

# WILCOX PHS

PUBLIC HEALTH SOLUTIONS

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## The Case for Roanoke City Schools to Adopt Hypochlorous Acid, HOCl, and Onsite Generation for Infection Mitigation and Control

Many things have changed in the last two years that have made everyone look at their world differently. Work has changed, life has changed, how we interact, purchase, recreate, spend time with family and do our jobs have all changed. The pandemic of Covid 19 has shown us in dramatic detail how pathogens can transmit, infect, hurt, and kill. It has also shown us the real crisis in our careers in the commercial cleaning industry and facility maintenance in more ways than one. The last two years have shown us that the indoor air and what's in it matters as much or more than what is on the surfaces in our facilities. Updating chemicals, equipment, processes, and training are all important and needed.

What Covid showed us is that staying home when you are sick, wearing a face covering in public, and good hand hygiene. It taught us to think about social distancing, and to think more about how pathogens work. Covid made us examine how our behaviors affect our own health. Self-care and public health came to the forefront for everyone. More importantly facility managers now must look at the surfaces they are tasked with maintaining, cleaning, and disinfecting as well as cleaning the air, protecting workers, students, staff, and the environment.

Now more than ever using chemicals and equipment that are more efficient to help departments do more with the same or less resources is becoming the norm. Technology is part of our lives in many ways, and now is the time that it became a bigger part of facility management. Some of this technology that can help solve many of the issues seen with the Covid 19 pandemic is onsite

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generation of cleaners, sanitizers, and disinfectants. This technology puts making product in the hands of the end user and not the chemical manufacturer. Supply chain issues have been some of the worst during the pandemic and will continue. In the beginning of the pandemic people were not able to get hand sanitizer, or many other cleaning and disinfecting chemicals. This was due to supply chain issues of bottles, pumps and chemical ingredients.

Onsite generation solves the supply chain issue. Once the capital investment is made of onsite generation equipment, cleaners, sanitizers, and disinfectants can be readily made with water, electricity, and salt.

The other key points of why using onsite generation products make sense are that they contain no synthetic chemicals, no VOC's, they do not promote superbug formation in how they kill pathogens, they are proven to work through lab testing. Onsite generated chemicals are EPA registered, "n" list approved, biodegradable, no rinse, and leave no residues behind, and are p.h. neutral. The two types of onsite generation are aqueous ozone production for cleaning and sanitizing and hypochlorous acid and sodium hydroxide production for sanitizing and disinfecting as well as degreasing.

Per the CDC and EPA, a two-step of process is needed and required for the best cleaning and infection control protection and practices. Onsite generation can cover both of these steps and produce better cleaning, disinfection and infection mitigation and control to put any facility in front of and not behind the eight ball when it comes to Covid 19 and any other pathogenic outbreak to come. Onsite generation is the least toxic, most effective way to kill pathogens we encounter daily in a school setting. As well as putting supply chain issues in our control regardless of what is happening in the world.

Aqueous ozone is the other side of the same onsite generation coin and is the perfect partner is facility maintenance. Roanoke City Public Schools has both and they will be integrated together to produce one of the best green cleanings and less toxic infection control systems in all the country. The Aqueous ozone products can replace hard surface, stainless steel, window and glass, floor, and carpet cleaning products. Additionally, HOCl can replace all sanitizer and disinfectant products.

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With Onsite generation there can be a 50 to 100 percent reduction in other cleaning and disinfecting chemicals used onsite.

Roanoke Public City Schools, RPCS, is taking this very important step in installing hypochlorous acid generators in its district to take control of their environment in house while doing it cost effectively, less toxically and safer than using any other products on the market. Hypochlorous acid isn't an alternative at this point it IS the answer for health, safety, performance, financial and supply chain responsibility.

We are living in a world where we never thought that a pandemic like we have seen with Covid would happen, but it did. The reality is pathogens are tenacious as we have seen with the longevity of Covid 19 and its variants and mutations. Odds are there are other pathogens waiting for an opportunity to break, out and with products like hypochlorous acid made by onsite generation districts like Roanoke will be well prepared to handle anything. Quats or quaternary ammonium compounds are old technology and need to be replaced due to their cost, toxicity, and hazards. While quats and chlorine bleach kill pathogens they also have toxicity, corrosivity, degrade indoor air quality and other issues. Quats came at a time when the industry needed to move away from phenolics, iodine and other old disinfectant technologies. Now New technology exists that works and is safer and it should be used.

Hypochlorous acid is different in that it isn't made and put in bottles and stored on a shelf for many years. It is much more sustainable than that. The machine or tablets used to make hypochlorous help cut down on solid waste of cardboard and plastic by up to 70 percent. There is also time savings involved in that the chemicals don't need to be ordered, shipped, received, stored, moved to janitorial closets, unpackaged, stocked, and diluted. Minutes saved over days, weeks months etc. turn into many hours of payable work hours to do these tasks. With onsite generation time is not wasted and the chemicals generated are just a button push away.

Other attributes of hypochlorous acid are that it is very inexpensive to make. Disinfectant routinely costs dollars per gallon to make and sanitizer cents per gallon making it very economical to use. It can also do many things from sanitize infant toys, to disinfecting diaper changing stations, to sanitizing food prep areas, disinfecting bathrooms, nurses' offices, wrestling mats, athletic

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equipment lockers, showers, classrooms. As well as offices, common areas as well as the air. Hypochlorous acid is the ONLY sanitizer and disinfectant needed in any facility.

The reason it is the only sanitizer and disinfectant needed is because at different concentrations it will kill any pathogen that a facility may see from food borne pathogens in kitchens and food to the hardest spore to kill in C diff in hospital settings. For k – 12 setting pathogens of concern such as the cold, flu, covid, MRSA, Norovirus, and other pathogens are all killed by hypochlorous.

Hypochlorous acid is also made in our own bodies in our immune systems. It is of a neutral pH and both of these facts make it much less toxic and hazardous to people when using. It is less sensitizing to skin, eyes, and respiratory systems than traditional disinfectants made of chlorine bleach and quats. Both chlorine bleach and quats are on the federal AOC lists of chemicals that cause or exacerbate asthma. Chlorine bleach can exacerbate asthma and other breathing problems like COPD and quat based products can cause primary asthma in one exposure. Quat products are also tied to reproductive issues and neurological hazards like dizziness, headaches, numbness, and tingling in fingers and hands. Hypochlorous acid does not cause any of these issues when used. It again is made in our bodies and was first used on battlefields as a wound care product. Therefore, with its lab testing to show pathogen killing efficacy, its neutral pH, its being less toxic and safer to the environment, materials, and people it is the disinfectant of choice in 2022. Hypochlorous acid does what we need it to do and more while being cost effective, less toxic, and safer.

Other factors to use hypochlorous acid are that it is biodegradable, has no fragrances or dyes that are synthetic to leave residues behind, it kills in a different way than quat and chlorine-based disinfectants so that it doesn't promote adaptation or mutation of pathogens to more infectious or dangerous species, and with onsite generation sanitizer and disinfectant are readily available when needed.

The below comparison table helps highlight the differences between the industry standard chlorine bleach and quat products versus hypochlorous acid, HOCL, the current best technology in disinfection products.

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EPA Registered Disinfectant Comparison Table			
	Chlorine Bleach	Quaternary ammonium compounds	Hypochlorous acid
Asthmagen	Y*	Y^	N
pH	13	13	6.5-7
EPA Registered, has all federal tested required	Y	Y	Y
No Rinse Food Contact Sanitizer great for cafes and pre-K and K toys	N	N	Y
Needs a Rinse	Y	Y	N
Fragrances & Dyes - synthetic	Y	Y	N
Can leave residue behind	Y	Y	N
Sustainable	N	N	Y
Onsite generation relieving supply chain issues	N	N	Y
Biodegradable	N	N	Y

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Can cause Superbug formation by the mode of killing microbes	Y	Y	N
Reduces solid waste	N	N	Y
No VOCs to protect Indoor Air Quality & HVAC systems	N	N	Y
Linked to reproductive issues in animal & human studies	N	Y	N
Causes systemic nerve damage	Y	Y	N
Causes sensitization and irritation to eyes, skin, and respiratory systems	Y	Y	N
* Can exacerbate respiratory issues			
^ Can cause primary asthma with one exposure, AOEC list			

While the table above highlights all the reasons why hypochlorous acid should be the only sanitizer or disinfectant used in any facility due to sustainability, toxicity, and health there are other reasons to use HOCl as well. HOCl is very inexpensive to make once generators or tablets are bought. A gallon of sanitizer / disinfectant can range between two dollars and twenty cents to make.

Roanoke Public City School spent approximately 223k dollars in chemical expenditures in school year 2020 / 2021. These expenditures were for quat based cleansers and disinfectants.

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RCPS bought approximately seventy-three thousand dollars last school year in Clorox T-360 disinfectant.

***By implementing onsite generation of AO and HOCl the savings the first year, 2022 and 2023, will be approximately Two hundred thousand dollars on chemicals.***

Other areas RCPS will see financial savings will be in the maintenance of any HVAC or air handling systems. Any upgrades or purchases that may have been made during the pandemic or before to increase air handling efficacy and decrease pollutants to the indoor air in their facilities. When chemicals produce VOCs or volatile organic compounds during their use, they are putting pollutant odors, mists, and sprays as well as particles into the air that people breath.

For example, if HVAC improvements have been made or retrofitted with products to clean and filter the air, then the Operations teams uses products to clean and disinfect the interior of the buildings that produce VOCs, such as the quats based products RCPS uses. The VOCs and their chemical ingredients can build up causing damage to materials like metal and plastic, clog up moving parts and filters faster than expecting raising costs to clean the systems and buy more filters. In addition, VOCs in the air decrease the quality of the air that people breath in and studies show more polluted air can affect cognitive abilities of teachers, staff and students as well as lowering test schools.

In times when private and commercial construction is trying to be more airtight to save energy this also means anything used in the inside environment that produces VOCs and or smells can impact the indoor air quality due to less turnover of natural air. Therefore, using chemicals that have less or no VOCs is the goal for facility maintenance systems that want to be cutting edge. Cleaning and sanitizing / disinfecting at RCPS will be done with products containing NO VOCs moving into school year 2022/2023 down from approximately 80 percent now.

Worker health should be of paramount concern as well. Over the last couple of years many workers have retired, quit, or never come back from layoffs or fear of getting seriously ill due to the pandemic. Many districts are significantly understaffed. This is a major barrier to keeping on top of enhanced cleaning and disinfecting protocols. Technology like onsite generation, electrostatic

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sprayers, and Aqueous ozone machines, lessen time to clean and apply sanitizers and disinfectants while using the same or less resources if trained correctly. RCPS after investing in HOCL technology will have the ability to make 90 percent plus of its cleaners, sanitizers and disinfectants needed to be used in maintaining their facilities on site with aqueous ozone it already has and the new HOCl generators.

Schools using the equipment, chemicals and training that RCPS will be implementing this summer can raise the bar on cleaning and disinfection protocols, streamline the green cleaning and disinfection protocols, handle any pathogen including Covid 19 and its variants, have the least toxic, safest, efficient, and cost-effective green cleaning and infection control system you can find anywhere. Using this system has shown the outcome of ATP testing in a middle girl schools' bathroom after cleaning and sanitizing to be in the number ranges needed to be achieved at a hospital. This is not a level of cleaning or disinfecting/ sanitizing that is needed in a school setting but with no more effort than what is being used today the equipment and safer and less toxic chemicals can help even the least talented crew member in a department shine and deliver a safer, cleaner, and controlled work environment with great indoor air quality.

That data shown below is for the exact equipment and onsite generation system that RCPS is purchasing and implementing this summer. This data was collected at Hillside Middle School in Salt Lake City Utah. By implementing and believing in onsite generation of cleaners and sanitizers and disinfectants SLCPS was held up as one of the facilities in the US that was able to and ready to handle the Covid 19 outbreak. Not once did they think they are not able to handle the pandemic due to using the advanced technology of aqueous ozone and hypochlorous acid onsite generation with electrostatics and training.

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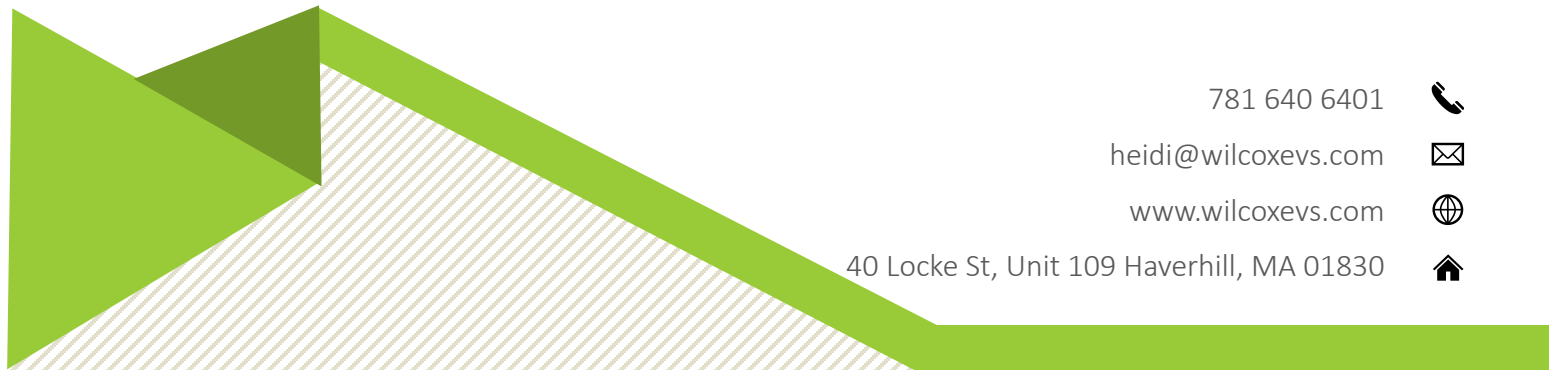
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Hillside Middle School ATP reading for CleanCore Technologies Caddy Cleaning with Electrostatic Delivered HOCL Sanitizer @ 100 PPM Concentration						
1st floor girl's bathroom across from gym	ATP reading location	ATP reading before cleaning, end of school day	ATP reading after CCT caddy cleaning	% ATP reduction cleaning w/ aqueous ozone using CCT caddy	ATP reading after sanitizing with HOCL Tab 100 ppm	% ATP reduction sanitizing w/ 100 ppm HOCL using electrostatic sprayer
	counter	98	6	94	1	83
	dryer	1150	146	87	10	93
	1st sink faucet	71	7	90	2	71
	middle soap dispenser	41	6	85	1	83
	2nd from back wall sink sides	647	102	84	11	89
	handicap stall rail above tp holder	256	15	94	3	80
	personal hygiene holder 2nd from back stall	240	38	84	5	87
	2nd stall from front toilet seat cover dispenser	18	3	83	1	67
	first stall inside latch	635	104	84	14	87
	2nd stall outside latch	105	14	87	2	86
	top of door 3rd stall	141	18	87	3	83
	paper holder handicap stall	292	43	85	8	81
Testing performed by Third Party scientist from ASE Services / Wilcox EVS						

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Due to this data collected by SLCPS and the communication outreach they did within their district departments, the public, PTA, and school board there was trust that they had chosen the right chemistry, technology, and training for their district to protect their buildings, staff, teachers, students, the public, and workers before and during the pandemic. This is what RCPS will be able to achieve, by implementing HOCl technology and integrating its AO cleaning system with it to its full potential and then promoting and showcasing it to nearby districts, businesses, their own district, teachers, staff, and students.

Is summary hypochlorous acid is the disinfectant to use now during the pandemic and beyond due to its healthier, safer, and less toxic chemical profile, its economic availability, its ability to help keep indoor air quality at a high level, its onsite generation and reduction in supply chain issues and its ability to not add to superbug mutation as we have seen in the Covid 19 virus. Roanoke City Public Schools will be more sustainable and reduce plastic and cardboard solid waste, save approximately two hundred thousand dollars in chemical costs its first year, reduce strain on HVAC and air cleaning retrofit, upgrades and equipment and increase IAQ and reduce hazardous chemical exposures to workers, students, staff, teachers, the environment, the public, and the building materials.

Roanoke City Public schools should be congratulated for walking the walk and putting the health and safety of their district in the forefront and doing what is necessary and needed during these changing times. They will be an example to all other K -12 facilities around the country in to how to take control of facility maintenance, indoor air quality, sustainability, environmental stewardship, supply chain issues and health and safety while implementing the best green cleaning and sanitizing/disinfection system known to the industry.

Other school systems and universities will be watching RCPS's direction and lead. Roanoke is ready to lead the way with this one-of-a-kind project using the best team in a progressive facility management team, a trusted distributor, technically advanced manufacturers and the industry expert in the technologies use, implementation, and training.

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