Arthur Jones (00:04):
How are PFAS affecting your work and our world?
Per- and polyfluoroalkyl substances are a large class of long-lasting synthetic chemicals used extensively in industrial and household products. Many PFAS don't degrade really on their own, and some are highly mobile in the environment. They can be found worldwide in water, soil, air, plants, animals, and even our bloodstreams.

(00:31):
We're still uncovering the full impact of these chemicals on the health of humans and our environment, but here's what is clear. It's a complex challenge at scale to globally remediate these so-called forever chemicals. Add fast-changing regulations and different geographies and regional differences to the scale in response to this PFAS challenge, and it all compounds the difficulty.

The way forward requires a greater understanding of the risks and challenges of PFAS. But that's just the start. We'll need cross-sector collaboration and innovation to tackle the issues and apply the right measurement tools and technology.

(01:06):
Our guests for this If/When episode are helping to define these solutions for clients, communities, and the industry at large. Sharon Minchak is the global solutions director for remediation and regeneration at Jacobs, and Dr. Russell Ford is the global director for drinking water and reuse solutions at Jacobs.

(01:24):
Sharon and Russell, thank you for joining us today. Before we jump right into the detailed PFAS questions, could you both please give us some insight of how your careers have led to where they are now, where you first encountered PFAS? I'd like to start with you Sharon.

Sharon Minchak (01:41):
Well, oddly enough, my career started along with Russell's. We started working together about 30 years ago, and so, we go back a long way. And after those early days where my path led me was down the environmental remediation road, looking at a variety of contaminant classes over the years to understand how they behave in the environment, how their toxicity impacts humans and other ecological receptors and how we can remediate them.

(02:15):
PFAS arrived on the scene in, oh, the early 2010s, and it was actually on the heels of Safe Drinking Water Act regulations that initiated sampling for what at the time were called unregulated compounds. And as that sampling began to happen throughout municipal water systems in the United States, the ubiquitousness of these synthetic compounds, PFAS, became apparent to everyone and it really started to pick up speed.

And we have been looking at it ever since, but obviously the scrutiny has gotten more and more focused over the last few years, right, Russell?

Dr. Russell Ford (02:59):
Yeah. Exactly. And yes, we have been working together a long time from sitting next to each other. My career started a slightly different. I came out of school as a chemical engineer looking for work. Wound up working in consulting, started doing drinking water. Early in my career, started working on regulatory compliance and cost documents for contracts with EPA, developing regs for synthetic organic chemicals and lead and copper, and all these different things. And my career led me to drinking water treatment where I, over the last 35-plus years, have been working in designing water treatment plants.

(03:35):
As Sharon indicated, early in the 2000s, the PFAS-related compounds kind of came into play. I was sitting on a couple of state regulatory advisory boards for regulatory setting entities and also for the EPA Science Advisory Board at one point in time. And these compounds were coming up and the challenge was as they started to realize that these are potentially harmful, the health effects data and the toxicity data wasn't available.

So, the regulations kept changing and they kept putting out numbers, "And is it really harmful in drinking water? Is it harmful in the environment?" So, over the last, I'd say 14, 15 years, more information has come to light and it's made it very important, in my case, the drinking water side of how do we remove them from drinking water to protect public health?

Arthur Jones (04:26):
It's fantastic to hear about your collaboration and how long you've worked together. It's amazing to hear that and the changes to the industry and how both of you have adapted in terms of careers. But I'm going to take a step back. Could you, I mean, explain exactly what

Dr. Russell Ford (06:44):
So, that's great. So, they're called forever chemicals, and we won't get into the technical science of why they're called forever chemicals and the bonds that keep them together, which makes them so challenging to mediate.

(06:57):
So, one of the myths are that they're there forever, but one of the things we have is we can remove them from the water, or the air, or the soil. There are technologies available to remove them. The challenge is that we remove them from one medium to the other, because they're very challenging to destroy at the moment. So, they can be removed, but they're very ... So, a lot of work is being done to look at how to destroy them in the environment, but right now we remove them from one medium ...

So, I take it out of drinking water, I put it on some kind of material, it gets out of drinking water, and then you have to either incinerate it or dispose of it or landfill it to that effect. But the myth is that they're there forever, but they can be removed.

Sharon Minchak (07:41):
Yeah. And I would add that whether it's a myth or a misconception or it's just a lack of what people understand and we even as an industry understand, is that there's definitely a lot of stir on this. There's a lot of discussion. The press, social media seem to have taken the knack of sensationalizing it with this fear factor versus necessarily worrying about understanding the real issue.

(08:10):
But the reality is that we really are only starting to truly understand what the toxicity of these substances are and how they behave in the environment, how they behave in us as humans and in other ecological receptors. And so, while it might seem obvious to say, "Well, if we're not sure how they impact us, then we should say, 'We don't want any of that.'" But that ship has kind of already sailed.

They are in our lives, they're in our environment, they are in us.

(08:47):
So, the focus, I think, in going forward really needs to be how do we put our very best science forward? How do we accelerate that understanding? How do we look at ways to truly assess what toxicity means to us and to other receptors? And we really figure out how we

need to concentrate and focus on the areas that we need to prioritize to create the most benefit for us, for the environment, for the future.

And we also probably really need to take a long, hard look at how many of our consumer products actually still contain these materials when we are talking about concentrations that we find unacceptable in the environment, but we still actually really like the properties that many of these items have. So, it's kind of rectifying that in our minds.

Dr. Russell Ford (09:46):
Sharon, can I just jump in on that again? I think with the health effects around the world, it's not consistent either. So, one of the challenges is that every region of the world is looking at these compounds at a different health effects, toxicity, how it impacts the environment. So, you get different

water space because there's actually two avenues for that too. I'm going to go in reverse order. So, on the water space, on the wastewater, right? When you have a wastewater treatment plant that removes stuff from the water and it has to discharge into the environment, these compounds get concentrated into biosolids. And then usually the sludge or the residuals, they get land applied. So, then you're worrying about getting these compounds out and then land applying them.

So, there's a host of regulations that are going to be coming forth looking at what's the impact of that in the environment, because you've got a concentrated solid in the system?

(15:21):
On the drinking water side, we don't talk about remediation so much, but as Sharon mentioned, if you can find the point source, if you could find out where it's been discharged to the ground because somebody physically contaminated the site, then yes, if you can remove it at the source, it's much better. Eventually the groundwater will be cleaned up and the treatment plants will not have to deal with that.

(15:43):
But unfortunately, since it's so ubiquitous in the environment with stream runoff and rainfall, and it's

Arthur Jones (17:28):
I mean, what are regulators doing right now globally? And is PFAS getting the scrutiny it needs? But it sounds like the regulation is a challenge because it keeps changing and it has to keep changing to obviously update and to follow and align with, obviously, the science that's coming out and what we are learning. But I'll go back to the question, do you think it's getting the scrutiny it needs?

Dr. Russell Ford (17:49):
I believe so. I believe so. I think they're looking at it. I think it's been brought to the attention that we need to look at it and get consistency in the health effects data. I think when we talked about how long we've been dealing with this reg. And back in the early 2000s, I remember sitting in conversations with various toxicologists, having differences of opinions of the level of PFAS and the health effects and what the risk should be. And so, I think the industry as a whole is coming together more on the toxicology data, the health effects data, looking at which medium you want to look at and remediating it in.

Like you said, do you want to go after the soil, the air, the drinking water, or all of the above? And how do you do it? So, I think these have been brought to the attention.

(18:30):
I think the more critical part, and I'll let Sharon jump in this more on her side, is it's obviously how do we remove it from the environment over time? So, the manufacturers have to start looking at, "This is the stuff that's in suntan oil" Ŏ ʁ So

translate directly to what our cleanup standard's going to be. And there are states that are doing things that still are different. And how do we bring all of these stakeholders, regulators, manufacturers, our industries, the public, together, collaboratively to say, "How do we really want to manage this global issue? How do we want to think about the way we direct and invest resources to address this important need for us?"

(20:08):
But when you look at the idea of trying to remove every molecule of PFAS in the world, you're going to probably drive climate change issues because that's the magnitude that we're looking at. And a big issue we all have to come to grips with is what is in the background? What do we set as a background level?

Not saying that we just accept that and not pay any attention, but are we driving investment of resources to try to achieve cleanup level that when you have a background condition that you really can't control in the same area? And how do we really rectify that? How do we understand, again, what is really the toxicity for us and how are those exposures occurring?

(21:05):
As Russell said, that product lifecycle, that sort of product stewardship upstream, where can PFAS be replaced in manufacturing processes, where can they be replaced in products so that we're simply eliminating that from the input source, from the equation? There are places it can be eliminated, as we've talked about. These are highly utilized, useful industrial chemicals that for some industries there aren't adequate, appropriate replacements at this point.

(21:44):
But in manufacturing processes for years, we use toxic materials and we just are aware of how they need to be managed, how they need to be controlled, how they need to be minimized, how we need to look at wastewater management, how we need to look at recirculation and recycling within industrial processes. So, bringing that lens to really addressing the whole lifecycle.

How are we using these compounds? Where are they? How do we manage them? If they do enter the environment or they have entered the environment, how do we appropriately address them?

(22:18):
And then, if we're really looking at the receptor protection in the drinking water space, then

we're taking care of that as actually sort of the final link in the chain. We would prefer to not have to be treating these in groundwater. We'd prefer they not be there, but they are, and they are treatable.

That's the good thing. But there's definitely a lot of focus, there's a lot of energy, there's a lot of regulatory emphasis. And getting all of those input signals to line up, and that might be

PFAS challenge. Our main lessons from this discussion start with a newfound appreciation of just how complicated PFAS treatment and remediation can be and how important it is to correctly identify and address the contamination at the source and focus carefully on the exposure pathways.

(27:21):
It's also insightful to hear how mitigating the risks and liabilities of PFAS for communities and clients relies on tailored approaches built on innovation and collaboration. You've both provided the answer to the PFAS challenge, which is multi-stakeholder partnerships supported by the best talents and technology, just like the way the two of you work together. So, thank you very much for this excellent discussion.