Tribal Water Reuse Training Webinar

JULY 15, 2020

Webinar Proceedings

Time Stamp	Transcript
S1: 00:05	Hello everyone. This is Dave Smith. I welcome you today. And I just want to let you know that we're going to get started more or less on time in a few minutes. But thanks for being timely. Standby.
	[silence]
S1: 00:37	I have to say, I do kind of like being able to see people's backgrounds on these video calls. We can't see everybody today. But it's always nice to see where people are in their various, unusual locations.
	[silence]
S1: 03:00	I'll just say hello one more time to everybody as you join. And thanks for joining us. We'll get started in a couple of minutes.
	[silence]
S1: 04:31	We'll give it one more minute and then we will start.
	[silence]
S1: 05:17	Well I believe in rewarding those who are timely. So why don't we go ahead and get started. Hi everybody. And thanks so much for joining us. My name is David Smith. And I'm with the Environmental Protection Agency. I hope everyone is staying safe. And I'd just like to wish y'all some clean water, a clear mind, and a full heart during these strange times that we're in. Hopefully, today's experience with this webinar is a good one. We do welcome you to the webinar. We look forward to spending some time exploring what it takes to be successful in developing and implementing tribal water recycling projects. Today's webinar is being sponsored by the National Water Reuse Team at the US Environmental Protection Agency. Before we begin, I'd like to review how we'll do the webinar today. Please mute your microphones and your telephones. They may be muted already. We'll pause periodically during our presentation to field questions from you, including from you folks who are on the telephone. There is a question box feature that we will use to field questions for those of you who are on [inaudible] webinar. And you should see in your command box an arrow next to the word questions. And if you'd like to ask a question, I would ask you to enter it there. And I'll be monitoring those during the presentation. And we'll be taking questions that way as much as we can. But of course, we'll also pause to give people an opportunity to ask questions orally if you like.
S1: 07:02	The presentation and a couple of supporting reference documents are being made available to you. And you should be seeing also a line on your control box called handouts. And you can download each of those documents there including the presentation, a reference document about water reuse

references, and a reference about water reuse funding sources. Today's webinar is being recorded for later posting on EPA's website. But now I'd like to briefly introduce today's speakers. Until he retires later this month, Dr. Bruce Mackler works for EPA's specific southwest region headquartered in San Francisco, recently, nationally recognized expert in microbial risk assessment and in water recycling treatment. We're also lucky to be joined by John Flores, who is the director of the Environmental Department and the water manager for the San Pasqual Band of Mission Indians in southern California, north of San Diego. Again, my name is Dave Smith. And I'm an assistant water director in the pacific southwest region of the EPA. But I'm also a member of the team that developed the national water reuse action plan. And finally, while you can't see him, Sargon de Jesus is a consultant with the eastern research group. And he's engineering today's webinar.

S1: 08:31 So, with that, let's get started. Next side please. After I briefly describe the new national water reuse action plan, Bruce is going to start discussing why recycling makes sense for many tribes and explore different types of water reuse that you might pursue. Then we will hear a detailed presentation from John Flores about the San Pasqual Band's successes in implementing water recycling and water conservation efforts. Then Bruce will take over again. And we'll dive into some details about some of the key considerations that you should keep in mind in developing state recycling projects that your committee and your communities will support. I'll finish up by touching on some funding issues and opportunities and asking you to tell us more about how we can help tribes build recycling capability going forward. There should be plenty of time for your questions and comments. And as a reminder, please remember to type it into the question box. We're scheduled for two hours. We think we may go a little shorter than that. But I think we'll have plenty of time to cover what you'd like to cover.

S1: 09:46 Next slide please. Many federal agencies have helped advance water recycling for years. And there's been a great deal of success in some parts of the country to implement water recycling systems, but not everywhere. Recently, EPA and some federal agency leaders made a commitment to bring federal efforts supporting recycling closer together and to do more to join with other groups to help advance water recycling throughout the country and making it available to more communities that might want to pursue it. EPA partnered with many other federal state and local agencies and stakeholders, including some tribal representatives, to identify some of our highest priority needs to advance water reuse. Our mutual goal is to help improve and maintain sustainability and resilience of our water systems, to really-- and in some cases, to help build the security of our water systems. We believe wastewater recycling and stormwater capture and use can be an important component of an integrated approach to water management. Which will help us build water security in the future. There was a huge response to this effort. And we were able to partner with other agencies and organizations to develop and issue the national water reuse action plan in February of this year.

S1: 11:20 In the WRAP as we call it, EPA and its partners commit to 37 specific actions that are designed to build our nation's capacity to take on more water recycling and to do so in ways that protects human health and the

environment. Next slide please. We heard from many people that the benefits of water recycling should not be limited to big cities and wealthy communities. They should be accessible to all. We wanted to specifically engage with tribes to help us better understand your interests in recycling and your needs around water recycling. WRAP action 2.2.15 includes commitments to reach out to tribes to discuss water recycling opportunities, to provide training on water recycling basics, and we're doing that today, and to seek to understand better how we can best aid your efforts to pursue water recycling projects. We've been doing some outreach already through national and regional tribal water organizations and expect to continue doing that. We're doing the training today. And we may do more in the future if that's useful to you. But we look forward to hearing more from you during the webinar and afterward about how we could best help you in this area.

S1: 12:39 Now let's turn to some basics about water recycling. And for that, I'm happy to turn it over to Bruce Mackler.

S2: 12:48 Alright. Thank you, David. And I'm Bruce Mackler as Dave said. I'm a toxicologist at the EPA office in San Francisco, the region nine office. And I've been working on water recycling for more than 30 years now. Before I came to EPA, I was doing this at NASA and where we were looking at water recycling for going to Mars on our Mars missions. 30 years ago, we haven't gone to Mars yet. But the recycling is quite active for the space station. And some of the technologies that were developed at those times are the technologies that we're now using today on Earth. One of the first questions you're going to have to ask yourself, you've probably already asked yourself, is why bother to recycle water. For NASA, the reason was that a Mars mission would be three years and the cost and the trouble to haul water, drinking water and wash water, for the astronauts on that mission would have been prohibitively expensive if not impossible to do. So, they were forced to do it. You might not be forced to do it. But there are some good reasons. And I think the first reason is that water is valuable. Even though we know that it's not going to disappear, it will go back to mother earth eventually, there isn't any reason, while you have it, to just use the water once and then consider it a waste and get rid of it. Or if it's rainwater and it's washing over the earth or through a community, there isn't any reason you can't use it for a while before returning it. So, it's valuable.

S2: 14:38 There's effort into pumping water out of the earth and [inaudible] well or taking it out of a river and treating it for drinking water or other purposes and once you have it, consider it a resource that can be used. So that's the first thing. But there are other reasons that you can understand. I mean, if you have limited supplies, reusing water will give you more water to use. One nice thing about reusing water and having a reuse program is that it can provide an alternative if there is a problem for some other reason. You get the redundancy in having a source. More prosaically, if you reuse water, you have the control over the water quality. You might be starting with something that is somewhat messy, but you can directly control what you're doing about it to make it useful for yourself. And then if you're considering stormwater obviously by capturing that water for use, you've also, at the

same time, provided yourself some flood control and some protection potentially.

S2: 15:53 Next slide. Well first off, to recycle water, you need water that can be recycled. And there a number of sources of that. If you think about it, in land, if you are treating the wastewater, that is if you have a centralized water treatment facility, that water is often just dumped back into a river or a lake. Or it could be evaporated. It could be just sprayed to evaporate the water or to put it into the ground. And in that sense, you have spent money to treat the water and then you're just getting rid of it. Certainly, in coastal areas, most of the treated water just goes into the ocean. The effort is made to weed out contaminants. And then it goes back into the ocean. You don't get any second use. Stormwater is a trouble. And usually it's discharged with minimal treatment. And then there are other sources. And we'll talk just briefly on some of them. Wastewater within a building, in a home, or in an apartment complex, in a casino, or a hotel, or a school or such, that water can actually be treated onsite and reused onsite. And there are some opportunities for that. And you might have some opportunities for that. And one thing to keep in mind is for most of the non-potable uses, all you're really talking about is minimal treatment and added disinfection before you can use that water for some purpose.

S2: 17:36 So next slide. Thank you. So here are some. And if you look at them, and some of these, maybe ones you're doing already. But if you look at it, a lot of these are places where you don't really want to be using your high-quality drinking water. Landscape, irrigation, park irrigation, golf course watering, dust control, there's no reason to use high quality water. It'd be much better to use reclaimed water, recycled water for that purpose. Similarly, for some food crops and non-food crops, livestock watering, the water can be treated. Wastewater can be treated and be perfectly safe for those uses. But you get into recreational water bodies, use in wetlands, or to add to a streamflow, those are all ones where a treatment doesn't have to be to drinking water quality. It'd perfectly fine with less treatment. Ground water recharge, industrial uses, those can be-- that's where you'll potentially need more treatment to be able to meet those needs. But again, it doesn't have to be for drinking purposes. And then finally you could treat wastewater, recycle water, clean enough for drinking water purposes. If we can do it for Mars, we can do it anywhere.

S2: 19:09 Next slide. So just to give a few quick examples here, and we'll start from the simple to the more complex. So, for [inaudible] river, they put up a wastewater treatment plant basically to get people off of sceptic. And then they had the water. Well what could they use the water for? Dust suppression, very straightforward, disinfection, a little bit of clean up, a little bit of disinfection, and it can be used for dust suppression, very simple. Next slide. Okay. A little more treatment for the [inaudible], they basically upgraded their water treatment plant. And by doing so, they could remove enough of the contaminants so they could use the water for landscape, landscape irrigation to put into their wetlands and to water their golf course. So, this required a little more treatment because if you're spraying water on a golf course and golfers are there, you don't want them inhaling waterborne

viruses and getting sick. But it doesn't take that much to get there. So, there's an example of a little more treatment for other types of benefits.

S2: 20:29 Next slide please. The [inaudible] had a casino. And they needed water there. [inaudible] by doing recycling, they were able to use-- to do the landscape irrigation, that's nice, but also for toilet flushing, for in building use. Well okay. This is not for potable purposes. And then it would be clearly labeled and such. But by doing additional treatment to the water to get rid of pathogens that might be there when you flush the toilet, they have water that it was perfectly safe for that application. They had a normal wastewater treatment plant. And they added to that by putting on a membrane treatment plant for the additional removal of pathogens. Next slide. Even a higher level of treatment was done in Washington state where the wastewater treatment plant had additional polishing elements into it so that that water could be put into wetlands. And the wetlands themselves provided additional removal of organics, organic materials, and metals. And then that water could be infiltrated to recharge the aquifer. So, it's not potable necessarily. But it's getting closer. And the wetlands and the recharge into the aquifer provides [inaudible] right there, additional treatment.

S2: 22:14 So next slide please. Okay. So, I had mentioned the onsite non-potable use. Recycling the water within a building requires a smaller footprint and smaller pieces of equipment. Packaged plants can be developed for this purpose. Basically, there are different kinds of water sources within a building if you think about it. Usually we're going to be looking at we call gray water. And that's the water from a laundry, from a washing machines, from dishwashers, from showers, from those purposes where it's not sceptic, it's not toilet water. Toilet water is black water. And we-- often times, we don't utilize that. But the gray water from laundry and such and from washing is perfectly fine. Rainwater or stormwater capture, rooftop capture of some sort, landscape capture of some sort, another source of water onsite. And then the cooling systems, the common [inaudible], can be utilized as well. They all have different properties as you might think about. But they're all amenable to onsite treatment. And onsite treatment again, depends on the use you're planning for that water, but a filtration and disinfection is common treatment particularly if you're just going to go back and use it for irrigation and toilet flushing. If you're going to use it for your cooling system, you'll probably have to take the metals out and other things.

S2: 23:51 Next slide please. So finally, potable reuse, this is probably something you're not going to be wanting to attempt. But the water can be treated. Right now, if you think about it, a lot of wastewater is treated and goes back into a river. That water is then taken up by water treatment plant and treated and used. We call that de facto reuse. Say Washington DC in the summertime, as the rivers slow because of the heat and evaporation and such, wastewater becomes more of a contributor to it. And to some-- in some places, wastewater can be a large component. Well that's treated wastewater. That's primary and secondarily treated water, maybe tertiary treated water. And then it gets diluted somewhat. And then it gets taken up by a drinking

water treatment plant. And it's treated again. It's filtered and disinfected. And that-- this de facto reuse is pretty common in the United States.

S2: 25:00 Now deliberate reuse, that's something else. And we'll talk about it a little bit later. It takes a lot more effort to do it if you're just taking it from a wastewater treatment plant directly. Next slide please. Okay. So where are we at in the United States. Some states are a little better than others. But in general, only about 3 percent of the water of the US is getting recycled. And almost all of that is being used for landscaping. So, 2 percent of all the wastewater goes to landscaping and maybe 1 percent gets used for other purposed. But that 97 percent, that's water. If it's your water, it's something you can use. And I think that that's available water that you should consider, if you have it, you should consider as an opportunity for recycling. Next slide. Well why is there 97 percent? There are disincentives to recycling. And you might be aware of some of these yourself or thought of them. For one, if you have free or cheap water, that is if you have a really good aquifer and pumping costs aren't a lot and you don't have to treat that ground water for any [inaudible] and then you might not be interested in recycling. But that isn't always the case. And in the southwest, it certainly isn't the case in general. Sometimes people don't realize that their sources are vulnerable. It is of course now more recognized as surface water sources are vulnerable. The Colorado ebbs and flows with the seasons. But it seems to be ebbing more than flowing. And we can see that in the future, some of the surface sources may be lost. And then what are you going to do? You have to start looking around for other sources.

S2: 26:56 So, it's those. Often times, it's a lack of money because to do the treatment, you're going to have to put in infrastructure of some sort. It might not be a lot for some of these applications. But it's still money. And then if you're going to do a major treatment, you're probably going to have to build pipes to move the water from where you're doing your treatment to where you need to utilize the water. So, this lack of distribution systems for recycled water can be an issue. Often times in some communities, there's a real distrust, a distrust that wastewater, sewage, maybe shouldn't be used for other purposes, that it's better to be dumped, treated and dumped. But that mistrust can be addressed and we're going to talk about that a little bit. And then finally regulatory hassles, there are regulations of all sorts that it can put delays into the process and can be a disincentive. We'll hear soon from John about how [inaudible] solved those problems and how you too could solve those problems.

S2: 28:09 Next slide please. Okay. So really, at this point, you might want to just think about, is recycling something you want to do? I mean there are these opportunities to reuse, recycle your water to not waste your water, to be respectful of the water. We certainly have examples. I showed you a few. There are plenty out there of tribal and non-tribal communities that are successful at this. You do need to be ready. You need to prepare. You would need to have the technical and the financial and the operational skills to be able to run recycling systems. But there is the experience that's out there. You can learn from other people and make it a lot easier for yourself. And we have some resources. So, with that, why don't we just see if there are any immediate questions. And if not, we'll turn it over to John Flores to talk

about their success at San Pasqual. Do we have any questions at this point? Dave, you're muted.

S3: 29:26 Oh Dave, I can jump here if you'd like. We did have a couple of questions that came in. The first one, to what extent is water reuse limited by pollutants which are introduced in households, especially medications?

S2: 29:42 Well I will be talking about that. To the most extent, very little because unless you're actually drinking that water, those contaminants, if they're put on the ground for dust suppression or are used for irrigation, people aren't going to ingesting. They're not going to be exposed to it, to any meaningful extent. The limited amount that might be in air if you're irrigating a golf course and somebody's golfing at the time, the exposure is so low that these contaminants don't pose a hazard to people at all. Pathogens like viruses and bacteria, that's a different story. But the common contaminants, metals and pesticides and household cleaners and such, don't pose a threat because the exposure is so, so low.

S1: 30:38 Bruce I would just add that when we're talking about onsite use, it's a building scale. In almost all cases, people are talking about non-potable reuse. People are not talking about recycling that water collected at your building site for drinking water purposes. And so, Bruce is right in those cases. The kinds of things that occur in household gray water, we call it, would likely not be a huge concern directly. But we will talk about later the additional treatment needs that would be necessary to address the kinds of chemicals that do come out of households if drinking water were your objectives. We do have one other question which is asking, "How can I get involved in the water reuse action plan?" And I guess I will answer that by saying we encourage you to look at the specific actions that are listed there. There are-- there's contact information for the leaders of each of those actions and rather specific descriptions of the work being done for each of these actions. If you are interested in getting involved, there are often opportunities to get involved. And we encourage you to contact the action leaders. We also expect to be doing and update to the plan some time in 2021 and introduce additional actions. And so if you have ideas, I urge you to contact me or other people on the water reuse team if you have ideas about needs that you think need to be met in the future.

S1: 32:24 We also have one additional question regarding onsite reuse at the household scale. "What are your thoughts on the reuse in water from washers and showers for those same purposes?" And I think I would answer, it is reasonable to consider the use of shower and wash water for things like landscape irrigation, irrigation, and in some circumstances, toilet flushing at the individual building scale. We may have one additional question. "Are there any permits required to use recycled water in a wetland?" Bruce do you want to answer that, or would you like me to take that?

S2: 33:10 Well you probably know more about permits than I do. But it's going to be state specific. But Dave, I think you could give a better answer.

S1: 33:21 Well in general, if there's a discharge of treated wastewater to a wetland, it is often subject to NPDES permitting requirements for discharge of treated [inaudible] to a water of the United States. And in those cases, it might be

necessary to obtain a permit. And I believe in all areas of Indian country currently, EPA is the permitting authority for the NPDS program. But for discharges to wetlands that are not jurisdictional, it may not be subject to those permitting requirements. And it would be a good idea for the tribe to make sure that the water receives sufficient treatment to protect the eco system in that wetland to which you're discharging. Let me pause and ask, are there any questions from people on the telephone? [crosstalk]--

S3: 34:24 So, Dave, I just wanted to interject that if folks want to ask [inaudible] a question over the phone, please just alert us in writing. And we'll be happy to unmute you. So just make sure you send us a quick note if you'd like to ask a question over the phone, which we welcome.

S1: 34:39 Thank you, Sargon. So please keep those questions coming. And I wanted to tell you, I promise you that John Flores is here. He just was not able to appear on camera today. So, I would now like to turn it over to John Flores from the San Pasqual Band.

S4: 34:56 Hi everyone. Thank you, Dave, and thank you Bruce for allowing me to be on this today, great start of the presentation on Bruce there. My name is John Flores. I'm the environmental director and the water manager for the San Pasqual Band of Indians. I can see a few names of our attendees today that I recognize and know. So those out there that know me, it's good to see you on this webinar today. I'm going to talk a little bit about San Pasqual's recent water and conservation projects that we've been doing here at San Pasqual since the last big drought we had in California that was back in the like 2012, 2015 timeline. And then of course we came out of the drought. But a lot of our efforts today that we've been doing these last five, six years are really to prepare us for future droughts in California that we know will be coming. The next slide please. So just to give people a little bit of a reference where we are, we are located within San Diego county. We're in the northeastern or northwestern or just north portion of the county. Everything you see that's colored; those are cities within the San Diego county. The closest city to us to the west is [inaudible]. The large pink one is the city of San Diego. And many of these cities are already using reclaimed water throughout their municipalities on irrigation and landscaping and other uses. So, we figured we would try to do some efforts here at San Pasqual.

S4: 36:28 Next slide please. So, this is a zoomed in of San Pasqual. Everything in orange is a tribal trust land. Everything hashed out is [sea?] land. The tribe's total acreage is 3,127 acres. And we have about 450 homes on the reservation, a population of about 5,000 or so. The tribe does own a golf course. That what's over further to the west or to the left on the map. That golf course is using reclaimed water to irrigate like Bruce talks about. That actually is not provided by us in our department. We actually purchase that water from [inaudible] municipal water district directly. So, the tribe purchased that golf course. And we are using reclaimed water there. And we're also using now reclaimed water on the reservation as well. Next slide please. [inaudible] again to the reclaimed water, I'd like to talk a little bit about water conservation efforts at San Pasqual. I feel there's very different things that tribes can do to conserve water. And I just want to talk a little bit about those because some of these are low hanging fruits that you can get started on

before you go further up to using reclaimed. Which is of course a little bit more pricey to do.

S4: 37:57 So next slide please. This is a picture. You can kind of see in the background, it says food grows where water flows. That's actually at the five freeway. I've passed that sign many times. It's in the central valley portion of California. And I took a picture of that one time when I was driving through there. And what is water? Well water is basically life. You cannot have life [inaudible] without water. And life grows where clean water flows. And also, what is land without water? Water doesn't just sustain people, but it sustains your economies. It allows more people to move onto the reservation, to live on the reservation. And as more people move on the reservation, that stresses water resources as tribes try to increase their economic portfolios. You need to access the clean water. And that's also a stress on tribal governments depending on where you're located. Next slide please. So, San Pasqual, I would consider the reservation, we are water insecure. Specially we're broken up into three districts, districts A, B, and C. And district A is especially water insecure. Like I said, we're near Valley [inaudible] water district. We do have some water wells. It's not enough to meet our demands for both residential and economic functions on the reservation. So, we purchase a lot of our water from Valley [inaudible] water district. So, each month we buy water from them. And we have to pay that each month.

S4: 39:37 So, some of our water supplies are at risk due to many of the same reasons a lot of people on this webinar are facing, climate change, population growth. We've seen Southern California in San Diego is a very expensive place to live. So as property values and home prices go up off the reservation, we see an influx of people moving on to the reservation because they can't afford to live off of it. Or they are selling a house that's worth almost a million dollars and building a dream house on the reservation now. And basically plants, often times, they're competing for the same limited water resources that more culturally significant plants like the Oaks and Sage are competing for. So, we want to cut those down. Water waste, it's just a fact of life. People have broken sprinklers, broken-- leaky toilets. How quickly do people get around to fixing those? Water waste is a big issue. And we try to do our best to reduce that. And that goes into of course water leaks. Next slide please. So, what is the solution? So, at San Pasqual, we met with the tribal leadership, [inaudible] assignment committee, with the fire department. And we talked about what are solutions here at San Pasqual and came up with some ideas. First, rainwater barrels, collecting rainwater that we get here at San Pasqual for reuse by homeowners. And that's a picture there of a rain barrel we installed. You don't need gutters on every home to collect rain barrels. A lot of times they have these little rain chains. And this is an example there of a home on the reservation that didn't have gutters. But we we're still able to get them a rain barrel.

S4: 41:27 Water efficiency efforts such as high efficiency toilets, promoting that when we're building new homes on the reservation, promoting the use of high efficiency shower heads. So as new homes come on the reservation, we try to work with homeowners to get the most efficient water toilets and stuff that's available out there. Technology, we had started leveraging technologies by going to AMI smart meters. Before, we would read meters

on the reservation. Our reservation's 100 percent metered. Every home has a meter. And we would have to read the meters once a month manually. Now these meters do a download once every day. And we get almost live, up to the minute, data of what's going on. And they can report leaks to us and leaks to the homeowners. Educational outreach to promote native drought resistant plants, we have a monthly newsletter that we put out. We have our website. We have Facebook. And we're constantly promoting outreach and education to the community and what they can do to help conserve our water. And then lastly, we got into getting recycled, reclaimed water Valley View Casino, which is tribe owned and operated.

S4: 42:45

Next slide please. So, as I mentioned, we're in Southern California. It's a very dry climate out here. We get low rainfall. But what rainfall we did get, we wanted to try to start capturing as much as we can. We don't have like a sewer system here to collect that. But we have homes that have roofs. And so, we want-- we get about 20 inches of rainfall per year. It's very seasonal. And we did some GIS analysis. And if we could capture most of that rainfall coming off the roof, you can see the more than 100 acre feet of water per year is what we could potentially capture just from the roofs alone on the reservation. And we were leveraging GIS to do that analysis. So, we're trying to-- we're not going to capture all of that. But we know that's what our maximum potential is. And the more we can capture, the better. Next slide please. So, our rain barrel program, the bottom corner is another example of a rain barrel we put in there. Once again, this one had both gutters on it. And we also had an extra rain chain. So, we added that to them. The homeowner liked the aesthetic of the rain chain more than she liked her gutter. So, some of this is off of aesthetics and making people happy. So how did we get this funded? Well we worked with EPA. We worked with our nonpoint source grant that we have. It was a 319 nonpoint source grant. And we've been putting in 2019 funding for this project. Over the last two years, we've installed 38 rain barrels for 19 residents. We typically do two barrels per home. Each barrel can capture up to 75 gallons, so 150 gallons of capacity for a homeowner.

S4: 44:37

And what do they use it for, just watering around their house. In that picture, you can see that person has some potted plants you can kind of see in the back there. She just has her little bucket that she fills up off her rain barrel. And then she walks out there and waters her plants around her house. And that's what a lot of people do with that. You'll be surprised how far that 150 gallons of water can go even after it was done raining. So, it's been very popular. It's been very successful. The demand definitely has outpaced the supply. But we [fit in?] each year. We put in for next year also for more funding from EPA. And they funded that. So, we're going to be able to put in another 10 to 15 rain barrels starting in October of this year. So, we're excited about the continuation of this program. Next slide please. The water efficiency efforts, we worked with San Diego Gas & Electric. They had a program going on where if you were an SDG&E customer, you were eligible for a high efficiency shower head at no cost to the homeowners. It was a little kit that came with two shower heads and some little aerators that you could screw on to your faucets there. And this is thinking and looking outside the box. I think a lot of people think when it comes to water efficiency, they

look to maybe like-- if you're close to a water municipality, if they have programs, and sometimes they do. But we were talking to our SDG&E kind of liaison. And she mentioned, "Hey, we have this water efficiency program." You don't really think San Diego Gas & Electric, energy, water.

S4: 46:25

But the nexus there is people have to-- water also includes the use of a lot of energy because you're heating water often in your home for showers and whatnot. So, they-- the more you can reduce your water usage, it's also you can reduce your energy bill. So, they have this program going on. We worked with them. They gave us about 200 of these kits. And we handed it out to about 150 homes on the reservation. If your reservation has meters or you're thinking about going to meters, they can definitely help you identify any leak. Even if you're just putting meters on there and you're not necessarily charging customers for their water usage, just having meters will help you find and identify leaks either at the home or on your system. And then once you do find those leaks, get out there and aggressively fix them, and then we finally transition to smart meters. Which is helping us find leaks much faster than before. I'll give you a little story. When I came on here, we had an area where we had this constant water running. And they had cut down into this road to make a [road?] there. And people just thought it was just a natural spring of water just going there. We had beautiful willows growing there and whatnot and [inaudible]. And finally, I was like, "It's pretty hot for water to still be flowing constantly year-round. And our water main is right up this road here." So, we took a sample and low and behold, it was-- it had still chlorinated water. Well how do you have chlorinate in the natural water? You really don't. It's typically only in potable water because we chlorinate our water. And it was a leak that had been running there for about almost two years, constant water flowing out of there. So that was money the tribe was losing since it was unmetered water. And then it was also wasting water. So, get out there. Find those leaks and fix them as quickly as possible.

S4: 48:18

Next slide please. So, this is our monthly newsletter. And we put it out to the community via our website, Facebook. And we print out a few to put out in common areas for them to pick up. And every once in a while, usually when it's hot like this time of the year in July, we'll put out water reductions tips and tricks. This is an example of one that we did for reducing water usage and drought [inaudible] landscapes and what people can do. We put in there about our shower head program, our reclaimed water efforts. So, every twice or three times a year, we'll put out some information about what the community can do to reduce their water usage. Next slide please. So now, I'm going to talk a little bit about our reclaimed water project. Next slide please. So how did we do it? Well like I said, we have Valley View Casino, which has a wastewater treatment plant where they treat the water and they use that water for irrigation around the casino property like many tribes that has a gated operation. And they have some purple hydrants for if they needed for fire suppression. And so, we approached the casino and said, "Hey, if we were to build a system to move water from your reclaimed system onto the reservation, could we do that? Would you give us some water for this? Do you have excess water? Because the casino, like many casinos, they actually had excess water. So, they had a spray [inaudible] that

they would spray excess water in a very-- in this just large spray [inaudible] and basically just watering the plants [out there?].

S4: 50:07 So, we knew they had excess water. And they agreed. They said yes. They have excess water. "We could give you up to--" or let's see. They can give us up to 30,000 gallons of reclaimed water a day. But the catch was it was a very Field of Dreams, Kevin Costner moment because they said, "If you build it, we will give it to you." So, we had to build all of the infrastructure. They weren't going to give us any money to build it. But they would give us the water at no cost. And they were going to handle all the treatment and oversight on their end. So, we had multiple project partners to get this off the ground, one, the tribal government. And then of course we need funding. So, we approached the Bureau of Indian Affairs. And they gave us $50,000 in a tribal resources grant to do all of the planning, engineering, and survey work. So, this was [inaudible] to allow the tribe to do a lot of its pre-construction work and get it done. So, we had all these engineering designs and drawings. Now we needed to actually get funding to do project implementation. So, we approached RCAC. And they said, "Hey, California passed [inaudible] 84. And they have all these money for all these projects and California's in the middle of a drought. So, we have all this money to do drought projects. Do you have any drought projects you can think of that the tribe would be interested in applying for to the integrated regional water management plan funding?" And we said, "Yeah, we have these engineering projects, engineering plans for this reclaimed water project." And they were like, "This is perfect." So, we applied for funding. And low and behold, we were lucky enough to get funded. And we received $650,000 in grant funding, spread out over two phases and about four years. And we're actually just finishing up the last little bit of that final phase this year. But we've been working on this [inaudible] about 2016.

S4: 52:01 So, it's been a long process. And you'll see some pictures of what we've done. So-- and then lastly, Valley View Casino of course provided the highly treated reclaimed water. So next slide please. So, this is just a very-- we have a map that we did before we did the engineering. I didn't want to put the engineering plans on their because they're kind of boring. It's hard to see. But this is a little bit-- it pops out a little bit more. So, you see we did our project. It's actually in three phases. We finished phase one. And now we're finishing phase two. And we finished a portion of phase three as well. So, we're almost 100 percent done with this project. We're about 90 percent complete. We don't have funding to complete all of phase three. But by completing phase one and phase two and that slight portion of phase three, we're able to get reclaimed water to majority of this portion. This is district B of the reservation. We can see on the upper right-hand corner, that's Valley View Casino and their complex. Right where you see the [call out?] line where it says reclaimed water tanks, that's Valley View Casino's reclaimed tanks. They were [inaudible] before we connected in. And everything in green are homes on the reservation. Next slide please. So just to talk a little bit about water treatment levels, there's four categories from highest to lowest. You have disinfected tertiary, disinfected secondary 2.2, disinfected 23, and undisinfected secondary. So, Valley View Casino treats to the highest level, the disinfected tertiary.

S4: 53:37 In California, which we follow because we're in and the feds don't have a lot of guidelines on this and California calls this Title 22-- I just want to talk a little bit about that because there's almost a catch 22 if you will for the tribe because we're a federal sovereign nation. And we're not on Californian land. We can't be classified as a Title 22 treatment facility because that would require state regulators to come on to the reservation. Which of course, the tribe wasn't really in favor of and then our compacts didn't require that. So, we treat to the highest level, which is technically Title 22 within the state of California. But it can never be a Title 22 plant because that requires state certification. So next slide please. So, this is what we do. We, in San Pasqual's reclaimed water, treat it to disinfected tertiary. Additionally, we have AA 100,000-gallon holding tank that was an old, abandoned tank that we repurposed. It used to be an old potable tank that was taken offline because we got funding from Indian [inaudible] to build a new 250,000-gallon potable tank. So, we repurposed that 100,00-gallon holding tank for the reclaimed water. And we do a little bit of additional treatment only because that water sits a little bit longer. The casino of course, they use their water daily. They're turning over their tank almost daily. Us, because we don't have quite as big of a demand and aren't using as much water as the casino is-- but we do keep that tank that almost filled to 100,000 gallons. So, we hit it additionally with a little bit more chlorinate. We chlorinate it a little bit more that goes into there just to get a little bit more contact time and to kill anything that might be in there just because we have it sitting.

S4: 55:33 Our 100,000 gallon tank right now, because our demand isn't that hot, that can last us probably almost-- if we had no water from the casino and that tank is completely full, that can last us almost two months to meet our reclaimed water needs on the reservation right now. And we like to keep it full during fire season and when it's warm outside. During the winter, we'll drop it down to about 50,000 gallons of capacity. Next slide please. Alright, so water treatments. The casino like I mentioned, they have the reclaimed water-- they have the wastewater treatment plant there. And they treat all of the water there. They produce 30,000 gallons of excess reclaimed water, which we pay from them a day. And we drop it into our 100,000-gallon tank. Primary and secondary treatment, this is some of the stuff they do, microfiltration, extra disinfection. They also have UV lights that they hit it with. So, they hit it also with some UV treatment at the casino. And they treat to the California standards. Next slide please. So, some stuff we did when we did our system and completed it, when you have a potable and reclaimed system, cross connection of course is the number one thing that you're most concerned about. So, we-- before we bought the reclaimed system online, we did a lot of cross connection system inspection just to make sure that there was no cross connection whatsoever between our potable and non-potable systems.

S4: 57:08 So, as I mentioned, we had that 100,000-gallon tank. And what we did because we knew we were going to repurpose it for our reclaimed thing, we filled that with 100,000 gallons of potable water before we connected it to the reclaimed system. The reclaimed lines were all empty. So, as we were doing this work from September through December for this first [day?], of course we're putting in a new purple line in the ground, it's all completely

empty. And we're also connecting service lines coming off to go into irrigation systems. So, they're completely empty. Then what we did with the [inaudible] tank that's all clean, potable water, we dropped that clean potable water into our purple lines. And we actually performed the dye test. We found this-- I didn't have any pictures to put up here. But we got this dye, and it was bright green. It looked neon green. And we dropped it into the tank and turned all our water neon green, flooded the reclaimed system. And then we sat there and performed-- and let it see if there was any neon green water coming out of anywhere that it shouldn't be coming out off. And it didn't. We didn't get any calls from anyone saying, "My water is neon green." Or we didn't see it coming out of ARVs that were on the potable system that were neon green. We flushed all of our potable hydrants to make sure we didn't see anything coming through. And then once that passed the dye test, we went ahead and did a pressure test on the system too because we wanted to make sure we had no leaks on our reclaimed system. Some people found it a little overboard. But once again, we're trying to conserve as much water as possible. And even reclaimed water has value to it. So, we don't want it to just waste away. So, we're very mindful of any leaks on our reclaimed system as well.

S4: 58:58

Next slide please. So back flow protection program, cross connection control because we're using this for irrigation on the government complex and we're going to be opening this up to residents to use for irrigation because every resident on San Pasqual gets five acres of land. And some people would like to irrigate around those five acres. So, all potable water connections must have a back-flow device installed prior to the reclaimed water connection. So, we go, and we install a back-flow device. We do a yearly inspection of all back-flow devices on the potable system. And we have some fees to help to pay for that. And then to connect to our reclaimed water system, it's a $250 connection fee, which pays for the purchase and installation of the back-flow device. And we also meter our reclaimed water wherever we put it out. And once again, we're looking for leaks. Now we don't use AMI smart meters on that. We're using just regular standard meters that we check maybe once a month for any leak. Next slide please. So, like I said, reclaimed water, it does have value. So, the tribe decided to implement a monthly flat fee of $12 a month. And you can use as much of the reclaimed water as you like and then the one-time connection fee of $250. Like I said, we're 100 percent metered. And we buy a lot of our water here. So, we-- people are used to paying a fee for water, especially potable water. So no, we didn't get any fight from the community on that $12 monthly fee at all. [inaudible] everyone's going to be okay with it.

S4: 01:00:40

Next slide please. So, what are we doing with this reclaimed water now? As I mentioned, every tribal member has about five acres of land. And a lot of them-- we don't have big green [inaudible] grasses or yards like you see in the city. But a lot of people have ornamental plants that they put around their property for shade because it does get very hot out here in San Pasqual. So, all homeowners who want to use this for irrigation purposes, those things are reviewed and approved by the San Pasqual department prior to installation. We only approve-- we don't allow like [inaudible] pathogens by spraying water at golf courses and all that. We don't allow large spray like

rain bird type spray irrigation. We only allow drip and bubblers or sub-surface irrigation. Which isn't that much of a problem because majority of people on here, that's what they're using anyway because we're in such a dry area and water costs a lot where we live. So, most homeowners already have drip bubblers or sub-surface irrigation. All irrigation lines must be purple. If they're putting in new irrigation lines, we want them to be purple. If they have previous stuff, we just ask that they go paint everything purple for identification purposes. And then we go check that to make sure everything's been painted. You can buy stuff that's purple or a can of spray paint of purple would be just as good as well. Hoses are allowed in a case by case basis and must be purple. And then they must have a sign at the front of their property indicating that they are using reclaimed water to irrigate.

S4: 01:02:26

Next slide please. So, what's allowable and not allowable for a homeowner on the reservation? They can use it for non-food bearing trees, just mainly shade trees, landscaping [inaudible] without a decorative fountain. So, Bruce kind of mentioned like wetland type areas, they have some people that don't have-- that have small little like-- kind of like ponds that they put on their property. It's like a natural pond. And some people want to build their little pond that they put in there. Like it's kind of cool. Only a few people have those. And then firefighting, we have a lot of purple hydrants now in the reservation. Unallowable use, we-- no food crops, you can't wash your car. And then we stress that they can't drink, shower, or wash in this water. Next slide please. The benefits of it, we're conserving potable water. We're not wasting it, potable water, on landscapes and yards. Financial benefit, all homeowners pay for water on the reservation. We charge per cubic foot. It's about five cents per cubic foot for water on the reservation. Which can get pretty price pretty quick. And so, the more reclaimed water people use for irrigation and landscapes, the less they're using potable water. Which means they're saving money each month. It's not uncommon for someone on the reservation in the summertime to have a water bill that's 150 to 200 dollars. And you'd be surprised how much of that is for irrigation around their property.

S4: 01:04:04

Bruce mentioned [inaudible] river and some other tribe, a similar thing, it's a source for construction projects, soil compaction and dust control. When people are cutting [inaudible], you need to water down those [inaudible] for dust control or they get compaction for the [inaudible]. We use the reclaimed water for that. We use it for dust control on a lot of our roads. And then finally fire suppression, and you'll see a map why that's so important to San Pasqual. Next slide please. So, this is why it was so important for us to get this up and running for fire suppression. San Pasqual, we've experienced quite a few fires, large wildfires in Southern California. The largest that greatly impacted the reservation was the Paradise [inaudible] fire of 2003 where basically the entire reservation was consumed in that fire. And we lost about 90 homes were burned down during that fire in '03. And then in '07 we had another large fire, the [inaudible] Witch fire, which did touch a portion of the reservation. But we were largely spared. The reservation was still evacuated. And some of the reservation did burn. But it was mainly unoccupied areas with no residential homes or structures. So, we just kept an eye on that. But you can see lots of fires. And we know it's just a matter of

time until we experience another large fire. And the reclaimed water-- water is wet. And the reclaimed water will do just as good a job as potable water in putting out a large forest fire. So, what we did was we met our fire department and saw gaps in our system where we didn't have coverage for fire hydrants to fight a fire where there was structure fire or a wildfire. And those were the areas where we put new-- our new reclaimed purple hydrants that on the reservations to fill in those gaps for the fire department.

S4: 01:06:01 Next slide please. So long term goals for us, we want to get the water out, more outreach and education to homeowners in district B. We want to get it to district A as well. We're trying to work on funding to get it over to district A. We want to connect the homeowners in district B to the reclaimed water system for irrigation on their property. And then like I said at the bottom here, [expand?] into district A. The people who live in district A, now that they see what we're doing here in district B, they want it now as well. And the issue for-- you may ask why didn't we do that? We were kind of a checker boarded reservation. And we didn't have a way to connect-- district A and district B didn't physically connect. So, we had a lot of private landowners in between. So, we couldn't just bring the pipelines to district A. That's-- and the reclaimed water system, as far as the wastewater treatment plant was in district B. And that's why district B was picked first rather than district A. The tribe has since bought some land. So now we're looking at moving. But we do have land that connects district A and B to each other. And we are looking at moving a pipeline through that newly owned land sort of going to district A with the water was well. Next slide please. So, here's some pictures and photos of us doing the work. I'm very proud of this job. I can tell you this job was 100 percent done with our tribal employees. This was a project that was completed by three departments. Our water department of course took the lead. Our public works department and their employees helped. And then our planning department provided all the survey work. So, you can see we're using the backhoe from public works there to dig the trench. You can see the survey equipment set up there. That was our planning department surveyor.

S4: 01:07:59 He was out, taking points of everything we're putting in the ground. And then you can see my guys up there. We're soft cutting a driveway to put the reclaimed water line to continue down that road. And you can see the purple pipes in the ground there in the trench before we went ahead and buried it. So, we're very proud that we were able to do just about all the work in house. We didn't really have to go to any outside contractor to do the work. So, it was one thing that the tribe was really proud of doing itself. Next slide please. So here we are. We're coming off the road. And you can see we're putting the reclaimed water down. And then we're putting tape. We buried the trench. And then we put some, I guess, like tracer wire tape down there so if people are digging, they'll hopefully hit the tape first before they hit our pipe. And what we did is we followed California standards for installing our main. This main is a 6-inch water main, 6-inch reclaimed water main. And we also have a 6-inch potable main. And so, what we did California standards were basically we had to be 10 feet away from our potable line at all times and one foot below in depth from our potable line. So, if there was ever a leak on the reclaimed side, the potable line was safe and secure because we

had such large distancing. And that was-- that's a California standard that we followed on that.

S4: 01:09:30 Now doing that, we did have to come through-- that what you're seeing on that white pipe, that's a residential service connection to our potable system. So, we're actually-- I think in this picture, we're two feet below that service line there. And that was a standard by the state of California we followed. So, we did have to cross service lines for residents. And then we always maintain a depth of two feet below that potable service line. So, once again, in case there is a leak on our reclaimed system, there is no way that reclaimed water could physically touch the potable system and then maybe pollute it somehow. So next slide please. This was our opening ceremony for the project. We were fortunate enough to like I said, get funded with multiple partners. And we really wanted to highlight this project. So, we invited all of our partners to our opening ceremony for the construction. That top right picture, that's Chairman Allan Locson. He has since retired. He served 20 years as our chairman. And he's enjoying his retirement. And to his left is Annatina Agustina with the department of water resources. She's a tribal liaison. She flew down from Sacramento to be a part of that. And then you have Mark Stadler who was on the microphone down there. He's the manager of the San Diego IRWM there. He put up a nice big construction sign at the entrance of the reservation so that people could see what was going on with some information. BIA was there. We invited members of the community there. It was a good turnout. We had about 50 people attend. We had some local press come and talk about it. We also invited guys [inaudible] water district to come. They came because they're-- a lot of the water that we're using for reclaiming is water we're buying from them and then we're reclaiming that water and getting a second use out of it.

S4: 01:11:30 Next slide please. So, keys to success, leadership, it starts from the top and getting people involved and all your stakeholders. So, it was something the water board within this committee, the land assignment committee were all in favor of this project. And then they approached the casino. And the casino was onboard with this project. So, getting-- I'm really big on the idea of leaders talk to leaders, kings talk to kings. And I'm just a pawn so I talk to the other pawns in the project. So, we had the tribal chairman talking to the general manager at the casino about first getting the okay to use their reclaimed water. And then I went and talked to the casino staff on how we would connect into their system. So yeah, so leadership, partnerships-- so leadership within the tribe, but now you needed to create [inaudible] partnerships outside the tribe to get this funded because the tribe didn't have the money and getting other agencies involved, so the department of water resources, RCAC, BIA. Indian health, I think, we even talked to about this project. And they didn't come on as a funder or anything. But they definitely knew about the project. So, get as many partners as you can. Cast that net far and wide. And then outreach to tribal members. Teach people about water scarcity.

S4: 01:13:03 The major thing for us, because we have meters and then we charge for water, that really created the buy in for this system, right. That was kind of the stick was, "Hey, every month I'm going to bill you for your water usage. And here's your potential [inaudible] of using reclaimed water for irrigation

on your property." So, it didn't take a lot of convincing to the community to get them onboard because they wanted to see a way that one, they can reduce their potable usage that then reduces their monthly water bill. But getting outreach to the community and explaining how this system is going to work, what they can and can't do with this water because there are certain limitations to this whereas with potable there's no limitations, so getting them involved, we do-- each time a new person comes on, they have to attend a class that they have to-- it's a PowerPoint slide that I give to them on the dos and don'ts of reclaimed water, how they can use it, how they can't use it. And they sign that they attended the class. And we also invite if they have landscapers. So, a lot of people here have people that do their landscaping for them. And I got that idea from the city of San Diego because that was from the city of San Diego was requiring landscapers who worked golf courses or other like HOA places that are using reclaimed water. And I attended that class with some of those folks. And so, we invite those landscapers to come as well and learn about it because you just kind of assume that no one knows what to do, right. You got to assume that you're teaching everyone from the ground up on how they can and can't use this water. I, because I worked in the industry, know. But you just can't assume that everyone knows these things. Common sense unfortunately as we've learned in society today is not so common. So early outreach and education, I think, is really the key going forward.

S4: 01:15:00 Next slide please. So great. So that's-- I hope I didn't ramble too much. And I hope that was clear [inaudible] to everybody. But if you have any questions, comments, I guess you can ask them now.

S1: 01:15:19 John, thank you very much. That was great. We do have a few questions. And I would encourage you to keep those questions coming through the question link. First one though, regarding the prior questions about permitting, a colleague did post a link to a recycling related MPDS permit in Orlando, Florida and gave the permit number, which makes it easy to look up if you're interested in looking at that. I also want to acknowledge a couple of people who contacted me about connection difficulties. I apologize for that. We are going to work quickly to caption and post this-- the recording of this. And we will make that available to folks in case you want to watch it again or share it with those who are unable to join us. But I do apologize for any connection issues. Next, Greg asked a question that was, I think, largely answered by John about how you ensure that you don't have undesired cross connections with reuse systems. And in addition to the great points that John made about how to avoid cross connections, I will just note maybe the obvious point that it's important professionals design these systems. There have been some issues with cross connections typically for onsite reuse projects where let's say the home hobbyist does the plumbing and maybe doesn't do the plumbing quite right. And we would discourage that. There's a lot of good information available out there about how to design and build these projects properly. But John's comment show that this is a process to take seriously and that-- but that it can be done. And I commend the tribe for using its own staff for being able to implement the project. Are there any other questions?

S4: 01:17:14 Hey Dave?

S1: 01:17:17 Yes, go ahead.

S4: 01:17:17 Dave? [inaudible] can I go in and just comment on that? And one thing that I've mentioned that we do to ensure there's no cross connection when they're going to irrigate on their property-- we're fortunate in the sense that we're very small, right. We have about 400 or so homes on the reservation. We're not like the city of San Diego with thousands of homes and it would be hard to do this. So, we can be a little bit more nimble and be-- give that more like personal touch. So, what we do is I send out my water guys to a home that's [inaudible] to connect on. And we do a physical inspection on the property before we turn their meter on for the reclaimed water. And what we also do is we ask that the homeowners to turn on all their sprinkler irrigation systems while we're there. And we have one guy sitting at the potable meter while they turn on all their irrigation. And we do a visual inspection. And as long as that potable meter isn't spinning, so we don't see any water coming out of the irrigation system, we know that they're completely severed from their potable line. And then we try to go out there and check the meters mostly on the reclaimed side to see what's going on there. And usually what we'll do is we'll sit and try to like watch both the potable and the reclaimed meter at the same time and make sure that they're both not spinning simultaneously. And so that's one of the things we try to do to try to make sure that people aren't-- and I think often like getting their landscape people involved is a big thing because typically it's the landscapers that are going to be the ones putting in new sprinklers and doing the irrigation work and not so much the homeowners. So, it's good to get them involved as well and not just the homeowners because really the homeowners are just writing a check to the landscaper each month. It's the landscaper that's out there doing the work on the ground for them.

S1: 01:19:15 Excellent. Good points, John. Any other questions before we move on? Seeing none at the moment, I'd like to turn it back over to Bruce Mackler.

S2: 01:19:28 Thanks.

S5: 01:19:29 Excuse me, this is Gerald Wagner with the Black [inaudible] Tribe, chair of the National Tribal Caucus. Can you hear me?

S1: 01:19:35 Go ahead, Gerald.

S5: 01:19:36 Yeah. I was getting on. And it looks like this is really aimed at a lot of the maybe tribes that are in areas where water is an issue in terms of drought and stuff. Am I correct in saying that?

S1: 01:19:54 Largely, but not entirely. We will talk in a moment that there are sort of different drivers and motivations about why people recycle. But you're largely correct. Go ahead.

S5: 01:20:04 Okay. And if so, then yeah, not-- it's good to know about that and how they do it and whatnot because I also oversee here at the tribe our tribe's drinking water, wastewater. And we sit up right next to glacier national park in the mountains, had waters and stuff. So, we're kind of in a different situation when it comes to the supply of water. But there have been times when our

wells have ran dry or low and whatever. And it's good to hear that there's different steps you can take to try to ease that situation.

S1: 01:20:41 Fair point. I'll just note now that among the other reasons why people are pursuing recycling projects even if they think they have pretty much enough water now, --

S5: 01:20:52 Yes.

S1: 01:20:52 -- in many cases, they want to explore redundancy in their system in case something does break or in case there is an unusual supply situation. Sometimes they have water quality concerns.

S5: 01:21:05 Right.

S1: 01:21:05 Discharge in their wastewater can be difficult to a water that was otherwise sensitive, things like that. And so, we would just emphasize it. People have a lot of different reasons why they do this in addition to addressing a supply concern.

S5: 01:21:19 Okay. I thank you.

S1: 01:21:23 Thank you for your comment. Bruce, why don't we move on to you? We'll have time for more questions later. Please keep them coming.

S2: 01:21:31 Yeah. That's just great. And I'm just going to basically summarize and generalize a little bit what John said because he provided a wealth of information. I couldn't keep taking notes as fast as he was talking through it. And I think the slides would be an excellent reference value to any of you that were thinking about because they're using the water for a variety of purposes just as I had talked about earlier. They went through all the trouble to do it. And John obviously has plenty of lessons learned. He shared a few of those. And I'm going to kind of, like I said, summarize this a bit. So, going away from John's specific situation to your specific situation, you're going to have to start thinking about recycling in terms of putting the pieces together. What are you going to have to do if you wanted to recycle? These are a few of things that you're going to have to think about. And I mentioned some of these earlier before John gave all his examples. First off, you have to take a look at your water sources, what you have is an opportunity to recycle. Is this going to be wastewater from a centralized treatment plant? Is this going to be stormwater that could be episodic or such. Could this be water from a building that you could tap and use within the building or externally. Then you're going to have to take a look at what the purpose is for the water. Are you going to use it for something as simple as dust suppression or landscape irrigation or for indoor toilet flushing and such? Because what you're going to use the water for will determine the level of treatment that you're going to need to do.

S2: 01:23:27 And John gave four different examples of situations that require different kinds of treatment. That will make-- those-- what you're going to use the water for will determine the technologies. And it will also, to some extent, determine the regulatory frameworks. I'm going to talk about that. John mentioned the consideration that tribes aren't subject to the state regulations directly. But you can't forget about them either. But beyond that,

then if you're going to do it, if you're going to run these systems, you have to make sure you have your operations taken care of. And as John mentioned, talking to the public, making sure that they understand what's going on and if there are some doubt out there, they come to accept the need for recycled water, be supportive of it, is something to address. And then finally financing, and I'll turn it back over to Dave to talk about financing down the line. Next slide. Okay. So, let's consider wastewater. If what you have is wastewater or you're thinking of recycling the wastewater, well you really kind of have to have a centralized source. It's very difficult to do recycling on sceptic systems for example because there's just too many of them. You need to have a centralized source, so a wastewater treatment plant. You could have a multi-family sceptic system, a large sceptic system of some sort, where the water is-- there's enough volume to be able to work with meaningfully. And those large volume sources could also be a factory or something, a casino.

S2: 01:25:19 And then the reason to do it, we've talked about that. But also, you're going to need space to do it because if you have a wastewater treatment plant, that's a-- there's a footprint there.

S1: 01:25:30 [inaudible].

S2: 01:25:30 If you're going to do the additional treatment--

S6: 01:25:36 [inaudible]--

S2: 01:25:38 -- you may need more footprint to be able to do that. And then you're going to also need the ability to distribute that water. I think the--

S6: 01:25:45 I don't know [inaudible] conditions that you as director are--

S1: 01:25:50 [crosstalk]--

S2: 01:25:51 [crosstalk]--

S1: 01:25:52 -- mute yourself.

S2: 01:25:53 Yeah. Yeah.

S6: 01:25:55 I understood it was drafted and would be ready pending your review.

S1: 01:26:01 Hello?

S6: 01:26:02 [inaudible].

S7: 01:26:02 The permit?

S6: 01:26:05 Yeah.

S2: 01:26:05 Yeah okay [inaudible].

S7: 01:26:06 I believe we're still having someone do that.

S6: 01:26:08 This is bullhorn.

S3: 01:26:09 I don't know if you can hear us. But we can hear you. So, could you please mute.

S7: 01:26:13 I--

S2: 01:26:15 Sargon, can you [inaudible]--

S7: 01:26:15 Yes, so I would-- I don't know if I received from David--

S2: 01:26:21 Sargon, can you mute everybody and just unmute me.

S3: 01:26:24 [inaudible]--

[silence]

S3: 01:26:32 There we go. Bruce you should be--

S2: 01:26:33 Alright. I think--

S3: 01:26:33 -- [inaudible].

S2: 01:26:34 Yeah. Okay. We can get back to business now. So besides needing the space to do the additional treatment, you're going to also have to put in and install the pipes necessary for distributing it. And John had mentioned some of the issues about being able to do that and particularly in areas where you might have the rights of way. So those are things to think through on this. And then you're going to need to have the resources, the money, and the human resources, the technical know-how to be able to plan out and build the treatment and distribution facilities, to staff, maintain those facilities. And then don't forget that you're going to need the communications people to work with your community on that. Next slide. Okay. Just briefly, and this came up before there had been a question on contaminants and wastewater and some of the issues associated with that. Okay. Let's just take the simplest wastewater, a sewage. Now in an urban area you might have inputs from industrial sources, metals or pesticides or chemicals of different sorts. But we'll just assume that most of it's sewage. Predominantly, the issues are going to be microorganisms, the protozoa, [inaudible], and [inaudible], the bacteria, the viruses, the pathogenic viruses, hundreds of pathogenic viruses that we might be concerned with. That's going to be the main thing. Then the next one would be salt, salt from just domestic use. If you increase your salinity too much, anyone that grows plants knows that you're going to have a problem growing those plants. You'll salt up the soil or the plants just won't do well. So, control of salts, the trace metals and inorganic materials can be an issue for recycling.

S2: 01:28:33 And particularly in inland areas where it's hard to dispose brines, treatment brines might be an issue that you'll have to address. Naturally occurring organic materials, leaves, just plant material, anything that degrades, waste, animal waste and such, the organic materials would have to be addressed. And then lesser amounts generally, but these can be a problem. The household products, we talked about, the pesticides. And we talked about the cleaning agents and such that can get into waste streams, sewage streams. And medicine residues, and I had made the comment before, but I should say it again, that typically these are at such low levels by the time they've been diluted out that for non-potable purposes, they're not really going to be posing an issue. For potable, that's different. But for non-potable, they're less of an issue. Next slide. Okay. So, you might have stormwater. And the stormwater issues, we've talked about these briefly. And I would just want to remind you of them, is you really need to have a location where

stormwater can be captured. Roof top capture systems can work fine for the amount of water that comes off a roof. And you may have the storm barrel, the rain barrels, and the chains and such to be able to do the collection.

S2: 01:30:09 But if you're talking about larger areas, you're talking parking lots for examples or just fields and such where you might want to capture the stormwater or in intermittent creeks and such where you'd like to capture that stormwater, you're going to need a location to put it because it's going to be episodic. There will be too much water to deal with on a very short-term basis. And you're going to be able to-- you're going to need to step capture and store it for the amount of time that it would take to be able to do whatever treatment it would be necessary and then to distribute that water. Again, you need to have a reason for doing it. And then again, you're going to have to have the resources to do all of that work. Next slide. Okay. So, what's in stormwater? Well stormwater will be different from sewage. And you would know that. It's obvious. But in most communities, what you're going to have would be the microorganisms again. That would be the worrisome thing. And that would be largely from animal detritus that gets washed off. Dogs and cats and cows and whatever is out there, wild critters that would be sources of fecal contamination and yielding your pathogens, your protozoa, your bacteria, and your viruses. Besides that, then it's going to be sediment, dirt, dirt and debris, stuff that washes off that you're going to want to filter out roughly to be able to utilize the water effectively that you won't damage pumps for example from grit or clogged pipes and things.

S2: 01:31:51 Besides that, then, depending on the environment, you will have run off. The runoff will take surface pesticides and nutrients. And you'll have to deal with those. To some degree, depending on where it is, a roadway for example, you'll probably pick up metals. You might pick up lead for example from car batteries and such and other inorganic materials that you'll have to address. And then finally organics, whatever gets spilled, you think about it, if you wash off a parking lot, you're going to get oil. So, you'll have to address that. It may not be of much consequence from a toxicity standpoint. But it can certainly be a nuisance to recovery and reuse. So next slide. So, treatment, I talked about it a little bit. And John talked about it quite a bit in terms of treatment. It really is going to depend on your intended use. For most of the non-potable uses, you just need to kill the microorganisms or control them, but kill them, chlorination, use of filters, and microfilters, nanofilters, use of ultraviolet light or ozone or other advanced oxidation methods to kill these microorganisms. If you were to go to potable, then you would have to address everything. It has to be pretty much squeaky clean. But for non-potable uses, it's really going to be depending on your needs. And those needs will really have to do with the kind of human exposure you're going to have. The less human exposure, the less opportunity for people to ingest the water, to breath in the water, to be exposed to the water on their skin, the more treatment for the more exposure. Okay.

S2: 01:33:46 Now one of the things that I think folks may not always realize is that wastewater treatment, traditional wastewater treatment removes most metals and organic compounds. It's been said that if you do proper secondary treatment of wastewater, you'll pretty much meet-- you pretty much meet all of the EPA drinking water maximum contaminant levels. And

then the only addition that is necessary is the tertiary filtration and disinfection to meet disinfection requirements. Now if you want to go beyond that to get other kinds of organic materials out, then you'll need to have advanced-- the use of potentially reverse osmosis or something to remove those materials. And the similar approach applies to stormwater depending on the source. Next slide please. Okay. So basically, if you're going to recycle wastewater, what would you be doing? First off, just do wastewater treatment, primary treatment, the removal of the settled and floating materials. That's primary. Secondary treatment as you would know, there involves a biological oxidation, mostly to remove organics. You may want to add on deep nitrification to control nitrogen if you wanted to get rid of the nitrogen. But if you were going to use it for irrigation, you may not want to get rid of that nitrogen. You have your fertilizer right there, so something to consider. Further, the tertiary treatment is typically filtration and to reduce turbidity. And by reducing turbidity, you improve the effectiveness of disinfection. And then you add on the disinfection. So those are for non-potable uses.

S2: 01:35:40

Okay. Next slide. How about if you're going to be using stormwater? Well stormwater is somewhat simpler. Mostly you're going to have the settling of the sediment, the dirt, in your storage facility. It will just settle on out. But you need to do that. You may need to do additional filtration to reduce the dilutants, but also perhaps to make the water more attractable for distribution so that it doesn't damage pumps because of the material in the water. And then if you're planning on using it for human contact, as I've mentioned already, you're going to-- you probably need to disinfect that water because there will be pathogens in it. Next slide. Okay. Now if you wanted to actually consider potable reuse, what's involved in that? Well pretty much wastewater treatment, the same things we've been talking about, the primary treatment, secondary treatment, tertiary treatment. But in almost every case, you would also have to add on the advanced tertiary, the advanced oxidation using ozone or a UV peroxide or a variety of different kinds of oxidation treatments not only to get rid of the pathogens, but to destroy difficult organic materials that you would want to get rid of, the reverse osmosis to remove trace metals and trace organics. And then almost certainly you would need to do denitrification and nitrification because you would not want to have a biofilm growth in your distribution system from the nutrients. So that's the wastewater treatment side.

S2: 01:37:28

Typically, if you're going to go onto uses for drinking water, there might be storage in between, in surface water storage, or in groundwater, groundwater injection or surface water augmentation. These would provide some extra treatment and also time for any organisms to die if you haven't killed them all already. Then that water would go through conventional drinking water treatment again. The water would be taken from the surface source, the groundwater source and treated with filtration and disinfection before the distribution. So that's a far more complex and it would take far more effort. And if you wanted to do it, you have to be prepared. Next slide. Okay. So, let's talk a little bit just briefly on regulations. It's already said, there really aren't very many federal regulations. The federal regulations that we have under the clean water act and the safe drinking water act address water

quality. They don't address resource. And this is largely a resource issue. It's providing yourselves with additional water. So, there aren't too many things. As Dave already mentioned, if you were going to discharge this water to a stream or a lake, then you would need an NPDS permit. And the EPA would work with you with regards to that. But that might not be what you would be doing with the water. You might be using the water and it would not go into a lake or a river. And you wouldn't need a permit for that. If you were going to inject the water for a potential reuse later, that is a ground water recharge of some sort, then you may need an underground injection control permit. But again, if you're not planning on utilizing it at that way, you wouldn't need that permit.

S2: 01:39:28

Then if you were going to use it for potable, then the safe drinking water act applies. And that would be compliance with the filtration requirements, the disinfection requirements with the maximum contaminant levels. So, you can see that in most cases, if you were going to use it, water for dust suppression or for irrigation and such, the federal rules wouldn't be so significant. Next slide. But there is no free lunch. And as John was talking about, the state regulatory requirements have to be considered. It's not a should. They wouldn't necessarily apply. But you're going to be in a context where everybody else around your tribe would be complying. And you have to be aware of that. And even though you could not, say in California, get a Title 22 permit specific to your use, it would be expected that you would be complying with the spirit of those rules, if not the specifics. Most of the state regulatory requirements are specific to the end use. And they're mostly more stringent. And John gave examples of that. For the low risk situations, dust suppression, irrigation, use on non-edible crops and such, that'll be smallish amounts of disinfection required. If you were going to use it on edible crops or where people will be exposed to the water, that'll be a higher level of disinfection and treatment. And then as I've already mentioned, if the highest risk situation, that is potable ingestion of water, domestic use of the water, that will have quite stringent regulations for that.

S2: 01:41:23

Typically, it's disinfection control. I've mentioned that several times and then in some cases, toxic chemical removal. Next slide. Okay. So, if you're all ready, you've taken a deep breath and you're going to go, how are you going to build the capacity to do It? Well first off, you do need to consider all your infrastructure needs, not just the footprint for treatment or the collection areas and such, but your distribution system, storage tanks, whatever you would be needing, the whole element, all the way up to where the water would be used. So that's one thing. That's hardware. That might be the easiest of the parts. Building the community and leader support is important because you are not going to be able to do this alone. Having people understand what you want to do and be supportive of it is critical. Definitely working with the regulators if that's appropriate or if they're not actually your regulators, at least being in touch with them to know what the expectations would be, it would be important there. And then funding, you certainly are going to need the money to be able to do it. And you may only be able to do a little at a time because of the situation. Finally, and one thing and I'll elaborate on this a little bit more is you have to make sure that you have your operators trained up to it. Sometimes if you were only using

groundwater and not even disinfecting it necessarily or only with chlorination, your level of treatment isn't that great. For wastewater treatment, you'll have operators that will be trained for wastewater treatment.

S2: 01:43:19 But if you're adding on additional treatment, they're going to have to understand what they need to do and be certified appropriately. Next slide. For wastewater recycling, just to repeat some of things I just said, people are going to expect that you'll have a reliable performance record, that you have been able to run a wastewater facility well or that you will be able to do that and definitely have to make sure that that facility has enough money to run and that it has a management structure to run, technical, managerial, and financial capacity. We say that many times. The operator training, I just was talking about, specifically advanced training if you're going to be using the advanced technologies. And then monitoring and asset management, but system monitoring will be important, both analytical tests, but also operational monitoring. Next slide. Much of the same applies to stormwater. The treatment often can be simpler. But you're still going to need storage tanks. You're still going to need to have the facilities. You're going to have to have the funding to be able to operate the system and the training, if you-- the [inaudible] of the treatment that you're going to be using, the training of the operators. And then again, monitoring of operations and water quality is appropriate.

S2: 01:45:05 Next slide. Community support, John talked about this a bit. Sometimes if you're starting new, you're going to have to get public and leader trust. And that would come from one, being able to explain that recycled water is necessary, two, that you're going to be able to do it safely, that that water will be safe, that you're not [inaudible]-- your customers, your community will not be adversely impacted by what you're doing, and third, that you can do this, that you know what you're doing and you can walk the talk. And the real way to do this is just to be transparent at the start and tell people what you want to tell them. Don't hide anything. Be very open and clear. It may take a while. There may be skepticism. In my experience, generally skepticism is where people start from. But the more that they hear about it, usually the more willing they are to go there. Next slide. Okay. Now I'm going to turn it back over to Dave to talk about money.

S1: 01:46:25 Well I buy through the whole hold the best for last. It costs money to plan and build and operate these kinds of projects. That's obvious. But the good news is as John pointed out, recycling can help your customers save money in the long run. The other good news is that there are a lot of funding sources available to help pay for these projects. I don't want to make it out that it's easy. But there are more sources available to fund this kind of work than you might think. Some are grants. Others are loan programs. And both of those funding vehicles have their pros and cons. Regardless of your outside funding sources, you do need some locally generated resources. You may need them to match grants because some grants have matching expectations. You may need them to repay loans if you borrow money at low interest. And certainly, you're going to need funding from somewhere to cover public outreach, your operational costs, and maintenance costs. Generally, there's more funding available for design and construction than there-- and I mean outside funding

sources than there is to pay for ongoing operations and maintenance. Several federal agencies and some state agencies do have funding sources that tribes can access to help pay for these projects. Funding agencies, I would encourage you to pay close attention to, including the EPA, yes, but also the department of agriculture, the Indian health service, which is a real partner for EPA and some others in helping to plan and implement some of these kinds of projects, the bureau of reclamation, the federal emergency management agency and some others.

S1: 01:48:22 It's a little broader list of federal funding agencies that fund reuse work than you might think. We've provided a link to a funding sources summary in the handout attachment for this. I encourage you to take a look at some of those funding sources. My number one piece of advice in seeking funding is talk to the funders early. Many, if not most of these agencies are interested in trying to help applicants apply and succeed with funding. I would also mention that the rural community assistances agency, the RCAC, can be a really helpful advocate in this process to help you link you up with potential funding sources that might work for the projects that you have in mind. And as I often say to people, if you don't ask, you don't get. So, I encourage you to ask for funding and ask for help in getting funding if you need it. I think the corollary these days if you don't mind is, if you don't mask, you do get. Sorry. So, with that I want to pause and take a few questions. We do have a few that come in online. And I encourage you to submit more if you have more questions. First, Aaron asked whether it's possible to obtain an attendance certificate for today's training so that you can receive CEU credit. I'm not sure what the answer is to that. We may be able to generate something indicating that you did attend this. I'm not sure whether and how that works for CEU credit. But we will look into that and get back to you.

S1: 01:50:09 In [inaudible] I had a couple of very good questions. One is are we aware of efforts to do onsite reuse at the household level in tribal communities. I do not know of examples of that. But I thought maybe some of the rest of you do. So, if anybody is aware of a case where there's household scale reuse happening in tribal communities, please speak up or please-- I don't know. Please let us know. We are still trying to learn more about what's going on in the recycling world in tribal communities. And while you think about that one, I'll pose [inaudible] other question to Bruce. She says, "I hear you talk about viruses, protozoa, and bacteria. Does that mean you were using a log reduction removal approach for monitoring of water quality?" Bruce?

S2: 01:51:04 Yes, basically. If you have protozoa-- if you're dealing with pathogens, usually you try and get a log reduction. And the state regulations, I'm mostly familiar with California's Title 22. But other states have-- many states have similar regulations. They're going to require certain reduction levels. And so yes, log reduction and we might have to do three log or four log, that is a thousand-fold or ten-thousand-fold reductions of protozoa or the viruses. Usually it will be three log for the protozoa and four log for the viruses. But those can be more depending on your application. And so that would be there, yes.

S1: 01:52:02 Thank you, Bruce. Next slide please. So, we're just about to wrap up here. And I guess I would say that it's important now that you've gotten a little introduction to what we're talking about, obviously there's a lot of details to

	delve into if you're interested. But we think it's important to ask yourself some of these basic questions. And we've kind of reviewed these. And we purposely done some repetition here on some of our key messages. And I just think it's important that you ask yourselves these questions. Do you really need the water? Do you have other good reasons for pursuing recycling? Do you have the water available to recycle? Do you have the capacity to really get this done? Or do you have the ability to build that capacity? Do you have the right locations, kind of the right geography to do this so that it works in your communities? How will your customers feel about this? How will your leaders and decision makers feel about this? Will they be supportive, or can you do the work to make them supportive? And then finally, are we clear about what we need to do this safely in the way of treatment and things like that? Just good questions to think about before you embark on to see if it makes sense for your tribe. Next slide please. We've been doing a lot of talking. You've asked some great questions. But we really appreciate it if you could give us some feedback now or as follow-up. We talked about different kinds of recycling and capabilities needed to do it. There is a lot of help available. But we'd like to get a sense from you what kinds of specific help from EPA or others could really help your tribes pursue this. And as I said before, if you don't ask, you don't get necessarily.
S1: 01:53:53	But we're genuinely interested in figuring out what kinds of follow-up work we could do and support we may be able to develop and provide to help tribes pursue reuse in ways that make sense for you. So, I'm going to pause to see if anybody has any immediate comments or feedback on that. I know a lot of people don't like to provide this kind of feedback on this kind of a webinar. But does anybody have any thoughts or comments you'd like to share right now?
S3: 01:54:28	And of course, we're taking responses in writing as well.
S1: 01:54:32	Absolutely. So, nobody's on the hook to do it right now if you don't choose to. But if there's more we could do, please let us know. I'll also ask, if you have any final questions, you'd like to ask any of the panelists today before we close this up. Well I think folks are ready to move on to their next thing. I did want to thank Bruce, John, and Sargon for helping out with this today. But most of all, I want to thank each of you who have tuned in for your time, your interest, and your excellent question. We will be following up with a brief request to do a little evaluation survey on today's training. And we'd be very grateful if you would complete and return it to us. As I mentioned, there is the presentation itself and a couple of related handouts available for you to download if you like. And with that, I want to thank you again for joining us. And everybody, have a fine day. Bye-bye.
S2: 01:55:41	Bye.