

Sewer Signals Podcast
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Season 1 Episode 6: Phillip Bowman with the City of Cody, Wyoming, and Franz Fuchs with the Wyoming Department of Health

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Transcript

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Anna Mehrotra: Hello and welcome to Sewer Signals, a podcast on utility experiences with wastewater surveillance. I'm Anna Mehrotra, Director of the Wastewater Surveillance Program at the Water Environment Federation. And I'm very happy to be talking with both Phillip Bowman and Franz Fuchs from Cody and Cheyenne, WY, respectively. Good afternoon, Phillip and Franz. It's great to be with you both. How are you?

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Phillip Bowman: Doing great, Anna.

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Franz Fuchs: Yeah, excellent. Thanks for having us here.

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Anna: It's great to have you both. Phillip is the Public Works Director for the City of Cody, and Franz is the chief data analyst for the Wyoming Department of Health. So, they bring both the local and sort of the state level perspective to our wastewater surveillance discussion today. And so we're going to talk a little bit about Wyoming's wastewater surveillance program generally, but will largely be focused on the city of Cody, which is Phillip's home turf. So let me tell you a little bit about the city of Cody. So the Wastewater Division of the City of Cody's Public Works Department provides wastewater collection and treatment services to 10,000 full time residents with wastewater flows that nearly double in the summer months, with visitors and tourism activities. Their infrastructure includes over 80 miles of sanitary sewer with four lift stations. And an aerated lagoon and rapid filtration pond treatment process that is permitted at 1,000,000 gallons per day, the treatment facility is in the final stages of a multi-year upgrade project that includes influent head works and screening, UV disinfection and a continuous flow sequencing batch reactor treatment process that is expected to go through final commissioning later in the summer of 2022. So, Phillip, some big changes are in store for your treatment process, it sounds like.

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Phillip: Yes. And it's been a long time coming. We we originally bid our final phase of the project in 2019 and started work in 2020, so throughout the course of the pandemic we've had material supply challenges and and other COVID related challenges that have delayed our project by a full year or more. So we're really excited to be seeing that in the light at the end of the tunnel of that project.

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Anna: Oh that that's awesome. I can't imagine going through the construction process during COVID. My goodness. I'm glad it's going to be wrapping up and you'll have a shiny new

treatment process at the end. All right, let's let's talk about wastewater surveillance. Phillip, how did you get involved in the state of Wyoming's wastewater surveillance program.

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Phillip: So, the City of Cody was originally approached by our Park County Health official locally, and that is Doctor Aaron Billin. He serves in that role for Park County government and he and I had a little bit of a personal relationship because he participates in the Park County search and rescue and so does my wife previously participated. But having that kind of small town connection, Doctor Billin had heard about wastewater sampling and wastewater surveillance early in the pandemic and he approached me in early 2020 and asked if that was something that that we could assist with and so from an operator perspective I I told him, you know, we could certainly be a part of that for the sampling and the collection of samples, but I really wasn't equipped to do that type of testing or or laboratory analysis. He informed me about Biobot Analytics. And so they were the first company we used for our testing and lab analytics. And we actually collected our first sample here in Cody in late April of 2020 and sent that to Bio Bot. That first sample we did by hand and built a 24-hour composite that one of our crew members came in and sampled every two hours on a 24-hour basis. So that was our first composite sample pulled based on our crew member being willing to do that and the second sample we did in later in May of 2020, we actually had a compact composite sampler that built more of a true 24-hour composite based on one hour sampling intervals. And then we used Biobot for a third sample and in June of 2020. And then starting in July, we worked with Franz on the state's program.

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Anna: OK. So that you said that was in July 2020. So yeah, I was going to ask you, Franz, what was going on at the state level, you know, around the time that Phillip was getting up and running with the Biobot testing for Cody, it sounds like you were off and running with the state level program by July of 2020. Talk to us a little bit about how that started up.

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Franz: Sure. So, you know, I think actually we heard about Cody doing this with Biobot in the, in the media. And so I think you know, the idea kind of came from Doctor Billin and and Phillip. So we heard about it. We thought we had some people at our state public health lab that were pretty interested in this idea. And we had, of course, at that time CARES Act money, you know, was was sort of raining from the sky. So there was sort of opportunity here with with the funding, the people that were interested in it and and local partners. And we thought hey, you know, Cody's paying for their testing. I bet we could probably do it, you know, make it free for them and or pay them to do the sampling and so make it worth a while to really try to build like, a statewide surveillance effort. And so that was kind of the genesis. The idea took a while to get the sort of contractual arrangements up we sort of we basically had to contract with every single city and town and site that was doing this to have that that relationship, you know, with the state you know, so you know took time that we did a like for example a batch order of composite samplers. Which we ended up either reimbursing cities and towns for what they purchased, or we just gave them those those samplers. The real goal of the state was to make it as easy as possible for cities and town to participate in the program. So all the contracts, everything was designed to that end. But as I said, kind of initially the idea started with Cody. I think Jackson was pretty close behind. Phil, do you remember if they were doing something with Biobot, too? But I know there was some interest in Jackson as well.

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Phillip: Yeah, my understanding was that Jackson got started a little bit before us and they were using Biobot for their laboratory analysis. But yeah, it seemed like we all kind of got started in that general time frame of of spring of 2020. Cody and Jackson both. I think had a an interest level due to the unknown factors of large visitor numbers. What might happen with visitors still coming into our community?

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Franz: Right. So yeah, we ended up kicking off our first sample was was with Cody on July 6th, 2020.

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Anna: OK, so you were leading the pack, Philip. So how ultimately how many communities participated in this statewide program?

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Franz: So we had a mix of communities and other sites. You know, we for example did it at our state operated institutions, we had some facility level wastewater sampling there. Ultimately I think we had a peak of around 37 sites that we ended up working with.

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Anna: OK. And then, Phillip, you talked about how you started out with the manual composite samples, but ultimately you did get an auto sampler. And then starting July 6, 2020, you're part of the state program for that program. Where were you sampling exactly at the influent or upstream in the collection system? Talk to me a little bit about the specifics of the sampling for Cody.

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Phillip: Sure. So as part of our multi-year plan prior to treatment facility project, one of the first things we did was build an improved head works and screening process. So we did all our sampling in that, that headworks building and we actually modified our sampling location the first few weeks. We were doing it above our screen. In the last weeks, we ultimately moved that behind the screen and found that to be a little more friendly for our composite sampler to be sampling the waste water after the screening process.

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Anna: Yeah, I would imagine so.

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Phillip: But yeah, we only sampled that. Our influent head works location. We did not do any collection system sampling and and I think that's pretty representative for a community of our size, again about 10,000 full time residents. Certainly some additional flow generation through the summer months. When we have peak tourism activities and the maximum amount of visitors to our hotels and campsites. And we did purchase as, as Franz mentioned, we purchased a Teledyne ISCO composite sampler through through the program that the state built. They were able to reimburse us a portion of that funding and and we actually dedicated some of our own funding to that in order to have some added capabilities for flow monitoring and flow measurement as well for future use on that sampler and full monitor.

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Anna: Yeah. That's great for Cody. Phillip, who is actually managing the autosampler and pouring off the samples for the SARS-CoV-2 analysis and and shipping them. And what did that that whole logistics look like?

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Phillip: So we had our wastewater operators perform that function and they they troubleshot that location and got the sampler set up in our headworks building. And then, yeah, we we eventually developed a two times per week sampling with France and in the state system we were collecting on Tuesdays and Thursdays through the state system. They provided all of the shipping materials and sampling vials. And so our crew would go out, our operators would go out and get the the composite sampler running on Monday morning, do a full 24-hour composite and then collect in a package that sample on Tuesday and get it into an overnight express delivery to ship from Cody down to the lab. I believe in Laramie. And so that would occur on Tuesday. And then the lab would have it by Wednesday morning. And then the same thing for our Thursday sample we shipped out on Friday and the lab would receive it on Saturday. And so our our crew members took on that responsibility. They really learned the operation of that, that composite sampler and and I thought that was really the best and most appropriate place for us to be performing. That was with our wastewater operators and crew members.

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Anna: Makes sense just out of curiosity and then I have a question for you, Franz. But out of curiosity, Phillip, what else are you analyzing in your influent composite sample now? We'll, we'll talk about how the the wastewater surveillance program is not ongoing at the present moment, but I suspect you're still taking samples at your influent. I'd be curious to hear what you're analyzing in those samples.

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Phillip: Yeah, so a big part of our wastewater treatment facility upgrades includes moving to a continuous flow sequencing batch, reactor treatment process and in the initial stages of that design close to five years ago we had taken a lot of samples from our influent for BOD and TSS concentrations. So what we've actually seen over the last couple of years is significant increases in, in the concentrations of both of those waste components. We've seen BOD averages grow from about 300 milligrams per liter. We've had some recent sampling that shows grab sampling for our monthly reporting at over 400 milligrams per liter. So so one thing that we have utilized that continuous flow sample for is to start to develop some 24-hour composite samples for BOD and TSS and that's going to be very critical for us when we start that new SBR process and and really dialing in that SBR cycle times on on the new operation. So we we have been using that data for some other purposes and in our wastewater operations and analyzing BOD and TSS from a composite sample, 24-hour composite sample instead of just from our permit-required grab samples during the course of the month.

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Anna: Gotcha. Yeah. Makes sense. OK. So, Franz, Philip mentioned that the Department of Health really managed sort of the the sample bottles and the shipping and the analysis and the the testing, the actual testing for SARS-CoV-2. Was that taking place in a Department of Health Lab or an academic partner? How was that happening?

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Franz: Yeah. So we, our public health lab did most of the testing and so they would. You know, those are all state staff. We did hire a bunch of temporary employees during COVID to sort of

help manage the the wastewater surveillance and everything else. And they also did all the things like boxing up all those sampling kits and bulk and sending them out, you know, on a regular schedule. We did end up contracting with the University of Wyoming to kind of help facilitate additional sites. And so they did handle some of the other other extra volume, which was nice. But yeah, it was internal to the state.

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Anna: You're analyzing all these these samples. You're getting data. What are you doing with the data? I know that you had a a public facing dashboard, was there, you know, was that sort of the primary repository of the data? What was the health department doing with the data? How were they using the data, if at all, to sort of inform? Yeah, public health actions. Yeah. Talk to me about that.

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Good, good question. A lot of questions there. So yeah, there there is a lot.

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Anna: Yeah, sorry. You can take them one at a time.

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So I'll talk about this for the process piece we we basically used and it it's kind of sounds like amateur hour but we use Google Sheets to track data.

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Anna: Hey it works.

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Yeah, so a lot, everyone, a lot of people could access it, and we could have collaborative efforts with the different two labs. And it was the, you know, and it's available on the on the dashboard today. We wanted to be as transparent as possible. But it's really interesting question because there's a lot of, you know, I'm kind of a a stats nerd. And so like for me it was very interesting question of how do you know we have a lot of a lot of data, it's it's very, it's very noisy, there's noise both within sites across samples and there's also sort of information that potentially could be shared obviously, over time, right? Because if it's coming from the same site, you also have potential geographic, you know, sites to maybe close together there. And then also maybe shared trends, you know across the state and you know the data itself is interesting because it's you know what we're measuring is is from this PCR, the polymerase chain reaction process. You sort of these cycle thresholds is kind of the raw data that's coming out of the the qPCR process and that data is is censored, right? So at you know when you when you have a negative COVID test just like a clinical sample you know we we we peg at at our maximum number of cycles which would be 40 in this case. But reading of 40 doesn't mean there wasn't COVID in the sample. It just means that it was below the limit of detection for the instrument. So there's an interesting statistical problem of trying to incorporate that censoring into the process. So when you're building this model that takes into account, you know, trying to share information across sites and within samples and adjust for the noise, try to convert the serial dilution curve of the the CT counts into the the concentration of the sample and then working backwards to try to figure out you know how much water pass through that wastewater facility that day, you know, so try to adjust for that, try to adjust for the population which may be seasonal. So there's a lot of like data processing that happens in the model and it happened all in one big, big Bayesian model, which was pretty cool. So that was a really fun project for me. It took me, you know, a few months to try to figure piece everything together and figure it out. But

at the end of the day, we're kind of able to extract, you know, the best we, the best we could do was kind of getting this, like, log concentration per person, like sort of an average viral load per person because we really didn't know, you know, at that point, what does that mean in terms of prevalence or anything else? It's kind of hard to make those leaps, so that's ended up with the signal that kind of we we published on the dashboard along with the the raw data and the and the and the sort of scatter plots of the raw data.

Now how it was used is of course a whole separate question and that just keep in mind that Wyoming is a very libertarian state. The health department we have, I think, a pretty light hand relatively speaking. As far as pandemic public health measures, it did get very bad in in the winter of 2020/21 and there were some measures that were taken like a mask mandate and such. But generally speaking, the purpose of the dashboard was for situational awareness for our state health officer, for the governor, and then for local public health officers like Doctor Billin and and Cody. So that was the primary audience was sort of those those decision makers to kind of take a look at the trend. You know, is it going up? Is it going down, you know, can we maybe foresee some potential You know, wave of hospitalizations coming that I think was the main utility of the the wastewater data and sort of being an independent source, right? It's not coming from clinical case counts. It's not coming from hospitalizations. It's sort of, you know, objective random sample that's coming from that community right? We talked about that a lot that it's a relatively unbiased sample.

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Anna: Thank you. No, you did a great job addressing all those questions. And you talked about the target audience or the decision makers, right? And you talked about Doctor Billin and at Park County Health Department, did you have a lot of interaction with other county level health apartments?

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Franz: Yeah, it just varies by county. So I think in Jackson, Teton County, Doctor Riddle over there was definitely involved. Sweetwater County and and Laramie County or sorry, Albany County, where the city of Laramie is. Those were also health officers that were more involved. The rest it was mostly just either city officials or or the wastewater operators. We didn't really track do any analytics on the on the dashboard to see who was visiting it. So I'm afraid I don't really have any data there, but you know, I would say as far as the people that we knew were watching it, it was certainly either state level officials or or sort of county health officers for the most part.

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Anna: OK, Phillip, did you get any sense that the the residents of Cody sort of were aware of this program and were tracking the data at all?

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Phillip: I think there was some awareness. I don't know that it was a real high level of awareness. I did frequently share just brief updates with City Council members and and discussions and Dr. Billin. And I would occasionally speak just you trying to check in to see. If we were continuing our sampling and if we had any changes in sampling frequency. I think the biggest thing that I would probably say occurred in Cody was just keeping our City Council members aware of what was going on and and I think there was a genuine interest on their part to see if we really could determine if there was upticks caused by visitor levels I think that was one of the main concerns for our community was, you know, we're we were very late in, in our case numbers like the first several months or six months. Of the pandemic, we were very,

very low numbers, but then once it hit we we did get kind of a similar pattern. It just was delayed by say six months. And so I think there was a definite interest to whether that was you know just kind of being geographically isolated or was that a result? Of perhaps some visitor levels increasing and and folks bringing it into our community for the first time.

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Anna: OK. Yeah, interesting. OK, so let's talk about funding. And you already spoke to this a little bit about COVID money used internally by the state. Those monies were available through the end of December 2021 and and that's why the this surveillance program is not ongoing at this time. What are what are your thoughts or are there any plans for you know restarting wastewater surveillance in Wyoming. Perhaps applying for the ELC funding to support a wastewater surveillance program? Tell me a little bit about what you know about that.

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Franz: Sure. Yeah. And I guess, you know, the CARES Act was expiring. You know, the funding we had to be had to be expended, but ARPA was was was available, there were other funds. We made the decision to discontinue the program mainly because you know they our federal dollars is not really monopoly money and it was really kind of a juice first to squeeze kind of argument, especially on our state, on our staff, at the public health lab. We anticipated, for example, with the vaccine mandates that there would be a a surge of employer testing. And so we'd have to have a huge, you know site, you know, emphasis on individual clinical testing at the state lab. And so it really was more of a cost benefit analysis, you know, argument from our perspective we we saw that. Yeah, you know it's it's interesting. It's nice to kind of be able to see these trends but you know when their vaccines available, when there's very limits, there's limits to what the state can really do as far as large scale, heavy-handed kind of public health approaches. You know, what is knowing whether it's going up or going down. How does that inform your decision? Right. And that's that's kind of the tricky. That's the benefit and and of course there were cost. So it was really you know we we made that decision internally. The funding itself is was not you know the the primary issue we probably could have continued it if if we had determined that it was you know in our interests or the the the benefits outweigh the costs, I know this lab is, I think they did apply for the ELC grant. I'm not sure what what the word is on that or or what's gonna happen in the future. I think if we do implement wastewater testing again, it will be probably more targeted probably towards maybe maybe on a facility level hospital level. I I'm really not for sure on that, but I don't think it'll be as as large or as wide scale as as it was.

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Anna: OK, makes sense. And what about for targets other than than COVID?

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Franz: The lab has certainly had interest in sort of expanding, you know, this to looking at like drug resistant bacteria or other kind of things coming out of hospitals. I think there were there. There's certainly a a wide range of applications to this technology.

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Anna: Yeah, I feel like we're scratching the surface, but we do have a lot to learn for sure. So let's talk about program challenges. And Phillip, you alluded to this a little bit just in terms of not having, you know, autosampler equipment to take a representative composite sample. And you know from your end from Cody's perspective, were there other sort of key program challenges that you'd wanna, you know, alert other folks to who are interested in starting these sorts of programs?

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Phillip: I think the biggest thing that I've shared when Anna and I did a presentation together at the APWA conference, one of the things that I like to emphasize is that, you know, when I as an operator, when my crew as an operator look at this issue it really seems overwhelming, but I would say pretty openly. The act of sampling and the the the role that we play can be done fairly easily and and I think once we had the right equipment, once we had our portable sampler and and had figured out where that really worked. In our system. You know overcoming that initial challenge really made the the process very easy for us to participate in. I think the other thing that really helped in that manner was was how Franz spoke to building a system that was really user friendly for all of our communities. Fact that they assembled those those sample kits and the the shipping materials and and just got us, you know, bulk bulk numbers every month and and made it really easy for us. I mean that that was it. It just made it really easy for us. So I mean I I think the advice I would give as as we move forward is that you know, the initial thoughts may be very ominous. And you know how much time is this going to take? How much money is this going to cost? But with with good partners like Franz and the state health department, I felt that our our impacts were pretty minimal to our operation. You know, a couple couple hours per testing cycle or per sampling and you know the the program that Franz developed with some compensation for us to help cover those costs and help reimburse us for the cost of the sampler. I mean that made it really beneficial for us to participate.

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Anna: Yeah, and and thanks for bringing up compensation per sample because that is a unique feature of the the Wyoming program. Phillip, do you want to go into a little bit more detail about about the compensation, the bonus and how that worked?

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Phillip: Yeah, I think. I think when Franz and I started initially chatting, you know, we did ask a very valid question. You know, how much time and how much effort does this take on your cruise part? And so, you know, it's it's, it's not a day, but it's certainly not, you know, 15 minute exercise either so. So I think he was very aware that, you know, especially here in Wyoming with a number of smaller communities where, you know, we have, we have the luxury of having three operators on our staff for our wastewater treatment plant. A lot of other communities, you know, when you're talking about a population of three or even 5000, they may only have one operator on their staff. So I think Franz was very conscious of the fact that this could be a significant amount of time investment for a limited staff availability. So he did build a compensation component into the program to help us and help other small communities offset some of that cost. And he also built in that reimbursement for the sampler or or even providing a sample. And then you know for continuous participation, if we provided a minimum of 1 sample per week for a full year, there was a bonus incentive as well. So we we saw that as a great opportunity here in Cody because we are moving forward with a new treatment process. We wanted to update some of our lab equipment, so I I pretty openly told the guys on my crew that if if you're willing to commit to this and you guys, you know, work between the three of you to keep that sampling up and running, we'll use, we'll dedicate that that bonus and that that compensation that we get to making improvements in our own laboratory with some new equipment or better equipment, and we've already started that. We've got a new pH meter that's already in place and we're looking at some upgrades to our BOD and TSS analysis equipment and possibly getting a CBOD meter to hasten that testing time frame on our BOD and CBOD analysis so so we're really using that to upgrade our facilities and and I know it was as you said Anna, it was unique, but it was great incentive that that Franz was able to build into our program here in Wyoming.

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Yeah. And just because folks are going to be interested, we're talking about a compensation of was it \$300.00 per sample? Well, and then the bonus for a year's worth of sampling, at least one sample a week that was \$10,000. OK. I'm getting nods. Confirmatory nods.

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Franz: Yeah. Also, you know the the shipping was free. We also contracted with the Wyoming Association of Rural Water Systems to do technical assistance, which I don't think, Phillip, you guys needed, but for a lot of the smaller cities and towns. And I think, you know, I mean Cody's like a a large city, I guess it's it's the kind of scale is all different. You know, we had cities like Fort Laramie. Which is like I don't know, a couple 100 people participating and they're the mayor is the, you know, the guy who runs the lagoon, who also runs the who's also the dog catcher and the police chief and everything else. So it's just a matter of compensating for their time and taking their time seriously. And you know, we I come certainly from a healthcare financing you know like we we work with Medicaid a lot. So we're acutely aware of of how paying for healthcare affects incentives and you know if doctors and nurses are are are paid for taking samples of COVID no you know I I figure you know why not compensate the wastewater operators as well.

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Anna: Yeah, absolutely. Taking their time seriously, I really like that that concept, because that's exactly what's needed. What about you, Franz? Any other challenges from sort of your perspective related to getting this program up and running?

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Franz: Well one I think would be the from the data side, I was worried in the beginning that the that we maybe our our limit of detection wasn't sensitive enough that the data would kind of be really super noisy. I was really pleasantly surprised. With with how, in some ways, like how sharp some of these curves came out, and I think to the credit, I think of a lot of the wastewater operators really taking, you know, being really, really careful with the composite sampling process and, you know, refrigerating the samples and making sure there's ice in the bucket and keeping this sort of chain of the the cold chain as it were, you know, I think that led to a lot of good quality data and so that was that was a very pleasant surprise that. So that's something I was worried about initially, but it turned out to be fine. I think the main the main challenge from our perspective from like interpreting this data is when new variants were coming out, we were seeing reports that you know the the viral load per person was very, very different and we have no reference data to no you know it with Delta or Omicron like how much more viral load was being excreted per person, right. And so when you see the curve going up like does that mean there's more COVID or does it mean that there's this different variant that happens to be shedding more rapidly? So there's a lot of unknowns. As far as going forward, so I think the signal as the as the just things got really complex with new variants and everything. It became harder and harder to interpret that signal as as sort of ground truth, especially when you're comparing it to past peaks or past trends, right? So I think that was the biggest challenge for us, everything else worked out were great. I mean the the contracting worked fine the the lab did a really, really good job. I think with the processing everything they had really talented staff there. You know really that you know we had a couple of hiccups with FedEx and UPS occasionally with holidays and and transport times. But otherwise, you know, I think everyone did a really you know really good job in this process and we had very few operational issues.

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Anna: That's fantastic. Well, I had one more question for each of you unrelated to wastewater. So Philip, what would you recommend to visitors to Cody in terms of things to do places that go?

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Phillip: So Cody is the closest city or town to the east entrance of Yellowstone National Park. So we get a lot of traffic for National Park visitors going up to Yellowstone or going to other state parks or outdoor activities. But Yellowstone National Park is obviously a big driver for the city of Cody in our in our tourism in the summer and one thing that I really emphasize to my friends and family when they're visiting, when they're going through the grand loop or other attractions in Yellowstone is the Grand Canyon of the Yellowstone River. And I think that's just an amazing geologic feature. It's got one of my favorite rivers, the Yellowstone River. And I'm a river enthusiast, so I just really love the Grand Canyon and encourage people to always go and visit that. It's just an amazing, just an amazing feature of the park along with all the other things that are going on. And secondly, one of the things that a lot of people don't know about Cody is we have an amazing museum here called this Buffalo Bill Center of the West and it's really a combination of five museums. You can easily spend a full day, if not more, visiting all the different exhibits and just learning about Western culture, plains, Indians, the background of Buffalo Bill Cody and his traveling shows in the early 1900s. And it's just an amazing museum. Amazing facility for a community of our size. So I would tell people if they get rained out in Yellowstone to spend the day down in the museum and it's a lot of time. I try to encourage them to go, but I know that that Yellowstone is usually a bigger draw, that people are visiting for. But I really love the museum and really encourage people to go and check it out. And then finally, obviously, if you come into Cody, you got to eat something. So there's a lot of good restaurants, local restaurants, but our favorite is a little takeout place called Wy Thai. And that's Wy, like the letters, Wyoming, WY, Thai. So we love Dara and her mom. They do a great job with and it's just awesome that we have great Thai cuisine here in, in Cody. It's not something you'd expect to find. I would say come into a smaller community and having great Thai food. So a shout out to Dara and her mom and Wy Thai.

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Anna: Awesome. Yeah, I would say that would that is unexpected but wonderful. All right. Same question for you, Franz. But anything outside of Cody, what would you recommend folks see in Wyoming?

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Franz: Yes, Phillip's not underselling Cody. I mean, it's a beautiful, but if you're driving to Cody and Yellowstone, which many people do, there's a lot of good, really awesome place to stop in the state. I, I love, you know, a real big perk of my job is going to like legislative meetings and and they are held at, you know, very random parts around the state. So it's. I've gotten to see most of it, which is, which is cool and and there's a lot of, you know, I think lesser known tourist places or lesser known sites that are just, you know, possibly just as beautiful as as the Cody area I read. Like the Lander area, which is in Fremont County, Saratoga is really beautiful in in Carbon County. Also, the big horns, Sheraton, Buffalo area, fantastic. So there's a lot of really scenic, you know, a a ton of nature, a ton of place to be outside. That's that's why would people should come here. But you do, I mean, like, Saratoga has some really, I mean, it's a tiny town has like, really excellent, excellent restaurants, you know two or three fantastic restaurants, which is really just disproportionate for a town of that size. And and Cody has a lot lot to offer to. So you know and either I don't think you Phillip or or myself are employed by the winding off the tourism, but I do think we are both very happy to to live here and get outside.

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Anna: Yeah. Well, you're being good ambassadors for your state. It sounds like there's just so many beautiful places to visit, and we'll share links to the the restaurants and the locations that you mentioned in the episode notes, so people can plan their trip to Wyoming accordingly. But I just want to say thank you so much, Phillip and Franz, for taking the time to talk with me today. I really appreciate you sharing your perspective and your expertise and your knowledge about wastewater surveillance in Wyoming in general. So thank you.

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Franz: Thank you. Appreciate the time.

00:35:47

Phillip: You're welcome, Anna. It's been great to meet and visit with you.