MEETING

STATE OF CALIFORNIA

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

PUBLIC MEETING

PRESENCE OF 1,4-DIOXANE IN PERSONAL CARE AND CLEANING PRODUCTS AND THE ALTERNATIVE ANALYSIS THRESHOLD

LOS ANGELES COUNTY SANITATION DISTRICT

JOINT ADMINISTRATIVE OFFICE

1955 WORKMAN MILL ROAD

WHIITER, CALIFORNIA

FRIDAY, JUNE 28, 2019

10:02 A.M.

APPEARANCES

DEPARTMENT OF TOXIC SUBSTANCES CONTROL (DTSC)

Manuel Lopez, Public Participation Specialist, Office of Environmental Equity

Karl Palmer, Acting Deputy Director, Safer Products and Workplaces Program

Andre Algazi, Senior Environmental Scientist, Supervisor, Safer Products and Workplaces Program

Anne Cooper Doherty, Senior Environmental Scientist, Specialist, Safer Products and Workplaces Program

PRESENTERS

Thorsten Reemtsma (via WebEx), Helmholtz-Centre for Environmental Research, University of Leipzig

Ann Heil, Sanitation Districts of Los Angeles County

Mark Kawamoto, Orange County Sanitation District

Jeff O'Keefe, State Water Resources Board, Division of Drinking Water

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Nancy Buermeyer, Breast Cancer Prevention Partners

Stephen P. Risotto, American Chemistry Council

PUBLIC COMMENT

Kelly Grant

Jennifer Stackhouse

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P R O C E E D I N G S

10:02 A.M.

MR. LOPEZ: Good morning. So on behalf of the Department of Toxic Substances Control, we would like to welcome you to our Public Meeting on 1,4-Dioxane in Personal Care and Cleaning Products. Thank you for participating.

My name is Manuel Lopez and I am a Public Participation Specialist for the Office of Environmental Equity for DTSC.

First, we have a couple of housekeeping items.

Please note that the restrooms are located down the hall, and then down this hall to your left for the women’s bathroom.

Secondly, if you notice these three doors, that will be our exit in case of an emergency, and towards the main entrance of this building.

Should you need any assistance during this public meeting, please seek the attention of DTSC staff, if you can please wave your hand so that they can see who you are.

I would also like to acknowledge Los Angeles County Sanitation Districts for allowing us to host this meeting here today.

A couple of requests that we have from the audience.

If you can please silence all your phones, the outlets, and all electronics? If you can please also limit cross conversation during the meeting, treat other people with the same level of respect you expect from others?

I would also like to share that there’s a court reporter. And this workshop will be webcast and recorded.

We will be providing an opportunity for public comment later this morning. We ask that anyone who is interested in providing a public comment to please complete a speaker card. You can find one of those over there on the table. And you can return it to the registration table to one of our DTSC staff.

For those tuning in remotely, your email -- you can email your comments to Safer Consumer Products at DTSC.ca.gov and it will be read out loud.

At this time, I would like to introduce Acting Deputy Director of DTSC Safer Products and Workplaces, Karl Palmer.

MR. PALMER: Thank you, Manuel.

Good morning. I just am going to be very brief because there’s a lot of good information today that we want to share and hear about.

First, I want to echo Manuel’s thanks to L.A. County Sanitation Districts, and specifically to Ann Heil, for hosting us here. We’re glad to be here with all of you. I’m excited to hear from our speakers today. We have a great group of speakers.

And we're also excited to share with you our perspective to date on 1,4-dioxane in personal care and cleaning products as an issue that we've been looking at for a while. And the main purpose today is for us to share that information with you here and everyone on the webcast, as well as to hear from you because, fundamentally, our process is really -- the cornerstone of it is information, good science and information, so that we can make good decisions within our Safer Consumer Products framework.

You're going to hear in detail from Andre and Anne Cooper about both how the program works and what we've done to date. I really want to encourage everyone, if you haven't already, to read the background document that's posted on our website and to provide us comment through our CalSAFER web portal, which you can find on our web page.

I also want to note that we're going to have another workshop on August 21st in Sacramento. It will be a little bit of a deeper dive on some of the issues around what we're going to talk today. And through the end of August, you'll have an opportunity to comment.

It's really important from our perspective to hear from all of you. As I said, information is the coin of the realm, so we need everyone's perspective so that we can make good decisions and move forward within our framework and to meet our policy objectives.

So with that, thanks to our speakers that are here today. We really appreciate people coming from far and wide, and the people in Europe, who are joining us. And again, thanks so much. Looking forward to the dialogue today and moving forward.

So with that, I'm going to introduce Andre Algazi. Andre is a Senior Environmental Scientist who leads our Chemical Product Evaluation Team. It's a group of scientists and engineers who look at the work plan of potential consumer products containing certain chemicals for identifying what we call priority products. So Andre is going to give an overview of the system, the framework, and we'll go from there.

So thanks again.

MR. ALGAZI: So thank you, Karl, and good morning everybody.

Do I have the slide advance? This?

So many of you or some of you, I'm sure, are somewhat familiar with our regulatory framework. I'd just, for the benefit of everybody, I'd just like to spend a few minutes going over sort of the outline of what the regulatory framework that we're working in is and how what we're talking about today, 1,4-dioxane, fits into the framework.

So this chart depicts the four steps in the regulatory process. The steps are laid out in framework regulations that we adopted in 2013. And we're implementing a bill that was adopted five years prior, AB 1879, which was the Green Chemistry Law.

So in the framework regulations the four elements are the chemicals, products, alternative selection and analysis, and regulatory response.

So the Candidate Chemicals List is laid out in the framework regulations and there are 23 source authoritative list that comprise the Candidate Chemicals List. We maintain an informational list on our website of all of these chemicals. So a chemical that appears on one or more of these 23 lists is a candidate chemical for the purposes of our program.

The blue circles represent the Hazard Traits List, so things like carcinogens, mutagens, reproductive toxicants, things like that. The purple circles are the exposure potential list and they include chemicals that are on, for example, 303(d) List, toxic air contaminants, things like that.

So the lists do change. The source lists do change over time as the various bodies that maintain them amend them. And when that happens then, in many cases, our Candidate Chemicals List changes, too, along with it.

So 1,4-dioxane is a candidate chemical and so that brings us to the second column which is the products column.

So identifying a priority product kind of starts with our three-year priority product work plan. And we're in the second three-year work plan. Our current work plan covers 2018 to 2020. There are seven product categories in the work plan. And we've identified two product categories where we're concerned about 1,4-dioxane, which is cleaning products and personal care products.

So the process of going from the work plan to a specific product chemical combination, and we're not there yet, is sort of a iterative kind of discernment process that includes public engagement, like the meeting we're having today, to get information from our stakeholders so that we can, as Karl said, make informed decisions.

The framework regulations have sort of two overarching, what are called, key prioritization principles that we have to think about in deciding what products to identify as priority products. There has to be potential for exposure to one of more candidate chemicals in the product. And secondly, there needs to be potential for significant or widespread adverse impact resulting from that exposure.

So today, we haven't yet focused in on very specific product chemical combinations, so we're going to hear a bit about the types of products and one that we're looking at and the hazards of 1,4-dioxane as determined so far.

Once we do eventually -- assuming we do eventually select a specific 1,4-dioxane-containing product in one of these categories, it would become a priority product only after we go through a rulemaking process under the California's Administrative Procedure Act. And again, that's another public comment and public engagement process.

So we're in the early stages of the first column -- I mean, the second column, which is priority product selection. We haven't yet selected the product. That's my takeaway from that.

So what happens after the rulemaking process is the alternatives analysis and alternatives selection-alternatives analysis process. The regulations lay out a two-stage process that generally people would follow, the manufacturers of a priority product, although there are some other options like product removal or product -- or chemical removal or abridged alternatives analysis. Generally speaking, there are two stages, the first of which are identifying a potential alternative.

And then the second one, identifying relevant factors for comparison to compare the adverse impacts of the priority product and the alternative and so on. So that is a public process that involves publishing the final alternatives analysis report, receiving public comment.

And at the end of that process we get into the fourth column, regulatory response. And the regulation -- the framework regulations lay out several options for regulatory responses ranging from we need more information to decide what regulatory response to pose to potentially a sales restriction or nothing at all, it really just depends. We haven't predetermined at the time, even when we identify a priority product, what we're going to do ultimately as a regulatory response. It really is determined based on the alternatives analysis.

So that is really a very kind of nutshell, brief overview of the four steps of the SCP regulatory process. We have kind of a little bit more in-depth information available on our website if you're interested and you are not already familiar, so I encourage you to look at the Safer Consumer Products website.

And with that, I'd like to hand it over to Anne Cooper, Doctor Anne Cooper Doherty, who is the lead of the team that's been doing the work on 1,4-dioxane for the past year or so, and so she'll be giving you an overview of some of the information that you'll also find in our background document.

So thank you.

MS. DOHERTY: Thank you, Andre. All right.

So thanks everyone for coming. So the purpose of today is to hear concerns specifically related to 1,4-dioxane in consumer products, specifically the potential for adverse impacts, concerns associated with 1,4-dioxane in wastewater, and potential impacts of 1,4-dioxane on the beneficial reuse of wastewater.

So the format for the rest of the morning, I'm going to go over a brief overview of kind of the research that we've done, that includes presence in products, exposure concerns, and potential for adverse impacts. And as Andre mentioned, we've got more information on that in our background document, which is actually in the back of the room but also online. We're going to have a series of stakeholder presentations. And we are going to have a quick break in the middle of that just for planning purposes.

And then we have a general public comment period. If you are here in person and want to provide a comment, please make sure to turn in your comment card to one of our staff.

And if you are online, please email our Safer Consumer Products at dtsc.ca.gov email address.

So I'll just start with a few basics about 1,4-dioxane.

As you can see in the top right corner, the structure, it is a very small chemical that's highly soluble in water and is persistent in water, which means it’s not easily broken down. We know that it can volatilize, which means that it can be inhaled. The United States Environmental Protection Agency indicates that it’s a likely carcinogen and the National Toxicology Program indicates that this is by any route of exposure.

We know it doesn’t stick to solids, and this include things like water filters or Brita filters, as well as particulates that might be removed during the wastewater treatment plant process. And as a result of that, we know that most standard forms of water treatment actually do not remove it.

So Andre mentioned our priority product work plan. Within that work plan there’s two product categories that we’re most interested in. The first is cleaning products, including things like laundry detergents and dish detergents. And the second is beauty, personal care and hygiene products, things like shampoo and body wash and cosmetics. And we’re really focusing on these two consumer product categories because of their widespread use, their potential to contain 1,4-dioxane, and the fact that they’re released down the drain after use.

So determining which products contain 1,4-dioxane and at what concentration can be difficult because it’s a contaminant, which means it’s not intentionally added to the personal care and cleaning products it’s used in, and instead it’s formed in the production of ethoxylated surfactants and other raw materials. So it’s not included on the label but we do know that it’s often associated with ingredients that end in or contain the ETH, indicative of (indiscernible) ethoxylation. And chemicals include sodium laureth sulfate or polyethylene glycols. And we’ve underlined a few of those chemicals in this example label in the bottom right corner, but those don’t always necessarily mean 1,4-dioxane is there, it just might give you an indication.

But to that end, DTSC is going to be conducting some of our own product testing in the upcoming few months to try and get a better handle on that.

So related to -- we have a couple of exposure concerns related to 1,4-dioxane. The first is during product use. So when you’re using the product, you can be exposed by inhalation if you’re in a hot shower. Dermal; a lot of these products are applied directly to the skin. Or even ingestion, as my two-year-old, who drinks his bath water, probably experiences.

And product use alone, we don’t think that for most of the general population, that that’s going to represent a significant exposure to 1,4-dioxane, but we are concerned about people that have 1,4-dioxane in their drinking water, so they're being exposed to 1,4-dioxane that way, as well as through their products, and that's where our concern comes.

And then second, we're concerned about end of life. We know it goes down the drain. It goes to the environmental reservoirs, and eventually through the drinking water process, where we can be exposed through ingestion.

And for all of these exposure pathways, we're most concerned about the general population, and this includes children and other sensitive subpopulations.

So to get a little bit more about -- into that environmental reservoir and drinking water contamination, I wanted to walk through a graphic to illustrate how 1,4-dioxane from consumer products moves through the waste stream and could potentially impact drinking water.

So we know that manufacturers are producing products that unintentionally contain 1,4-dioxane and they ship them to our communities where we use them. We use them and then they, of course, go down our pipes to the wastewater treatment plants where, as we've already discussed, we know that most standard forms of treatment are not effective in removing it.

The effluent that's coming out of the wastewater treatment plants can be released to surface or groundwater which is then sometimes used for drinking water. And additionally, California is also generating recycled water which has received additional treatment before being released to groundwater or surface water, which is one reason we're at L.A. County Sanitation District today. And the intention of this is to supplement drinking water. And this is part of the state's water management strategy.

And in the somewhat near future, we will be taking wastewater treatment effluent, giving it extra treatment and using it directly as drinking water instead of first releasing it to a groundwater or surface water system.

And then, of course, it's treated in a drinking water treatment plant and then delivered back to our communities where we could, potentially, be exposed to whatever 1,4-dioxane might be in that drinking water.

So I'd add one note on drinking water. We do know that a significant amount of the groundwater and drinking water contamination is most likely a result of historical industrial-related contamination. But we think that this graphic shows the potential for consumer products to contribute to this contamination as well.

So related to the presence of 1,4-dioxane in drinking water, there's two data sets that we've consulted.

The first is from the United States Environmental Protection Agency's recent survey of drinking water systems.

The map on the left shows this data. The background is the population density in California. The darker colors, the darker blues, indicate higher population. And then the individual dots are the data points within that survey. And those in red are data points that are above 3.5 micrograms per liter, which is the EPA's health reference concentration.

We also looked at the State Water Board's data of drinking water sources and systems, and that's in the table on the right. You can see that a lot of the counties that had concentrations above the 3.5 value overlay and are very similar to those that have exceedances in the EPA's data. And while these are not geographically widespread across the state, if you look at the population column on that table, you can see that these counties represent almost half of the state's population, so that they indicate a potential for widespread exposure.

And then I mentioned environmental justice communities. So we're particularly concerned about these communities that might be exposed to 1,4-dioxane from both products and drinking water.

And to get a better understanding of this possibility we looked at the Office of Environmental Health Hazard Assessments CalEnviroScreen which is a mapping tool to help identify California communities where people are especially vulnerable to pollution’s effects. And those communities are indicated by the red shaded areas in the insets on the map. And you can see that some of these communities overlap with the data points from the USEPA’s survey with exceedances of that health reference concentration. So here we show Sacramento and Monterey Counties.

And then particularly relevant for us here today, in this inset we focused on L.A., Orange, and Riverside Counties where we’ve actually overlaid the USEPA data with the CalEnviroScreen data. And you can see a significant amount of overlap between these communities and samples that exceed the USEPA health reference concentration.

Children also represent a sensitive subpopulation that may be particularly vulnerable to the effects of exposure to 1,4-dioxane in consumer products and drinking water. We do know that 1,4-dioxane is present in some products targeted for use by children. And we know that children also have a number of special attributes that make them especially vulnerable. These can include things like different product use patterns. As I mentioned, my son, who loves to drink his bath water. I don’t think most adults do that. High surface area to body weight ratio. And they’ve also got increased diffusion through the skin.

And finally, why we’re here today, we’re concerned about impacts to water treatment agencies. We know that background 1,4-dioxane concentrations in wastewater effluent indicate widespread constant input such as that that might come from consumer products. We know that standard treatments are ineffective. And the specialized treatments that have to be used to remove 1,4-dioxane can be extremely costly.

So we're particularly concerned about the cost of this specialized treatment on the water treatment agencies that are generating recycled water, and they have to abide by permit requirements related to 1,4-dioxane, so we really don't want 1,4-dioxane to interfere with the beneficial reuse of wastewater and the state's plans to manage our water resources.

So with that, we've come up with three themes of key questions to stakeholders that we're hoping to get additional information from you on. The first theme is the potential for 1,4-dioxane adverse impacts. That's what we're focused on today. Themes two and three is related to the presence of 1,4-dioxane in personal care and cleaning products. And then the alternatives analysis threshold, that's a level that we would set if we were to go forward with the priority product. And anyone that makes a product that has a concentration below that level would not have to conduct and alternatives analysis.

So those two topics are going to be the focus of our workshop on August 21st up in Sacramento. And we invite all of you to join us there as well.

We have a CalSAFER comment period on our CalSAFER website that’s open through -- we just extended it to August 30th to allow people plenty of time to provide comments based on their knowledge, as well as the two workshops. And we’re going to be considering this feedback to inform possible priority products that we might potentially list in the future.

So with that, we’ll take any questions on any of the DTSC presentations that we’ve heard for the last few minutes if anyone’s got any.

(Indiscernible.) We’re good? All right. (Indiscernible.)

MR. LOPEZ: Thank you, Anne Cooper.

So we will now transition into stakeholders’ presentations. We will start with Professor Thorsten Reemtsma of the Helmholtz-Centre for Environmental Research, and the University of Leipzig in Germany.

MR. REEMTSMA: Hello?

MS. DOHERTY: Hello.

MR. LOPEZ: Hello.

MR. REEMTSMA: Good morning from Germany. I would like to briefly introduce you to the concept of partially closed water cycles and illustrate the problems that may stem from the presence of persistent and mobile contaminants in such water cycle.

MR. LOPEZ: Professor Thorsten?

MR. REEMTSMA: Yeah?

MR. LOPEZ: Can you please share your screen with us?

MR. REEMTSMA: I thought I already did so. No? Ah, yes, here we are. I thought it was --

MR. LOPEZ: We see it. Thank you.

MR. REEMTSMA: You see it. Thanks.

So this is a partially closed water cycle. We also, as well as industry and cities as a whole, generate wastewater, most of which is actually treated in wastewater treatment plants and then discharged to rivers and streams. In densely populated areas the percentage of treated wastewater in river waters can easily exceed 20 percent, especially in dry seasons of the year.

Further downstream, the surface water may be used for drinking water production, either after infiltration to the subsurface or banked filtration, or even after direct abstraction. And the water is then treated in the waterworks and it comes back to us as a consumer. So this is a partially closed water cycle in which wastewater, after proper treatment, and part of which is coming back to us as consumers in the form of drinking water.

In these partially closed water cycles we basically find three barriers, the wastewater treatment plant, the subsurface, and the waterworks. These are three barriers which remove contaminants from the water. And they usually are quite effective at removing all contaminants which originate from the wastewater that we have discharged.

However, all three barriers actually rely on the same removal mechanisms which basically are microbial degradation of organic contaminants and sorption to surfaces, either to the flux of the activated sludge, to the soil, or to activated carbon in the drinking water treatment plant.

Unfortunately, in wastewater we sometimes find components which are neither biodegradable, we call them persistent, and which are so polar that they do not tend to absorb to surfaces, and then we call them also mobile because they do not -- are not removed effectively. Such persistent and mobile contaminants, abbreviated as PM compounds, are not effectively removed by the three barriers. And there is a higher risk that these compounds actually move through all these barriers and finally end up in the drinking water which comes back to us as consumers.

Thus, the presence of persistent and mobile compounds in partially closed water cycles clearly limits the reuse options -- and it limits the reuse options and endangers the water resources.

Together with colleagues, we were wondering how many of such PM compounds may be present in our water cycle and we searched chemical databases, in this case the REACH Regulation’s Database of the European Union for compounds which may be persistent and mobile according to the criteria which are shown on this slide.

We then also checked for the risk of these compounds actually to be emitted into the environment based on the tonnage and the use characteristics of the chemicals. And it turned out that of the about 14,000 chemicals we were initially considering, more than 1,000 PM compounds have a high risk to be emitted into the environment. This, for us, was an unexpectedly higher number of chemicals.

One of the major compounds, one of the higher-ranked compounds, actually, in this exercise was 1,4-dioxane which made us more closely look at it, into the properties and the data, more closely look into the studies, actually, that were available. And it was confirmed in that study, then, that 1,4-dioxane is, indeed, persistent and very mobile.

And it may be worthwhile, also, to look at its toxicity. And based on the studies it turned out that 1,4-dioxane would be carcinogenic Class 2, according to the

European categorization, meaning that it is considered carcinogenic for humans based on animal data.

So obviously, for resources, for our water resources and the quality of our drinking water, it makes a large difference whether we find only persistent mobile chemical, or a PM chemical, or a compound which is also a toxic PMT chemical, like 1,4-dioxane.

Colleagues from the German State of Bavaria in Southern Germany, they are monitoring their surface waters for the presence of 1,4-dioxane in the past years. And they virtually found 1,4-dioxane everywhere in the surface waters and, usually, in low concentrations, which suggests that the compound was regularly emitted from municipal wastewater. But in some cases, also, very high concentrations of several micrograms per liter. And in these cases, 1,4-dioxane was actually released by industry from production processes.

So to conclude, persistent mobile compounds are an issue in partially closed water cycles. Technical measures to remove these compounds from water are limited because they’re not biodegradable and do not sorb to surfaces. And in the case of 1,4-dioxane of oxicated -- other oxidation processes are not very effective. The presence of PM compounds in partially closed water cycles endangers drinking water resources and limits wastewater reuse options. And this, of course, is especially true for compounds which are also toxic. And one of these -- this one, actually, is 1,4-dioxane, at least according to the German Environmental Agency UBA.

Avoiding the release of PMT compounds is probably the most sustainable way to protect our drinking water resources.

Thank you.

So this is my presentation. I'm not sure that you could hear me.

MS. DOHERTY: We could. Thank you.

MR. LOPEZ: Thank you, Professor Reemtsma.

Are there any questions for Professor Reemtsma?

MS. WILLIAMS: Yeah. Can you ask him what the measure of the persistency that he used?

MR. LOPEZ: Professor, were you able to hear that question?

MR. REEMTSMA: The measures for the persistency; was that right?

MR. LOPEZ: Yes.

MR. REEMTSMA: Yeah. We had the -- I had this on one slide, which was maybe sloppy. There are the defined criteria for persistency in the European REACH Regulation which are based on the definitions used for selecting PVT compounds, or the persistent volatile and toxic compounds. And they actually stick to those criteria, also, in evaluating the PMT, the persistent, mobile and toxic compounds. And then this degradation outlet in river waters and exceeding 60 days, degradation in fresh or estuary waters exceeding 40 days, and in sediments, exceeding 120 days, and in soil, also, exceeding the time of 120 days.

MS. WILLIAMS: So can you ask him that -- how this compares to the LOG Kow?

MR. LOPEZ: Professor, Jane Williams is asking, how does this compare to --

MS. DOHERTY: The LOG Kow.

MR. LOPEZ: Log K-A-W?

MR. PALMER: K-O.

MR. LOPEZ: K-O-W.

MR. REEMTSMA: Okay. So mobility, actually, was measured using the Koc and not the Kow. And the Koc of -- the log Koc of 1,4-dioxane and it’s 0.8.

MR. LOPEZ: We have one more question for you.

MR. REEMTSMA: Yes, please.

MR. LOPEZ: Never mind.

(Laughter.)

MR. LOPEZ: Is there any -- we do have another question for you, Professor.

MR. RISOTTO: Ask him whether this is published?

MR. LOPEZ: Is this published information, Professor Reemtsma?

MR. REEMTSMA: Yeah. The evaluation on these PMT compounds, there's a record, which is actually on this slide I'm showing right now. There's a record of the European -- of the German Environmental Agency, UBA. And this is available for download, yes. That's the Assessment of Persistence, Mobility and Toxicity of 167 REACH registered substances. That's the title of the study and that is published.

MS. DOHERTY: Were those detections just surface water or were they also drinking water?

MR. REEMTSMA: Well, the data I have shown were only for the surface waters because the colleagues in Bavaria, I think they only sampled surface waters. So I do not have specific data for groundwater or for drinking water in this case.

MS. DOHERTY: Thank you.

MR. LOPEZ: Any other questions for Professor Reemtsma from the audience?

Thank you so much for your presentation, Professor.

MR. REEMTSMA: You're welcome. Goodbye. Thank you.

MR. LOPEZ: Thank you.

MS. DOHERTY: Thank you.

MR. PALMER: Thank you.

MR. LOPEZ: So we will now hear the -- we will now hear from Division Engineer of the Reuse and Compliance of Sanitation Districts of Los Angeles County, Ann Heil.

MS. HEIL: Heil.

MR. LOPEZ: Heil.

MS. HEIL: Are you going to put it up, this slide? Well, good morning. There we go. All right. Thank you for that introduction. Today, I'm going to be talking about the Sanitation District's experience with 1,4-dioxane.

There's that. Oh, do I do slides here?

MS. DOHERTY: Yes.

MS. HEIL: Oh, look at that. Okay. Where do I point to? Oh, there we go.

So I'm going to cover three topics today. I'm going to just start, for those of you not familiar with our agency, with a little bit of an overview of the Sanitation Districts. Then I'm going to talk about the 1,4-dioxane regulations and how they impact us. And then I want to go over the data that we've collected to date on 1,4-dioxane.

So the L.A. County Sanitation Districts operate a very large interconnected wastewater treatment system in L.A. County. We serve about half of L.A. County and have a service area that includes about 5 million people. And as part of our system we treat about 400 million gallons per day of wastewater at 11 different wastewater treatment plants throughout the county.

So our mission is to take that wastewater that's coming into our system and turn it into valuable products. We make recycled water from it. We collect the gases that are given off during the treatment process and we make energy from it. And then for the solids product that's left over at the end, we make that into fertilizers and different soil amendments. So our entire system is structured in order to maximize production of recycled water.

We have several different interconnected area, one -- is there a little light on it? -- one at the main part of the L.A. Basin down here, and then one up in the Santa Clarita Valley, and then one up in the Antelope Valley.

So what we did when we grew the system was to put -- we started with one main treatment plant at the low spot in the L.A. Basin. And then as the system grew we put these satellite treatment facilities in, in order to produce recycled water near the area where it can be best used by our consumers, so 10 of our 11 plants are specifically designed in order to produce recycled water.

We're one of the largest suppliers of recycled water in the country. And this recycled water has become a very important supplement to local water supplies, particularly during drought periods. So we have a mature recycled water program that sends water directly to over 800 sites. And we recycle over 100,000 acre feet per year of water.

The highest volume of recycled water goes to groundwater recharge, although we do also send it for other things, like irrigation, industrial uses and agricultural uses, and maintaining environmental habitat. So this shows some of our biggest projects that we've got. We've got two existing recycled water projects for groundwater recharge and two that are in development right now.

The one shown, Montebello Forebay, is our oldest and largest project right now. It was brought online way back in 1962. So what we do with this project, it's actually very sustainable, the water from the treatment plant just behind our building, and several other treatment plants, flows by gravity down the river to spreading basins. And the water receives additional treatment in the spreading basins as it percolates down through the basins. And we call that soil aquifer treatment. So you don't have to add more chemicals, you don't have to add energy, just let the water flow. Nature does its work and we get good clean recycled water out of that.

The one on the right on this slide is our Vander Lans Water Treatment Facility. And in this case we apply, in partnership with the Water Replenishment District, advance treatment to the water consisting of microfiltration, reverse osmosis, and advance oxidation. And then the water is injected directly into the groundwater. So this is very equivalent -- Mark Kawamoto is going to talk about what they do down in Orange County with their system.

And then at the bottom of the slide is one of our new projects that we're working on and this is a partnership with the Metropolitan Water District. And we are working with them on a project that will provide up to 150 million gallons a day, so about 160,000 acre feet per year of water that would receive advance treatment and then be distributed to groundwater basins around the basin. So this picture is just a demonstration project. It's a half-million gallon a day demonstration project to demonstrate the technology. And that, we're just wrapping up construction on that and hope to bring it online later this year.

So the reason we care about 1,4-dioxane is that it's regulated in our groundwater recharge projects. And the speaker before me talked a little bit about this partially closed water cycle and that definitely comes down into play down here in the Los Angeles Basin. So there are regulations for groundwater recharge using recycled water in California. Those were formalized about five years ago. And if you're going to do subsurface injection, like I showed with the Vander Lans Plant, or that Orange County does, there are specific requirements in the regulation to remove 1,4-dioxane.

There’s a whole set of elements in the regulations all about 1,4-dioxane. And the reason for this is it’s not removed, as Anne Cooper said, biologically, and it also slips right through reverse osmosis membranes which take out almost everything in the water. So those regulations require a half-log removal which means about 69 percent of the 1,4-dioxane present in the water has to be removed during that treatment. So not only do you have to put an extra treatment to remove the 1,4-dioxane, there’s monitoring. You have to demonstrate that your unit is operating properly, you have to do challenge tests, that sort of thing. So it’s very expensive to add this additional layer of treatment onto it.

And then for our projects that do surface application the standard is meeting the California notification level of one microgram per liter. If you’re doing a subsurface injection project, you have to meet that at end of pipe. If you’re doing surface spreading the regulations call for you to meet it in the recharge water after it’s gone subsurface. But our current permits require us to meet that limit at end of pipe at our treatment plants. And then, of course, there’s the EPA number of 0.35 micrograms per liter that Anne Cooper mentioned.

So we began doing a lot of sampling of 1,4-dioxane in the 2011 timeframe, which is right around the timeframe that notification level came into play, so we needed to understand it better and really characterize it because we had to meet these as a standard for our groundwater recharge plants. So we went out and we sampled at nine of our different wastewater treatment plants. The one you see on the far side, JWPCP, is our ocean discharging plant. So right now no recycled water is used at that plant. All that water goes out to the ocean. The other ones that you see listed are all water reclamation facilities producing recycled water.

And, you know, one of the interesting things about our system is we have so many different treatment plants that when we go and sample them all we can get a really quick and easy determination as to the nature of the sources. So if we see widely varying concentrations at our various treatment plants, that immediately points the finger at industries, so it’s probably coming from one or two, a few, industries that are discharging high concentrations.

When we see similar concentrations across our treatment plants, that means that it’s just the concentrations are driven by some sort of widely distributed source that’s the same all around the basin. And for us that means households, potentially commercial applicators. So it’s just an immediate fingerprint. We can go out, we can run these initial samples and say, oh, we've got a very widespread problem. It's coming from sort of consumer product. Let's go try to track down where it's coming from.

So the one large industrial source that, at our Joint Water Pollution Control Plant, is a membrane manufacturer. And those are the known biggest wastewater sources of it. And I'm sure Mark from Orange County will talk about that when he follows us. So we have an eye on that one if we need to reduce concentrations at joint plant, we are looking at regulating them, but they put out enormous concentrations of 1,4-dioxane.

So let's take a harder look at our water reclamation plants now, once we can see it a little better now that we take off that big spike from our Joint Water Pollution Control Plan.

So this graph shows the concentration of 1,4-dioxane on the Y axis and then our different plants across the bottom. And then each different color is a different year. So if you look at our Long Beach plant, on the one end you've got the red and the green and the purple, so that's sort of a time series of it.

And so what you can see from this graph right away is that, again, even when we dial in we see very consistent concentrations across most of our treatment plants. It looks like for that one LC, that's our Los Coyotes Plant, there may be a few industrial sources, more minor ones, at that plant, maybe a tiny bit at Long Beach. But again, we're seeing very, very consistent concentrations across our treatment plants.

And then another thing we did with this data is we didn't just look at the effluent from the plant, we looked at the concentrations of sewage coming into the plants. That's shown in the gray. We call that raw. And then the purple-ish blue is our primarily treatment, so that's after just a gravity settling treatment step. The secondary treatment in the dark orange is after biological treatment where microorganisms eat the dissolved organic material in the water. And then the lighter orange is our tertiary water where the water goes through a filter after you're done.

And for each of these we have five of our different water reclamation plants here. And you can see that the concentrations are remarkably similar across the plants. We really aren't getting any removal through gravity treatment, biological treatment, filtration. The 1,4-dioxane just isn't sticking to any of it.

Okay, and another way to look at our data is to do a time series. So what we're showing here is concentrations at our various water reclamation plants from 2011 until 2018. And you can see that we're not really seeing a big time trend on it but the concentrations bounce around a little bit, particularly at Los Coyotes where we think we have an industrial source, but, really, they're staying relatively steady over the time period that we've examined.

So here's a look at the water reclamation plants that feed our Montebello Forebay Groundwater Recharge Project, so that's our Pomona, our San Jose Creek which is the one out back here, we have two sides to it, east and west, and then our Whitter Narrows plant. And this shows the data for those plants from 2016, 2017 and 2018, as compared to that California notification level of one microgram per liter. And you can see that we're right on the edge of meeting that standard. It's actually rounded to one, so we actually have snuck under and we're meeting that number right now, but we're really right at the edge on meeting that number.

If the number drops down, it gets revisited by the water regulators to the EPA IRIS number, then we're going to have a problem. And this would necessitate adding additional treatment to all of our water reclamation plants and that would be at considerable cost to add that extra treatment step to these three water treatment plants -- water reclamation plants. So we're nervous about 1,4-dioxane but hanging in there right now.

So here's the takeaway messages I've got.

1,4-dioxane is ubiquitous at our treatment plants, so we really believe there is some sort of cleaning products that are driving it.

1,4-dioxane is not removed through tertiary treatment. The concentrations are remaining relatively steady. We do have some industrial sources at some of our treatment plants.

We're right now right at the regulatory level in our Montebello Forebay plants. And if the regulatory standards go down, that would necessitate additional treatment at our water reclamation facilities.

So that's it. Thank you.

You want to take questions now?

MR. LOPEZ: Yeah. Yeah.

MS. WILLIAMS: So would you have to install AOP at all your plants if went down to the --

MS. HEIL: Yes, we would.

MS. WILLIAMS: Do you guys have costs for that? Have you figured that out yet?

MS. HEIL: No. We haven't costed that out yet.

MS. WILLIAMS: What's the total volume of the wastewater going through your plants?

MS. HEIL: The Pomona plant right now runs about eight, well, 8 to 10 MGD, San Jose Creek between the east and the west side runs about 60, 50 to 60 MGD, and Whittier

Narrows is running 8 to 10 MGD. And our Whittier Narrows plant does do disinfection with UV but you can see that that’s not doing it.

MS. WILLIAMS: That’s the AOP.

MS. HEIL: Yeah, it’s the AOP. You’d have to add something to it.

MS. WILLIAMS: Have you guys talked to -- we just put in AOP systems for LAWP.

MS. HEIL: Where?

MS. WILLIAMS: Have you talked to them at all, like on what these costs would be on these volumes for AOP?

MS. HEIL: No. We haven’t done that yet.

MR. O’KEEFE: Well, you have costs from Vander Lans. You can --

MS. HEIL: Yeah. Well, that has -- yeah, we could. We could.

MR. O’KEEFE: -- extrapolate on that.

MS. HEIL: Yeah. Yeah. We could ask. We could put in a design request to get a sense of that cost but hoping to not have to do it, so we haven’t costed that out. It would be cheapest at Whittier Narrows because they’ve already got UV in, so presumably it would be easier to retrofit that to some sort of AOP process.

MR. RISOTTO: You mentioned reverse osmosis. How much of the -- how many plants are using that as treatment?

MS. HEIL: None of our water reclamation plants have reverse osmosis in place, just the Vander Lans plant is run by Water Replenishment District and they do the advance treatments specifically for that subsurface injection.

Okay, well, good. Thank you.

MR. LOPEZ: Thank you, Ann.

So now we will be hearing the presentation of Engineering Supervisor of the Resource Protection Division of Orange County Sanitation District, Mr. Mark Kawamoto.

MR. KAWAMOTO: Good morning everyone. Thank you for having the Orange County Sanitation District here. So I'm here to tell you today about our story about 1,4-dioxane. And I'll say, it dovetails very well into Anne's presentation, as well, so it was not a coordinated effort, it's our story.

Similarly, I'll start with a brief overview.

For those of you who are not aware about the Orange County Sanitation District, the Orange County Sanitation District, unlike our name, actually only serves the north and central Orange County. So south Orange County would be below this Irvine area. We have two main reclamation and two facilities. One is -- plant number one is the reclamation facility. It's right next door to the Orange County Water District where GWR is located. And we also have a treatment facility closer to the beach and that's our Huntington Beach facility.

So this is what we would say is our service area. However, we have agreements in place with other agencies, so we actually provide service that goes throughout the whole Santa Ana Watershed because there's a brine line that goes into the Inland Empire area, plus we do receive waste hauling waste from SOCWA, which is south, in the south Orange County area. We do the pretreatment program for IRWD. And actually on the border with L.A. County Sanitation District there are some flows that crisscross on the edge there. So in total the area that we serve is much greater than our technical service area.

So one of the things that we're known for is our partnership with the Orange County Water District. So together we jointly implement the groundwater replenishment system, so we're currently at 100 million gallons of water that's being recycled per day. We're on our way up to 130 million gallons. And you can see at the bottom of the slide the typical treatment process for the GWRS, the groundwater replenishment system. So we do the microfiltration, the reverse osmosis, and then the ultraviolet light plus hydrogen peroxide is what we call advance oxidation.

Okay, so I'm in what's often called the Pretreatment Program. Technically, what the Pretreatment Program was created for was to help manage sources of pollutants before they entered the sewer. The traditional Pretreatment Program was particularly targeted at specific industrial users. But with the advent of the groundwater replenishment system, OCSD made a decision that it understood that there may be other sources of contaminants that we would have to deal with that are beyond what we would normally control through the Pretreatment Program.

So that's where the Non-Industrial Source Control Program comes into play. And that's the particular group that I'm in and I'm overseeing. But as you can see, so we understood that in addition to certain kinds of industries, there's a bunch of other industries that are not covered under the traditional Pretreatment Program, plus the residential and commercial dischargers. So there's some examples of some of the pollutants that are sent in from those various industry types or various groups.

So here's the heart of what I want to show you today. So I'm going to show you this slide and it looks very, very busy, but I'm going to step you through this story of how we chased down 1,4-dioxane. So let me start with a few orientation remarks first.

One, you notice the title slide is that this is the groundwater replenishment system GWRS Q1 point. It's the point at which the OCSD's treated secondary effluent is sent to GWRS, so it's GWRS' influent or our effluent to them, so our treated effluent to them, okay? So that’s what we’re looking at. And so we’re looking at 1,4-dioxane concentrations at that particular point.

For reference the second arrow shows you the Orange County Sanitation District and the Orange County Water District established a level of service, an LOS, of ten micrograms per liter, so that’s the level that we are obligated, OCSD is obligated to send the water over. So as you can already see, we weren’t always successful, at least at some point in time.

And then to reference back to the notification level, just for reference, at the bottom of the slide is the one microgram per liter notification level previously set by the California Department of Public Health and now the Division of Drinking Water.

Okay, so as you can see, GWRS started January 2008. And as you can see, we were doing well for a while. Well, something started to happen in 2009 where you see the numbers start to spike a bit, especially when it goes over the level of service. But this, to me, is real data. There are some fluctuations.

Well, as we came into the 2011-2012 era, we see that now the spikes are happening more frequently and at a higher level. By the time we got to 2012, we have a very serious issue on hand that, over constantly exceeding our level of services, and it's going higher and higher. So this -- at this point we start to hunt, what is causing this 1,4-dioxane spikes?

I should mention that, up front, based on a rough calculation, we believe we were hunting for a total of 15 pounds of 1,4-dioxane. So I have a colleague that basically puts it this way, it's a small wastepaper basket full of 1,4-dioxane. That's how much we're trying to trace down in our system. Okay.

So here's how we approached it. As I mentioned, GWRS is fed by our reclamation plant number one. We have five main trunk lines that feed plant number one. And just to complicate things more, two of our trunks are actually intertied. So the New Hope and Euclid Trunks actually have interties in between them. So sometimes it's difficult to distinguish where the pollutant might be coming from or being discharged to.

But we started to sample in our trunks and we discovered that two particular trunks stuck out. One is our Sunflower Trunk where we estimated there were six pounds of 1,4-dioxane being discharged. And at the Euclid-New Hope Trunk system, there was five pounds. So already we have a major amount of the 15 pounds we're looking for. Okay.

So understand the Pretreatment Program one of the things that we know to do is then -- I'm going to go forward -- well, what are the potential sources of 1,4-dioxane?

So we have information on hand and so we consult our information. And we looked up and sure enough, as Ann mentioned, membrane manufacturers are a well-known source. They're also used for pharmaceuticals' manufacturing, pesticides, paper. It's also found in the personal care products previously mentioned.

So in the case of the Sunflower Trunk, we were immediately able -- we knew we had one on permit, so we sampled covertly there. And sure enough, we found that they were the ones discharging a large amount of 1,4-dioxane. So that took care of the Sunflower Trunk.

Now for the Euclid-New Hope Trunk lines, that was a little bit more intricate work. So we actually had to step up the trunk lines zone by zone, so we looked for key points where we could isolate the trunks and try to determine in which areas.

Meanwhile, we started to look and see, well, what kind of facilities are discharging in these areas? So there were several that stood out. There were other membrane manufacturers and distributors, a couple of electronics facilities, one metal finishing place, and one soap and detergent manufacturer.

So, unfortunately, at arrow number seven, we saw a sudden drop in the concentration of 1,4-dioxane that we were able to detect. We believe at that point then our covert operations had been discovered or, at the very least, the word had gotten out and so people started to change their practices. So at that point we changed from covert operations to overt operations. We basically went onsite and we had conversations and we worked with these people.

Well, the good news is, after all that work, in the case of the membrane manufacturer, their first step was to stop discharging. So they basically did thermal destruction or, basically, evaporation of their wastewater so that it wasn't being sent to the sewer. Eventually they did a product substitution where they used a different chemical in lieu of 1,4-dioxane for their membrane manufacturing process.

Bottom line, as you can see, it was very steady, that we're now consistently under five micrograms per liter. I will say that you might be wondering, what happened since then? It's consistently been below three micrograms per liter, so we believe that, so far, that things are understand control.

So one of the tools we have to protect our facilities is in the pretreatment program, we can set local limits. So as it turns out with every NPDES permit cycle, we're required to do the technical evaluation of local limits. And so, of course, one of the constituents we targeted was 1,4-dioxane.

In 2016, we adopted a new local limit for 1,4-dioxane, so I'm showing you the list here. As you can see, we set a local limit of one milligram per liter. This was a heroic effort because we went to a lot of efforts. Otherwise, if we did a uniform distribution the number would be much, much less than this. But for those places that are known to use or work with 1,4-dioxane, we set a one milligram per liter. And as you can see, the basis for the whole limit is to protect GWRS, in this case. Okay.

I will say, one of the important things here, also, with this slide is when we're doing the technical evaluation of local limits we determined that 80 percent of our influent was based on domestic discharges. For pretreatment programs, this is really bad news because what this means to us is, in our pretreatment program, this is uncontrollable. This is what everyday residents are using, so there's not much that we can do in a pretreatment world.

So we can try to do education and outreach. We can work with legislation and regulation. But that's why I'm happy that, you know, I want to support the Safer Consumer Products efforts. I've been a long-time advocate, just for this aspect, because there's certain things that wastewater treatment plants can't do, pretreatment programs can't do. And this is where we need your help to help control 1,4-dioxane.

So in summary, I want to thank you very much very for the opportunity and for helping us work on 1,4-dioxane. You might be saying, does it really matter? Yes. Small quantities add up so small changes can have significant impacts.

Thank you very much.

MR. LOPEZ: Are there any questions?

MS. WILLIAMS: What kind of membranes were being manufactured?

MR. REEMTSMA: Would you believe it's the membranes that are used for reverse osmosis. It's very ironic.

MS. WILLIAMS: Totally.

MR. REEMTSMA: Right?

MS. WILLIAMS: Yeah.

MR. REEMTSMA: So 1,4-dioxane is used to help induce porosity of the membranes. So of all the things it allows through, 1,4-dioxane.

MS. WILLIAMS: The irony; right?

MR. REEMTSMA: Yes.

Anything else? Okay.

MR. LOPEZ: Thank you, Mark.

So at this time we will take a break of about ten minutes.

I will also encourage you all, if you want to do a public comment, to take this time to grab a card and we can do that after the presentations are over.

(Off the record at 11:03 a.m.)

(On the record at 11:17 a.m.)

MR. LOPEZ: So are going to continue.

I know -- I've just been informed that there's a couple of questions that have been sent to the chat feature. Unfortunately, we're not able to check that. If you can please, if you're tuning in remotely, if you can please send those comments to saferconsumerproducts@dtsc.ca.gov so that we can answer those questions.

At this time I would like to invite Jeff O'Keefe, Chief of the Southern California Section, Division of Drinking Water of the State Water Resources Board -- Control Board.

MR. O'KEEFE: Hello. Yes, I'm Jeff O'Keefe. I'm with Division of Drinking Water. We call ourselves the DDW for short often. We were formally with the Department of Public Healthy, CDPH, and for about the last five years, we were moved over to the Water Board to align ourselves with the other programs that deal with water and wastewater. I'm located in our Glendale field office. We have field offices throughout the state. So my responsibility is regulatory oversight for public water systems in L.A. County up to San Luis Obispo County.

I just want to acknowledge some of the sources I used today and some people that I borrowed from. Brian Bernados. It does say brain. He is a smart guy but that’s a typo. But I borrowed from Water Board fact sheets, EPA fact sheets, and some people within our program helped with some of the information. I also got some information from the City of Los Angeles, from the City of Monterey Park, on a couple of the projects that they’re working on right now to treat for 1,4-dioxane.

So I have the benefit of going fourth, is it, so a lot of what I have is a repeat. So, yes, I do want to point out, though, the use as a stabilizer in solvents or as a solvent because I do have some slides related to some groundwater remediation projects from that type of disposal. Present in a number of products, we’ve mentioned some of these consumer products before and some of these other industrial uses. And it’s a byproduct of manufacturing of PET plastics, classified as possible human carcinogen, and it gets into the environment and it can be harmful to people by ingestion, inhalation and dermal exposure.

So there’s properties that make it troubling in the environment when it reaches groundwater. It’s very soluble. It migrates rapidly, relatively resistant to bioremediation. It does not absorb onto the soil particles. And we see co-occurrence in some other volatile organic plumes from some industrial sites. And it sort of moves faster and expands more than the other chemicals. And it's difficult to treat because most typical groundwater treatment processes don't remove it. Like GAC, granulated activated carbon, air stripping, it doesn't remove it.

So I'm going to talk a little bit about the occurrence data and had some similar slides about the datasets.

We have voluntary monitoring, there's no formal monitoring requirements by California regulation, but we have some of that information. I have that in tabular form. It's fairly similar to the information previously presented. And we also have, from EPA, they do these periodic, what they call, unregulated chemical monitoring rules where they develop a candidates list and they do -- select areas throughout the state are required to monitor. And they use that for collecting occurrence data and helping them to make decisions on future drinking water regulations.

So from that dataset, about three percent nationally were detected above their EPA health advisory level, a little higher occurrence in California. And about seven percent of public water systems have at least one result that was over that level, that's national, and it was also found in surface waters and groundwaters and, again, in wastewaters, as we've previously discussed.

So this table is just the voluntary data from the state's database. We see high amount of occurrence in Los Angeles with some of the higher concentrations detected, and Orange County coming in second. And we don't really -- and the difference between my slide and Anne's is I screened out, if it was like a single detection, I threw that away. It had to be confirmed more than one detection above the one part per billion microgram per liter level. And I screened out things that were not used for drinking water. We might have monitoring data that's not actual an active in-use drinking water source. But, you know, the numbers fairly correlate to Anne's occurrence information.

And this is a national map from the EPA Unregulated Chemical Monitoring Rule. And just to point out, they use very low detection limits for this monitoring requirement, much lower than the state's reporting limits. So I would want to just kind of focus on the yellow and the red areas. And what's interesting about this slide is there are some clustered areas in the Northeast, Mid-Atlantic and Southeast, and in Southern California where have the highest amount of occurrence. And I want to thank Eurofins Lab for this slide. This was a graphic prepared by Andy Eaton.

So just a little history of how -- what the state's response has been.

We first detected it in groundwater in 1988. And shortly thereafter our toxicologist reviewed the available health information and we established a non-regulatory number called a notification level. That's a health-based guidance level. At that time the EPA health advisory was higher than it is currently, it was at three-and-a-half, so we established our state notification level at three in 1998 and later revised it in 2010 when the EPA lowered their health advisory number. So at that time, in 2010, we lowered it to one microgram per liter.

So like I said, it's -- and notification level is a placeholder. It's used when there is a chemical of health concern that is lacking a formal enforceable standard maximum contaminate level. And it's set, typically, at a level that corresponds to a one-in-a-million theoretical cancer risk value.

We do have another value which is set a higher level where we recommend more immediate action. That's called a response level. It's typically for cancer-causing chemicals. It's set at 100 times the notification level. In this case it's set at 35 micrograms per liter. And we don't have any drinking water sources in the state that are above that value that are in use.

More recently, this year, we are now starting what might be the beginning part of a formal rulemaking process to establish a maximum contaminant level. And the first step is through our sister agency, the Office of Environmental Health Hazard Assessment, through CalEPA. They have to review all the literature, all the available health information, health studies, and they establish what's called a public health goal. Now often it would match the EPA's one-in-a-million cancer risk value for cancer-causing chemicals. But they're just beginning that process. It may take one or two years for them to complete that and that has to go out through a public review process.

But once that is established that would be sort of the starting point of where my program makes a decision on proceeding with the formal rulemaking process to establish a maximum contaminant level. And we have to consider factors, like whether there's technology capable of removing it in drinking water, what the costs associated with that, and are there labs that are capable of analyzing it?

Just a quick mention, there's no federal MCL. The EPA, after each UCMR round, they're supposed to do what's called a regulatory determination where they determine, is there high enough occurrence? Is it widespread throughout the nation? And would there be a meaningful health risk reduction by regulating that chemical? EPA has not made the decision on 1,4-dioxane yet. And they're in the process of doing that for PFOS and PFOA, which was also part of the same round of monitoring.

And from the UCMR 1, EPA made a regulatory determination to regulate perchlorate and they have not yet formally finished that process, they're just now out for the comment on a range of potential MCLs, so this is a slow process.

So lacking a federal number, many state's toxicologists review the literature and they come up with their own values of what they think is considered to be a safe level in drinking water. As you can see, they vary quite a bit, and we're seeing this repeat with the PFAS chemicals, where each state has a different interpretation of the literature. Many of them are close to the EPA health advisory. But Alaska's is as high as 77. I'm not sure how they developed that number.

So I'm going to talk first, the next couple of slides, about the drinking water treatment projects. And then I'm going to switch gears and talk a little bit about the wastewater reuse projects.

So we haven't yet talked, really, about another big source that has impacted drinking water, that is these contaminant plumes from -- that are present at a number of EPA Superfund sites, the EPA-managed cleanups, and they have impacted drinking water. They have higher -- tend to have higher concentrations than, you know, what might be influenced from wastewater. And it's present in the San Fernando Valley. These are all L.A. areas, San Gabriel Valley.

We have a number of projects that have already been completed. These are very complex treatment plants that are addressing multiple chemicals, multiple volatile organics, perchlorate, the nitrosamines, and also 1,4-dioxane. Not all of them have all of those but many of these sites are treating for all those chemicals through multiple treatment processes.

The next couple of slides will be about current, two projects we're currently reviewing or in the permitting stage, that's the Los Angeles Department of Water and Power's North Hollywood Plant and the City of Monterey Park Plant that's in the South El Monte operable unit, not too far from this location.

So this is a plume map of the 1,4-dioxane in the San Fernando Basin. The City of Los Angeles has several wells just on the leading edge of that plume. And as part of sort of multiple efforts there will be some source remediation that will not be used for drinking water. And there will be sort to this containment system that is treated and used for drinking water. And we'll also protect down-gradient wells from also being impacted.

So the treatment process that L.A. is using is advance oxidation, UV AOP with peroxide addition. And since the process is capable of removing multiple volatile organics, plus 1,4-dioxane at the same time, you know, there's, you know, site-specific design parameters, depending on what's in the water. This is very different than the water that Orange County or L.A. County San is treating.

And then since you add a very high dose of peroxide and there's excess leaving the process you have to have a secondary process called GAC, carbon filtration, that will remove the excess peroxide and, also, is an additional barrier that can remove any, maybe, low-level volatile organics that might be present. It's just more of a reliability feature for the organics. And then it will go out to the distribution system.

This is Monterey Park's project. You know, these -- not a lot to look at. It looks like a pipe. You know, these -- the UV lamps are inside that pipe. And there's a peroxide addition and it's added right to the pipe. It mixes through the turbulent flow in the pipeline. And the UV and the peroxide react together and form the radicals that reduce the concentrations of the organics and the 1,4-dioxane.

So this Monterey Park project is treating for multiple volatile organics and 1,4-dioxane, fairly, moderately low levels of 1,4-dioxane. It can be as high as five micrograms per liter. And they've completed some testing to demonstrate that you have complete reduction of all these chemicals through the process.

So they've demonstrated you can use this process to address multiple chemicals at once. But, you know, one thing is the peroxide dosages that these type of projects use versus the wastewater projects is you have to use a much higher peroxide dose, which means you need this carbon filtration step afterwards. And if, you know, there was a project where we didn't have to use that high of a peroxide dose, there's an easier way to quench the excess peroxide by just adding chlorine that will react with the peroxide and remove it.

So, like I said, these projects are very site specific. They're, you know, very involved with the design phase. And you have to look at what's in the water. Now remember, this water isn't first going to reverse osmosis, so it's definitely a different water quality than Orange County and L.A. County San. And things like total alkalinity bicarbonate, any kind of color in the water from organics, any chloramine, TOC, these things will sort of interfere with the production of the hydroxyl radials and will compete for removal with the other things that you're trying to treat for.

I have a couple numbers for costs just for these two current projects we’re working on. North Hollywood’s project, it’s a fairly high-flow plant for a groundwater treatment plant. It’s going to cost $21 million. They have even a larger-scale plant in the planning phases, Rinaldi-Toluca. That’s going to be, you know, $36 to $36 million. And Monterey Park, they had the benefit of having a developed site that already had treatment facilities, they already had carbon vessels there, so they had some cost savings there and their project was a lot lower.

I was reading, Long Island has 1,4-dioxane present in their groundwater sources too. And I saw some numbers. They’re building a plant that’s going to cost about $4 million.

So these costs vary depending on how many reactors you need and what’s the influent water quality.

But you’re not done. Once you build it you then have to operate it and maintain it. And these plants are very expensive to run. They use a lot of energy. These UV lamps are higher -- the newer lamps are less energy intensive but, generally speaking, the energy costs and the chemical costs, the peroxide, is very expensive to operate. And I don’t have values for that but that’s certainly something that we need to consider. When a water utility is building a plant, they need to make sure that they have water rates that are able to sustain the system that they can pay for the operations of.

So AOP works. We know that. We have some pretty good track record on these nine-or-so plants but, you know, it needs to be pilot tested. We need to demonstrate it at, start up and demonstrate that it’s effective.

So switching gears, I’m going to talk a little bit about reuse. And some of this was covered by Ann Heil from the L.A. County San District but I just want to go over the history.

We had many versions of a draft groundwater recharge and replenishment regulation. These are the regulations that we currently adopted in 2014. But, you know, we were sort of on the leading edge in the nation of how to develop criteria to make sure that these projects are safe and don’t have some unintended consequences. And in an earlier draft we weren’t aware that 1,4-dioxane would be a problem. Orange County had done some sampling of their drinking water sources.

In the early 2000s they found it. And then Orange County San District and Orange County Water District worked together, worked with the state, and worked on a strategy to address it. And then we then subsequently changed our draft regulations to include what’s called full advance treatment for the subsurface injection projects to include reverse osmosis and advance oxidation.

Subsequent to that we have a new set of regulations called the Surface Water Augmentation Regulations and these requirements would apply to that type of project. And I don’t intend to, you know, give you a lecture on the process but I have a few slides that talks about the process. So the full advance treatment includes the reverse osmosis and the AOP. The AOP is good for the NDMA reduction, which can also be present in the treatment process, but it’s also good for the 1,4-dioxane reduction. And it’s a good barrier for low molecular weight. Chemicals that pass through the reverse osmosis process. So even though we know it’s removing 1,4-dioxane, it may be removing things that are unknown also.

So I think it covered this, R.O. can remove the larger molecules but not the smaller molecules, like 1,4-dioxane and NDMA. These have fairly low molecular weights, so that’s why the advance oxidation process is effective at these lower molecular rates.

Ann did cover this. We do have requirements to meet the -- to meet all MCLs and notification levels for that degradation to the aquifer. And 1,4-dioxane is a good indicator for other organics, other unknowns, other chemicals of emerging concern, and it’s a good indicator for that.

So I'm not an expert on this but the peroxide and the presence of the UV light forms the hydroxyl radicals and that's what is reducing these organic molecules. We have a lot of information from Orange County Water District, and now the Vander Lans Plant at L.A. County San. But there's some new studies going on to use an alternative to peroxide that we're still learning more about that's using free chlorine, in addition to the UV, rather than the peroxide and UV. So we're still learning more about that but that's also showing promise and it will be cheaper to operate.

So the dosages is now -- we're now at the point where we're trying to optimize and reduce the costs and determine the best dosage. It's very difficult to really quantify. One of the vendors has some algorithms that they're working on that will help kind of optimize the dosage. That's still not finalized yet but we're working with industry on that. But typically the dose is about three parts per million or milligrams per liter, compared to the drinking water treatment which is a much higher dose.

This is my last slide. So this just talks about what is the requirement of these reuse projects to what is the removal requirement and what is the demonstration test requirement, and what's the ongoing monitoring requirement.

So there's a spike test. They have to show half of all reduction through the process and establish the operating parameters at which the plant will operate, that's typically using a UV dose and a peroxide dose, a power-type dose, and those are monitored continuously to ensure that the process is working effectively.

And then at the water produced, there's also a quarterly monitoring requirement to confirm that the MCLs and the NLs are met.

I just have a few links to some references that I thought were very worthwhile. The GAMA fact sheet was in the back of the room. That was one of the handouts. I think so. And these others are not in the back of the room but we have a webpage where a lot of the information from our slides comes from without the history of the state's notification level. And EPA has a technical fact sheet that's also very worthwhile checking out.

Any questions? Yes?

MR. RISOTTO: Jeff, one of the concerns I've heard about the AOP process is the potential to generate some oxidation byproducts.

MR. O'KEEFE: Correct.

MR. RISOTTO: Have you -- are you sort of finding anything? Is just the activated carbon deal with that or are there other issue, anything that may be an indication that you've listed in the projects you've done?

MR. O'KEEFE: Yes. Well, we're still learning on that. A lot of the San Gabriel projects are using the UV at the tail-end of the treatment process after the volatile organics are removed, but now there's -- so there's a less likelihood of byproduct formation. But for the North Hollywood and the Monterey Park projects, yes, there was some studies done during the demonstration testing to determine what forms during the process and what happens after carbon filtration.

And, yes, there are a couple things, you know, haloacetic acids, which is present in nearly every water supply because of disinfection, is present. But there is also a couple aldehydes that are present. And the literature does show that glyoxal is potentially formed. We didn't see it at these projects. But the aldehydes are removed, acetaldehyde and formaldehyde can be formed. And so you have to make sure you have an effective barriers to remove that post treatment.

Okay. Thank you.

MR. LOPEZ: Thank you, Jeff.

I would like to invite Jane Williams, Executive Director of the California Communities Against Toxics.

MS. WILLIAMS: Good morning. It's still morning. Thank you for inviting me to speak. I work quite a bit on drinking water and groundwater in Los Angeles. And some of the points in here have already been covered, so I'm just going to flip very quickly through these slides, the ones that have already covered.

So this chemical is similar to some of these other chemicals that we're struggling with here in Southern California in that they like water and they tend to get in water no matter where they are, whether they're in a consumer product, whether they're in an industrial discharge, whether they're a source, say an old landfill or an old industrial site that was pre-RCRA. So that's -- this chemical is just one of many chemicals that we are very concerned about they are water-loving.

The remarkable thing about this chemical is that one of the seminal studies that the numbers that we're looking at is based on this study that was done before I was born, okay? So, you know, this is not like, wow, we figured out this chemical is really toxic all of a sudden. No, actually, we've known that it was toxic for a long time.

Here's the same chart that Jeff had. So I'm just going to -- here's the same map that someone else had. So very interesting, when we look at these maps for PFAS, TCE, PCE, perchlorate, all these chemicals that we are, you know, working on we see a similar pattern in Southern California, which is no bueno from an environmental justice perspective.

L.A. So this is the problem, this is the environmental problem, if you look at these water companies and where they are and you look at CalEnviroScreen, and then you look at systems that are under 10,000, you will begin to see a picture where the communities that are going to be least able to pay for treatment for the contaminant is where the burden is going to be concentrated. And that is not just a problem with 1,4-dioxane. It's a problem with solvents. It's a problem with PFAS. And there's probably a bunch of other chemicals that we're not regulating yet that we're going to find out in the future that we should be regulating. And so the burden is being concentrated in the communities that are least able to bear it.

Ironically, many of these communities are either the Exide-impacted communities, or they're in Cristina Garcia's district, who's carrying the PFAS Notification Bill.

So this issue of notification is very important because as I go around the state and I talk to people about groundwater and drinking water, even people who are fairly plugged into what's going on, most people do not read their consumer reports, most people do not know the difference between a notification limit, a PHG, an MCL, and I'm talking even senior staffers in the legislature. So this whole thing about how we're regulating water is a sort of mysticism to them.

So I'm talking to you, Jeff. You may understand it but a lot of other people don't.

These issues of the lack of regulation by USEPA in setting federal standards. So USEPA has not issued a new MCL for over two decades. I actually petitioned USEPA to set an MCL and regulate perchlorate before my son was born, now he turned 18, and they have just now gotten their acts together to say, we should do something about perchlorate. Now if I had put up a map on perchlorate, you would see that we have entire groundwater aquifers in Southern California that have been abandoned, essentially, because of perchlorate contamination.

And so now when you add the 1,4-dioxane contamination, and you're going to PFAS on there, and you're going to add the solvents on there, I'll just keep saying this over and over again, in Southern California, we have a huge problem.

You can see the states are acting, you know, in different ways to resolve this issue of a lack of federal standard setting.

So I applaud the Safer Consumer Products Division of DTSC because you are actually getting at the problem upstream from there I see it. And I just want to reiterate to you how important that is.

It's relatively easy for one of our colleagues that are at a sanitation agency, or our friends at DWRD, or OCW, those guys can track down industrial sources. But what you heard the one gentleman say, in the back, was 80 percent is coming from consumer products. And when we get into PFAS we're going to be looking at a similar type of pattern, so we really need to get ahead the curve. And the only way to get ahead of the curve is to really attack the sources.

The irony of this problem, which, let me just get to this last slide, here's the irony of the problem that I want to point out in this workshop, is that USEPA has a program that allows the production and release of chemicals into the environment in the United States. It is supposed to be -- it was basically supposed to solve the problems that PCBs were -- that PCBs created; right? PCBs were produced. They were in consumer products. They were in the environment. And everyone figured out, oh, my gosh, you know, they're super persistent, they're mobile in the environment, and they're toxic.

And so TSCA was passed in 1976 and it was the political solution to get at this problem. But here we are, almost at 2020, and we clearly haven't gotten at the problem because now, if you go and actually did non-targeted analysis of drinking water in Southern California you're going to find a host of chemicals, not just 1,4-dioxane, not just perchlorate, not just PFAS, you're going to find hundreds of chemicals that, as we learn more about the toxicity and the -- of drinking -- of what’s in our drinking water and we look at the patterns of disease and these activities on these different systems, we’re going to say, why didn’t we get ahead of the problem? Why didn’t California say to itself, drinking water and our water resources are so important that we need to restrict some chemicals used?

And, oh, by the way, I almost forgot, we actually did that. It’s called the Porter-Cologne Act; right?

And Jeff has been to a number of groundwater convenings that we’ve held. And I always start off with the same thing. Did you know that at the turn of the last century there were two capital offenses in California, only two? The one, my favorite, was stealing a man’s horse. Because most people who love me know I love horses. I rescue horses and I have horses; right? The second one was poisoning someone’s well. Those were the only two capital offenses in 1899.

And we went from there to here where I could, you know, put up maps of here’s perchlorate contaminated aquifers, here’s 1,4-dioxane, now it’s going to be the PFAS. And it’s like how did we go in 100 years from one to the other?

So I just want to conclude by saying I applaud you guys getting ahead of this problem, looking at these in consumer projects, and I encourage you to look at your Safer Consumer Products through this lens of not only, like you did with the PFAS and the carpets, of protecting kids' health, but also looking very carefully and clearly that what are some of these chemicals that we know are getting into drinking water and we know are persistent and are toxic already.

This chemical is very interesting to me because we knew it was toxic before I was born and we didn't do anything about it.

So thank you so much for the opportunity to speak. And thank you to all the presenters who came before me, where I did not have to fill in all these great details. I could just more editorialize on the bigger, larger problem.

Thank you.

MR. LOPEZ: Do I have any questions?

Thank you, Jane.

I would like to know invite Senior Policy Strategist of the Breast Cancer Prevention Partners, Nancy Buermeyer.

MS. BUERMEYER: Thank you so much. And I will start by apologizing for not actually having a PowerPoint. I didn't have a chance to put one together, so you'll have to bear with me and just listen to me talk.

So thank you very much for the opportunity to come down and speak to you all. I did come down from Oakland this morning.

Let me just first introduce you to the Breast Cancer Prevention Partners. We're a national organization located in San Francisco. As our name suggests, we work to prevent breast cancer by chemicals linked to the environment out of consumer products and our communities. We do that based on a sound foundation of science, of the peer-reviewed science, to identify those chemicals. And then through policy, market campaigns and public education, we work to address those issues.

We are also one of the founding members and the current host of the Campaign for Safe Cosmetics. And as many of you may know, cosmetics is a term that actually does incorporate personal care products in the federal definition, and it just sounded better than Campaign for Safe Personal Care Products, so -- and the Campaign is a coalition of organizations and responsible businesses that are working to take toxic chemicals that linked to cancer, birth defects, neurotoxicity and other reproductive toxicity out of personal care products and cosmetics. And in that goal we have been concerned about 1,4-dioxane for a very long time.

So you've heard a lot about 1,4-dioxane in water.

And I’m going to talk about it consumer products and one of the major sources, as we heard, for the contamination in the water. Because it turns out if you don’t put it in the water, you all don’t have the same trouble getting it out that you currently do.

We have a little applause in the back. Thank you.

So again, you’ve heard a little bit about the health impacts. The last slide that Jane had up was kind of person. It’s a carcinogen. And depending on who you talk to it has various levels of likely, possible, probable, known to the state of California. Trust us, it’s a bad chemical. It’s linked to liver and nasal cavity cancers. It’s general kidney and liver toxicity. And there is evidence that it promotes formation of mammary gland tumors in rodents, so it’s a big concern for breast cancer, so that’s why we care about it.

It is formed in products through a process called ethoxylation. And that process helps to reduce the harshness of chemicals in personal care products and cleaning products.

The specific ingredients, again, you saw a couple of different charts of the kinds of ingredients that are likely to be contaminated with 1,4-dioxane, sodium laureth sulfate, the PEGs, oleths, there’s a couple of different phrases or clauses you should look for in the number of chemicals on your personal care products. You won't know that about cleaning products until next year because they don't have to disclose cleaning product ingredients until California passed a law that says they have to do it as of 2020, so stay tuned on that one.

And it's found in a variety of different kind of products, so lotions, shampoos, body washes, liquid and hand soaps, bubble baths, hair relaxers, sun blocks, and then various cleaning products.

You can be exposed through inhalation, ingestion, whether through water or food, and absorption through the skin which, obviously, is important for things like lotions that you put on your skin and leave there.

And, of course, we're not exposed to just one source of the chemical at a time. We all use multiple personal care products every day, sometimes slathering it on our body and leaving it there, sometimes rinsing it off and making sure all that dioxane goes into your water systems. You're welcome.

Cleaning products, we don't -- most of us don't use it every day but there are communities that do. Domestic workers, janitors, hotel workers work with these products day in and day out, often without a lot of control about which products they use. So again, those folks who are mostly woman and mostly woman of color, so it's an environmental justice issue around that.

And then, of course, we’re all exposed to the environmental sources, so the water that we’ve been talking about all day today.

The EPA has a program called the Toxic Release Inventory which tells us something about the amount of a chemical that’s released into the environment. It’s not a complete list because you have to hit a certain threshold before you have to report. But even given that, they estimate that 4.2 million pounds of this stuff is released into the environment. And that, again, doesn’t include the exposures that you’ll get from personal care products and cleaning products. That’s a lot of a toxic that’s out in the world.

So we’ve actually done some -- you know, we’ve talked about the chemicals you might look for, the ingredients you might look for that suggest there might be 1,4-dioxane. But there’s also been a fair amount of or several product testing projects or research projects that have shown that, in fact, the chemical is there.

There was a study done in 2007 of a couple of Tide products that found 63 and 89 parts per million in two different Tide products.

In 2007 the Organic Consumer Association tested a bunch of products that were labeled as organic or natural.

Of course, the FDA doesn't actually regulate what you have to do to be able to use those claims, so they don't really mean anything but consumers think they do. And in that testing they found 46 of 100 products had detectable levels of 1,4-dioxane. And again, these are just the ones that are marketed as being natural or organic.

By contrast, if you're certified organic, where the -- one of the testing -- part of this testing was done as if it was certified by the USDA as being organic, they did not find any 1,4-dioxane, which speaks to the fact that you can take this stuff out if you have the will to do it.

In 2008, my organization, the Breast Cancer Prevention Partners, tested children's bath products. So we looked at baby shampoos, baby washes, a number of other categories of products; 32 of 48 of those products had 1,4-dioxane, detectable levels of 1,4-dioxane, including things that suggest to consumer safety, like Johnson & Johnson Baby Shampoo, Huggies Bath Wash, American Girl, Shower Gel. So these are iconic names that consumers assume are safe and yet we found detectable levels in 2008. In fact, in that testing, all of the bath washes and all of the bubble baths tested positive for this chemical.

And then more recently, in 2017, we did a much smaller testing of seven different cleaning products. And of those seven we found detectable levels of 1,4-dioxane in two of them. They were in Totally Awesome and Fabuloso, which are products that you're likely to find in dollar stores which, again, are located in low-income communities of color.

And then there's been -- people have looked at the environmental working group, Skin Deep, database which has shown somewhere around 22 percent of the products that they have used -- they have on there have some level of 1,4-dioxane.

And then our very own California Safe Cosmetics Program database has approximately 50 products that have been reported, including body washes, shampoos and conditions as having 1,4-dioxane.

The interesting thing about that is it's a serious underrepresentation because they aren't even -- they are not even required to actually report 1,4-dioxane because it's not an intentionally added product -- or ingredient. So we appreciate the voluntary disclosure of those companies, although I'm not sure they knew they were doing that.

But the fact that there are still over 50 products in there shows that this continues to be a problem. And I think it's a problem. I think some of these companies have cleaned up their act over time, so some of this data is a little bit dated. But, you know, it continues to be an issue that we need to address.

So one of the sort of related issues that doesn't get talked a lot about is I mentioned the ethoxylation process, which is used to make certain chemicals less irritating, milder. It also helps with solubility of things. The chemical that's used to do that is ethylene oxide. Ethylene oxide is a well-well documented breast carcinogen. It's also been linked to lymphoma, leukemia, and stomach cancer. But it's a chemical that we have really, really deep concern about. And that's how the 1,4-dioxane gets formed. Two of these ethylene oxide molecules come together to create 1,4-dioxane.

And so that tells us that products that are contaminated with 1,4-dioxane may also have trace amounts of ethylene oxide in them which goes to consumers. And then you have to think about the workers who actually make this stuff. So the workers in the plants that create the personal care products and cleaning products have to work with ethylene oxide, a highly toxic chemical.

And then, of course, the ethylene oxide has to be produced somewhere, too, in plants around the country. And that's an environmental justice issue because there's been some recent activity by the EPA that has shown that there are communities that are way, multiple times, over the safe level for ethylene oxide. And the recent science from the EPA reduced the safe level to a lower level in terms of the science part of the EPA. But the policy side of the EPA would like to reconsider that because that science doesn't really fit with their priorities in terms of who gets protected by the EPA, whether that's consumer and the public or the chemical industry.

So again, that's an ongoing EJ issue because people are fighting back against the EPA, possibly revising that level to be less protective and, therefore, leaving these communities in danger.

So let me just talk one second about, sort of, regulation, or lack thereof.

So personal care products and cosmetics are regulated by the FDA and they have no standard for 1,4-dioxane at all. They like to suggest that what they've seen isn't a problem but they don't regulate it.

The EPA is considering 1,4-dioxane as one of the first ten chemicals that will be considered under the new TSCA. So Jane mentioned that the bill was passed in 1976. It was just revised in 2016. And they had to pick ten chemicals to start with and 1,4-dioxane is one of those. However, given the track record of this EPA, there's not a lot of confidence that that's going to end up with a protective standard. So it's there but I don't think it's something that people feel like is going to come out with the result that environmental health and environmental justice folks would like to see.

In Canada and the E.U., cosmetics with 1,4-dioxane are banned. So they have actually taken action. And just last week the State of New York.

And you had seen the maps that Jeff and Jane put up and it showed a little grouping of dots in the Northeast. Long Island has a huge problem with 1,4-dioxane contamination. And the State of New York, of the legislature, at least, just passed a bill that would ban sale of personal care products and cleaning products with levels of 1,4-dioxane above two parts per million by 2022 and above one part per million by 2023. They had a different standard for cosmetics of ten parts per million, which I’m not quite sure how that all happened.

But the State of New York has decided that the majority of their contamination is related to cleaning products. So I think that’s why they were particularly cognizant of making sure that the cleaning products got down to one or two parts per million, or two and then one parts per million.

Now chemicals -- companies that make this -- use this ethoxylation process can remove it through vacuum stripping. It’s a volatile organic compound, so they can take it out and they can, depending on how much they’re willing to spend and how much time they’re willing to take, I think they can get it down to quite low levels. But a number of companies have just changed the process and used a different ingredient, like Seventh Generation took out the chemicals that are related to 1,4-dioxane and now they don't have any in their products, so, clearly, it can be done. We can just substitute the chemicals or use a different process.

And I think, you know, one of the tenets of the Safer Consumer Products Program is: Is it necessary? And I think there's good information out there to say that in these products it's not necessary.

And given the money it takes to clean this up, the millions and millions we've just seen put up on the screen, it seems a lot easier to just turn off the tap rather than take the time to remove it.

I would want to urge the Safer Consumer Products Program both to take this issue up but to use as wide a swath of products as you can under the law. So I would urge you not just to look at shampoos or conditioners but to look at personal care products and cosmetics and all cleaning products. It's the same process. It's the same result. And if we can clean it up in one we should be able to clean it up in others. And given the complexity of the process, having to do it iteratively for different smaller chunks of the broad category of personal care products would take way too much time.

So with that, I want to say, thank you very much for the invitation to come and speak. And if you have questions, I'm happy to take them.

Okay. Thanks.

MR. LOPEZ: Thank you, Nancy.

We will now hear from our last presenter, Senior Director for the American Chemistry Council, Steve Risotto.

MR. RISOTTO: Thank you, Manuel, and thanks to DTSC for allowing me to speak.

I first want to say, in case you're wondering, unlike Jane, I was alive when that 1974 reference that she put up there was published, but I was only a teen, so I can't say I was particular focused on the issue at the time. But suffice it to say that a lot has happened since 1974. And a fair amount has happened since California and USEPA have last looked at the toxicity of 1,4-dioxane. And so what I want to do in these few slides is talk about what's happened since 2010 and 2013 when California and EPA did their assessments and including some research that ACC has just completed that we plan to share with DTSC and the world as soon as we get it sort of written up and published.

So what do we know? What do we know about 1,4-dioxane in terms of this toxicity? And, basically, as you've surmised, this is what underlies all of the discussion that we've had so far is sort of what is the toxic level? What is the safe level and how do we get there?

So first, what do we know? 1,4-dioxane is readily metabolized at lower doses in rats, in mice, and in humans. But you see a saturation of that metabolic pathway at higher doses. And so then what happens is you start to accumulate the parent compound, 1,4-dioxane, in the blood and in the system. And there's also very clear evidence that dioxane and its metabolites are not genotoxic, so this is not your classic mutagenic reaction to cancer. There's some other non-mutagenic process going on.

And as a result of that, we've heard soft of referenced the E.U. and Health Canada, Health Canada, World Health Organization, and the European Union have concluded that the tumors that you see, the cancer that you see in the animals, forms only after the metabolic pathway is saturated and, therefore, it's a nonlinear threshold and a threshold mode of action, meaning that below a certain level there's no activity.

USEPA, on the other hand, in their 2013 risk assessment, which essentially mirrors California's conclusions, said that, yeah, there's data supporting a threshold mode of action but there's incomplete evidence that you see sort of the cell damage and cell regrowth that you would expect for a nonlinear mechanism, that we don't have a clear idea of metabolism, and also that we don't see a cell growth, a burst of cell growth that would lead to tumors.

So based on that they said we've got to go with our default, linear assumptions, which essentially what they always do.

So just to kind of demonstrate what difference that makes is if you take a standard, here's your, you know, lab data, when you do a linear approach you draw a straight line to zero. With a nonlinear approach you're drawing -- you're following that curve and you can see that you cross the X axis well above zero. And so below there, there's no effect.

And also, your assessment of where that one-in-a-million risk, which is the standard for carcinogens or probably carcinogens is quite a bit higher. So that's the difference. And you can see, it can make a pretty significant difference in terms of what your threshold is, what your safe level is. And this, obviously, is just a generalized curve.

Now let me -- just to talk briefly about the pathway, this nonlinear pathway for 1,4-dioxane, because it will help you understand some of the data I present, and this is from EPA's IRIS assessment. And this is the most likely pathway that has been identified, although, again, EPA said, we don’t have enough information that we can affirm that this is the pathway. But basically, exposure to dioxane, typical metabolic pathway, breaks it down to the metabolite HEAA, and then you pee it out of your system.

At a certain point that pathway saturates, you get accumulation of dioxane in the blood. It then moves to, in this case, the liver. You get either, you know, cell damage, liver cell damage, then cell regrowth, swelling and tumor formation, or you go right to cell -- a burst of cell growth, swelling, and then tumor formation. So that is the most likely pathway for the carcinogen 1,4-dioxane.

So shortly after the EPA’s assessment was released a number of researchers -- sorry, I hit the wrong button -- a number of researchers commissioned a reanalysis of the slides from one of the two cancer bioassays, the one, it’s a 1976 study, I was also alive when that was done, by the National Cancer Institute, and found evidence of both cell toxicity and proliferation, along with the tumors, in the slides.

So we have evidence, and this is in both rats and mice, we have evidence that there is damage and regrowth that is associated with the formation of tumors.

Now the fact that the NCI researches didn’t report it is not because they missed it or they were -- they forgot, it’s just, basically, at the time, you only reported the most severe effect, so they only reported the tumors. And so it’s not surprising that it wasn’t reported as an observation in the NCI analysis.

Now the second bioassay was done in Japan. And so the researchers hoped to do some similar reanalysis but it turns out there were no slides available. But they were able to get the lab reports that were translated from Japanese to English. And then did a subsequent publication that added some additional insights into the toxicokinetics and threshold.

And so both of these publications are available. And we certainly will provide them to the DTSC.

So we first, we’ve got sort of insight now, new insight, into the progression of tumors.

The second question on metabolism. Now this is looking at liver cells, isolated liver cells, that are incubated with various levels of 1,4-dioxane. And we’ve got it in the rat and the mouse and it clearly plateaus. You clearly hit a point where you see the metabolite accumulating, breaking down rather quickly. At a certain point it levels off. The pathway gets saturated and you get the accumulation of dioxane. You can also see that the rat, it happens a lot faster in the rat than in the mouse. And we’ve seen similar results in human liver cells and in whole animal tissues. So this is a fairly classic pattern with dioxane in mammals.

Now this is from the work that we have just completed. We did a 90-day study, sacrificed animals at 7, 28 and 90 days. This is first dioxane levels in the blood. And you can see -- and these are the exposure levels. For 7 and 28 days, basically no dioxane accumulating at all. Then at 90 days and at the higher exposure level we see it jump up. So we're clearly seeing a saturation of the pathway here.

We also, we look at the metabolite, we see something similar. At seven days, you see sort of a quick adaptive response. But at 28 and 90 days the pathway just keeps tooling along, breaking the dioxane to HEAA as much as it can but, clearly, it's being saturated at the higher levels.

So again, I've got further evidence of this saturation pattern.

Then to talk about the third one of EPA issues, and that relates to this proliferative response, basically the damage creates -- stimulates the cells to reproduce quickly, rapidly, and in that process is when you get the tumor formation. So this, again, is from our new study. We did a standard kind of BrdU pump which looks at proliferative response. And you can see at 6,000, this is just the PPM, the level in this drinking water study, you see a significant burst of cells, cell growth, at 6,000, not in the lower levels, and not in the earlier time periods at any dose. So again, at a very clear threshold right there when you start to see cell growth.

We also did genomics analysis where we looked at sort of the genes. What genes are being turned on and turned off with exposure to 1,4-dioxane? And after 90 days at 6,000 PPM, we see these -- this enrichment, all of these gene sets that were related to proliferation.

So we have, for the first time, a real sort of genetic level, gene-level confirmation of this proliferative response.

So we have essentially addressed each of the three limitations in the database that EPA identified back in 2013 and that OEHHA reiterated in 2010.

So now I want to just kind of dig in a little deeper on this gene expression, one, just to give you a better sense, it may be a little hard to see, and also, it's really cool data. I love this stuff.

So this is 90 days. This is the five -- the five dose levels. And the red dots are when there's a significant change, either up-regulating or down-regulating the genes. You can see absolutely nothing going on at 40 and 200 PPM. It looks what we think is an adaptive response at 60. Again, very little at 2,000. It’s only really at 6,000 where you see much of a change at all. And again, so it’s showing that there really is a threshold right here at 90 days because, again, very little activity at the earlier time periods.

Now just for comparison, this is a more typical kind of pattern of gene expression. So you can see, we’re not getting an awful lot of activity with 1,4-dioxane, even at 6,000 PPM, a fairly high dose.

So just to kind of summarize, again, this is EPA’s schematic of the -- of this most likely pathway to cancer. We’re clearly seeing a metabolic saturation, so not only at dose but also at time period, so it sort of seems to be a combination. We are seeing proliferation very clearly, again, at the higher doses, the longer time periods. And we are also -- in this case, we’re not seeing the cytotoxicity, but we are seeing evidence of proliferation consistent with tumor formation. So we basically have really sort of answered all three of those questions.

So why is this important in DTSC’s activity? I think, you know, it really gets to the heart of, you know, one, first and assessment of is there an adverse impact that -- that needs to be addressed. And then secondly, if it’s still determined there is, what is that threshold for an alternatives assessment? You know, sort of what --

as I demonstrated, with a nonlinear pathway that threshold moves quite a bit further.

And sort of as evidence, while you still have that EPA's health advisory level for -- in drinking water for 1,4-dioxane is 0.35 parts per billion, Health Canada and WHO are at 50 parts per billion, so 100-fold difference because of that assumption of nonlinear versus linear. So it can really make a large difference in terms of where -- what you decide is the level of toxicity in a particular dose.

So thank you so much for the opportunity to present. I'm happy to take any questions.

Yes?

MS. GRANT: So I had a question on the BrdU study.

MR. RISOTTO: Yes.

MS. GRANT: Did you look for any markers for cell death, you know, markers for --

MR. RISOTTO: Yes, we did. Sorry, I forgot to mention, we did. We looked at caspase-3. This is all names I've heard. I can't tell you the details of it. But really did not see a lot of cell death. And we have that data we can present but it's just not -- was not very picturesque. So we really weren't seeing the cell death that we thought we might see or that others suggested. It may be that that happens over a longer time period. We only did for 90 days. But we definitely did see the cell growth.

Thanks.

Other questions? Yes.

MS. STACKHOUSE: So when you’re -- when you were doing the study --

MR. RISOTTO: Yes.

MS. STACKHOUSE: -- just looking at your PPM results, these were all in mice; correct?

MR. RISOTTO: This is in female mice.

MS. STACKHOUSE: Right.

MR. RISOTTO: And the reason we did that was because that was the most sensitive species in the EPA analysis.

MS. STACKHOUSE: Right. So when we’re talking about getting up around 2,000, 6,000 --

MR. RISOTTO: Right.

MS. STACKHOUSE: -- do you guys take into any account like other effects, besides just dioxane? I mean, if you start flooding the body with, you know, any chemical at such --

MR. RISOTTO: Uh-huh.

MS. STACKHOUSE: -- high concentrations, how are you accounting for whether it was actually caused by 1,4-dioxane or just by the fact that the body just couldn’t process it, no matter what chemical it was?

MR. RISOTTO: Well, I mean, you know, we are also looking at, you know, lower doses. That’s why we wanted -- we really took a lot of time figuring out what doses to you because, based on previous studies, we wanted to see if we can find, you know, lower doses to see what’s going on early. We also want to look at can we find sort of where the saturation level is, and then sort of the doses where previously reported.

We looked at, you know, drinking water consumption. We looked at, you know, all other parameters, you know, body weight, et cetera, et cetera, and those will be in the report; no significant changes in those. Whether -- I don’t know what other impacts. I mean, obviously, you’re controlling for exposure to other -- anything else, really just controlling for just dioxane exposure, so it’s not likely that there are other parameters there.

We did, you know, the blood analysis. So if there was other stuff in the blood, we would detect it. So we don’t -- we can’t eliminate every possibility but I think we’ve done a reasonably good job to sort of really tie it to the levels of dioxane.

Does that -- okay. Awesome. Let me get –- well --

MS. WILLIAMS: Well, so I just have one question.

MR. RISOTTO: Sure.

MS. WILLIAMS: (Off mike.) So it is a carcinogen in this example?

MR. RISOTTO: It is a rodent carcinogen at higher levels of exposure. And I don't know that the human data, the epidemiology data is fairly inconclusive. But as you know, we typically use the rodent data to determine, you know, what the likelihood of cancerous effects in humans.

MR. LOPEZ: Thank you, Steve.

So this concludes the section for presentations from stakeholders.

I would like to share that we are transitioning into public comment. Is there any public comments here in the room? Not at this stage?

I've been informed that we don't have anything in our Safer Consumer Products email either.

We, however, received one comment and I will read this so that it's part of the court reporter.

So this was a public comment given by Arjun Venkatesan, Professor and Associate Director for Drinking Water Initiatives in New York State, New York State Center for Clean Water Technology of the Stony Brook University. And the comment says as follows:

"1,4-dioxane is a persistent chemical and is difficult to remove by conventional water and wastewater treatment systems. The water providers would have to upgrade to advance oxidation processes, AOP, to efficiently remove 1,4-dioxane from water. AOP involves the use of strong chemical oxidants, typically in the presence of UV light, to generate hydroxyl radicals. Some challenges/concerns associated with the use of AOP are below.

“AOPs are expensive systems that increase the cost of treatment significantly.

“Hydroxyl radicals are not specific to 1,4-dioxane and, hence, can react with other organics present in source waters that can generate unintentional byproducts. There is a lack of characterization of AOP byproducts and some research indicates the formation of toxics byproducts, for example, phenolic compounds during AOP.

“Hence, there is a need for additional polishing treatments that -- for example, GAC, to remove them. Chemical oxidants, hydrogen peroxide, also, added in AOP systems are not completely consumed in the reactor and, hence, high residual oxidants is present in treated AOP effluent.

“The oxidant is usually catched (phonetic) using GAC. However, the presence of oxidant can have an impact on the GAC filter performance to remove byproducts.

“Also, an increased in DBP formation has been observed in AOP effluent when chlorine is used as the oxidant.

“Thank you.”

MR. PALMER: Thanks Manuel.

So closing up, I have a couple of points I want to make.

First, I want to express my thanks for everyone who attended today, both online and here.

I really want to thank all our speakers for putting in the time and energy and sharing their wisdom and experience with us. It's really important.

And I particularly want to thank my staff, who I am continually amazed with and proud of and thankful for every day, so thank you. And my -- and our colleagues at our Southern California staff who have supported us coming down here. Nice seeing you and thank you very much.

But I wanted to take, in closing, a thought, kind of stepping back a little bit and sort of teeing up our next workshop.

I think it's really important that everyone understand our regulatory framework and how it is very different from what DTSC does in its other programs and what most of our colleagues and other environmental and health organizations do. And this was not by accident. This was by design. You know, we're focusing largely on drinking water and water resources today. But as you've heard from some of our speakers is that this issue for 1,4-d crosses not just water but exposure to people. It affects workers.

It affects communities who are disadvantaged in a variety of ways that may be adversely or disproportionately impacted.

And we have a framework, generally, where each of our state agencies and local agencies have a specific authority and responsibilities and things they can do and they're relatively narrow. Our Superfund cleanup deals with hazardous substances. Our RCRA Hazardous Waste Program deals with RCRA hazardous waste.

And one of the things I'm thankful for today is that we have this collaboration with our colleagues in water here to not just focus on what is our specific authority but what is the problem and how can we work together with all the stakeholders to address these problems that affect all of us. And that's an important concept because no one has a silver bullet. No one has all the answers or all the resources.

But further, I think, I was reminded in our last presentation is that our framework is very different. We -- I think it was one of the speakers said that our fundamental question in the SEP regulations is: Is it necessary? The fundamental question is not have we done a full-blown risk assessment and have we determined what an action level is? Is it scientifically sound and within these parameters of traditional risk assessment? That's not our framework.

And it's important to understand that because of all of these challenges that we have, both in terms of the scope of the problem, the multitudes of problems that are contained in this chemical, the multitude of stakeholders that use it and, on one hand, benefit from those materials, or they're from products that have a valuable use, for people who are designing alternatives to those chemicals, different ways to address these problems, there's a lot of landscape here. And it's not just about in a cleaning product or a personal care product, it's bigger than that.

And so we're a small group in DTSC. And our hope is that that the dialogue that we have, the action that we'll take under our regulations, will put in the marketplace information that will help everyone, you know, make decisions that can help manufacturers make products that work, that are effective, that are cost effective, and that are safe, for consumers to know what products are out there that they can choose which are safe and effective, and for regulators to deal with our challenges in meeting our responsibility to protect people and our environment in each of our silos in an effective way.

And our framework really looks at working with all those stakeholders to take action to move forward in a progressive and positive way, notwithstanding the scale of the problem, and a huge amount of uncertainty on many levels, so that's our challenge.

And we need your help. And so when we talk, at the next workshop, about marketplace and we talk about our alternatives analysis threshold process, we're going to need input and we're going to need understanding of how we're going to implement that within our framework, because it's very different. We're not going to be developing a risk assessment-driven AAT that says if you're below this, you know, you're okay. It's probably going to be something more of a functional definition that says if you're below this level for a variety of reasons, then you're out. If you're above it, you're in. And so there's science behind that, there's policy behind that, there's values behind that.

So I've stepped way back into some big-ticket issues. But it's really important that everyone understand the regulatory framework we're working with and understand that we're asking for your help to give us information to make it work. And so it's a big challenge and we're really thrilled that all of you are helping us with that. And we'll look forward to seeing you, hopefully either in Sacramento or online, on the 21st at our next workshop. Please read the background document. Give us your comments, questions. We're happy to move forward.

And with that, we'll conclude our workshop today. So thank you very much.

(Thereupon, the Meeting was adjourned at 12:35 p.m.)

CERTIFICATE OF REPORTER

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a certified electronic court reporter and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF, I have hereunto set my hand this 27th day of August, 2019.

Elise Hicks

ELISE HICKS, IAPRT CERT**2176

CERTIFICATE OF TRANSCRIBER

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were transcribed by me, a certified transcriber and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

I certify that the foregoing is a correct transcript, to the best of my ability, from the electronic sound recording of the proceedings in the above-entitled matter.

MARTHA L. NELSON, CERT**367

August 27, 2019