

Public Comments and Responses for Monitoring & Testing Module Code and Annex after First 60-day Review Period

Informational Copy: NOT Open for Public Comment

Comment from the MAHC Committees:

There was an oversight by the MAHC Committees regarding automated controllers. The MAHC has always intended to require automated controllers on all aquatic venues and has mentioned this requirement in public presentations and discussions. As a result, language has been changed in MAHC Section 4.7.3.8 and corresponding Annex to include this and provide a 1 year compliance period for existing facilities.

1. Jennifer Hatfield, APSP (Delray Beach, FL) – 15 Comments

- *Comment:*
GLOSSARY “Water Quality Testing Device” – **“Water Quality Testing Device”** means a product designed to measure the level of a water parameter. A WQTD includes a device or method to provide a visual indication of a parameter level, and may include one or more reagents and accessory items. -- General comment re *visual indication*: this should not be limited to just a visual indication device or method, as this would then eliminate colorimeters, pH meters, conductivity meters, ORP meters, etc.

CHANGES TO CODE/ANNEX: Added “in water” after “parameter”. Disagree regarding comment on visual indicators. “Visual indication” encompasses observations of measurements reported by meters.

- *Comment:*
4.7.3.9.1 – *Reference to “Standard Methods” alone is unclear.* -- Microbiological testing equipment and methods shall be EPA-Approved or conforming to Standard Methods APHA et al. (2012) Standard Methods for the Examination of Water and Wastewater, 22nd Ed. E.W. Rice, R.B. Baird, A.D. Eaton, and L.S. Clesceri (Eds). New York: American Public Health Association. General Comment: Does EPA *approve* equipment and methods?

CHANGES TO CODE/ANNEX: Revised text to say “latest edition of Standard Methods for the Examination of Water and Wastewater, or conforming to the most recent version of NSF/ANSI Standard 50”.

- *Comment:*
5.7.3.1.2.1 – General Comment: Meeting drinking water standards for copper is strict.

CHANGES TO CODE/ANNEX: The code text was not changed in response to this comment. Drinking water supplying pools should have levels below 1.3 mg/L and copper/silver systems for pools typically operate at approximately 25% of this level. NSF/ANSI 60 (Drinking Water Treatment Chemicals—Health Effects) states that levels of copper/silver should not be imparted into pool or spa water in excess of USEPA Primary and Secondary National Drinking Water Standards.

- *Comment:*
5.7.3.2.1 – *Requirement is vague without mentioning specific devices. Could also reference sections 5.7.5 and 5.7.6 -- Water Quality Testing Devices (WQTDs) for the measurement of sanitizer residual, pH, alkalinity, and temperature, at a minimum, shall be available on site.*

CHANGES TO CODE/ANNEX: Agreed. See text for change

- *Comment:*
5.7.4 – General Comment: there are 13 regulations on water sampling.

CHANGES TO CODE/ANNEX: Identifying these procedures step by step in separate lines of code is the best way of clearly communicating these best practices.

- *Comment:*
5.7.4.3.4 – *Do not need a sample for each test.--* For each water sample taken, sampling locations shall rotate around the shallower end of the pool.

CHANGES TO CODE/ANNEX: Agreed. See text for change.

- *Comment:*
5.7.5 – *General Comment to consider, basis is APSP-11. -- General Comment: Very specific recommendations for testing frequency as opposed to the APSP-11 standard that utilizes a non-prescriptive approach. – **REFERENCE:** ANSI/APSP-11, 2009*

CHANGES TO CODE/ANNEX: APSP-11 addresses water quality standards for public pools and spas. Recommending monitoring and testing procedures was not part of its scope. Water quality in pools is addressed in another part of the MAHC (Disinfection and Water Quality).

- *Comment:*
5.7.6.1 – *Incomplete* -- All pools shall comply with either MAHC Section 5.7.6.1.1 *Point* to serve as a reference point for assessing adequate water clarity. General Comments: Why not say all pools and all spas, why just pools? Further, this is an incomplete sentence, “either MAHC Section 5.7.6.1.1 to serve...” It says “either,” but only lists one section.

CHANGES TO CODE/ANNEX: Changed as suggested.

- *Comment:*
5.7.6.1.1 – “A 4-square-inch (10.2 cm²) marker tile in a contrasting color to the pool surface shall be located at the deepest part of the pool”. General Comment: Can the deep end drain be used?

CHANGES TO CODE/ANNEX: Agreed. See revised code text.

- *Comment:*
5.7.6.2 – *Incomplete* – “This reference point shall be visible at all times.” General Comments: The distance and angle of observation is not specified.

CHANGES TO CODE/ANNEX: Changed as suggested.

- *Comment:*
5.7.6.1.1 & 5.7.6.2 – General Comment: how would the requirements of these two subsections work in a shallow pool?

CHANGES TO CODE/ANNEX: They would apply in the same way without respect to pool depth.

- *Comment:*
ANNEX 4.7.3.7 – 2nd Paragraph -- *The word “colorimeter” contains “meter” and is usually associated with an electronic device, a meter that measures color. These are commonly used in the pool industry for testing water. They are sometimes called photometers. Colorimeter test can be accurate to 0.1 mg/L. They are not “portable spectrophotometers” as implied in the last sentence. Though portable spectrophotometers do exist they are not commonly used in the pool industry. Therefore, both titration and colorimeters should be considered “objective” and “visual color matching” or “visual color comparators” should be considered “highly subjective”.*-- It is important for an operator to use equipment that is easy to read and as objective as possible. The current, common means of testing pools using a colorimeter visual color comparator or visual color matching test is highly subjective because the color and intensity must be compared. Titration testing for free and combined chlorine is an objective test, which is accurate to 0.2 mg/L with an easily recognizable start and end point. Titration testing is recommended over colorimetric testing. Due to the use of inconsistent

concentration gradations (i.e., the difference in concentration between adjacent color blocks) and the subsequent rapid darkening of the color blocks (e.g., above 1.5 mg/L), the accuracy of colorimetric test methods is likely to be lower than for titration test methods. Colorimetric methods are accurate only to +/- half the difference between the adjacent color blocks, and thus the confidence limits for these methods are wider at higher concentrations (e.g., above 1.5 mg/L). Where portable spectrophotometer test kits are affordable, these are the most accurate kits available for use at poolside.

CHANGES TO CODE/ANNEX: Changed as suggested.

- *Comment:*
ANNEX TABLE 4.7.3.8 – Chlorine Testing, High Calcium –
May cause the
sample to turn
cloudy white when
adding DPD #1.

General Comment: High calcium causing a cloudy sample “when adding DPD #1” under chlorine test should only apply to liquid DPD reagents and not to DPD tablets or DPD powders.

CHANGES TO CODE/ANNEX: Agreed. Add “liquid reagent” after “DPD #1”.

- *Comment:*
ANNEX TABLE 4.7.3.8 – “High Chlorine Effects” section immediately after the table – General Comments:
 - 1) Chlorine Testing
 - a. The addition of double the quantity of DPD reagent during testing can minimize this interference or use a smaller sample size or dilute with DI water. Follow manufactures instructions.

CHANGES TO CODE/ANNEX: Agreed.

- 2) pH Testing
 - a. There are chlorine inhibitors available that do not shift the pH of the sample
- 3) Total Alkalinity Testing
 - a. Add a chlorine inhibitor to minimize chlorine interference

CHANGES TO CODE/ANNEX: WQTD instruction manuals should provide instructions on addition of chlorine inhibitor to minimize interference.

- 4) “Metals:” and “Metals of calcium testing:”
 - a. This should not be a sub-topic of High Chlorine effects
 - b. The word “of” in “Metals of calcium testing” should be “in”.

CHANGES TO CODE/ANNEX: Changed as suggested.

- 5) High calcium effects on chlorine testing:
 - a. This should not be a sub-topic of High Chlorine effects
 - b. This section only applies to liquid DPD reagents not to tablets or powders which are not affected by this.

CHANGES TO CODE/ANNEX: Changed as suggested.

- 6) Potassium Monopersulfate shock: This should not be a sub-topic of High Chlorine effects

CHANGES TO CODE/ANNEX: Changed as suggested.

- *Comment:*
ANNEX 5.7.6 – *General Comments:* This section is very non-specific. It says water quality is “useful” and “important,” but it does not say you must be able to see the drains, only that it is “important” to observe them. Further, if the use of a Secchi disk is not recommended, why reference the article for more information?

CHANGES TO CODE/ANNEX: The requirement for clarity is in the code. The annex is for supporting information. The Secchi disc reference explains constraints and limitations when using Secchi discs and language was added to clarify why the reference was included.

2. Patsy Root, IDEXX Laboratories, Inc. – Manufacturer (Westbrook, ME) – 1 Comment

- *Comment:*
4.7.3.9 – *Pool and spa water is ingested and reliance on a consistent level of disinfectant, especially during times of high bather load, is unrealistic. Weekly Microbiological monitoring should be added to increase bather protection and compare microbiological data with chemical data. The CDC acknowledges that “1 in 8 public pool inspections resulted in pools*

*being closed immediately due to serious code violations such as improper chlorine levels” To rely **only** on a proper disinfection level puts bathers at risk since:*

- (1) disinfectant levels cannot be continuously monitored,*
- (2) some bacteria are resistant to disinfection and*
- (3) biofilm can protect and promote bacterial growth.*

***Please see references supporting disease testing/monitoring* and references to other rules and guidance that support microbiological monitoring ***

Include language on *minimal* microbiological testing. This will align this MAHC module with US State rules and other countries that accept microbiological monitoring as an important tool to protect public health. Recommended language to add or modify at section 4.7.3.9 :

ADD:

A. 4.7.3.9.1

Tests are to be performed using EPA-approved methods, methods listed in *Standard Methods for the Examination of Water and Wastewater* (APHA, AWWA, WEF; 2012), or an alternative method that has been validated by a 3rd party organization or process.

CHANGES TO CODE/ANNEX: Changed as noted.

B. 4.7.3.9.2

Testing Frequency: Microbiological tests are to be performed at least weekly

CHANGES TO CODE/ANNEX: Disagree. While agencies in other countries have established maximum contaminant levels for microbial water quality monitoring of pools and spas, such standards have not been shown in scientific studies to have a significant impact on protecting human health. Until such data are reported in scientifically peer-reviewed communications, there are insufficient data to establish evidence-based microbial water quality standards for pools and spas, or to warrant the recommendation that pool and spas be regularly monitored to meet microbial water quality standards. As such, the MAHC code on microbiological water quality testing can be considered a minimum guidance standard. Aquatic venue operators wishing to achieve additional microbial water quality characterization are encouraged to use the references in the MAHC Annex regarding water quality monitoring techniques and standards in other countries. We appreciate the detailed information that the commenter provided on this subject and have added some of this information to the Annex.

C. 4.7.3.9.3

Microbiological parameters with associated Maximum Contamination Levels are listed in the chart below :

Table #XX Microbiological Maximum Contamination Levels

Microbiological parameter	Maximum Contaminant Level
Total Coliform	<10 organism/100 mL
Heterotrophic Bacteria	<100 organisms/mL

<i>Pseudomonas aeruginosa</i>	0 organisms / 100 mL
<i>Legionella pneumophila</i> *	0 organisms/ 100 mL
*Recommended for the testing of spas/hot tubs or features with aerosolized water	

CHANGES TO CODE/ANNEX: Disagree. See response to Comment on 4.7.3.9.2.

REFERENCES:

* References supporting inclusion of Microbiological testing to protect public health:

1. Jonathan K. Lutz and Jiyoung Lee (2011) Disinfectant resistance of common strains of *Pseudomonas aeruginosa* in pools and spas, concentration of *P. aeruginosa* in pools and spas with adequate disinfectant. *Int. J. Environ. Res. Public Health*, 8, 554-564
2. Nancy Hall, Cathy Lord, John Kempf, Carrie Lueck, Cindy Rieflin, and Karen Owens (2011); Poster: *Incidence of Pseudomonas aeruginosa in Private Spa Water*, State Hygienic Laboratory, University of Iowa Research Park, Iowa City, IA 52242
3. Michele C. Hlavsa *et al* (2011) *Surveillance for Waterborne Disease Outbreaks and Other Health Events Associated with Recreational Water — United States, 2007–2008*; Centers for Disease Control MMWR Surveillance Summaries, Vol 60 No. 12

**Selected Rules or Guides with language to support regular monitoring of microbiological parameters:

1. William De Haan and Julie Stachecki Johnningsmeier (2000) *Swimming Pool Pest Management: A Training Manual for Commercial Pesticide Applicators and Swimming Pool Operators* Category 5A;
 - a. **Excerpt Monitoring and Sampling, page 8**, “Bacteriological analysis of swimming pool water determines the sanitary quality and suitability for public use. Pool water can become highly contaminated or polluted, at least momentarily, from the swimmers in it. Michigan’s rules for public pools require the collection and bacteriological analysis of water samples once a week, or more often under unusual conditions as directed by the state or local health department.
2. **Alberta Public Health**, Alberta Regulation 293/2006 (2006) *Swimming Pool, Wading Pool and Water Spray Park Regulation*; Alberta, Canada
 - a. **Excerpt, Page 10**, Bacterial Limits: Heterotrophic Plate Count less than 100/mL; *Pseudomonas aeruginosa* 0/100 mL, coliforms 0/100 mL
3. **Centers for Disease Control** (2008) *Violations Identified from Routine Swimming Pool Inspections---Selected States and Counties, United States*, MMWR Morb Mortal Wkly Rep. 2010;59 (SS19):582-587. <http://www.cdc.gov/healthywater/swimming/rwi/index.html>
 - a. **Excerpt:** Keeping chlorine at recommended levels is essential to maintain a healthy pool. However, a 2010 study found that 1 in 8 public pool inspections resulted in pools

being closed immediately due to serious code violations such as improper chlorine levels

4. Code de la Santé Publique, **FRANCE**, (2007) Arrêté préfectoral en date du 15 juin 2007 fixant les 8upermen8s du contrôle sanitaire de la qualité des eaux des piscines
 - a. **Excerpt:** Détermination des paramètres à analyser soit in situ soit au laboratoire 8uper :

Paramètres bactériologiques Noms Normes Analyses

Bactéries aérobiesrevivifiables à 37°C	<100/ml
Coliformes totaux	<10/100ml
Coliformes fécaux (E. coli)	0/100ml
Staphylocoques pathogènes	0/100ml
Pseudomonas aeruginosa(dans l'eau des bains bouillonnants)	0/100ml

5. MINISTERIO DE SANIDAD, POLITICA SOCIAL E IGUALDAD (**Spain**) (2011) *Real Decreto, por el que se establecen los criterios técnico sanitarios y de seguridad de las piscinas.*
 - a. **Excerpt:**

Parámetro	Valor paramétrico	Unidades	Aviso de cierre del vaso
<i>Escherichia coli</i>	1	UFC o NMP/100 mL	- Cuando los valores 8upermen 100 UFC/100 ml se cerrará el vaso hasta normalización del valor.
Legionella spp 100	100	UFC o NMP/100 L	- Cuando los valores 8upermen 1.000 UFC/L se cerrará el vaso hasta normalización del valor.
<i>Pseudomonas aeruginosa</i>	1	UFC o NMP/100 mL	- Cuando los valores 8upermen 100 UFC/100 ml se cerrará el vaso hasta normalización del valor.

6. **Health and Safety Executive and Health Protection Agency** (United Kingdom) (2006) Management of Spa pools: Controlling the Risk of Infection.
 - a. **Excerpt:** 2.3.4 Microbiological tests 139. Tests for indicator organisms should include an aerobic colony count (sometimes called the total viable (colony) count or plate count)), coliforms, *Escherichia coli*, and *Pseudomonas aeruginosa*. In addition, tests should be quarterly for *Legionella*.
7. **New Jersey Department of Health and Senior Services (2009)** New Jersey State Sanitary Code, Chapter IX, Public Recreational Bathing N.J.A.C 8:26
 - a. **Excerpt:** pages 20 – 21; Heterotrophic plate count do not exceed 200 colonies per one milliliter sample; Coliforms to be less than one colony per 100 milliliter sample, *Pseudomonas aeruginosa* not to exceed one colony per 100 milliliter sample.

3. Gary Fraser, Washington State Dept. of Health (Olympia, WA) – 5 Comments

- *Comment:*
4.7.3.7.1 – *Inability to determine product in compliance.* -- Conformity with NSF/ANSI Standard 50 shall be evidenced by the certification, listing, and/or testing by a third party Nationally Recognized Testing Laboratory – **REFERENCE:** All three conditions are needed to allow state and local health to have assurance that the product in consideration is “currently” certified, listed and tested. Manufacturers decide which products maintain listings and we need to have access to current listings to determine compliance.

CHANGES TO CODE/ANNEX: Agreed.

- *Comment:*
4.7.3.10.1.1 – *Inability to determine product in compliance.* -- Conformity with NSF/ANSI Standard 50 shall be evidenced by the certification, listing, and/or testing by a third party NRTL – **REFERENCE:** Same conditions and concerns as above. We have approved devices and a couple of years later the product no longer is certified. We need to ensure current and ongoing testing occurs and that we have access to the information.

CHANGES TO CODE/ANNEX: Agreed.

- *Comment:*
4.7.3.8.3 (NEW) – *Protection of assuring minimum primary disinfectant remains in solution.* -- When automated controllers are used with supplemental disinfection treatment devices (e.g. ozone, UV), ensure the placement of the supplement treatment and automated controllers used for reading these products are beyond the primary treatment device (e.g. chlorine or bromine compound) automated controller, if so provided. – **REFERENCE:** Failure to provide this configuration could create condition where primary disinfectant is not feeding due to the high ORP reading of the supplemental disinfectant.

CHANGES TO CODE/ANNEX: Agreed regarding need for code, but placement better under 5.7.3.3. See code text for change.

- *Comment:*
5.7.3.1.2.2 (NEW) – *Some cases of argyria have created irreversible effects.*-- Silver concentrations used to be set at 0.1 ppm in solution to prevent problems with “argyria”. This has been moved to a secondary standard in the drinking water standards. are we confident of not putting an upper limit of acceptable levels for silver in the pool? --
 - i. **REFERENCE:** Public Health Aspects of the Treatment of Water and Beverages With Silver* Feb, 1937, AJPH.

- ii. **Historical impacts of environmental regulation of silver** Thomas W. Purcell[†]
Jennifer J. Peters Article first published online: 2 NOV
2009DOI: 10.1002/etc.5620180102 Copyright © 1999 SETAC
- iii. **Environmental Toxicology and Chemistry** Volume 18, Issue 1, pages 3–8, January 1999

CHANGES TO CODE/ANNEX: Unfortunately, no good poolside test kits are available for silver testing, so we can't include an upper limit in the code at this time. However, discussion will be added to the annex to note this issue and hopefully spur development of appropriate rapid water test kits for silver testing.

- *Comment:*

5.7.6.1.1 – Suggest inserting language: Ensure the pool bottom and main drain are visible at all times – **REFERENCE:** When we were revising our pool rules effective 1990 including how to address the issue with water clarity in pools, our discussion with New York Health Dept left an indelible memory. They had a child missing and police went to the pool as one of their first places to look. After several hours of searching the neighborhood, one of the police again returned to the pool and the body of the child had rolled next to the main drain and was then visible. New York noted that the main drain is generally more visible than the rest of the pool and just looking at the contrasting color on the dark drain will be easier to spot than a light colored child on the bottom of the pool. Thus our state rule since 1990 states Water clarity (safety), main drain and pool bottom visible at all times. WAC 246-260-999 Appendix A, Table 111.2

CHANGES TO CODE/ANNEX: Agreed. See revised code for change.

4. Stacey Zarazua, Ventura Aquatic Center (Ventura, CA) – 10 Comments

5. Tom Hellmann, California Park and Recreation Society (Elk Grove, CA) – SEE “HELLMANN M&T Cover Letter”

- *Comment:*

5.7.3.1 – Dye Testing- language should be included in this module and not left for later review

CHANGES TO CODE/ANNEX: Disagree. The MAHC Recirculation and Filtration Module is the appropriate module for description of dye testing practices. This module will be available for public comment soon.

- *Comment:*

5.7.3.3.6 – Table Information -- Flow rate: you are requesting that it be recorded every 4 hours. Current CA code requires it recorded 1 time during the day when operating. This a drastic leap to record every 4 hours. What do you hope to gain from this increase in recording? How will

this recording help with pool operations?

CHANGES TO CODE/ANNEX: Disagree. UV effectiveness is highly dependent on system flows and proper intensity levels, and thus warrants frequent observation.

- *Comment:*

Set-Point Intensity: you are requesting the recording of the set point every 4 hours. The staffing power to ensure both flow rate and set-point is recorded is insane and not measurable or obtainable in today's standards and employment. What do you hope to gain from this recording? How will recording the set-point help with pool operations?

CHANGES TO CODE/ANNEX: Disagree. UV effectiveness is highly dependent on system flows and proper intensity levels, and thus warrants frequent observation.

- *Comment:*

Question: is this only for UV systems or all pools? It is unclear if no UV pools are included in this table due to the Keyword heading.

-- **REFERENCE:** See CA code

CHANGES TO CODE/ANNEX: The keyword heading indicates that the code applies to "UV Systems" and "UV System Monitoring". It does not suggest that the code applies to pools not using a UV system.

- *Comment:*

5.7.4.1 – Shall does not give any options to take a pool direct sample. It is suggested that taking a pool direct sample would be a better option once a day then from the in-line port

CHANGES TO CODE/ANNEX: Disagree. Justification is addressed in new annex text specific to this code section.

- *Comment:*

5.7.4.2.1 – The idea of a midday bulk water sample works but only if you remove the requirement in section 5.7.5.3 for testing every 4 hours. Current CA code requires 1 test during an operational day and now you want every 4 hours. Testing the pool once prior to opening and once midday would be a terrific plan for all public pools. – **REFERENCE:** CA Code: Automated sanitizers are already a CA requirement

CHANGES TO CODE/ANNEX: Disagree. Collecting a mid-day bulk water sample is not onerous in conjunction with other code requirements.

- *Comment:*

5.7.4.3.4 – Rotating to take a water test may not be possible and it is suggested that consistently taking the water sample from the same general area during that same day would deliver more consistent results that would help with better understanding of the facilities water chemistry.

CHANGES TO CODE/ANNEX: Disagree. Collecting samples from different locations around a pool gives a better picture of general pool water quality than sampling from one location.

- *Comment:*

5.7.4.3.5 – Please provide research that shows that this is necessary and not just busy work for employees. If you want accurate, measurable, and operators that truly want to take care of the pools then don't dictate water testing locations that do not have any relative science or need behind them. Taking a water sample from the pool at least 12-18" under the surface of the water is required for accurate water test sampling.

CHANGES TO CODE/ANNEX: It is not unreasonable to think that water conditions in the deep end of a pool could be different from the shallow end, based on different circulation patterns, volume to air surface ratios, etc. At least one peer-reviewed study (Cyril C, Simard S, et al. 2012. Occurrence and spatial and temporal variations of disinfection by-products in the water and air of two indoor swimming pools. *Int. J. Environ. Res. Public Health*, **9**:2562-2586) has reported that water quality parameters in samples collected from the deep end of a swimming pool can be significantly different than in samples collected from the shallow end. This reference has been added to the Annex.

- *Comment:*

5.7.5.3 – Testing pool water every 4 hours is not a realistic or manageable expectation and is an extreme to pool operations. As described above the idea of testing the pool prior to opening the facility and a midday bulk sample is the recommendation. – **REFERENCE:** CA Code: Automated sanitizers are already a CA requirement

CHANGES TO CODE/ANNEX: Disagree. Texas code requires testing public pool water every 4 hours for chlorine and pH.

- *Comment:*

5.7.5.9 – *Don't just make it a Spa requirement* -- Water temperature should be a recorded item for swimming pools. It is important to not the temperature of the pool when looking at overall pool chemistry. -- NRPA AFP manual

CHANGES TO CODE/ANNEX: Agreed. See text for change.

- *Comment*:

5.7.6.1.1 –Existing pools should be exempt from the 4 square inch tile and the use of alternate color coding should be allowed by either a drain cover color code or a weighted color disc that can be put into the pool at the deepest point to ensure water clarity

CHANGES TO CODE/ANNEX: See previous response to comments on this section and revised code text.

- *Comment*:

5.7.6.2 – *To decrease mistakes for closing a pool due to water clarity* -- You need to take into account surface disturbance and glare when looking for this visual. The untrained operator without the right eye protection or experience who does not see this visual because of bright sun or lots of bathers could make the wrong decision – **REFERENCE**: Pool knowledge and operating experience.

CHANGES TO CODE/ANNEX: See previous response to comment on this section and revised code text.

6. Pamela Scully, CT Dept. of Public Health (Hartford, CT) – 1 Comment

- *Comment*:

5.7.3.2.1.1 -- (add to existing section) The test kit provided must be able to measure both the free and total concentrations of the disinfectant within 0.1 mg/l. Test kits must use DPD (diethyl-p-phenylene-diamine) method for measuring chlorine residual. -- CT Public Swimming Pool Design Guide Section 24.3

CHANGES TO CODE/ANNEX: The section appears to not be correct in this comment. Comment likely referring to 5.7.3.2.1. We disagree that precision should be within 0.1 mg/L. Colorimetric test kits are allowable and have precision within 0.2 mg/L.

7. Robert Wagner, Private Citizen (Kansas City, MO) – 1 Comment

- *Comment*:

4.6.2.2 Air Quality – Health – *I have yet to attend a pool where I did not smell the chloramine odor. “Smell” is very ambiguous. Remediation cannot occur unless precise data is being captured. However, simple testing kits are not available. This presents a chicken or the egg problem. They will not become available unless there is a requirement for them.* -- Existing Language: “Monitoring for trichloramines can be effectively accomplished by training pool

operators to be on alert for the distinctive chloramine odor. The odor threshold for trichloramine is 0.1 mg/m³ and health symptoms start happening around 0.3-0.5 mg/m³, so odor monitoring generally works well as an early warning system” Proposed Language: “Monitoring for trichloramines is necessary to ensure the pulmonary health of users and staff. Trichloramine levels shall be reported with pool water test reports. Any levels exceeding 0.3 mg/m³ shall include a description of activity occurring in the pool and the action the pool operator took to reduce trichloramine levels in the air. An audible alarm shall sound when levels reach or exceed 0.5 mg/m³.”

CHANGES TO CODE/ANNEX: The MAHC committees are not aware of a rapid and commercially available test to quantify trichloramines in the air and this wording has been added to the Annex. Requiring testing when no rapid, commercially available test is available means that facilities automatically fail this code requirement which is not acceptable for any regulatory authority or facility. Commercial tests are being discussed that will meet the market need. This is certainly a potential research agenda. Please see the MAHC Ventilation Module, the Disinfection and Water Quality Module, and Hygiene Module Code and Annex for further guidance on improving air quality.