**Jar Testing Small Group Discussion**

**Attendees:** Tom Waters (EPA TSC), Stephen Baker (WA), Joe Uliasz (KY), Dave Messer (KY), Julie LeBlanc (LA), Aaron Hillborn (AR), Erich Webber (TN), Indumathy Jayamathy (MI), Amy Francis (TN), Johnny Mendez (AK), Tom Chyra (CT), Mike Bolf (MI), Brandon Comeaux (LA), Chris Roberts (AR), Emily Hoskin (OK), Johnathan Reynolds (EPA R6), Traci Miles (KS)

**Objectives:**

1. Are you or systems in your state or region conducting jar testing? If so, what applications (e.g., tur­bidity, DBP precursors, pre-oxidation, HABs, PAC, etc.)?
2. What barriers do you see in getting systems to conduct jar testing?

**Discussion:**

* Dave Messer discussed what Kentucky does with jar testing. He and Joe apply jar testing to most treatment plant processes, including PAC dosing, testing chemical application points, optimal pre-oxidation concentration, and dose location (dose rate to satisfy demand).
	+ Dave discussed his *“bucket test”* for assessing permanganate demand. He tells systems the water should stay pink for 15-30 minutes to satisfy pre-oxidant demands.
	+ Kentucky rarely uses calibrated jar test settings. Usually, the standard settings do a decent job of predicting plant performance and usually the full-scale processes perform better.
	+ Dave actually has a jar tester in his truck for field work.
	+ In most systems, especially the smaller ones, jar testing is only conducted by chemical salespeople.
	+ Dave oversees two regions in Kentucky, encompassing about 100 WTPs. He usually provides technical assistance to systems that are having issues with compliance.
* Stephen Baker is interested in any tips or techniques the group may have regarding calibrating doses (i.e., how to transfer jar test results to the full-scale plant). It would also be helpful to have a decision tree to select coagulants based on raw water parameters.
* Mike Bolf indicated that, in Michigan, coagulant selection usually comes from chemical salespeople. This approach has mixed results.
* Julie LeBlanc indicated that it has been a while since Louisiana staff have conducted jar tests. They have only done jar testing during turbidity-based PBT. In those situations, they tried to match plant conditions and coagulant type, then tried to optimize dose. Most jar testing conducted in Louisiana is done by chemical salespeople. Julie had never even thought of applications for jar test­ing outside of optimizing coagulant dose.
* Joe Uliasz sometimes calibrates a system’s jar test ahead of time, prior to arriving onsite; however, most of the time, Kentucky staff do not have time to calibrate for each plant that they visit. Joe acknowl­edged that an uncalibrated jar test won’t necessarily provide an exact result, but it will give you a *“rela­tive result.”*
* Chemical salespeople often rely on visual characteristics of the floc during jar testing. Operators see the big floc and switch; then sometimes issues arise. Kentucky is trying to educate operators.
* Dave Messer indicated that Kentucky often uses a micropipette to dose jars. These are the small, adjustable pipettes with disposable tips. He uses a 5-50 µL pipette, which costs about $150 - $200.
* He emphasized that the jar test is the start of the process to optimize, but you also need to ensure that the operators understand the process and how to interpret the results.
	+ Dave also has developed a guidance document for permanganate dosing. The guidance essen­tially creates charts for individual plants such that, given particular raw water iron or manganese con­centrations, the guidance helps operators know what permanganate dose to feed.
	+ Stephen Baker asked about switching coagulants and implications on corrosion control, for exam­ple switching from alum to polyaluminum chloride.
	+ Tom Chyra asked if anyone is looking at the chloride-to-sulfate ratios at plants when they switch from alum to PACl.
	+ Dave Messer is Kentucky’s statewide chemical change coordinator. Part of his review process is to consider simultaneous compliance with other regulations. Test pH and alkalinity during chem­ical trials/pilots and conduct follow-up sampling. Kentucky has chemical change SOP templates.
	+ Mike Bolf indicated that Michigan has a state peer review team for these matters.
* Johnny Mendez asked about the use of a streaming current meter during jar testing.
	+ Dave Messer indicated that the ones he has seen require pH adjustment and are only applicable with alum. He doesn’t have too much experience with streaming current meters. He has found that, in general, the best TOC removal is achieved by a littler higher coagulant dose than one that is opti­mized for turbidity removal.
	+ Joe indicated that a streaming current meter is only as good as it is maintained. Calibration and verification are important.
* Chris Roberts has had only a few jar testing experiences in Arkansas. Given his lack of experience, he understands how it can be intimidating for operators. Arkansas had one system that would conduct jar testing frequently – every day. However, once they got a new manager, he figured they had enough data and now they don’t jar test as much.
	+ Joe indicated that he and Dave are very comfortable with jar testing. However, other technical assistance providers in Kentucky had never jar tested, so they conducted training. Also, the first plant that Joe worked at would jar test at least once per shift.
* Mike indicated that, in Michigan, they encourage systems to jar test. However, a minority of the high-performing plants jar test, and the rest do not. Michigan does not have equipment to perform jar test­ing. How do other states have capacity?
	+ Dave’s job is technical assistance, so usually the plants he works with are having issues with compliance and his involvement is enforcement related. His job is to bring them into compliance by looking at all aspects of treatment (PAC dosing, coagulants, chemical feed locations, oxidants, etc.).
		- Mike indicated that many of these TA activities that Kentucky is describing are performed by consultants in Michigan.
	+ Julie LeBlanc indicated that she has only jar tested as part of AWOP PBT.
	+ Joe indicated that he and Dave also do hold studies, tank studies, etc., in addition to jar testing, as part of their technical assistance positions with Kentucky.
	+ Traci Miles – In Kansas, similar to Louisiana, they have only jar tested as part of PBT.
	+ Aaron – Arkansas used to have more jar testing practice, focused mostly on technical assistance related to DBPs. They have kind of moved away from jar testing, but they hope to start again soon.