Guidance for Kansas Drinking Water and Wastewater Operators Regarding Coronavirus (COVID-19) Risks

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Increased incidents of COVID-19, the respiratory ailment brought on by exposure to the novel Coronavirus-19, has prompted KDHE to provide the following guidance to drinking water and wastewater treatment operators on the occupational risk of encountering the virus as they conduct their duties. One case has been confirmed in Kansas, although the exposure and infection occurred out of state. The virus appears to be chiefly contracted through person-to-person interactions of close (within 6 feet for a duration of 10 minutes or more) proximity. The spread of the virus is thought to be spread by respiratory droplets produced during sneezing or coughing. COVID-19 appears to be related to other coronavirus illnesses, including past outbreaks of Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS). The mechanisms of transmission of the virus are assumed comparable to those outbreaks. In 2003, 20 – 40% of SARS patients had symptoms of diarrhea with infected individuals having viruses detected in their urine and stools for months. The RNA of the COVID-19 coronavirus has been detected in the stools of patients contracting the disease late last year. Thus, a fecal – oral pathway could be a means of waterborne transmission between humans. While detection of coronavirus genetic material in wastewater does not confirm its viability as an infection route, precautions should be in place to protect water and wastewater personnel and the general public. It needs to be noted that no indication of waterborne transmission of the COVID-19 coronavirus has been found, particularly in the United States.

Wastewater Treatment

Studies have indicated coronavirus, such as SARS, can be present in hospital wastewater or domestic sewage for 2 – 3 days. Combined sewer overflows and bypasses could release such viruses into the environment. However, experts in waterborne infection and disease outbreak control at the Water Environment Federation have been told by health officials that this particular coronavirus is “not very tough”. As an enveloped virus, coronavirus can be inactivated relatively easily. Pathogenic indicators, such as E. coli and coliform, have a higher resistance to disinfection than coronavirus. Additionally, coronavirus survival rates in wastewater and surface water will decline as the water temperatures increase with the onset of Spring and Summer.

In Kansas, all wastewater is effectively disinfected through chlorination, ultraviolet (UV) irradiation or long-term (>120 days) retention in multi-cell facultative lagoons. Dosing with chlorine sufficient to leave a free chlorine residual between 0.2 - 0.5 mg/l readily inactivated the SARS coronavirus. Care must be taken to ensure chlorine is not used up by demanding substances, such as ammonia in the wastewater. The resulting chloramines are not as effective against viruses as free available chlorine. Setting UV

fluence at intensities deemed sufficient to inactivate viruses should have a high probability of success against the coronaviruses.

Therefore, standard municipal wastewater disinfection processes are viewed as highly effective to inactivating coronavirus before it enters the environment. Attention thus shifts to the protection of the wastewater treatment operators having high exposure to waterborne pathogens in raw sewage entering the wastewater treatment plants. In general, typical occupational hygiene practices should be protective of staff.

Guidance issued by the Occupational Safety and Health Administration (OSHA) indicates no additional protections are needed for wastewater treatment operators beyond routine hygienic practices. Those practices include:

- Using engineering and administration controls
    - Barriers to prevent worker exposure to splashes and sprays
    - Enclosing certain processes that may produce aerosols
    - Adequate ventilation to remove potentially contaminated air from the workspace

- Safe work practices
    - Thoroughly washing hands with soap and water
    - Avoiding touching the face, eyes, mouth, nose or open cuts or sores
    - Before eating, removing work clothes and eat in designated areas
    - Cover open sores and cuts with clean, dry bandages
    - Remove work clothes before leaving the worksite

- Personal protective equipment normally required for tasks involving handling untreated wastewater
    - Goggles, face masks and face shields
    - Rubber boots
    - Liquid repellent coveralls and gloves

If workers come into contact with sewage, they should flush eyes with clean water, wash cuts with soap and water and be evaluated post-exposure for any emerging complications.

Disinfection of hard surfaces at the worksites, including personal protective equipment should be a standard practice, with a solution containing at least 0.05% chlorine, such as diluted bleach. Similar precautions should be taken for workers handling municipal biosolids at the wastewater treatment plant.

Water Treatment Plants

Water treatment plants downstream (surface water) or down gradient (ground water) of wastewater systems have some susceptibility to their raw water supply being contaminated. Potential threats are incomplete wastewater disinfection, bypasses or

discharges from combined sewer overflows or if there is a high density of fecal sources from infected individuals lying outside the service area of the upstream wastewater treatment system. Nonetheless, the fragile vitality of the coronavirus in the open environment renders the threat of raw water contamination low. Furthermore, filtration and disinfection at the water treatment plant provide adequate barriers to breakthrough by ambient viruses into the drinking water supply. Primary disinfection, with a target 4-log (99.99%) virus reduction should be effective in protecting the public.

Secondary disinfection, often with chloramines, maintains a residual chlorine level in the finished water that adds another protective level to infection. Disinfection processes are keyed toward reducing pathogens, such as E. coli, total coliform and Giardia, to levels deemed adequate for human consumption. As those pathogen indicators are more resistant to disinfection than viruses, their elimination virtually assures no pass-through of virus into the drinking water supply. Therefore, coronavirus represents a low health risk to the public through their water supplies.

Exposure risks to the staff operating water treatment plants is similarly low because of the coronavirus susceptibility to wastewater treatment and environmental stresses present in Kansas streams and reservoirs. Virus threats should be considered and handled no differently than other pathogens present in raw, ambient waters entering the plants. Once again, employing routine engineering controls, safe work practices and protective equipment should provide the safeguards necessary to protect the operating staff at the water treatment plant.

Staff Management and Continuity of Operations

Perhaps the greatest threat to drinking water and wastewater operations is attrition and absenteeism among staff that limits the ability to adequately oversee the treatment and disinfection processes at the treatment facilities. Utilities should have contingency plans to shore up depleted work shifts, ensure separation of work crews to avoid transmission, isolate crews from infected staff, and create redundancy coverage of operations. Flexible leave policies should be employed to discourage ill workers from “toughing it out” and continuing to work, risking exposure to the remaining operators. Mutual aid agreements with surrounding utilities should be reviewed for emergency coverage as a tactic to maintain operations.

As the COVID-19 contagion runs its course, the lessons learned from decades of operational and safety experience in Kansas drinking water and wastewater treatment plants should be drawn upon as common sense guidelines for minimizing exposure to any pathogens present in the water. The best safeguard to the Kansas public from incidental waterborne transmission of coronavirus is through ongoing operation of drinking water and wastewater treatment plants.

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