State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

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Governor

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TO: All Drinking Water Laboratories with New Jersey Certification for Analysis of NJ Regulatory Samples for Gross Alpha

All New Jersey Community Water Systems

FROM: Joseph Aiello, Manager - Office of Quality Assurance DW for JFA

Karen Fell, Assistant Director - Water Supply Operations Element KF

DATE: December 19, 2014

RE: REVISED MEMO OF SEPTEMBER 26, 2014: Analytical and reporting requirements for the measurement of gross alpha in drinking water using the New Jersey 48 Hour Rapid Gross Alpha Testing method, ECLS-R-GA Rev 8

A memo dated September 26, 2014 was distributed by the Department of Environmental Protection to all drinking water laboratories and community water systems notifying of revisions to the New Jersey 48 Hour Rapid Gross Alpha Test method, ECLS-R-GA. As a result of comments received regarding these changes, the Department is reissuing this memo with clarifications. The wording in item 3 in the September 26, 2014 memo has been modified in this revised memo. Item 7, an addition to this memo, addresses the frequency of duplicate samples as part of quality control. The basis for these modifications can be found in the Comment and Department Response section appended to the text of this memo.

REVISED MEMO

The ECLS-R-GA method is the official name for the New Jersey 48 Hour Rapid Gross Alpha Testing Method and is the only gross alpha method approved for federal and NJ safe drinking water compliance monitoring by public water systems and for testing conducted as part of the New Jersey Private Well Testing Act. As a screening method, inherent variability of results due to varieties and amounts of alpha emitting isotopes in the sample is to be expected. However, in cases where split samples were collected, it was observed that the results generated by different laboratories varied significantly. In order to minimize variability attributable to the manner in which laboratories conduct the procedure, several clarifications to the ECLS-R-GA method are stated below.

1) The laboratories must count samples for a sufficient length of time in order to meet the Safe Drinking Water federal detection limit of 3 pCi/L.

2) The first counting of the prepared sample must start no sooner than 36 hours from sample collection and must be completed before 48 hours of the sample collection time.
3) Second counting: For results that exceed 5 pCi/L, a second counting of the same prepared sample is required. The same plancheted sample must be recounted between 20 to 28 hours after the midpoint of the first counting time.

4) The SDWA detection limit (DL) must be calculated using the formula:

$$\text{DL (pCi/L)} = \frac{1.96^2}{2t_G} x \frac{\left[1+\sqrt{1+\frac{4t_G^2}{1.96^2} xR_B x\left(\frac{1}{t_G}+\frac{1}{t_B}\right)}\right]}{(\text{Efficiency})(\text{Volume})(\text{Chemical Recovery})(2.22)}$$

Where,

t_G is the sample count time (minutes)

t_B is the background count time (minutes)

R_B is background count rate (cpm)

Efficiency: Counting efficiency of the gas proportional counter for alpha particles

Volume: Volume of sample used for the analysis expressed in liters

Chemical Recovery: Chemical recovery is always 1 for the evaporation technique.

5) Uncertainty (counting error) must be calculated using the formula below:
Uncertainty associated with activity (pCi/L) = 1.65 σ

$$= 1.65 \text{ x } \frac{\sqrt{\frac{\text{Sample Gross Count Rate (cpm)}}{\text{Sample Count Time (min.)}} + \frac{\text{Background Count Rate (cpm)}}{\text{Background Count Time (min.)}}}}{(\text{Efficiency}) \text{ x } (\text{Volume}) \text{ x } 2.22}$$

6) The minimum detectable concentration (MDC), which is <u>not</u> equivalent to the **SDWA detection limit (DL)**, is calculated using the formula below:

$$\text{MDC (pCi/L)} = \frac{2.71/t_B + 4.65\sqrt{\text{Background Count Rate (cpm)}/t_B}}{(\text{Efficiency})(\text{Volume})(2.22)}$$

The MDC is no longer a requirement for the purpose of drinking water compliance monitoring. However, laboratories are encouraged to keep the data available for Department review.

7) As part of quality control, a duplicate sample analysis must be performed every 10 samples or fewer for the determination of analytical precision. This is further explained in the Comments and Department Response section appended to this revised memo.

The gross alpha data that must be reported to the NJDEP Bureau of Safe Drinking Water through the electronic reporting system, E2, includes the following:

a) The activity concentration in pCi/L
b) The uncertainty (counting error)
c) If a second count is required, the E2 Analysis Start Date/Time and Analysis Completion Date/Time would be that of the second count

Although the SDWA Detection Limit cannot be submitted electronically at this time, it must be included in the laboratory analysis report to your client.

New Jersey Regulations Governing the Certification of Laboratories and Environmental Measurements, N.J.A.C. 7:18-6.4 (a)3 state that any regulatory sample analyzed for gross alpha must modify EPA Method 900.0 according to the criteria specified in 3i through 3iv of the regulation. The September 26, 2014 memo adds the requirement to N.J.A.C. 7:18-6.4 (a)3ii requiring that the initial count be completed within 48 hours. Also, N.J.A.C. 7:18-6.4 (a)3iv states that a second count is required if the first count result exceeds 5 pCi/L and that the second count must start between 20 and 28 hours from the first count. This memo clarifies the reference time (or time zero) for the second count as the midpoint of the first count.

These clarifications have been included in the method ECLS-R-GA, Revision 8 of the New Jersey Department of Health Standard Operating Procedure (SOP). The revised method has received the approval of the US EPA Region-2. A copy of the ECLS-R-GA, Revision 8 is available upon request or can be accessed at www.nj.gov/dep/oqa/bboard.html.

Effective January 1, 2015, only data generated by the method ECLS-R-GA Rev 8 will be accepted by the New Jersey Department of Environmental Protection's Safe Drinking Water (SDW) Program. Up until January 1, 2015, the SDW Program will accept data generated using your laboratory's current certified method.

Laboratories shall forward the following documentation to the OQA for review.

- A revised SOP incorporating the changes to the test method
- Demonstration of Capability to include a precision and accuracy study using the revised criteria, data for the uncertainty of measurements (using the formula given in item 5 above) and the SDWA detection limit (using the formula given in item 4 above).

Upon receipt, the OQA will review the submittal and, if acceptable, issue an updated Annual Certified Parameter List (ACPL) for your facility that includes the method with the revision number. If there are any questions, please contact the Bureau of Safe Drinking Water, Linda Bonnette (609) 984-4060 or the Office of Quality Assurance (OQA), Dr. Vas Komanduri, (609) 292-3950.

COMMENTS AND DEPARTMENT RESPONSE

Comment: The language in the September 26, 2014 memo for the second counting could be interpreted to be inconsistent with the method language. Item 3 of the Sept. 26, 2014 memo states "For results that exceed 5 pCi/L, a second counting of the same prepared sample is required. Using the midpoint of the first count time as time zero, the second count must be initiated within 20 hours and completed within 28 hours." The ECLS-R-GA, Revision 8 method states: "If the measured gross alpha activity is over 5 pCi/L, the same plancheted sample must be recounted between 20 to 28 hours after the midpoint of the first counting time."

Department's Response: The Department acknowledges the difference in the language between the memo and the method. The September 26, 2014 memo states that the second count must be initiated and completed between 20 and 28 hours from the midpoint of first counting interval thereby allowing only an eight hour window to accomplish the second count. The method does not impose such a restriction for the second count, but requires the sample be recounted between 20 and 28 hours from the midpoint of the first counting time. The method language pertaining to the second count is correct which states that the same plancheted sample must be recounted between 20 to 28 hours after the midpoint of the first counting time.

Comment: This pertains to the frequency of duplicate sample analysis. Both NELAC Standard and N.J.A.C. 7:18-1 et seq. require one duplicate sample for a batch of 20 samples or fewer whereas the method ECLS-R-GA, Rev. 8 in section 12.3 requires one duplicate for a batch of 10 samples or fewer.

Department's Response: Laboratories analyzing drinking water compliance samples must meet the EPA requirements specified in the *Manual for the Certification of Laboratories Analyzing Drinking Water*, EPA 815 R-05-004, Fifth Edition; January 2005. Per the manual (at 7.7.1), duplicate sample analysis must be performed every 10 samples or less. The method, ECLS-R-GA, Rev. 8 is consistent with the EPA requirement. Therefore, the Department will require that laboratories perform one duplicate sample analysis for a batch of 10 samples or fewer. The Department does not require the average of the sample and duplicate results to be reported. The sample result (and not the duplicate result) should be submitted through E2. The purpose for duplicate analysis is for the determination of the analytical precision which must be calculated and documented as outlined in the EPA Manual. The associated data shall be readily available for review during an onsite audit. The laboratories are allowed to duplicate an LCS, especially when sufficient volume of sample(s) is unavailable for duplication.

Cc: Dr. Bahman Parsa, Director, ECLS