

# Your PAA Questions Answered:

## *Responses to Webinar Questions*

Thank you for all the great questions submitted during our webinar. As promised, here are the written responses. If you need additional information—or have thought of more questions—please do reach out to our panelists. Their contact information is provided in the blue box to the right.

### ***Is there a PAA discharge limit for effluent?***

There are guidelines on the PAA labels, but effluent limits are regulated at the state level and usually based on specific toxicity studies. Receiving body water quality and dilution capabilities are taken into account.

### ***What water quality features do you think cause PAA to be less effective than Chlorine?***

This is site specific, but there are more examples of water quality characteristics where PAA has lower demand than chlorine, such as nitrite and other chlorine-reducing compounds. Typically, if PAA isn't selected as an alternative, (barring other drivers) the reason is that dose is not significantly lower than the chlorine dose to make it cost effective.

### ***Have you done toxicity tests on PAA?***

Yes, we and others in the industry have performed toxicity tests on PAA-treated effluent at many different locations. Toxicity is a big focus of the WRF PAA report that will be released this year. One of the major advantages of PAA is that it degrades quickly and is generally less toxic than chlorine.

### ***When I did a study on PAA, I was required to store the PAA in a fire-protected fridge. Is this required?***

At the facility level (as required by the IBC), regulations are less onerous for PAA than for chlorine gas. Please contact us if you'd like information on code references and guidelines.

### ***Will PAA reduce pH? What about effects on concrete or pipes?***

The effect on pH is not usually detectable at typical doses. For neat chemical conveyance, passivated stainless steel is the preferred material. For PAA-treated effluent, no special materials or coatings are required.

### ***Did you have issues with heat over the PAA tanks in Memphis? What were the measures taken to minimize heat impact on the PAA solution stored in the tanks?***

No measures were implemented to mitigate heat impacts for on-site storage tanks because storage time is short enough that degradation is not an issue.

### **Did you think of another question?**

Please reach out directly to our panelists. They will be happy to respond:

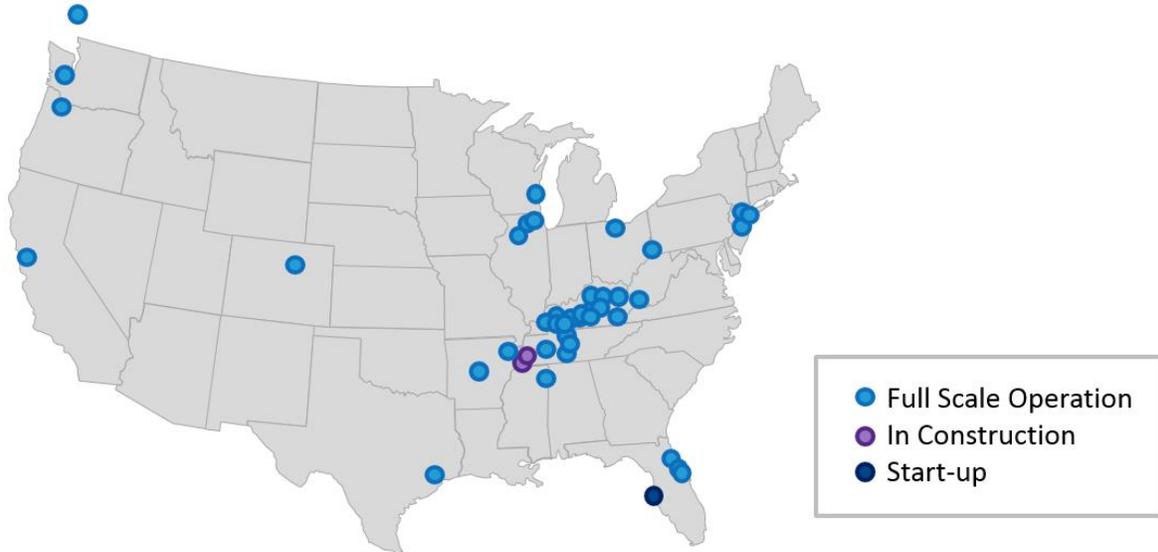
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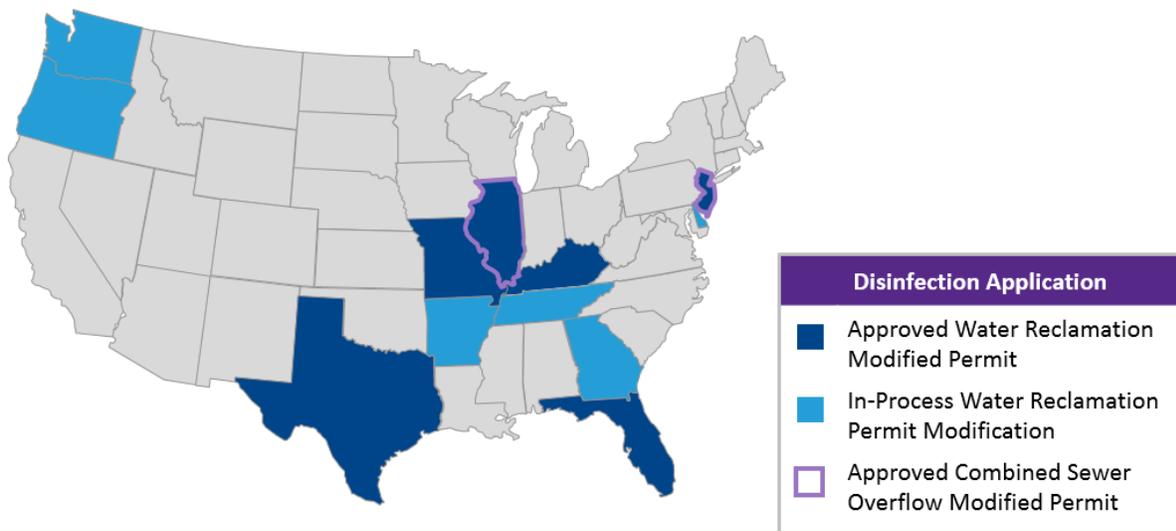
**Do you have a list of facilities and states the use or allow the use of PAA?**

The maps below illustrate 1) the states and general locations of where PAA is being implemented. CDM Smith is unable to provide information on facilities utilizing PAA, however we suggest you reach out to the larger PAA providers, such as EnviroTech, PeroxyChem and US Peroxide, and ask if they are able to provide a list of the facilities that utilize their PAA.

*As of Feb 2018, there are more than 20 installations across North America utilizing PAA as the full-scale disinfectant.*



*Summary of Regulatory Acceptance*



***Would you know which parameters can mostly affect the dose (or eventually killing of bacteria) of PAA?***

When conducting PAA pilots, we typically measure a host of undisinfected water quality characteristics including color, BOD, COD, UVT, TSS, bacterial load. These parameters often correlate directly to instantaneous PAA demand, which in turn impacts overall efficacy for a given dose.

***Have you had any experience with the maintenance of the contact tank (since it seems disinfection with PAA may cause a pinkish slime to develop on the walls of the contact tank)? It appears it is not easy to clean and may impact system performance.***

We have seen slime issues at select locations; some mitigation measures include covering the tank or implementing a tank cleaning schedule using high pressure water spray.

***Can you compare/contrast the health & safety benefits/disadvantages of PAA utilization?***

No RMP is required for storage of PAA compared to chlorine gas. PPE requirements are the same as full strength sodium hypochlorite. Off gassing measures are required in the PAA piping system. One disadvantage is that rapid decomposition can occur (in rare instances), and the tanks must be built to accommodate that safely.

***Will PAA use eliminate PSM and RMP programs for a chlorine system?***

See answer to previous question.

***Are there any water treatment plants using PAA?***

Not any that we are aware of at this time.

***In drinking water, could you use PAA at a contact time that kills bacteria that chlorine will not kill?***

We are not aware of any use of PAA for drinking water disinfection at this time because the residual does not persist. We also are unaware of any bacteria that PAA inactivates that chlorine does not.

***Is PAA NSF approved for drinking water?***

Yes, there are formulations that are NSF approved, but not all of them are.

***Does PAA require a Risk Management Plan as chlorine does?***

No.

***Are there different ways the regulators look at the use of PAA between full disinfection vs. supplemental disinfection for a UV system?***

There are still very few supplemental systems permitted; however, we believe there is no difference. Residual oxidant limits and disinfection requirements still apply.

***What would you say is too much contact time? Can we get regrowth at low flow time?***

A dose/contact time configuration that does not maintain a residual in the contact tank is a concern and can result in bacterial growth in the contact tank. Therefore, a residual should be

maintained at all times in the contact basin to prevent growth, and correct dosing procedures will attain that goal.

***How does PAA's carbon footprint compare to chlorine or UV?***

From a transportation perspective, it is similar to chlorine. From a manufacturing or energy perspective, we have not quantified this yet.

***Is it a non-oxidizing biocide? for RO membranes?***

PAA is an oxidant, and it is being studied as a possible membrane biocide.

***Do the Memphis projects have high speed induction mixers?***

No. PAA was added neat at the surface of the contact tank and fixed baffles in the contact tank, sized via CFD modeling, provided the necessary mixing.

***What is the pH impact of PAA?***

PAA has a low pH; however, there is so little added to the effluent of a treatment facility that the effluent pH is unchanged after PAA is added.

***Does PAA require additional pH adjustment of the effluent?***

No.

***How much BOD are being added?***

The amount of BOD added per mg/L of PAA varies from facility to facility, and it depends upon the acetic acid content of the PAA itself. We have seen no increase (because the amount of BOD added is within the accuracy of the BOD analysis) up to 3 mg/L of BOD per mg/L of PAA dosed. The typical range of BOD added per mg/L of PAA dosed for a 12 or 15 percent PAA solution is between 0.5 and 1.0.

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