 31, 2015.

(1) *Applicability to transient non-community systems.* If you own or operate a transient non-community water system, you are not subject to monitoring requirements in this section.

(2) *Applicability to community water systems and non-transient non-community water systems—(i) Large systems.* If you own or operate a retail PWS (other than a transient non-community system) that serves more than 10,000 people, you must monitor according to the specifications in this paragraph (a)(2)(i). If you believe that your applicability status is different than EPA has specified in the notification letter that you received, or if you are subject to UCMR requirements and you have not been notified by either EPA or your State, you must report to EPA, as specified in § 141.35(b)(2) or (c)(4).

(A) *Assessment monitoring.* You must monitor for the contaminants on List 1, per Table 1, UCMR Contaminant List, in paragraph (a)(3) of this section. If you serve a retail population of more

than 10,000 people, you are required to perform this monitoring regardless of whether you have been notified by the State or EPA.

(B) *Screening Survey.* You must monitor for the unregulated contaminants on List 2 (Screening Survey) of Table 1, as specified in paragraph (a)(3) of this section, if your system serves 10,001 to 100,000 people and you are notified by EPA or your State that you are part of the State Monitoring Plan for Screening Survey testing. If your system serves more than 100,000 people, you are required to conduct this Screening Survey testing regardless of whether you have been notified by the State or EPA.

(C) *Pre-Screen Testing.* You must monitor for the unregulated contaminants on List 3 of Table 1, in paragraph (a)(3) of this section, if notified by your State or EPA that you are part of the Pre-Screen Testing.

(ii) *Small systems.* Small PWSs, as defined in this paragraph, will not be selected to monitor for any more than one of the three monitoring lists provided in Table 1, UCMR Contaminant List, in paragraph (a)(3) of this section. EPA will provide sample containers, provide pre-paid air bills for shipping the sampling materials, conduct the laboratory analysis, and report and review monitoring results for all small systems selected to conduct monitoring under paragraphs (a)(2)(ii)(A) through (C) of this section. If you own or operate a PWS that serves 10,000 or fewer people you must monitor as follows:

(A) *Assessment monitoring.* You must monitor for the contaminants on List 1 per Table 1, in paragraph (a)(3) of this section, if you are notified by your State or EPA that you are part of the State Monitoring Plan for Assessment Monitoring.

(B) *Screening Survey.* You must monitor for the unregulated contaminants on List 2 of Table 1, in paragraph (a)(3) of this section, if notified by your State or EPA that you are part of the State Monitoring Plan for the Screening Survey.

(C) *Pre-screen testing.* You must monitor for the contaminants on List 3 of Table 1, in paragraph (a)(3) of this section if you are notified by your State or EPA that you are part of the State

Monitoring Plan for Pre-Screen Testing.

(3) *Analytes to be monitored.* Lists 1, 2, and 3 contaminants are provided in the following table:

TABLE 1—UCMR CONTAMINANT LIST

1—Contaminant	2—CAS Registry No.	3—Analytical methods ^a	4—Minimum reporting level ^b	5—Sampling location ^c	6—Period during which monitoring to be completed
List 1: Assessment Monitoring Cyanotoxin Chemical Contaminants					
"total microcystin"	N/A	EPA 546	0.3 µg/L	EPTDS	3/1/2018–11/30/2020.
anatoxin-a	64285-06-9.	EPA 545	0.03 µg/L	EPTDS	3/1/2018–11/30/2020.
cylindrospermopsin	143545-90-8.	EPA 545	0.09 µg/L	EPTDS	3/1/2018–11/30/2020.
microcystin-LA	96180-79-9.	EPA 544	0.008 µg/L	EPTDS	3/1/2018–11/30/2020.
microcystin-LF	154037-70-4.	EPA 544	0.006 µg/L	EPTDS	3/1/2018–11/30/2020.
microcystin-LR	101043-37-2.	EPA 544	0.02 µg/L	EPTDS	3/1/2018–11/30/2020.
microcystin-LY	123304-10-9.	EPA 544	0.009 µg/L	EPTDS	3/1/2018–11/30/2020.
microcystin-RR	111755-37-4.	EPA 544	0.006 µg/L	EPTDS	3/1/2018–11/30/2020.
microcystin-YR	101064-48-6.	EPA 544	0.02 µg/L	EPTDS	3/1/2018–11/30/2020.
nodularin	118399-22-7.	EPA 544	0.005 µg/L	EPTDS	3/1/2018–11/30/2020.
List 1: Assessment Monitoring Additional Chemical Contaminants					
Metals					
germanium	7440-56-4	EPA 200.8, ASTM D5673-10, SM 3125.	0.3 µg/L	EPTDS	1/1/2018–12/31/2020.
manganese	7439-96-5	EPA 200.8, ASTM D5673-10, SM 3125.	0.4 µg/L	EPTDS	1/1/2018–12/31/2020.
Pesticides and a Pesticide Manufacturing Byproduct					
alpha-hexachlorocyclohexane.	319-84-6	EPA 525.3	0.01 µg/L	EPTDS	1/1/2018–12/31/2020.
chlorpyrifos	2921-88-2	EPA 525.3	0.03 µg/L	EPTDS	1/1/2018–12/31/2020.
dimethipin	55290-64-7.	EPA 525.3	0.2 µg/L	EPTDS	1/1/2018–12/31/2020.
ethoprop	13194-48-4.	EPA 525.3	0.03 µg/L	EPTDS	1/1/2018–12/31/2020.
oxyfluorfen	42874-03-3.	EPA 525.3	0.05 µg/L	EPTDS	1/1/2018–12/31/2020.
profenofos	41198-08-7.	EPA 525.3	0.3 µg/L	EPTDS	1/1/2018–12/31/2020.
tebuconazole	107534-96-3.	EPA 525.3	0.2 µg/L	EPTDS	1/1/2018–12/31/2020.
total permethrin (cis- & trans-).	52645-53-1.	EPA 525.3	0.04 µg/L	EPTDS	1/1/2018–12/31/2020.
tribufos	78-48-8 ...	EPA 525.3	0.07 µg/L	EPTDS	1/1/2018–12/31/2020.
Brominated Haloacetic Acid (HAA) Groups^{d e}					
HAA5	N/A	EPA 552.3 or EPA 557.	N/A	D/DBPR HAA location.	1/1/2018–12/31/2020.
HAA6Br	N/A	EPA 552.3 or EPA 557.	N/A	D/DBPR HAA location.	1/1/2018–12/31/2020.
HAA9	N/A	EPA 552.3 or EPA 557.	N/A	D/DBPR HAA location.	1/1/2018–12/31/2020.

TABLE 1—UCMR CONTAMINANT LIST—Continued

1—Contaminant	2—CAS Registry No.	3—Analytical methods ^a	4—Minimum reporting level ^b	5—Sampling location ^c	6—Period during which monitoring to be completed
Alcohols					
1-butanol	71-36-3 ...	EPA 541	2.0 µg/L	EPTDS	1/1/2018–12/31/2020.
2-methoxyethanol	109-86-4	EPA 541	0.4 µg/L	EPTDS	1/1/2018–12/31/2020.
2-propen-1-ol	107-18-6	EPA 541	0.5 µg/L	EPTDS	1/1/2018–12/31/2020.
Other Semivolatile Chemicals					
butylated hydroxanisole.	25013-16-5.	EPA 530	0.03 µg/L	EPTDS	1/1/2018–12/31/2020.
o-toluidine	95-53-4 ...	EPA 530	0.007 µg/L	EPTDS	1/1/2018–12/31/2020.
quinoline	91-22-5 ...	EPA 530	0.02 µg/L	EPTDS	1/1/2018–12/31/2020.
List 2: Screening Survey					
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved.
List 3: Pre-Screen Testing					
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved.

Column headings are:
 1—Contaminant: The name of the contaminant to be analyzed.
 2—CAS (Chemical Abstract Service) Registry Number or Identification Number: A unique number identifying the chemical contaminants.
 3—Analytical Methods: Method numbers identifying the methods that must be used to test the contaminants.
 4—Minimum Reporting Level (MRL): The value and unit of measure at or above which the concentration of the contaminant must be measured using the approved analytical methods. If EPA determines, after the first six months of monitoring that the specified MRLs result in excessive resampling, EPA will establish alternate MRLs and will notify affected PWSs and laboratories of the new MRLs. N/A is defined as non-applicable.
 5—Sampling Location: The locations within a PWS at which samples must be collected.
 6—Period During Which Monitoring to be Completed: The time period during which the sampling and testing will occur for the indicated contaminant.
^a The analytical procedures shall be performed in accordance with the documents associated with each method, see paragraph (c) of this section.
^b The MRL is the minimum concentration of each analyte that must be reported to EPA.
^c With the exception of HAA monitoring, sampling must occur at entry points to the distribution system (EPTDSs), after treatment is applied, that represent each non-emergency water source in routine use over the 12-month period of monitoring. Systems that purchase water with multiple connections from the same wholesaler may select one representative connection from that wholesaler. This EPTDS sampling location must be representative of the highest annual volume connections. If the connection selected as the representative EPTDS is not available for sampling, an alternate highest volume representative connection must be sampled. See 40 CFR 141.35(c)(3) for an explanation of the requirements related to the use of representative GW EPTDSs. Sampling for UCMR 4 HAA groups must be conducted at the Disinfectants and Disinfection Byproduct Rule (D/DBPR) sampling locations (40 CFR 141.622).
^d UCMR 4 HAA monitoring applies only to those PWSs that are subject to D/DBPR HAA5 monitoring requirements.
^e PWSs that purchase 100 percent of their water ("consecutive systems") are not required to collect UCMR 4 source water samples for TOC or bromide analyses. Sampling for TOC and bromide must otherwise occur at source water influent locations representing untreated water entering the water treatment plant (*i.e.*, a location prior to any treatment). SW and GWUDI systems subject to the D/DBPR TOC monitoring must use their D/DBPR TOC source water sampling site(s) from 40 CFR 141.132 for UCMR 4 TOC and bromide samples. SW and GWUDI systems that are not subject to D/DBPR TOC monitoring will use their Long Term 2 Enhance Surface Water Treatment Rule (LT2) source water sampling site(s) (40 CFR 141.703) for UCMR 4 TOC and bromide samples. Ground water systems that are subject to the D/DBPRs, and therefore subject to UCMR 4 HAA monitoring, will take TOC and bromide samples at their influents entering their treatment train. TOC and bromide must be collected at the same time as HAA samples. These indicator samples must be collected at a single source water influent using methods already approved for compliance monitoring. TOC methods include: SM 5310 B, SM 5310 C, SM 5310 D (21st edition), or SM 5310 B-00, SM 5310 C-00, SM 5310 D-00 (SM Online), EPA Method 415.3 (Rev. 1.1 or 1.2). Bromide methods include: EPA Methods 300.0 (Rev. 2.1), 300.1 (Rev. 1.0), 317.0 (Rev. 2.0), 326.0 (Rev. 1.0) or ASTM D 6581-12. The MRLs for the individual HAAs are discussed in paragraph (a)(5)(v) of this section.

(4) *Sampling requirements*—(i) *Large systems*. If you serve more than 10,000 people and meet the UCMR applicability criteria specified in paragraph (a)(2)(i) of this section, you must comply with the requirements specified in paragraphs (a)(4)(i)(A) through (I) of this section. Your samples must be collected according to the schedule that you are assigned by EPA or your State, or the schedule that you revised using EPA’s electronic data reporting system

on or before December 31, 2017. Your schedule must follow both the timing and frequency of monitoring specified in Tables 1 and 2 of this section.

(A) *Monitoring period*. You must collect the samples in one continuous 12-month period for List 1 Assessment Monitoring, and, if applicable, for List 2 Screening Survey, or List 3 Pre-Screen Testing, during the time frame indicated in column 6 of Table 1, in paragraph (a)(3) of this section. EPA or

your State will specify the month(s) and year(s) in which your monitoring must occur. As specified in §141.35(c)(5), you must contact EPA if you believe you cannot conduct monitoring according to your schedule.

(B) *Frequency.* You must collect the samples within the timeframe and according to the frequency specified by contaminant type and water source type for each sampling location, as

specified in Table 2, in this paragraph. For the second or subsequent round of sampling, if a sample location is non-operational for more than one month before and one month after the scheduled sampling month (*i.e.*, it is not possible for you to sample within the window specified in Table 2, in this paragraph), you must notify EPA as specified in §141.35(c)(5) to reschedule your sampling.

TABLE 2—MONITORING FREQUENCY BY CONTAMINANT AND WATER SOURCE TYPES

Contaminant type	Water source type	Timeframe	Frequency ¹
List 1 Cyanotoxins Chemicals.	Surface water or Ground water under the direct influence of surface water (GWUDI).	March–November.	You must monitor twice a month for four consecutive months (total of eight sampling events). Sample events must occur two weeks apart.
List 1 Contaminants—Additional Chemicals.	Surface water or GWUDI	12 months	You must monitor for four consecutive quarters. Sample events must occur three months apart. (Example: If first monitoring is in January, the second monitoring must occur any time in April, the third any time in July and the fourth any time in October).
	Ground water	12 months	You must monitor twice in a consecutive 12-month period. Sample events must occur 5–7 months apart. (Example: If the first monitoring event is in April, the second monitoring event must occur any time in September, October or November).

¹ Systems must assign a sample event code for each contaminant listed in Table 1. Sample event codes must be assigned by the PWS for each sample event. For more information on sample event codes see §141.35(e) Table 1.

(C) *Location.* You must collect samples for each List 1 Assessment Monitoring contaminant, and, if applicable, for each List 2 Screening Survey, or List 3 Pre-Screen Testing contaminant, as specified in Table 1, in paragraph (a)(3) of this section. Samples must be collected at each sample point that is specified in column 5 and footnote c of Table 1, in paragraph (a)(3) of this section. PWSs conducting List 1 monitoring for the brominated HAA groups must collect TOC and bromide samples as specified in footnote d of Table 1, in paragraph (a)(3) of this section. If you are a GW system with multiple EPTDSs, and you request and receive approval from EPA or the State for sampling at representative EPTDS(s), as specified in §141.35(c)(3), you must collect your samples from the approved representative sampling location(s).

(D) *Sampling instructions.* For each List 1 Assessment Monitoring contaminant, and, if applicable, for each List 2 Screening Survey, or List 3 Pre-Screen Testing contaminant, you must follow the sampling procedure for the method specified in column 3 of Table 1, in

paragraph (a)(3) of this section. In addition, you must not composite (that is, combine, mix, or blend) the samples; you must collect and preserve each sample separately.

(E) *Sample collection and shipping time.* If you must ship the samples for analysis, you must collect the samples early enough in the day to allow adequate time to send the samples for overnight delivery to the laboratory. You should not collect samples on Friday, Saturday, or Sunday because sampling on these days may not allow samples to be shipped and received at the laboratory at the required temperature, unless you have made special arrangements with your laboratory to receive the samples.

(F) *Analytical methods.* For each contaminant, you must use the respective analytical methods for List 1, and, if applicable, for List 2, or List 3 that are specified in column 3 of Table 1, in paragraph (a)(3) of this section; report values at or above the minimum reporting levels for List 1, and, if applicable, for List 2 Screening Survey, or List 3 Pre-Screen Testing, that are

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specified in column 4 of Table 1, in paragraph (a)(3) of this section; and conduct the quality control procedures specified in paragraph (a)(5) of this section.

(G) *Laboratory errors or sampling deviations.* If the laboratory data do not meet the required QC criteria, as specified in paragraph (a)(5) of this section, or you do not follow the required sampling procedures, as specified in paragraphs (a)(4) of this section, you must resample within 30 days of being informed or becoming aware of these facts. This resampling is not for the purpose of confirming previous results, but to correct the sampling or laboratory error. All systems must report the results obtained from the first sampling for each sampling period, except for cases of sampling or laboratory errors. For the purposes of this rule, no samples are to be recollected for the purposes of confirming the results observed in a previous sampling.

(H) *Analysis.* For the List 1 contaminants, and, if applicable, List 2 Screening Survey, or List 3 Pre-Screen Testing contaminants, identified in Table 1, paragraph (a)(3) of this section, you must arrange for testing by a laboratory that has been approved by EPA according to requirements in paragraph (a)(5)(ii) of this section.

(I) *Review and reporting of results.* After you have received the laboratory results, you must review, approve, and submit the system information, and sample collection data and test results. You must report the results as provided in § 141.35(c)(6).

(ii) *Small systems.* If you serve 10,000 or fewer people and are notified that you are part of the State Monitoring Plan for Assessment Monitoring, Screening Survey or Pre-Screen monitoring, you must comply with the requirements specified in paragraphs (a)(4)(ii)(A) through (H) of this section. If EPA or the State informs you that they will be collecting your UCMR samples, you must assist them in identifying the appropriate sampling locations and in collecting the samples.

(A) *Monitoring period and frequency.* You must collect samples at the times specified for you by the State or EPA. Your schedule must follow both the timing of monitoring specified in Table

1, List 1, and, if applicable, List 2, or List 3, and the frequency of monitoring in Table 2 of this section.

(B) *Location.* You must collect samples at the locations specified for you by the State or EPA.

(C) *Sample kits.* You must store and maintain the sample collection kits sent to you by the UCMR Sampling Coordinator in accordance with the kit's instructions. The sample kit will include all necessary containers, packing materials and cold packs, instructions for collecting the sample and sample treatment (such as dechlorination or preservation), report forms for each sample, contact name and telephone number for the laboratory, and a prepaid return shipping docket and return address label. If any of the materials listed in the kit's instructions are not included in the kit or arrive damaged, you must notify the UCMR Sampling Coordinator who sent you the sample collection kits.

(D) *Sampling instructions.* You must comply with the instructions sent to you by the State or EPA concerning the use of containers, collection (how to fill the sample bottle), dechlorination and/or preservation, and sealing and preparation of sample and shipping containers for shipment. You must not composite (that is, combine, mix, or blend) the samples. You also must collect, preserve, and test each sample separately. You must also comply with the instructions sent to you by the UCMR Sampling Coordinator concerning the handling of sample containers for specific contaminants.

(E) *Sampling deviations.* If you do not collect a sample according to the instructions provided to you for a listed contaminant, you must report the deviation within 7 days of the scheduled monitoring on the sample reporting form, as specified in § 141.35(d)(2). You must resample following instructions that you will be sent from the UCMR Sampling Coordinator or State. A copy of the form must be sent to the laboratory with the recollected samples, and to the UCMR Sampling Coordinator.

(F) [Reserved]

(G) *Sampling forms.* You must completely fill out each of the sampling forms and bottles sent to you by the

UCMR Sampling Coordinator, including data elements listed in §141.35(e) for each sample, as specified in §141.35(d)(2). You must sign and date the sampling forms.

(H) *Sample collection and shipping.* You must collect the samples early enough in the day to allow adequate time to send the samples for overnight delivery to the laboratory. You should not collect samples on Friday, Saturday, or Sunday because sampling on these days may not allow samples to be shipped and received at the laboratory at the required temperature unless you have made special arrangements with EPA for the laboratory to receive the samples. Once you have collected the samples and completely filled in the sampling forms, you must send the samples and the sampling forms to the laboratory designated on the air bill.

(iii) *Phased sample analysis for microcystins.* You must collect the three required samples (one each for EPA Methods 544, 545 and 546 (ELISA) at the EPTDS) for each sampling event, but not all samples may need to be analyzed. If the Method 546 ELISA result is less than 0.3 µg/L, report that result and do not analyze the EPA Method 544 sample for that sample event. If the Method 546 ELISA result is greater than or equal to 0.3 µg/L, report the value and analyze the other microcystin sample using EPA Method 544. You must analyze the EPA Method 545 sample for each sample event for Cylindrospermopsin and anatoxin-a only.

(5) *Quality control requirements.* If your system serves more than 10,000 people, you must ensure that the quality control requirements listed below are met during your sampling procedures and by the laboratory conducting your analyses. You must also ensure that all method quality control procedures and all UCMR quality control procedures are followed.

(i) *Sample collection/preservation.* You must follow the sample collection and preservation requirements for the specified method for each of the contaminants in Table 1, in paragraph (a)(3) of this section. These requirements specify sample containers, collection, dechlorination, preservation, storage, sample holding time, and extract stor-

age and/or holding time that you must assure that the laboratory follow.

(ii) *Laboratory approval for Lists 1, List 2 and List 3.* To be approved to conduct UCMR testing, the laboratory must be certified under §141.28 for one or more compliance analyses; demonstrate for each analytical method it plans to use for UCMR testing that it can meet the Initial Demonstration of Capability (IDC) requirements detailed in the analytical methods specified in column 3 of Table 1, in paragraph (a)(3) of this section; and successfully participate in the UCMR Proficiency Testing (PT) Program administered by EPA for each analytical method it plans to use for UCMR testing. UCMR laboratory approval decisions will be granted on an individual method basis for the methods listed in column 3 of Table 1 in paragraph (a)(3) of this section for List 1, List 2, and List 3 contaminants. Laboratory approval is contingent upon the capability of the laboratory to post monitoring data to the EPA electronic data reporting system. To participate in the UCMR Laboratory Approval Program, the laboratory must complete and submit the necessary registration forms by February 21, 2017, and necessary application material April 19, 2017. Correspondence must be addressed to: UCMR Laboratory Approval Coordinator, USEPA, Technical Support Center, 26 West Martin Luther King Drive, (MS 140), Cincinnati, OH 45268; or emailed to EPA at: UCMR_Sampling_Coordinator@epa.gov.

(iii) *Minimum Reporting Level.* The MRL is an estimate of the quantitation limit. Assuming good instrumentation and experienced analysts, an MRL is achievable, with 95% confidence, by 75% of laboratories nationwide.

(A) Validation of laboratory performance. Your laboratory must be capable of quantifying each contaminant listed in Table 1, at or below the MRL specified in column 4 of Table 1, in paragraph (a)(3) of this section. You must ensure that the laboratory completes and has on file and available for your inspection, records of two distinct procedures. First, your laboratory must have conducted an IDC involving replicate analyses at or below the MRL as described in this paragraph. Second, for

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each day that UCMR analyses are conducted by your laboratory, a validation of its ability to quantify each contaminant, at or below the MRL specified in column 4 of Table 1, in paragraph (a)(3) of this section, following the procedure listed in paragraph (a)(5)(iii)(B) of this section, must be performed. The procedure for initial validation of laboratory performance at or below the MRL is as follows:

(1) All laboratories performing analysis under UCMR must demonstrate that they are capable of meeting data quality objectives at or below the MRL listed in Table 1, column 4, in paragraph (a)(3) of this section.

(2) The MRL, or any concentration below the MRL, at which performance is being evaluated, must be contained within the range of calibration. The calibration curve regression model and the range of calibration levels that are

used in these performance validation steps must be used in all routine sample analyses used to comply with this regulation. Only straight line or quadratic regression models are allowed. The use of either weighted or unweighted models is permitted. The use of cubic regression models is not permitted.

(3) Replicate analyses of at least seven (7) fortified samples in reagent water must be performed at or below the MRL for each analyte, and must be processed through the entire method procedure (*i.e.*, including extraction, where applicable, and with all preservatives).

(4) A prediction interval of results (PIR), which is based on the estimated arithmetic mean of analytical results and the estimated sample standard deviation of measurement results, must be determined by Equation 1:

$$\text{Equation 1} \quad \text{PIR} = \text{Mean} \pm s \times t_{(df, 1-\alpha/2)} \times \sqrt{1 + \frac{1}{n}}$$

Where:

t is the Student's *t* value with *df* degrees of freedom and confidence level (1- α),
s is the sample standard deviation of *n* replicate samples fortified at the MRL,
n is the number of replicates.

(5) The values needed to calculate the PIR using Equation 1 are: Number of replicates (*n*); Student's *t* value with a two-sided 99% confidence level for *n* number of replicates; the average (mean) of at least seven replicates; and the sample standard deviation. Factor 1 is referred to as the Half Range PIR (HR_{PIR}).

$$HR_{PIR} = s \times t_{(df, 1-\alpha/2)} \times \sqrt{1 + \frac{1}{n}}$$

For a certain number of replicates and for a certain confidence level in Student's *t*, this factor

$$C = t_{(df, 1-\alpha/2)} \times \sqrt{1 + \frac{1}{n}}$$

is constant, and can be tabulated according to replicate number and confidence level for the Student's *t*. Table 3 in this paragraph lists the constant factor (*C*) for replicate sample numbers 7 through 10 with a confidence level of 99% for Student's *t*.

(6) The HRPIR is calculated by Equation 2:

$$\text{Equation 2} \quad HR_{PIR} = s \times C$$

(7) The PIR is calculated by Equation 3:

$$\text{Equation 3} \quad \text{PIR} = \text{Mean} \pm HR_{PIR}$$

TABLE 3—THE CONSTANT FACTOR (C) TO BE MULTIPLIED BY THE STANDARD DEVIATION TO DETERMINE THE HALF RANGE INTERVAL OF THE PIR (STUDENT'S *t* 99% CONFIDENCE LEVEL)^A

Replicates	Degrees of freedom	Constant factor (C) to be multiplied by the standard deviation
7	6	3.963
8	7	3.711
9	8	3.536
10	9	3.409

^AThe critical *t*-value for a two-sided 99% confidence interval is equivalent to the critical *t*-value for a one-sided 99.5% confidence interval, due to the symmetry of the *t*-distribution. PIR = Prediction Interval of Results.

(8) The lower and upper result limits of the PIR must be converted to percent recovery of the concentration being tested. To pass criteria at a certain level, the PIR lower recovery limits cannot be lower than the lower recovery limits of the QC interval (50%), and the PIR upper recovery limits cannot be greater than the upper recovery limits of the QC interval (150%). When either of the PIR recovery limits falls outside of either bound of the QC interval of recovery (higher than 150% or less than 50%), laboratory performance is not validated at the concentration evaluated. If the PIR limits are contained within both bounds of the QC interval, laboratory performance is validated for that analyte.

(B) Quality control requirements for validation of laboratory performance at or below the MRL.

(1) You must ensure that the calibration curve regression model and that the range of calibration levels that are used in these performance validation steps are used in future routine sample analysis. Only straight line or quadratic regression models are allowed. The use of either weighted or unweighted models is permitted. The use of cubic regression models is not permitted.

(2) You must ensure, once your laboratory has performed an IDC as specified in each analytical method (demonstrating that DQOs are met at or below an MRL), that a daily performance check is performed for each analyte and method. A single laboratory blank, fortified at or below the MRL for each analyte, must be processed through the entire method procedure. The measured concentration for

each analyte must be converted to a percent recovery, and if the recovery is within 50%–150% (inclusive), the daily performance of the laboratory has been validated. The results for any analyte for which 50%–150% recovery cannot be demonstrated during the daily check are not valid. Laboratories may elect to re-run the daily performance check sample if the performance for any analyte or analytes cannot be validated. If performance is validated for these analytes, the laboratory performance is considered validated. Alternatively, the laboratory may re-calibrate and repeat the performance validation process for all analytes.

(iv) *Laboratory fortified sample matrix and laboratory fortified sample matrix duplicate.* You must ensure that your laboratory prepares and analyzes the Laboratory Fortified Sample Matrix (LFSM) sample for accuracy and Laboratory Fortified Sample Matrix Duplicate (LFSMD) samples for precision to determine method accuracy and precision for all contaminants in Table 1, in paragraph (a)(3) of this section. LFSM/LFSMD samples must be prepared using a sample collected and analyzed in accordance with UCMR requirements and analyzed at a frequency of 5% (or 1 LFSM/LFSMD set per every 20 samples) or with each sample batch, whichever is more frequent. In addition, the LFSM/LFSMD fortification concentrations must be alternated between a low-level fortification and mid-level fortification approximately 50% of the time. (For example: A set of 40 samples will require preparation and analysis of 2 LFSM/LFSMD paired samples. The first LFSM/LFSMD paired sample set must be fortified at

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either the low-level or mid-level, and the second LFSM/LFSMD paired sample set must be fortified with the other standard, either the low-level or mid-level, whichever was not used for the initial LFSM/LFSMD paired sample set.) The low-level LFSM/LFSMD fortification concentration must be within $\pm 50\%$ of the MRL for each contaminant (e.g., for an MRL of $1 \mu\text{g/L}$ the acceptable fortification levels must be between $0.5 \mu\text{g/L}$ and $1.5 \mu\text{g/L}$). The mid-level LFSM/LFSMD fortification concentration must be within $\pm 20\%$ of the mid-level calibration standard for each contaminant, and is to represent, where possible and where the laboratory has data from previously analyzed samples, an approximate average con-

centration observed in previous analyses of that analyte. There are no UCMR contaminant recovery acceptance criteria specified for LFSM/LFSMD analyses. All LFSM/LFSMD data are to be reported.

(v) *Method defined quality control.* You must ensure that your laboratory analyzes Laboratory Fortified Blanks and conducts Laboratory Performance Checks, as appropriate to the method's requirements, for those methods listed in Table 1, column 3, in paragraph (a)(3) of this section. Each method specifies acceptance criteria for these QC checks. The following HAA results must be reported using EPA's electronic data reporting system for quality control purposes.

TABLE 4—HAA QC RESULTS

1—Contaminant	2—CAS Registry No.	3—Analytical methods ^a	4—Minimum reporting level ^b	5—HAA6Br Group	6—HAA9 Group	7—HAA5 Group
Brominated Haloacetic Acid (HAA) Groups						
Bromochloroacetic acid (BCAA)	5589-96-8	EPA 552.3 or EPA 557	0.3 µg/L.			
Bromodichloroacetic acid (BDCAA).	71133-14-7	EPA 552.3 or EPA 557	0.5 µg/L.			
Chlorodibromoacetic acid (CDBAA).	5278-95-5	EPA 552.3 or EPA 557	0.3 µg/L	HAA6Br		
Tribromoacetic acid (TBAA)	75-96-7	EPA 552.3 or EPA 557	2.0 µg/L.			
Monobromoacetic acid (MBAA)	79-08-3	EPA 552.3 or EPA 557	0.3 µg/L.			
Dibromoacetic acid (DBAA)	631-64-1	EPA 552.3 or EPA 557	0.3 µg/L		HAA9	
Dichloroacetic acid (DCAA)	79-43-6	EPA 552.3 or EPA 557	0.2 µg/L.			HAA5
Monochloroacetic acid (MCAA)	79-11-8	EPA 552.3 or EPA 557	2.0 µg/L			
Trichloroacetic acid (TCAA)	76-03-9	EPA 552.3 or EPA 557	0.5 µg/L.			

Column headings are:

1—Contaminant: The name of the contaminant to be analyzed.

2—CAS (Chemical Abstract Service) Registry Number or Identification Number: A unique number identifying the chemical contaminants.

3—Analytical Methods: Method numbers identifying the methods that must be used to test the contaminants.

4—Minimum Reporting Level (MRL): The value and unit of measure at or above which the concentration of the contaminant must be measured using the approved analytical methods. If EPA determines, after the first six months of monitoring that the specified MRLs result in excessive resampling, EPA will establish alternate MRLs and will notify affected PWSSs and laboratories of the new MRLs.

5-7—HAA groups identified in paragraph (a)(3) of this section to be monitored as UCMR contaminants.

^aThe analytical procedures shall be performed in accordance with the documents associated with each method, see paragraph (c) of this section, and must meet all quality control requirements outlined paragraph (a)(5) of this section.

^bThe MRL is the minimum concentration of each analyte that must be reported to EPA.

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(vi) *Reporting.* You must require your laboratory to submit these data electronically to the State and EPA using EPA's electronic data reporting system, accessible at <https://www.epa.gov/dwucmr>, within 120 days from the sample collection date. You then have 60 days from when the laboratory posts the data to review, approve and submit the data to the State and EPA, via EPA's electronic data reporting system. If you do not electronically approve and submit the laboratory data to EPA within 60 days of the laboratory posting data to EPA's electronic reporting system, the data will be considered approved and available for State and EPA review.

(6) *Violation of this rule—(i) Monitoring violations.* Any failure to monitor in accordance with §141.40(a)(3)–(5) is a monitoring violation.

(ii) *Reporting violations.* Any failure to report in accordance with §141.35 is a reporting violation.

(b) *Petitions and waivers by States—(1) Governors' petition for additional contaminants.* The Safe Drinking Water Act allows Governors of seven (7) or more States to petition the EPA Administrator to add one or more contaminants to the UCMR Contaminant List in paragraph (a)(3) of this section. The petition must clearly identify the reason(s) for adding the contaminant(s) to the monitoring list, including the potential risk to public health, particularly any information that might be available regarding disproportional risks to the health and safety of children, the expected occurrence documented by any available data, any analytical methods known or proposed to be used to test for the contaminant(s), and any other information that could assist the Administrator in determining which contaminants present the greatest public health concern and should, therefore, be included on the UCMR Contaminant List in paragraph (a)(3) of this section.

(2) *State-wide waivers.* A State can waive monitoring requirements only with EPA approval and under very limited conditions. Conditions and procedures for obtaining a waiver are as follows:

(i) *Application.* A State may apply to EPA for a State-wide waiver from the

unregulated contaminant monitoring requirements for PWSs serving more than 10,000 people. To apply for such a waiver, the State must submit an application to EPA that includes the following information: The list of contaminants on the UCMR Contaminant List for which a waiver is requested, along with documentation for each contaminant in the request demonstrating that the contaminants or their parent compounds do not occur naturally in the State, and certifying that during the past 15 years they have not been used, applied, stored, disposed of, released, or detected in the source waters or distribution systems in the State.

(ii) *Approval.* EPA will review State applications and notify the State whether it accepts or rejects the request. The State must receive written approval from EPA before issuing a State-wide waiver.

(c) *Incorporation by reference.* These standards are incorporated by reference into this section with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. All approved material is available for inspection either electronically at <http://www.regulations.gov>, in hard copy at the Water Docket, EPA/DC, and from the sources as follows. The Public Reading Room (EPA West, Room 3334, 1301 Constitution Ave. NW., Washington, DC) is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for this Public Reading Room is (202) 566-1744, and the telephone number for the Water Docket is (202) 566-2426. The material is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741-6030 or go to <http://www.archives.gov/federal-register/cfr/about.html>.

(1) U.S. Environmental Protection Agency, Water Docket, EPA/DC, EPA West, Room 3334, 1301 Constitution Ave. NW., Washington, DC 20004.

(i) Method 200.8 "Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma—Mass Spectrometry," Revision 5.4, EMMC

Version, 1994. Available on the Internet at <https://www.nemi.gov>.

(ii) Method 300.0 “Determination of Inorganic Anions by Ion Chromatography Samples,” Revision 2.1, August 1993. Available on the Internet at <https://www.nemi.gov>.

(iii) Method 300.1 “Determination of Inorganic Anions in Drinking Water by Ion Chromatography,” Revision 1.0, 1997. Available on the Internet at <https://www.epa.gov/dwanalyticalmethods>.

(iv) Method 317.0 “Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography with the Addition of a Postcolumn Reagent for Trace Bromate Analysis,” Revision 2.0, July 2001, EPA 815-B-01-001. Available on the Internet at <https://www.epa.gov/dwanalyticalmethods>.

(v) Method 326.0 “Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography Incorporating the Addition of a Suppressor Acidified Postcolumn Reagent for Trace Bromate Analysis,” Revision 1.0, June 2002, EPA 815-R-03-007. Available on the Internet at <https://www.epa.gov/dwanalyticalmethods>.

(vi) Method 415.3 “Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water,” Revision 1.1, February 2005, EPA/600/R-05/055. Available on the Internet at <https://www.epa.gov/water-research/epa-drinking-water-research-methods>.

(vii) Method 415.3 “Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water,” Revision 1.2, September 2009, EPA/600/R-09/122. Available on the Internet at <https://www.epa.gov/water-research/epa-drinking-water-research-methods>.

(viii) Method 525.3 “Determination of Semivolatile Organic Chemicals in Drinking Water by Solid Phase Extraction and Capillary Column Gas Chromatography/Mass Spectrometry (GC/MS),” Version 1.0, February 2012, EPA/600/R-12/010. Available on the Internet at <https://www.epa.gov/water-research/epa-drinking-water-research-methods>.

(ix) Method 530 “Determination of Select Semivolatile Organic Chemicals

in Drinking Water by Solid Phase Extraction and Gas Chromatography/Mass Spectrometry (GC/MS),” Version 1.0, January 2015, EPA/600/R-14/442. Available on the Internet at <https://www.epa.gov/water-research/epa-drinking-water-research-methods>.

(x) EPA Method 541: “Determination of 1-Butanol, 1,4-Dioxane, 2-Methoxyethanol and 2-Propen-1-ol in Drinking Water by Solid Phase Extraction and Gas Chromatography/Mass Spectrometry,” November 2015, EPA 815-R-15-011. Available on the Internet at <https://www.epa.gov/water-research/epa-drinking-water-research-methods>.

(xi) Method 544 “Determination of Microcystins and Nodularin in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS),” Version 1.0, February 2015, EPA 600-R-14/474. Available on the Internet at <https://www.epa.gov/water-research/epa-drinking-water-research-methods>.

(xii) EPA Method 545: “Determination of Cylindrospermopsin and Anatoxin-a in Drinking Water by Liquid Chromatography Electrospray Ionization Tandem Mass Spectrometry (LC/ESI-MS/MS),” April 2015, EPA 815-R-15-009. Available on the Internet at <https://www.epa.gov/dwanalyticalmethods>.

(xiii) EPA Method 546: “Determination of Total Microcystins and Nodularins in Drinking Water and Ambient Water by Adda Enzyme-Linked Immunosorbent Assay,” August 2016, EPA-815-B-16-011. Available on the Internet at <https://www.epa.gov/dwanalyticalmethods>.

(xiv) Method 552.3 “Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-Liquid Microextraction, Derivatization, and Gas Chromatography with Electron Capture Detection,” Revision 1.0, July 2003, EPA 815-B-03-002. Available on the Internet at <https://www.epa.gov/dwanalyticalmethods>.

(xv) EPA Method 557: “Determination of Haloacetic Acids, Bromate, and Dalapon in Drinking Water by Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS),” Version 1.0, September 2009, EPA 815-B-09-012. Available on

the Internet at <https://www.epa.gov/dvanalyticalmethods>.

(2) American Public Health Association—Standard Test Method for Elements in Water by Inductively Coupled Plasma-Mass Spectrometry,” approved August 1, 2010. Available for purchase on the Internet at <http://www.astm.org/Standards/D5673.htm>.

(i) “Standard Methods for the Examination of Water & Wastewater,” 21st edition (2005).

(A) SM 3125 “Metals by Inductively Coupled Plasma/Mass Spectrometry.”

(B) SM 5310B “Total Organic Carbon (TOC): High-Temperature Combustion Method.”

(C) SM 5310C “Total Organic Carbon (TOC): Persulfate-UV or Heated-Persulfate Oxidation Method.”

(D) SM 5310D “Total Organic Carbon (TOC): Wet-Oxidation Method.”

(ii) The following methods are from “Standard Methods Online,” approved 2000 (unless noted). Available for purchase on the Internet at <http://www.standardmethods.org>.

(A) SM 3125 “Metals by Inductively Coupled Plasma/Mass Spectrometry” Editorial revisions, 2011 (SM 3125-09).

(B) SM 5310B “Total Organic Carbon: High-Temperature Combustion Method,” (5310B-00).

(C) SM 5310C “Total Organic Carbon: Persulfate-UV or Heated-Persulfate Oxidation Method,” (5310C-00).

(D) SM 5310D “Total Organic Carbon: Wet-Oxidation Method,” (5310D-00).

(3) ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

(i) ASTM D5673-10 “Standard Test Method for Elements in Water by Inductively Coupled Plasma-Mass Spectrometry,” approved August 1, 2010. Available for purchase on the Internet at <http://www.astm.org/Standards/D5673.htm>.

(ii) ASTM D6581-12 “Standard Test Methods for Bromate, Bromide, Chlorate, and Chlorite in Drinking Water by Suppressed Ion Chromatography,” approved March 1, 2012. Available for purchase on the Internet at <http://www.astm.org/Standards/D6581.htm>.

[72 FR 393, Jan. 4, 2007; 72 FR 3916, Jan. 26, 2007, as amended at 77 FR 26098, May 2, 2012; 81 FR 92688, Dec. 20, 2016]

§ 141.41 Special monitoring for sodium.

(a) Suppliers of water for community public water systems shall collect and analyze one sample per plant at the entry point of the distribution system for the determination of sodium concentration levels; samples must be collected and analyzed annually for systems utilizing surface water sources in whole or in part, and at least every three years for systems utilizing solely ground water sources. The minimum number of samples required to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer may, with the State approval, be considered one treatment plant for determining the minimum number of samples. The supplier of water may be required by the State to collect and analyze water samples for sodium more frequently in locations where the sodium content is variable.

(b) The supplier of water shall report to EPA and/or the State the results of the analyses for sodium within the first 10 days of the month following the month in which the sample results were received or within the first 10 days following the end of the required monitoring period as stipulated by the State, whichever of these is first. If more than annual sampling is required the supplier shall report the average sodium concentration within 10 days of the month following the month in which the analytical results of the last sample used for the annual average was received. The supplier of water shall not be required to report the results to EPA where the State has adopted this regulation and results are reported to the State. The supplier shall report the results to EPA where the State has not adopted this regulation.

(c) The supplier of water shall notify appropriate local and State public health officials of the sodium levels by written notice by direct mail within three months. A copy of each notice required to be provided by this paragraph shall be sent to EPA and/or the State within 10 days of its issuance. The supplier of water is not required to notify appropriate local and State public health officials of the sodium levels