

NATIONAL WATER REUSE ACTION PLAN

COMPLETED ACTION

Action 4.5: Evaluate and Promote Air-Cooling Condensate Water Reuse Standards, Methods, Tools, and Technologies for Implementing Systems in Large Buildings



Background

Air-cooling (AC) equipment pulls warm air across cooling coils and humidity in the air condenses on the coils, creating condensate water in large volumes. In humid zones, a 100,000 square foot building (or if arid, a 200,000 square foot building) can produce one million gallons of A/C condensate per year. AC condensate is an alternative water resource that can serve several purposes for onsite non-potable reuse. For example, condensate can provide water used for landscape irrigation, help compensate for cooling tower evaporation and save costs by reducing power plant water usage and energy.

While generally considered a high-quality source, empirical studies of condensate water quality to inform appropriate risk management practices have been limited. Through research and professional events, this action sought to develop a better understanding of AC condensate water quality.

Accomplishments

- Conducted a study that characterized the quality of AC condensate from 13 air handling units across four geographic locations (North Carolina, Indiana, Texas, and Florida), focusing on contaminants specifically relevant for fit-for-purpose use in cooling towers or irrigation.
- Developed a [presentation](#) that summarized results of the condensate water quality study characterizing opportunistic pathogens and metals.
- Created *Water Quality Assessment of AC Condensate for Onsite Collection and Use* [poster](#) summarizing study results, including the following information:
 - Why collect AC condensate?
 - Is condensate safe for use?
 - Microbiology study results
 - Metals and major ions study results
 - Best management practices for reuse
- Engaged in various collaborative action team meetings to promote information sharing related to relevant ASHRAE and IAPMO codes as well as applications of EPA's Non-Potable Environmental and Economic Water Reuse ([NEWR](#)) Calculator.

Action Team

Action Leaders

- **American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE)**
 - Thomas Lawrence (proftom@uga.edu)
- **Design Aire**
 - Bob Boulware (bobboulwater@aol.com)
- **International Association of Plumbing and Mechanical Officials (IAPMO)**
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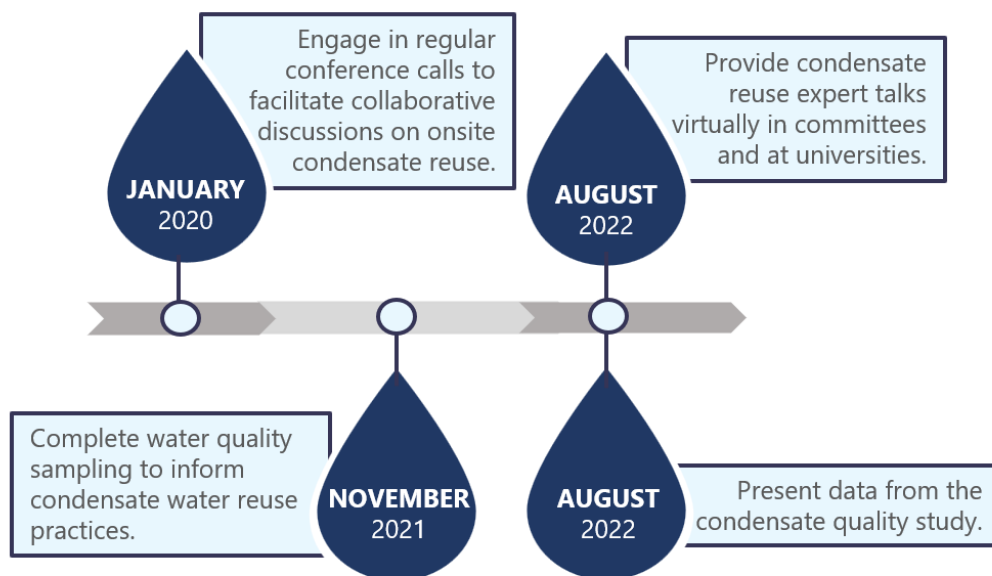
Action Partners

- See the full list on the [WRAP Online Platform](#)

Impact

- Results of the condensate water quality study indicate the potential for microbial growth and metals leaching in untreated condensate collections, emphasizing the need to manage these systems similarly to other premise water distribution systems during reuse. These conclusions are consistent with existing guidance and will be used as supportive evidence for inclusion of appropriate condensate collection and use practices in industry plumbing codes.
- The poster presents an analysis of opportunistic pathogens and metal ions in condensate collections to inform the development of fit-for-purpose onsite reuse guidance. It recognizes the potential for AC condensate collection and use in large buildings and increases understanding of relevant water quality concerns by empirically demonstrating real-world contaminant occurrence. It also shares how the growth of *Legionella* and other opportunistic pathogens can be controlled in condensate collection systems.

Action Implementation Process



Potential Future Activity

- Study results can be used to inform the development of risk-based targets for these systems, facilitating the incorporation of condensate collection and use within relevant plumbing codes and reuse policies. A peer-reviewed journal article is in preparation.

Additional Resources

- Glawe, D., Wooten, M., and B. Lye. (2016). [*Quality of Condensate from Air-Handling Units*](#). ResearchGate.
- San Antonio Water System. (2013). [*San Antonio Condensate Collection and Use Manual for Commercial Buildings*](#).
- Sharvelle, S., Ashbolt, N., Clerico, E., Hultquist, R., Leverenz, H., and A. Olivieri. (2017). [*Risk-Based Framework for the Development of Public Health Guidance for Decentralized Non-Potable Water Systems*](#). Prepared by the National Water Research Institute for the Water Environment & Reuse Foundation. Alexandria, VA. WE&RF Project No. SIWM10C15.