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INTRODUCTION

Sewage has become a COVID-19 tool. American colleges and universities have struggled to cope with the COVID-19 epidemic as students returned to campus in 2020. Most colleges are unable to provide widespread testing and contact tracing. Testing all students, faculty, and staff on a campus is prohibitively expensive.[1]

As a result, many colleges and universities have turned to a different approach. Those infected with COVID-19 shed viral particles in their waste.[2] Evidence of these viral particles can be tested by sampling wastewater.[3] Testing sewage offers a reliable method for identifying outbreaks and is cheaper and easier to administer than a mass testing and contact tracing program

The reliance on wastewater testing during a pandemic makes sense ata time when no national program on mass testing and contact tracing exists.[4] And as COVID-19 is likely to affect the population well into 2021, state and local governments have considered or started sewage testing.[5] But emergency measures have a tendency to stick around after the crises that prompted them diminish. COVID-19's public health crisis will end. But the incentives to monitor wastewater will continue.[6][7]

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[1] There are some exceptions. In June 2020, Colby College announced a plan to test all of its students twice a week, at cost of approximately ten million dollars. Nick Sambides Jr., *Colby College plans to test all students for coronavirus twice a week*, BANGOR DAILY NEWS (June 30, 2020), https://bangordailynews.com/2020/06/30/news/mid-maine/colby-college-will-open-its-campus-this-fall-despite-coronavirus-but-with-many-restrictions/.

[2] Sewage can test for RNA from SARS-CoV-2, the virus that causes COVID-19. *See* CENTERS FOR DISEASE CONTROL, *National Wastewater Surveillance System*, (Aug. 17, 2020), https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/wastewater-surveillance.html.

[3] Sewage surveillance did not arrive with the advent of COVID-19. Wastewater testing has been used for decades, for example in Brazil and Israel, to detect poliovirus. *See* I. Michael-Kordatou et al., *Sewage analysis as a tool for the COVID-19 pandemic response and management: the urgent need for optimized protocols for SARS- CoV-2 detection and quantification*, 8 J. ENV'T CHEM. ENG'G (Oct. 2020), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7384408/.

[4] *See, e.g.*, Sharon Begley, *Wastewater testing gains traction as a COVID-19 early warning system,* STAT (May 28, 2020), https://www.statnews.com/2020/05/28/wastewater-testing-gains-support-as-covid19-early-warning/.

[5] *See, e.g.*, CALIFORNIA ASSOCIATION OF WASTEWATER AGENCIES, *Wastewater as a Surveillance Tool to Identify the Prevalence of COVID-19 in Communities*, https://casaweb.org/research/ (noting "many California wastewater agencies have begun testing influent wastewater for the COVID-19 virus").

[6] *See* Carol Thompson, *To stop coronavirus, these Michigan State scientistsare turning to the sewers,* LANSING STATE JOURNAL, (Sept. 22, 2020), https://www.lansingstatejournal.com/story/news/2020/09/22/msu-scientists-

This essay argues that sewage testing will outlive the pandemic and become a part of a general policing surveillance infrastructure. We risk adopting this surveillance method without taking care to assess the legal and policy questions raised by its use. Wastewater can provide early clues not just for COVID-19 outbreaks, but also for the presence (and assumed use) of opioids, methamphetamines, and other illegal drugs.[7] Sewage testing at the University of California, San Diego, recently led to an alert that an infected person was "someone who used a restroom [at a specified residence hall] from 6 a.m. and 9:30 a.m. on Sept. 2."[88] Now replace "methamphetamine" for "COVID-19."

Systematically looking for evidence of criminal activity in sewage "may be a goldmine for law enforcement authorities."[9] COVID-19 is the current object of wastewater surveillance. However, the use of sewage testing now–by public universities, counties, and other government entities–can be readily repurposed from the detection of COVID-19 to other substances of interest to law enforcement agencies.

I. THE SURVEILLANCE INFRASTRUCTURE: COVID-19 AND ILLEGAL DRUGS

Identifying those infected with COVID-19 is a key component of controlling the spread of the virus. Yet addressing that problem has proven to be a considerable challenge in the United States.[10] The federal government has left the primary responsibility of testing and contact tracing to the states.[11]

Individual testing is a problem, however.[12] First, there is the issue of deciding who should be tested; testing symptomatic individuals is

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monitor-wastewater-coronavirus/5819535002/ ("Monitoring wastewater for disease could become a staple in public health… It might be a silver lining to the COVID-19 pandemic.").

[7] *See e.g.*, Ettore Zuccato et. al, *Estimating Community Drug Abuse by Wastewater Analysis*, 116 ENV'T HEALTH PERSP. 1027 (2008), https://ehp.niehs.nih.gov/doi/full/10.1289/ehp.11022.

[8] Randy Dotinga, *A New Kind of College Exam: UCSD Is Testing Sewage for COVID-19*, VOICE OF SAN DIEGO (Sept. 7, 2020), https://www.voiceofsandiego.org/topics/news/ucsd-is-testing-sewage-for-covid-19/.

[9] EUROPEAN COMMISSION, *Sewage Monitoring System for Tracking Synthetic Drug Laboratories* (Results in Brief), (Apr. 14, 2020), https://cordis.europa.eu/article/id/415821-urban-drug-labs-may-soon-have-no- place-to-hide.

[10] *See Upper Midwest Covid-19 Surge May Signal Problems Ahead for U.S.*, N.Y. TIMES (May 7, 2021, 9:35 AM), https://www.nytimes.com/live/2021/04/07/world/covid-vaccine-coronavirus-cases; David Leonhardt, *The Unique U.S. Failure to Control the Virus*, N.Y. TIMES (Aug. 8, 2020), https://www.nytimes.com/2020/08/06/us/coronavirus-us.html.

[11] *State Approaches to Contact Tracing During the COVID-19 Pandemic*, NAT'L ACAD. STATE HEALTH POL'Y (Apr. 22, 2021), https://www.nashp.org/state-approaches-to-contact-tracing-covid-19/; Howard K. Koh, *We Need One Response–Not 50–to Fight Covid-19*, STAT (May 22, 2020), https://www.statnews.com/2020/05/22/we-need-one-response-to-fight-covid-19-not-50/.

[12] *See* Anna Mehrotra et al., *It's time to begin a national wastewater testing program for Covid-19,* STAT (July 9, 2020), https://www.statnews.com/2020/07/09/wastewater-testing-early-warning-covid-19-infection-communities/ (noting that even with the means to fund the $3 billion daily testing costs, a national testing infrastructure would be "logistically nearly impossible to achieve").

inadequate because asymptomatic people can still infect others.[13] Second, there is the matter of cost. Adequate individual testing is expensive and difficult to administer.[14] Early on in the pandemic, local jurisdictions often struggled to report results quickly.[15] Third, the politicization of COVID-19 responses means that significant numbers of people may refuse to be tested or to participate in contact tracing.[16]

Enter sewage testing. People infected with COVID-19 shed the virus in their feces whether they are symptomatic or not.[17] Testing sewage for the presence of the virus can therefore predict COVID-19 outbreaks days in advance of other forms of diagnoses.[18] Samples collected from a building can thus predict a COVID-19 problem without asking individuals for tests, securing their compliance, and perhaps even without their knowledge. Sewage testing is also cheaper than individual testing.[19]

Without comprehensive government testing programs, colleges and universities have turned to sewage testing as a solution to determining whether a COVID-19 outbreak has or is about to occur on their campuses. Typically, residence halls and dormitories are targeted for regular sewage testing.[20] Once a particular building tests positive, a college may quarantine everyone within the building[21] and require them

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[13] *See* William Kimbrough, *The Importance of Testing Asymptomatic Patients for COVID-19*, ONE MED. (May 7, 2020), https://www.onemedical.com/blog/healthy-living/asymptomatic-covid-19.

[14] Alia Paavola, *The Average Cost of a Hospital COVID-19 Test in Each State*, BECKER'S HOSP. REV. (Dec. 9, 2020), https://www.beckershospitalreview.com/finance/the-average-cost-of-a-hospital-covid-19-test-in-each-state.html.

[15] Sarah Kliff & Margot Sanger-Katz, *Bottleneck for U.S. Coronovirus Response: The Fax Machine*, N.Y. TIMES (July 13, 2020), https://www.nytimes.com/2020/07/13/upshot/coronavirus-response-fax-machines.html.

[16] Rita Rubin, *First It Was Masks; Now Some Refuse Testing for SARS-CoV-2*, JAMA NETWORK (Nov. 6, 2020), https://jamanetwork.com/journals/jama/fullarticle/2772860.

[17] *See* Will Pass, *Many COVID Patients Shed Virus in Feces, Even Without GI Symptoms*, MD EDGE (June 12, 2020), https://www.mdedge.com/infectiousdisease/article/223857/coronavirus-updates/many-covid-patients-shed-virus-feces-even; Soo-kyung Park et. al, *Detection of SARS-CoV-2 in Fecal Samples From Patients With Asymptomatic and Mild COVID-19 in Korea*, NCBI (June 10, 2020), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7286243/..

[18] *See e.g.*, Beth Daley, *Sewage-Testing Robots Process Wastewater Faster to Predict COVID-19 Outbreaks Sooner*, CONVERSATION (Mar. 11, 2021, 8:29 AM), https://theconversation.com/sewage-testing-robots-process-wastewater-faster-to-predict-covid-19-outbreaks-sooner-156467.

[19] *See* Elissa Nadworny, *Colleges Turn to Wastewater Testing in an Effort to Flush Out the Coronavirus*, NPR (Oct. 26, 2020, 5:01 AM), https://www.npr.org/2020/10/26/925831847/colleges-turn-to-wastewater-testing-in-an-effort-to-flush-out-the-coronavirus ("[T]esting wastewater is cheaper than regularly testing students, even when followed up by more targeted screening.").

[20] *See, e.g.*, Dillon Thomas, *CSU Moves Quarantined Students Off Campus as Wastewater Testing Continues,* CBS4DENVER (Oct. 7, 2020), https://denver.cbslocal.com/2020/10/07/csu-quarantine-wastewater-testing/ (noting testing of sewer lines connected to residence halls).

[21] *See, e.g.*, Chris Carlson, *Syracuse to temporarily quarantine 200 students in Ernie Davis Hall after coronavirus found in wastewater,* SYRACUSE.COM, (Sept. 4, 2020), https://www.syracuse.com/coronavirus/2020/09/syracuse-university-to-quarantine-ernie-davis-hall-after-coronavirus-found-in-wastewater.html (reporting quarantine of 200 students after a positive COVID-19 wastewater test).

to submit to individual testing.[22]

Sewage testing has its shortcomings. A positive test indicates that *some* person or persons infected with COVID-19 have used the toilet or shower in the tested building. But that infected person or persons may have been a visitor, not a resident.[23] Further, sewage testing can vary in its sensitivity, depending on whether the college is testing waste from individual buildings or only groups of buildings.[24] Nevertheless, sewage testing has successfully identified COVID-19 infections on college campuses around the country.[25]

This public health surveillance system can be easily repurposed for other substances. Law enforcement-related testing is already contemplated by developments like the European Union's microMole project. This sewage monitoring system consists of remotely accessed sewage sensors mounted in sewage pipes by crawler robots.[26] The microMole project is designed to identify the illegal production of drugs like methamphetamine.[27] Sewage testing of this sort can, of course, identify widespread patterns of illegal drug use that can guide public health responses. The microMole project, however, is designed primarily for law enforcement purposes.[28]

Sewage drug surveillance could be used in different ways. In one scenario, sewage testing becomes part of an ongoing criminal investigation; a person or group has already been targeted by law enforcement, and sewage testing serves as an additional means of gathering evidence. But the calls for systematic wastewater surveillance envision another scenario.[29] Here, the police have no *particular suspicion* about anyone, and rather use regular sewage testing to develop suspicion about unknown persons. In this way, mass sewage testing expands the "surveillance discretion" of the police to help identify suspects upon whom to focus greater attention.[30] Because both identify

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[22] *See e.g.*, *Public Health Alert: Important Information for Ernie Davis Hall Residents*, SYRACUSE UNIV. (Sept. 3, 2020), https://news.syr.edu/blog/2020/09/03/public-health-alert-important-information-for-ernie-davis-hall-residents/ ("We are writing today to inform you that based on our most recent wastewater testing of Ernie Davis Hall, the results indicate a possible COVID- 19 infection within the community of student residing in EDH. . . .[The] team will test all EDH residents and RAs today.").

[23] *See, e.g.*, Steven Lundeberg, *Zero Positives Among More Than 300 Tested in Sackett Residence Hall,* OR. STATE UNIV. NEWSROOM (Oct. 6, 2020), https://today.oregonstate.edu/news/zero-positives-among-more-300-tested-sackett-residence-hall-gem-apartment-building(observing that it was possible that "viral markers in the wastewater came from people who work at or visited the buildings, but were not tested.").

[24] *See generally* Lisa M. Colosi et al., *Development of Wastewater Pooled Surveillance of SARS-CoV-2 From Congregate Living Settings*, MEDRXIV (Oct. 11, 2020), available at https://tinyurl.com/yr68xkp4.

[25] *See* Nadworny, *supra* note 19.

[26] EUROPEAN COMMISSION, *Sewage Monitoring System for Tracking Synthetic Drug Laboratories*, (Nov. 19, 2019), https://cordis.europa.eu/project/id/653626.

[27] MICROMOLE EU, http://micromole.eu/ (last visited Mar. 30, 2021).

[28] *About,* MICROMOLE EU, https://micromole.eu/#about (last visited March 30, 2021).

[29] CENTERS FOR DISEASE CONTROL, *National Wastewater Surveillance System (NWSS)*, https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/wastewater-surveillance.html (Mar. 19, 2021), (describing establishment of a national database for COVID-19 wastewater surveillance).

[30] Elizabeth Joh, *The New Surveillance Discretion: Automated Suspicion, Big Data, and Policing,* 10 HARV. L. & POL'Y REV. 15, 15 (2016) (defining surveillance

previously unknown information, mass testing for COVID-19 and for illegal drugs raise similar questions of law and policy.

II. THE FOURTH AMENDMENT AND SEWAGE SURVEILLANCE

When the COVID-19 epidemic has passed, local governments, colleges, and law enforcement agencies will see the advantages of sewage monitoring to identify substances like methamphetamines, heroin, and MDMA (ecstasy). A positive identification of an illicit substance from a specific home or building will lead to further investigation. The sewage test may be part of the basis for a warrant application to search the physical space itself. The Fourth Amendment requires that government searches and seizures must be reasonable.[31] What legal framework might apply to such sewage tests?

The most direct analogy the government might use to justify sewage testing without a warrant or individualized suspicion is searching through garbage. In 1988, the Supreme Court reasoned that trash left at the curb for municipal collection lacked any reasonable expectation of privacy.[32] In other words, the act of a police officer looking through such garbage, even for the specific purpose of looking for evidence of a crime, would not even qualify as a Fourth Amendment search.[33]

Deciding that mass sewage testing is analogous to the collection of garbage would grant the police virtually unlimited Fourth Amendment authority to implement an ongoing drug sewage surveillance program. The only regulatory alternatives would lie in limits placed by state laws or city and county ordinances.

Perhaps, though, courts may find that sewage collection and analysis from homes is different and should qualify as Fourth Amendment searches and seizures. Those same courts may nevertheless decide that a mass sewage testing program would qualify under the Fourth Amendment's "special needs" exception.[34] In contexts like housing and fire code inspections and the drug testing of public high school students, the Supreme Court has decided that the usual requirements of a warrant and individualized suspicion may be suspended because of a special government need "beyond the needs of ordinary law enforcement."[35]

Such a special needs analysis justifies COVID-19 sewage testing. Public sewage testing, even if it can link positive tests to individual homes, is intended to identify emerging viral outbreaks in the community. The Supreme Court has upheld mass search and seizure programs–even without a warrant or individualized suspicion–in cases where the program had as its primary "programmatic purpose" a non-law enforcement objective, and where test results were not delivered to law

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discretion as "the decisional freedom to focus police attention on aparticular person or persons rather than others").

[31] U.S. CONST. amend. IV.

[32] California v. Greenwood, 485 U.S. 35 (1988).

[33] *See id.*

[34] For a more extensive discussion of epidemiological surveillance programs as justified by the special needs exception, see generally Natalie Ram & David Gray, Mass surveillance in the age of COVID-19, 7 J. L. & Biosciences 1 (2020).

[35] *See, e.g.*, Vernonia School District 47J v. Acton, 515 U.S. 646, 653 (1995) (drug testing of student athletes); Camara v. Municipal Court, 387 U.S. 523 (1967) (housing inspection).

enforcement authorities.[36]

Sewage testing for illicit drugs cannot be justified in the same way. When a public program continuously monitors sewage output from homes and businesses for the purpose of finding evidence of a crime, both the purpose of the program and the use of information collected are an ordinary law enforcement purpose. Should a court apply a special needs framework, a sewage drug testing program would not likely qualify under this Fourth Amendment exception.[37] Mass testing programs, whether for COVID-19 or for illicit drugs, however, are by their very nature implemented because the targets are unknown. Requiring individualized suspicion or a warrant would make such a drug sewage testing program impracticable.

A third possible framework emerges from a seemingly unlikely source: The Supreme Court's recent decision recognizing that individuals have Fourth Amendment rights in cell site location information held by mobile telephone companies. The third-party doctrine provides that information voluntarily disclosed to others receives no Fourth Amendment protection.[38] In *Carpenter v. United States*,[39] however, the Supreme Court held that the government's collection of the defendant's cellphone location data–even if held by a third party–constituted a "search," and therefore the absence of a warrant violated the Fourth Amendment.

Carpenter's impact on Fourth Amendment doctrine is significant, and a key aspect of the Court's rationale in the case is helpful to sewage testing. In *Carpenter*, the Court found that the Fourth Amendment provides protection to cellphone location information because of its revealing nature and because surveillance of cellphone location is, practically speaking, "inescapable."[40] A number of lower court decisions[41] have already determined inescapability as an important factor in whether government collection of information constitutes a Fourth Amendment "search."[42]

With nearly 80 percent of American households linked to municipal sewage systems, a police sewage monitoring system would seem to qualify as practically "inescapable."[43] Accepting a public service

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[36] Ferguson v. Charleston, 532 U.S. 67, 82 (2001) (observing need to "consider all the available evidence in order to determine the relevant primary purpose" ofa purported special need).

[37] Indianapolis v. Edmond, 531 U.S. 32, 48 (2000) (rejecting special needs justification when a checkpoint's "program is ultimately indistinguishable fromthe general interest in crime control").

[38] The Supreme Court articulated the third-party doctrine in Smith v. Maryland,442 U.S. 735 (1979) and United States v. Miller, 425 U.S. 435 (1976).

[39] Carpenter v. United States,138 S.Ct. 2206 (2018).

[40] *Id.* at 2212-13.

[41] *See, e.g.*, Naperville Smart Meter Awareness v. City of Naperville, 900 F.3d 521, 527 (7th Circ. 2018) (holding that government collection of information from smart utility meters constituted a Fourth Amendment search because customers had "no choice at all.").

[42] Matthew Tokson discusses the emerging consideration of Fourth Amendment"inescapability" in, Matthew Tokson, *Inescapable Surveilliance*, CORNELL L. REC. 409 (2021) ("While the precise contours of post-*Carpenter* doctrine remain in flux, the inescapability of information disclosure is likely to play a major roleinFourth Amendment law going forward.").

[43] CENTERS FOR DISEASE CONTROL, *National Wastewater Surveillance System*, https://www.cdc.gov/coronavirus/2019-ncov/cases- updates/wastewater-surveillance.html (noting that homes with septic tankswould not be included in the

like sewage would otherwise leas to nonconsensual surveillance. And a positive result linked to an individual home could begin the basis of an investigation and later a search of the home–even if that positive alert is later attributable to a guest or temporary visitor. Should a court apply *Carpenter*'s inescapability principle to sewage surveillance? Collection of this information would be a search, and would require a warrant if conducted as part of a criminal investigation.[44]

III. CONSIDERATIONS FOR SEWAGE SURVEILLANCE

How courts might evaluate legal challenges to a policing sewage surveillance system is unclear: such collection of evidence may be unprotected by the Fourth Amendment, or it may not be. Such a program, conducted without warrants or suspicion, may constitute a reasonable Fourth Amendment search, or it may not be. At the same time, the speed with which colleges and universities have been able to institute COVID-19 sewage surveillance suggests that a program to test sewage systems for illicit substances that can be traced to individual buildings may soon be an attractive investigative method. Rather than wait for a Fourth Amendment challenge, lawmakers should consider anticipatory response.

First, until there are regulations in place for how and whether the police should monitor wastewater, sewage surveillance should be limited to public health uses only.[45] Not only would this permit COVID-19 testing, but also would allow for testing of illicit drugs if conducted for the purposes of identifying whether cities or counties are experiencing spikes in illicit drug use.[46] Such studies could also complement law enforcement by inferring from sewage testing whether particular policing interventions have worked.[47]

Second, lawmakers should consider imposing statutory warrant requirements before permitting police to test sewage for criminal investigations. Such a requirement would not bar sewage testing in individual investigations but would prohibit mass sewage surveillance by the police. As a mass data collection program, indiscriminate sewage testing is similar to license plate reader and facial recognition technologies, both of which have prompted calls for increased scrutiny and regulation.[48]

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surveillance infrastructure).

[44] The 7th Circuit held that while smart meter data collections were searches, they were reasonable because such information was necessary for efficient energy delivery and lacked "prosecutorial intent." *Naperville*, 900 F.3d at 528.

[45] Even when testing pooled samples, cities and counties should be careful aboutstigmatizing already stigmatized communities and neighborhoods with sewage testing for drugs. *See* WORLD HEALTH ORGANIZATION, *Status of environmental surveillance for SARS-CoV-2 virus*, (Aug. 7, 2020), https://www.who.int/news-room/commentaries/detail/status-of-environmental- surveillance-for-sars-cov-2-virus.

[46] For instance, a 2019 Europe-wide project has tested wastewater to determinethe drug consumption habits for illicit stimulants in 70 cities to determine geographic and temporal variation. *See* EUROPEAN MONITORING CENTRE FOR DRUGS AND DRUG ADDICTION, *Perspectives on Drugs, Wastewater analysis and drugs: A European multi-city study* (March 2020) https://www.emcdda.europa.eu/publications/pods/waste-water-analysis_en (describing work of sewage analysis CORe group).

[47] *See id.*

[48] *See e.g.*, Patrick McKnight, *Facial Recognition Technology Comes Under Scrutiny*, Pa. Bar Assoc. (July 29, 2020),

Without even modest steps–such as temporary bans on law enforcement uses for sewage surveillance–we are likely to see disagreement and confusion about the legality of such testing regimes. At the same time, the exigencies of the COVID-19 pandemic have shown us that sewage testing is readily available as a method of mass surveillance.

CONCLUSION

Sewage testing has emerged as a practical solution to a public health emergency of COVID-19, but it also highlights the emerging interest in using such surveillance strategies for law enforcement purposes. Established for one purpose, a sewage surveillance system can easily be adapted for another. The incentives to rely on sewage surveillance to find evidence of crimes tied to persons yet unknown are clear. But since it expands the surveillance discretion of the police, sewage surveillance should become the focus of regulatory attention.

http://cyber.pabar.org/index.php/2020/07/29/facial-recognition-technology-comes-under-scrutiny/; Tanvi Misra, *Who's Tracking Your License Plate*, Bloomberg (Dec. 6, 2018, 9:31 AM), https://www.bloomberg.com/news/articles/2018-12-06/why-privacy-advocates-fear-license-plate-readers.