No Specific Language (NSL) Resolution Report on ANSI Public Review Comments – Second Public Review

CSA/ICC B805 Rainwater Harvesting Systems

CSA/ICC Joint Technical Committee on Rainwater Harvesting Systems - IS-RCSDI

Second Public Review: 11/1/2016-1/2/2017

The following comments received during the Second Public Review did not contain specific language proposed for either inclusion in or removal from the Draft Standard document. Accordingly, all comments included in this Report were Disapproved by the IS-RCSDI Joint Committee during Meeting #9 on June 7 and 8, 2017 based on the lack of specific text revisions to the Draft Standard document.

PR2 No.	Name	Clause	Comments	Proposed change
6	Wilson Chu	0	Fourth paragraph, first sentence "this Standard requires that a water safety plan (WSP) be developed for all rainwater harvesting systems." Who is responsible for this? When should it be prepared? It would be good to identify this right off the bat in this introduction. Also given the previous paragraph, should it also be done for single family residential dwellings?	Elaborate the fourth paragraph based on comment suggestions.
11	Tige Procyshyn	3	While end uses of rainwater are listed, the use of rainwater for Spray irrigation (restricted access or exposure) is not defined or detailed anywhere in the document.	Please add detailed explanation of Spray irrigation (restricted access or exposure) and how it differs from Spray irrigation (non-restricted access or exposure).
20	Wilson Chu	3.1	Sewer definition is wrong. This definition applies to a sanitary sewer as opposed to a storm sewer which does not transport sewage.	Elaborate based on comment suggestions.
26	Wilson Chu	3.1	Secondary directly-connected water supply definition, see the note. The reference to the distribution system piping is based on the premise that backflow preventers are appropriate. Not everyone agrees to this being the case. 7.3.7.6 Secondary Water Supply requires changing to the wording, as there is risk to the utility provider. Wording change in this section may be required.	Elaborate based on comment suggestions.
27	Wilson Chu	3.1	Missing definition for Restricted Access/Exposure.	Tables 5.1, 8.1, 8.2, 8.3, 8.4 refer to spray irrigation systems with

				restricted access or exposure. There should be a clear definition for the restricted access/exposure (ex. Is a fence enough of a restriction?).
28	Wilson Chu	3.1	Secondary directly -connected water supply -- this definition, as well as the definitions for distribution system and water distribution system are confusing throughout the document. Distribution system is commonly referred to in the sense of potable water systems. Suggest definitions and usage of terms, including "water supply" throughout the document be more specific. Potable water distribution system and end uses and re-use distribution system.	Elaborate based on comment suggestions.
34	Chris Twemlow	6.5	Editorial	6.5 (b) .....plumbing code..... A definition of this (while obvious to most) should be noted
37	Wilson Chu	9.8	Where is the required UVT of systems using UV disinfection stated? (as per section 8.2.3/8.2.4)	Elaborate based on comment suggestions.
38	Wilson Chu	9.8	Since Tables 8.5 and 8.6 refer to median and maximum values, over what time period does this apply? How many samples should be collected and processed/analyzed? Who should the results be reported to? What about any start up periods?	Elaborate based on comment suggestions.
57	Wilson Chu	5.2.1.2	In the first sentence, there is reference to "normal operation". What is the definition of "normal operation".	Elaborate based on comment suggestions.
59	Wilson Chu	5.2.1.2	Second sentence, "...where humans rarely come in contact with the treated rainwater...", what is the definition of "rarely"?	Elaborate the fourth paragraph based on comment suggestions.
62	Wilson Chu	5.2.2	In Table 5.1 End use Tier 2 references "Rooftop thermal cooling". Is there a consensus/clarity as to how this water is applied? For instance size of drops.	Elaborate based on comment suggestions.
67	Wilson Chu	5.2.2	In Table 5.1 End use Tier 1 references "restricted access or exposure". Please provide definition of "restricted access or exposure".	Elaborate based on comment suggestions.
68	Wilson Chu	5.2.2	Refer to Table 5.1, second footnote. If exposure potential through inhalation for HVAC evaporative cooling is high, why not move it to Tier 3 instead?	Elaborate based on comment suggestions.
71	Rosanna Breiddal	6.7.5	Section 6.7.5 Alerts and Alarms (page 30) – this section could be greatly simplified by discussing critical, major and minor alarms versus 'alarms and alerts';	Simplify by discussing critical, major and minor alarms versus 'alarms and alerts';
72	Wilson Chu	6.7.5.1	Who should alerts be provided to?	Elaborate based on comment suggestions.
73	Wilson Chu	6.7.5.2	Who should alarms be provided to?	Elaborate based on comment suggestions.

74	Wilson Chu	6.7.5.3	The second sentence states "A remote alarm or alert system using electronic communication may be used", would one make this alarm mandatory for remote installations? Also what is the definition of remote?	Elaborate based on comment suggestions.
76	Wilson Chu	6.8.2	Should the signage also be tamper/vandalism resistant?	Elaborate based on comment suggestions.
77	Wilson Chu	6.8.2	Suggest that Figure 6.1 also include the required text.	Elaborate based on comment suggestions.
79	Wilson Chu	7.1.3.1	Title is missing in this section.	Elaborate based on comment suggestions.
80	Wilson Chu	7.1.3.1	In the first sentence of Section 7.1.3.1, it references "based on the prescriptive approach". Prescriptive as opposed to? Is this defined anywhere?	Elaborate based on comment suggestions.
84	Wilson Chu	7.1.3.2	Title is missing in this section.	Elaborate based on comment suggestions.
85	Wilson Chu	7.1.3.2	In the first sentence, the reference "unless appropriate treatment", how does one treat for salt? Also please be specific in the note that follows the first sentence.	Elaborate based on comment suggestions.
91	Wilson Chu	7.1.3.2	In Table 7.1 second foot note, please provide a definition of what the word contaminated entails.	Elaborate based on comment suggestions.
92	Wilson Chu	7.1.3.2	First sentence, "address salt content", to what extent does the salt content need to be removed/addressed? What is an acceptable level of salt?	Elaborate based on comment suggestions.
94	Wilson Chu	7.1.5	First sentence, "limited to potable water or clear water waste...", suggestion that Clear Water Waste should be a defined term.	Elaborate based on comment suggestions.
104	Wilson Chu	7.3.4.3.2	In this section, there is a reference to the loads defined by AASHTO; is the AASHTO load the only relevant code? What about Canadian codes? What about access by fire trucks?	Elaborate based on comment suggestions.
105	Wilson Chu	7.3.6.1	General -- Design of access should consider confined space entry requirements , where applicable. System owners/ operators need to be aware of certification and training requirements to maintain confined spaces. Tank location and access should contemplate vehicular access for vac trucks or other large equipment required for sediment removal.	Elaborate based on comment suggestions.
107	Wilson Chu	7.3.6.2	In the second sentence there is a reference to "Access openings shall extend at least 100 mm (4 in) above ground", what about when the installation is in a basement or a parkade?	Elaborate based on comment suggestions.
113	Stephen Little	7.3.7.6	Article 2.7.1.1 of the National Plumbing Code of Canada 2010 (NPCC) prohibits interconnection of non-potable water systems and potable water systems. As per the NRC - Construction	N/A - See comment above for committee resolution/adoption.

			technical query response below, no exception is made under NPCC Section 2.7, meaning the presence of a backflow preventer does not make the interconnection acceptable under the code. As it stands, the current clause(s) in CSA B805 regarding direct connection of potable water back-up to non-potable systems is in contravention of the requirements of the National Plumbing Code of Canada and cause tremendous confusion amongst AHJs. We look forward to the resolution of this item and consistency between CAS B805 and the NPCC. Note, the Ontario Plumbing Code does allow interconnection of potable water systems and non-potable water systems provided an RPBA or AG is installed. Your question: The National Plumbing Code Article 2.7.1.1 states 'A non-potable water system shall not be connected to a potable water system'. Can you confirm this statement implies there shall be no cross-connections, as defined by CSA B64.10, unless a suitable backflow preventer is installed? Are such connections permitted when the potable and non-potable systems are interconnected with the appropriate backflow prevention device as specified by CSA B64.10 and/or in accordance with local by-laws? Codes Canada response: The intent (purpose) of Sentence 2.7.1.1.(1) of the National Plumbing Code (NPC) 2010 is "To limit the probability that the interconnection of non-potable and potable water systems will lead to contamination of potable water systems, which could lead to harm to persons.". Sentence 2.7.1.1.(1) indicates that non-potable water systems cannot be connected to potable water systems. No exemptions to this are given under Section 2.7. of the NPC.	
118	Chris Twemlow	7.3.8.6	Treated water	Although this may not fit here, many jurisdictions prohibit treated water to enter storm sewers. Some RWH tanks employ chlorine-type disinfection systems. There may be a requirement to have the treated water indirectly piped to sanitary.
121	Wilson Chu	7.4.4.1	How does the designer know what the quality of the source water is? Especially cause of new construction/design?	Elaborate based on comment suggestions.
122	Wilson Chu	7.4.4.1.1	In the third sentence there is a reference to "day tanks". Please provide a definition of day tanks.	Elaborate based on comment suggestions.
123	Wilson Chu	7.4.4.1.1	In the last sentence of this clause there is a reference "provided	Elaborate based on comment suggestions.

			measures are taken to maintain the required water quality"; what kind of measures are we referring to? and maintained to what extent?	
124	Wilson Chu	7.4.4.2.3	Where should the system be installed relative to the tank?	Elaborate based on comment suggestions.
125	Wilson Chu	7.4.4.2.5	Should this be monitored at all times? Does this contradict the values in section 8.1.4 and Table 8.5.	Elaborate based on comment suggestions.
127	Wilson Chu	8.1.1	How shall equipment used be validated to meet the minimum performance criteria?	Elaborate based on comment suggestions.
129	Wilson Chu	8.1.4	Last sentence, "maintain a chlorine residual of 0.5 mg/L" how does this relate to section 7.4.4.2.5.	Elaborate based on comment suggestions.
130	Wilson Chu	8.1.4	In the note, third sentence, there is reference to "Regular flushing-out of storage sediments" what constitutes as regular?	Elaborate based on comment suggestions.
133	Sara Finley	8.1.5	These quality standards are, beyond a shadow of a doubt, excessively strict for non-potable water uses. I fear this will have the effect of effectively disallowing the re-use of rainwater to supplement the use of potable water, especially at the single-family residential level. As a rainwater harvesting systems designer, I can guarantee that zero (or perhaps *very* few) single-family houses will be willing to invest in both micro-filtration and disinfection just to use rainwater in the garden or in the toilet. These are extremely low-risk activities and no illnesses have ever been actually documented from the use of rainwater for these uses. This excessively cautious approach risks quashing interest in rainwater harvesting in Canada, even as it becomes more necessary from an environmental standpoint and interest in the practice grows. I encourage you to take a look at the German rainwater code, in place since 1989- the German code allows untreated rainwater reuse for a range of non-potable purposes, and no adverse health effects have ever been reported in relation to this permissive code. In Australia, 10 million people drink untreated rainwater on a daily basis. The fears of illness from reusing this water are unfounded and unproven, and obligating would-be water-conserving residential users to disinfect rainwater for use in the toilet or the garden is excessively restrictive. Quoting Susan R. Ecker (Senior Plumbing Engineer, Rumsey Engineers) "Recent studies conducted in Germany have shown that although the quality of rainwater in reservoirs generally does not meet the	This subject was considered at length by a committee of experts involved in the Water Use Efficiency task group at the CNRC. We performed extensive literature review and considered the equivalencies of codes and standards in place around the world, including those that have long been implemented without issue in numerous US cities, foreign cities, and other countries. The above quality criteria are hundreds of times stricter than each and every other rainwater standard and code consulted, and there is no logical reason for Canada to be so much more cautious in this regard. Based on this research, the committee decided to allow a performance route and a design route to meet acceptable levels of quality for rainwater. The code section proposed is below. I can also supply research documents and detail on foreign codes and standards in attached material if required. Please do not hesitate to contact me for more documentation. A rainwater harvesting system shall be provided with a means to treat the water in such a way that the quality of the delivered non-potable water conforms to appropriate provincial/territorial requirements or, in the absence of such requirements. [a] --) shall be provided with a means to treat the water in such a way that the delivered non-potable water contains less than the maximum acceptable levels stated in ARCSA/ASPE 63, “Rainwater Catchment Systems” as follows: [i] --) 100 CFU/100ml of Escherichia coli, [ii] --) 10 NTU of Protozoan Cysts, or [b] --) shall be provided with a treatment system consisting of, [i] --) a 6mm mesh size debris screen before the inlet to the cistern, [ii] --) a first-flush diversion system with a

			quality of potable water, it is extremely well suited for domestic uses such as flushing toilets. One study took several billion fecal bacteria and mixed them in a toilet bowl with the water from of rainwater reservoir, which has a maximum concentration of 10,000 E. coli per liter. According to the literature, the probability of a single bäcterium reaching the vicinity of the human mouth during the flushing action is in the order of approximately 1:1,000,000. From this the study concludes that the possibility of any E. coli reaching the vicinity of the human mouth when toilets are flushed can be virtually excluded. These studies were performed to demonstrate that no special disinfection measures were necessary for rainwater to be used for non-potable water functions." I also strongly caution against the use of performance-based (log-reduction based) quality standards for rainwater. This criteria format is intended to gauge the effectiveness of wastewater treatment, where log-reductions of bacteria represent millions of specimens removed. In rainwater, raw water bacterial counts are many orders of magnitude lower (usually well below 100CFU/100mL), so even a 2 log removal effectively means 0 bacteria, and 4-log removal has no real scientific meaning for water of this raw quality. This level of disinfection is absolutely excessive for these purposes, and the wastewater-based criteria system is effectively meaningless when rainwater is considered. This standard effectively requires that well-meaning single-family homes treat rainwater to potable levels in order to be allowed to use it for garden watering. Its application would discourage rainwater use entirely, or encourage scofflaws to develop unpermitted systems. It is far too strict.	0.3 l/m2 of roof area before the inlet to the cistern, [iii] --) a calming inlet or settling chamber before the inlet to the cistern, [iv] --) a device to prevent sediment entrainment into the suction of the pump, and [v] --) where rainwater is used for indoor applications, a maximum 50 micron filter.
136	Wilson Chu	8.1.5	In Table 8.1, Fifth foot note, second last sentence there is a reference "unless a chlorine residual of at least 0.5 mg/L". How does this relate to section 7.4.4.2.5?	Elaborate based on comment suggestions.
137	Wilson Chu	8.1.5	In Table 8.2, Fifth foot note, second last sentence there is a reference "unless a chlorine residual of at least 0.5 mg/L". How does this relate to section 7.4.4.2.5?	Elaborate based on comment suggestions.
138	Wilson Chu	8.1.5	In Table 8.3, Fifth foot note, second last sentence there is a reference "unless a chlorine residual of at least 0.5 mg/L". How	Elaborate based on comment suggestions.

			does this relate to section 7.4.4.2.5?	
139	Wilson Chu	8.1.5	In Table 8.4, Third foot note, second last sentence there is a reference "unless a chlorine residual of at least 0.5 mg/L". How does this relate to section 7.4.4.2.5?	Elaborate based on comment suggestions.
150	Wilson Chu	C.3.1	In Table C.1, the Low Temperature Resistance Row states a "Pass -32 degrees celsius". This requirement may not be appropriate for Canada as the temperature will drop past -32 degrees celsius during the winter months.	Elaborate based on comment suggestions.
151	Cameron Braun	C.4.1	Are you suggesting that wooden tanks can be used for any of the water storage types listed in this Standard, whether non-potable or potable, if it meets the criteria listed?	Consider if a specific application needs to be associated with wooden tanks.
153	Wilson Chu	D.1	What is the definition of environmental initiative storage (EI)?	Provide a definition or elaborate on the meaning of EI.
155	Wilson Chu	D.1	What is the definition of storage loss volume (SLV)?	Provide a definition or elaborate on the meaning of SLV.
157	Wilson Chu	D.2.1.2	Why is the yield not evaluated for the minimum amount of rainfall too?	Elaborate based on comment suggestions.
160	Wilson Chu	D.2.2.1	Why is the yield not evaluated for the minimum amount of rainfall too?	Elaborate based on comment suggestions.
161	Wilson Chu	D.2.2.2	The rainfall abstraction Fabs, should reflect the summation of all events.	Elaborate based on comment suggestions.
167	Wilson Chu	D.2.2.5	Please provide references for the values and equations.	Elaborate based on comment suggestions.
170	Wilson Chu	D.2.3.2	The rainfall abstraction Fabs, should reflect the summation of all events.	Elaborate based on comment suggestions.
172	Wilson Chu	D.2.3.3	Why not refer to section D.2.2.5? As that one is more comprehensive.	Elaborate based on comment suggestions.
173	Wilson Chu	D.2.4	Perhaps consider looking at another name for the title instead of the title "Calculation method" as the preceding two methods are calculation methods as well.	Elaborate based on comment suggestions.
178	Wilson Chu	D.4.12.1	What is this? Please provide a graphic.	Elaborate based on comment suggestions.
179	Wilson Chu	D.4.12.2	What is this? Please provide a graphic.	Elaborate based on comment suggestions.
181	Wilson Chu	D.4.2.1	The examples provided appear to be farfetched and unrealistic in reality, please consider eliminating the examples and only leaving section D.4.3.	Elaborate based on comment suggestions.
187	Wilson Chu	D.4.6	What is the rationale for using a 10 year return frequency?	Elaborate based on comment suggestions.
188	Wilson Chu	D.4.6	The equation provided appears to be for one specific locale. It shall be made, generic to all of North America?	Elaborate based on comment suggestions.
189	Rosanna Breiddal	D.4.6	Rainfall Intensity – In the Clarington Intensity Formula, I = a/(b + Td) where b = 16 for a 10 year storm event. Not sure where	Check number and correct if necessary.

			the 15 value set out in section D.4.6 came from. Is this number correct?	
191	Wilson Chu	D.4.8	Please provide references for the equations in this section. They appear to have been created for one particular location, and then, by extension, be extrapolated to all of North America. If so, that is inappropriate from a Water Management Perspective. These formulas shall be generic, in principle.	Elaborate based on comment suggestions.
192	Wilson Chu	D.4.8.1	What is the rationale for using a 10 year return frequency?	Elaborate based on comment suggestions.
199	Wilson Chu	E.1.4.2	How many samples shall be collected? How often?	Elaborate based on comment suggestions.
200	Wilson Chu	E.1.4.2	Report results to?	Elaborate based on comment suggestions.
201	Wilson Chu	E.1.4.2	What if results are poor? What actions are taken?	Elaborate based on comment suggestions.
202	Wilson Chu	E.1.4.2	Reconcile temperature of 20 degrees Celsius with the value of 25 degrees Celsius in section 8.1.4.	Elaborate based on comment suggestions.
204	Edward Van Giesen	E.2.2	Excessively onerous for the water safety plan. Recommend striking it. Especially if the system is for non-potable systems.	The site assessment should provide, at least, a general description of the site, end uses for harvested rainwater and any potential chemical or microbial contamination that could be present. Therefore, the information provided in the site assessment should include at least the following: Site location and a map showing all the properties within the proposed catchment area. Sanitary maintenance hole covers on or in close proximity to the site. Zoning classification of all properties contributing to the catchment area. If the site is zoned as industrial and the proposed catchment area contains surfaces other than the roof area, a more robust baseline investigation should be conducted to determine if chemical or microbial contamination is present. Total size of the catchment area. Description of site and surrounding area based on available information and data. Short narrative of how the property was historically used. Description of planned future uses of the site. Summary of any environmental investigation(s). Surface characteristics of the catchment area (e.g., Is the catchment area subject to vehicular traffic or pedestrian traffic? Are there overflows or bleed-off pipes from roof mounted appliances, flues, or smoke stacks? What is the roofing material? Are there vegetated roof systems?) Summary of end uses for the harvested rainwater system.. Note: ASTM E2727 provides useful guidance on site assessment related to rainwater quality.
205	Rosanna Breiddal	E.3.2	Suggest highlighting that rainwater has a higher potential to leach metals and other soluble chemicals from collection and	See above.

			storage material due to its usually soft/corrosive in nature. Therefore, some consideration may need to be given to corrosion control, particularly if there will be storage for some time.	
206	Edward Van Giesen	E.4.1	Need to designate the person who monitors the system.	An essential component of the incremental improvement plan is to ask questions related to each identified hazard, such as the following: (a) What is the source of the hazard, and can the likelihood of contamination be eliminated or reduced? (e.g., removal of overhanging branches that could enable animals to access the roof, or the placement of a fake owl to deter birds.) (b) Where is the hazard located? (e.g., northern quarter of the catchment area.) (c) How is the hazard assessed? (e.g., visual inspection or water quality testing.) (d) What system components are impacted by the hazard? (e.g., collection surfaces, downspouts, storage reservoir, or distribution system.) (e) Designate the person Who is responsible for inspections and for monitoring the hazard(s)? (f) How often is the system likely to be inspected for each identified hazard and mitigation measures adjusted? (g) What mitigation measures can be applied? (e.g., routine cleaning, first flush diversion, removal of overhanging vegetation, bird deterrent systems, exclusion of roof areas from collection.)
208	Edward Van Giesen	E.5.2	Inlet pre-filters must be designed to account for velocities of roof water entering the filter body. This should be noted. See below.	The general narrative of the overall collection, treatment, storage, and distribution system should include the following technical information: Catchment area size. Roofing materials. Vertical conveyance materials. Conveyance pipe materials. including a calming length for pipe entering the inlet pre-filter Storage tank information, including: tank volume; tank dimensions; tank construction materials; and location (i.e., above- or below-ground). Pre-filtration system information, including type of pre-filter(s); quantity of pre-filters; filtration particle size; and location (e.g., above- or below-ground). Pump system information, including brand, make, and model of pump(s); capacities and heads of pumps and flow (gpm's) and pressures (psi) after last appurtenance before rainwater enters the distribution system; and horsepower. Water treatment system information, including narrative on treatment goal; intended level of disinfection (e.g., not applicable or log reduction of viruses, protozoa and bacteria); type of filtration or disinfection: (e.g., sediment, activated carbon, UV, or chlorine,);

				make-up water or rainwater harvesting system bypass contingency; water treatment components brands, makes, and models; and date of equipment installation. Distribution piping information, including distribution piping material(s); and length of distribution piping system.