Sewer Signals Podcast
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Season 1 Episode 5: Karie Holtermann with City of Unalaska, AK

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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 delighted to be talking to Karie Holtermann today, who is calling in from warm, sunny, Cupertino, CA. Hey, Karie, it's wonderful to have a chance to speak with you today. How are you doing?

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Karie Holtermann: I'm doing great. Thank you for having me, Anna.

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Anna: Oh, of course. So, Karie has a BS degree in marine biology from the University of North Carolina and an MS in biological oceanography and is a returned Peace Corps volunteer from Belize. During her eleven years as a microbiologist, she has worked at Scripps Institution of Oceanography, the University of Washington, a startup research university in Saudi Arabia and drinking and wastewater labs in California and Alaska. Karie is currently working as a microbiologist, spearheading a newly created molecular microbiology program for the city of San Jose, CA, and she was previously the laboratory manager for the city of Unalaska's Wastewater Division. And that's what we're going to be talking about today is her time in Alaska.

So, a little bit about the City of Unalaska. It's the chief population center of the Aleutian Islands, and it's 800 air miles southwest of Anchorage and the heart of the North Pacific and the Bering Sea fisheries. With approximately 4500 full-time residents, the city doubles in size during peak fishing and seafood processing seasons. The wastewater division in the City's Department of Public Works maintains 10 lift stations, 350 manholes, 20 miles of gravity sewer line 2 1/2 miles of pressure sewer and a wastewater treatment plant, which screens and disinfects an average of 483,000 gallons per day of domestic wastewater from both the city of Unalaska and a Mackinac Island.

So, Karie, you've been all over the world, but like I said, we're gonna really focus in on your time in Alaska. So, let's dive in. Tell me a little bit about how Unalaska got started with its wastewater surveillance program for COVID.

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Karie: OK. Well, at the beginning of the pandemic, we were seeing some of the articles coming out of the Netherlands and out of Israel and the Biobot start up out of MIT in Boston. And we became really interested in what they were doing and we were wondering if we could do it on a really small scale in our little town in Alaska, so I approached my boss and the city manager and asked them if they would support buying the instrumentation that we needed to do this type of work and the supplies and they agreed to it. So we started out on our journey.

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Anna: That's just excellent to get the support of your of your management!. So, this was, you said March? 2020, April 2020?, just really early on?

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Karie: Yeah, this was at the very beginning of the pandemic, so it was it was February 2020, and it was even before our clinic there in the town got their instrumentation to do clinical testing.

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Anna: Ok. So what was that like? Procuring the equipment you needed for your laboratory? When a pandemic is going on around you, I imagine that would be challenging.

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Karie: Yeah, I would say that the most challenging part of working up there was getting supplies and of course the backlog of supplies got worse as the pandemic went on. And we did wait quite a while to get our supplies to the island. And in the clinic also waited for their instrumentation to do clinical testing. So that was kind of a hold up, but we got it as soon as we could and started out.

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Anna: So you started the process of procuring your equipment and your supplies in February 2020. How long did it take, really, until you were up and running with running samples on a regular basis?

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Karie: So we started running samples on a regular basis with the protocol in place in July of 2020. And the program lasted until early this year, 2022, March of this year, almost two years.

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Anna: OK, you were really the sort of the program director, so to speak, for this whole effort in the sense that you designed the the sampling plan. You also collected the samples and you also did all the analysis. So talk to me about where you sampled for this program and how you selected those sampling locations.

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Karie: Well, as you spoke about before, the distribution system of the wastewater treatment system in in in Alaska is made-up of 10 lift stations. And we explored sampling from different lift stations in town and you could really isolate different parts of that island by the lift station. If you haven't been to the island, there are commercial fishing industry is there, and they have big fishing fish processing plants. And we were interested in what was happening in those plants. We didn't want for production to go down at those plants. It was important to for the fisheries of the United States and also the community. We were keeping an eye on the community and a lot of the community lived in a certain part of town, so we were looking at certain lift stations where we could isolate those parts of town. And we ended up sampling from two different lift stations. One was on the back next side of the island, which is more industry and then one was on the on Alaska side, which was where the public works building was and also where most of the community live. And then we sampled from the wastewater influent at the plant. So we had an auto sampler there and we're able to get 24 hour composite samples at the plant.

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Anna: And what about at the lift stations? Did you have autosamplers there or were you taking grab samples?

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Karie: We did eventually get autosamplers, but the entire time we did grab samples so I would go every two hours over 24 hour period in sample so it you know, sometimes there was a blizzard happening so you would get your bucket and go out to the lift station and grab, you know a manual sample and put it in the composite bucket. So it was very interesting way to sample.

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Anna: Yeah, I would imagine so. So you did that every two hours for a day and and you would do that once a week, twice a week, or how many times a week were you going out and filling up your bucket?

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Karie: Depending on what we were seeing, we did see cases during alpha. Then cases during delta and then cases during Omicron.

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Anna: And just for those of us who don't know because you've mentioned blizzards and we've also talked about fishing season, sort of what is the fishing and the seafood processing season in Unalaska, like when does that happen?

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Karie: They started in January this season. They also have a summer season as well. So they do have year round fishing there, but they have seasons for certain fisheries, cod and pollock. So those are the big seasons up there and that's when you had people from all over the world. And you wouldn't think that we would be exposed to COVID in this area, but the people that came to work at the fish processing plant were from all over the world.

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Anna: Yeah, I was wondering if, like a blizzard would ever coincide with fishing season. It sounds like it absolutely could. So, you've talked a little bit about how you were the one going out and collecting samples at the two lift stations. You already have that autosampler set up at the influent to the to the treatment facility. And I know that you spent a lot of time in the lab, sort of developing and validating the method. So you were doing the actual testing, the analysis for SARS-CoV-2 on these samples. Is that correct?

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Karie: Yes, that's correct.

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Anna: Tell me a little bit about that whole process of the method development and validation and application and then what what was that like?

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Karie: In the beginning we were following protocols put out by the MIT startup Biobot, so they were actually using a different protocol in the beginning too. And as the pandemic has gone on. People have kind of gotten on the same page with testing wastewater and come up with the same QA/QC, and it's really come a long way in the last two years. But in the very beginning, many different people were doing many different things, so it was hard to compare that data across different labs. But in the beginning, I used a method they were using, which was pretty inexpensive. And they were using polyethylene glycol and salt in a high-speed centrifuge to to

settle the influent coming into the plant. So in our case, it was a very dilute system. So you had to then use quite a bit of water. And it's you had to spend quite a bit of time to get the amount of material you needed to.

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Anna: What volume of sample are we talking about that you would concentrate?

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Karie: A liter. In the big cities, you know, people will send in a 50 mL sample and that's enough. But our system was so dilute that in order to get the signal, you would definitely have to concentrate that much.

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Anna: Is your wastewater dilute because of the industrial influences from the food processing or is there another reason?

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Karie: Yeah, it, I mean part of it is because of that and part of it is because we get a lot of leachate from a leachate tank from a landfill there on the island.

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Anna: OK. And that makes me wonder. I mean, did you ever have to deal with PCR inhibition from the leachate? I've heard stories of, you know, unknown compounds and leachate, which, you know, leachate is famous for causing PCR inhibition. But I don't know, did you did you see any of that?

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Karie: We did and I think everyone has seen that in wastewater messages in general, you know like and you can see that with recovery of whatever recovery material you're going to use. Most people are using bovine virus for the most part, everyone's recovery rates are really low and that's showing the inhibition. Another way to look at inhibition is to dilute the sample and look at signal that way. There was definitely inhibition so that that was problematic in the beginning and I feel like over time we developed a method that was better and more sensitive to picking up the virus.

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Anna: Yeah, I'm sure it was a lot of trial and error and just learning as you go. All right, so we've talked a lot about the city of Unalaska and your efforts. Who who else were you partnering with? You know, in your wastewater surveillance program, were you sharing the data with your city health department? Tell me a little bit about sort of how the data were being used and who your partners were.

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Karie: So the biggest partner in the was with the city of Unalaska and I was working with the city manager and she was working with the clinic there in town and the clinic during the pandemic. Thousands and thousands of tests PCR tests and they did so much work. And you know, I feel like I feel like that. And Alaska did such a great job of at keeping the virus at bay because of all the measures they took during the pandemic, all the testing they did and then all the vaccine effort that went out and then the virus didn't, we saw the biggest spikes of virus after the vaccine had been administered to most a lot of the community. So it was during Delta and during Omicron which were, you know, supposedly a lot less virulent than the first strain that came out

so, yeah, the city and the clinic we worked very closely with them the entire time they put the data out on a dashboard. So the community was aware of it when they started to see viral load and we picked it up at as low as 10 cases, 10 clinical cases. So when the viral load started to go up, sure enough, each time it followed the clinical cases really well and it forecasted it by several days. So it was a very good tool to kind of see what was happening in the community.

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Anna: It's great that you made the data available to the to the public. Did you ever get questions from members of the community about what the data mean and how you should interpret them?

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Karie: Yeah, I think in the beginning. First off, people were suspicious about it they were, they were thinking that that their privacy would be violated and that we would be able to tell where the COVID case was coming from directly which house it was coming from which you know the amount of manpower it would take to do that would be a lot of manpower would. Yeah. Then people really like the data and. But then I feel like not everyone understood what it meant, and also during the Delta wave we saw the wastewater data that was really high. Whereas the case load was was lower, didn't match as well, and that and I believe that's because people weren't getting tested.

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Anna: OK, so let's talk a little bit about funding. You know, you were spending a lot of your time on this. You talked about how you procured supplies and equipment to to run this program, who who is funding all of that?

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Karie: The city of Unalaska funded all of it and they were with the Cares Act funding. And I I was doing it sort of as a volunteer effort because my real job was to be the lab manager for an NS SDS certified lab and that in a a drinking water certified micro lab. So I kind of did this on the side.

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Anna: Right. So your full time job was doing compliance sampling and running all those sorts of analysis and which, yeah, is very much a full time job. Did you have any helpers with you in the lab for either your volunteer work or your full time work?

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Karie: I didn't. I didn't.

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Anna: OK. Wow, just sounds like an impressive effort. Do you know if the City of Unalaska has plans to to start this program back up or and or adapt it to other things besides COVID?

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Karie: I'm, I'm not sure they have all the infrastructure there. They have the equipment, so they definitely could in the future continue on and that's kind of why it was set up in the first place. And then you know, like a lot of places right now there isn't. I know that the University of California Berkeley has disbanded their program and that Stanford will be ending their efforts in December, so all of this sampling is kind of now going back to the public health labs. I hate for all of this knowledge that's been developed during the pandemic to be lost somehow, so hopefully we'll continue to use it for public health and over the long term.

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Anna: I mean, I'm optimistic. I feel like I hear more and more about all the potential applications for wastewater surveillance and the the recognition of the value of this, this whole approach is a is a, you know, effective, efficient public health surveillance tool but, on the other hand, there's a lot of we're all tired of talking about COVID, right, so there's that too.

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Karie: Yeah, I think it ultimately it's political. So it it comes down to that. But I think that definitely having this infrastructure and all the experience that went on during this time, and I mean it's almost like a standard method now where you have people that stepped in and and everyone's kind of gotten on the same page. So hopefully and like you said, the flu and RSV and many other diseases and narcotics and all sorts of things can be tested in wastewater.

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Anna: All right, you have all the wisdom you have now in us sitting here in May 2022. And if you could rewind to February 2020 and tell your two-year younger self a couple words of wisdom about what to watch out for in the next two years. What would you tell that younger self?

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Karie: Gosh, that's a really hard question. I know that I spent a lot of time on this and, you know, I'm. I'm glad the pandemic we've made it through some really hard times and, yeah, I would probably tell myself to relax a little more. I was happy to be there at that time. It was very fortuitous for me to be there with a skill set that I could use to help the community at that time. Yeah, I'm really proud of of that. And I was very I I put in that amount of effort because I got to know that community and and I really loved the people in that community, so I wanted to make sure that they were safe and to do my part and and that's why it was done so. I'm not sure I would change that.

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Anna: Well, yeah. And like you said, it would have been impossible to know that you were going to be in it for the long haul for almost 2 years, right? And have that sustained effort for those two years. But yeah, what a contribution you made to that to that community.

So is there anywhere are are the data still available online for for Unalaska wastewater data?

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Karie: It is. It is under the city website. If you go to their COVID page, they have the data they're available. And also I am working on a map right now that's mapping of some data so I can share that with you when I when I'm done with it.

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Anna: OK, wonderful. Yeah. And we can put links to those things on the in the notes for this episode. And what are you working on now in the city of San Jose?

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Karie: We are splitting samples with Stanford and running, we're validating 2 digital PCR machines. And we're extracting from primary sludge of the wastewater plant. So I mean, this is millions of people versus uh, you know, hundreds of people in Unalaska. So in Unalaska, I think the most we ever had that had COVID on the island clinical cases was 300. You're comparing that with thousands of people here that get it. So it's very interesting because it follows the same pattern everywhere. It's just in Unalaska. It was on a very small scale.

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Anna: Yeah. And I'm guessing you don't have to concentrate a leader of primary sludge to get a signal in San Jose. That's good. OK, one more question for you. Sort of off the topic of water and wastewater and COVID. What's it been like moving from Unalaska to San Jose, which happens to be a change in 16° of latitude? Right. It's a big change in so many ways. What's been one of the biggest adjustments for you?

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Karie: I would say that it's it's been a very huge adjustment. Yeah, the 16° of latitude are like a different planet almost, and it's been pretty overwhelming, uh, to move from rural Alaska, you know, UnAlaska is a very special place. It's a very beautiful place and you become part of the community there. And people really look out for you. And also you become part of the weather because you're you're part of the sea. You're basically on on a very tiny island in the middle of the Aleutians, on the Bering Sea. So you become part of that—the everyday weather and that rhythm. And then you come back to a very big, you know, overwhelming lots of people like lots of restaurants and stores and it's very overwhelming, I would say.

But I think on a personal level you, you know, I learned a lot up there. I I spent a lot of time alone up there. And so I I bring back with me hopefully I bring back some insight that I can use here in California, but it it you know, I know ask is a place where I had my first job when I was, you know, 19 right out of right out of college so it will always be a very special place to me and I'm I'm sad to leave my friends there.

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Anna: Yeah, I bet, yeah.

Thank you so much, Karie, for telling us a little bit about your journey. It's it's a remarkable one. Lots of changes in your life recently, a big project and big program that you ran up in Unalaska. So you know, I just wish you all the best in your new digs and the urban Bay Area jungle. Thank you for taking the time to talk with me today. I really appreciate it.

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Karie: Thank you, Anna.