BEFORE THE

CALIFORNIA ENERGY COMMISSION

In the Matter of:	)	Docket No. 14-AAER-1
	)	
	)	
Appliance Efficiency Pre-	)	
Rulemaking – California Code	)	STAFF WORKSHOP
of Regulations, Title 20,	)	RE: 2014 Appliance Efficiency
Sections 1601 through 1608	)	Pre-Rulemaking

STAFF WORKSHOP

TOILETS, URINALS, FAUCETS, AIR FILTERS, FLUORESCENT DIMMING BALLASTS, AND HEAT-PUMP WATER-CHILLING PACKAGES

CALIFORNIA ENERGY COMMISSION
HEARING ROOM A, 1516 NINTH STREET
SACRAMENTO, CALIFORNIA

TUESDAY, May 6, 2014
9:30 A.M.

Reported by:
Kent Odell

APPEARANCES

Commissioner Present

Andrew McAllister

Staff Present

Harinder Singh, Rulemaking Project Manager
Consuelo Martinez, Office Manager, Appliances and Existing Building Office
Tuan Ngo, Appliances & Existing Building Office
Ken Rider, Associate Electrical Engineer, Appliances & Existing Building Office
Josh Butzbaugh, Senior Fellow, Appliances & Existing Building Office
Jared Babula, Rulemaking Lead Attorney

Also Present (* Via telephone and/or WebEx)
Gary Fernstrom, Pacific Gas & Electric Company
Jerry Desmond, Plumbing Manufacturers International (PMI)
Fernando Fernandez, TOTO, USA, also representing Plumbing Manufacturers International (PMI)
Daniel Gleiberman, Manager of Product Compliance and Government Affairs, Sloan Valve Company
John Koeller, Maximum Performance Testing (MaP Testing)
Tony Brunello, Green Technology Leadership Group
Heidi Hauenstein, representing Statewide IOU Codes and Standards Team
Tracy Quinn, National Resources Defense Council (NRDC)
Jon McHugh, McHugh Energy Consultants
Eddie Moreno, Sierra Club California
*Marianne DiMaseio, Appliance Standards Awareness Project
*George Nesbitt, HERS Rater, Green Rater
*Jim Kemper, Los Angeles Department of Water and Power
Randall Higa, Southern California Edison Company
Mark Sadler, Daikin
*Patrick Splitt, Aptech
Annirudh Roy, Air-Conditioning, Heating and Refrigeration Institute
*Eddie Rodriguez, Daikin Applied
Jeffrey Steuben, on behalf of California IOUs
Stephen Irving, on behalf of Lutron Electronics
Daniel Young, representing California Investor-Owned Utilities, Statewide Codes and Standards Team
Pierre Delforge, Natural Resources Defense Council (NRDC)
*Alex Boesenberg, NEMA
*Richard Haring, Philips Lighting
*Alberto Mendoza, Philips Lighting

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P R O C E E D I N G S

MAY 6, 2014 9:31 a.m.

MR. SINGH: Good morning. My name is Harinder Singh. Welcome to the Energy Commission, everybody. First we have just a few housekeeping items before we begin. For those of you who are not familiar with this building, the closest restrooms are located as you go out the door to the left. There is a snack bar on the second floor under the white awning. Lastly, in the event of an emergency and the building gets evacuated, please follow our employees to the appropriate exit. We will reconvene at Roosevelt Park located diagonally across the street from this building. Please proceed calmly and quickly, again, following the employees with whom you are meeting to safely exit the building. And thank you. And now I would request my Office Manager, Consuelo Martinez, to come and introduce the staff.

MS. MARTINEZ: Good morning, everyone. I'm Consuelo Martinez, Office Manager for the Appliance and Existing Buildings Office. Thank you all for attending today. Some of you have come a long way and we appreciate the effort you

took to get here.

For those of you on the WebEx or on the phone, thank you for your valuable time, as well.

We're looking forward to hearing from all of you, not only today, but also in the future, as we move forward to develop Appliance Efficiency Regulations for water projects, heat pump water chilling packages, HVAC air filters, and fluorescent dimming ballasts.

Now I'd like to introduce our staff. Tuan Ngo will be leading the Water Product presentation. Tuan? That's Tuan. Ken Rider will present Heat Pump Water Chilling Packages and Fluorescent Ballasts. Josh Butzbaugh will present HVAC Air Filters today. Jared Babula is our Lead Attorney for the Rulemaking, and you've already met Harinder Singh, who is the Project Manager for this rulemaking. If you have any questions related to this rulemaking process, please contact him.

It is my pleasure also to introduce the Efficiency Lead Commissioner, Andrew McAllister. Commissioner.

COMMISSIONER MCALLISTER: I wanted to just -- so this is a staff workshop, not a Lead

Commissioner Workshop, so staff is running the show here. I wanted to first and foremost sort of manifest my solidarity with staff and call them out for doing a great job on the Appliance Pre-Rulemaking process as it's getting ramped up in the various categories of devices, this being the first group. So more groups to come down the road a bit. But I'm really excited to get the process moving forward in some earnest, and I think this first group is really important for just setting the rhythm of getting through the pre-rulemaking processes and then moving on to the rulemakings.

Now, this group is kind of a mix of devices, as you can see, some water, electricity, energy generally, and partly in conformance with other parts of the Building Code and partly to harvest some new energy savings potential based on new technology. So I think there are really some great opportunities here and really look forward to all your input. And I want to really thank everyone for coming. As Consuelo said, I'll reiterate that we really appreciate your effort to get here and participate and provide substance to the process.

The final think I'll say is just by way of setting the larger context. California's Appliance Efficiency Standards are really our bread and butter. They're something the Commission has been dedicated to for decades and something that has demonstrate over and over again the social good that it generates for the state, not only environmentally, but for our consumers. It's really just a win across the board, however many times you want to state it, and at relatively low cost we have a relatively high impact.

And certainly Appliance Efficiency Standards that make it to the end stage of being adopted and going into law have demonstrated that they are cost-effective for the consumer and that they generate all sorts of benefits to the state at relatively low cost, they are cost-effective.

So my goal actually coming in a few years ago now as Lead Commissioner on this topic has been to really make absolutely certain that the process supports participation and that at every step of the way, we have open communication, open dialogue, opportunities to participate and submit comments on the record from all the stakeholders

who are involved in each of the topics, and so it's the foundation really for getting to an end result that has consensus, or at least has a very sound basis in the record. And if we get there and somebody doesn't agree, then it can't be that they haven't had opportunities to participate. We really want to base everything on technical evaluation and viewpoints from the marketplace, viewpoints from the various stakeholders who are involved because we realize that what we do affects all of the folks out there in the world.

So again, this is really just a longwinded way of saying please participate, please offer your best information, your most up to date information, your viewpoint that is hard won from the marketplace wherever you happen to sit in it, because that's the basis for the record and that's what we're trying to create here is a process that collects all of those viewpoints and uses them to make good decisions. That's what we need to do here is come out with good decisions that benefit the State of California.

So that's kind of my filter that I put things through and I will be very sympathetic to

folks who sort of put in a good faith effort to participate and submit their hard won knowledge and information into the record, so that we can use it to make decisions. So with that, I want to pass back to Harinder, Consuelo, and wish you all a good workshop. Again, thanks for coming out and your comments will be welcome whenever you choose to submit them, and there will be some timelines stated throughout this workshop and future workshops on the Appliance Efficiency Rulemakings. So thanks again and have a great day.

MR. SINGH: Thank you, Commissioner. Harinder Singh again. I have a few slides for this presentation before we begin and I hand it over to Tuan.

I just wanted to mention that California Energy Commission is the State's primary energy policy and planning agency, created by the Legislature in 1974. Responsibilities include promoting energy efficiency and conservation by setting minimum Appliance and Building Standards, and other cost-effective measures.

The Commission Appliance and Building Energy Efficiency Standards have saved California

more than $74 billion in reduced electricity bills since 1975. The State's statutory mandate to the Energy Commission is the Warren-Alquist Act, it is Public Resource Code 25402. It requires the Commission to adopt to minimum levels of operating efficiency and other cost-effective measures, to promote the use of energy and water efficient appliances whose use require a significant amount of energy or water on a statewide basis.

So the purpose of this staff workshop is the Commission has posted two Staff Reports, they are staff's analysis, a staff report for water appliances that includes toilets, urinals, and faucets. And the second staff report is HVAC air filters, fluorescent dimming ballasts, and heat pump water chilling packages.

The workshop is an opportunity for the stakeholders to comment and seek clarifications on the draft staff analysis, read and comment period has begun on April 18th after we posted the staff reports, and stakeholders can submit their comments by June 6th any time between April 18 and June 6th. All comments received will be evaluated and staff will update the proposed

Draft Regulations as needed.

So if you have to submit the data, this is how you submit written comments. They should be submitted to the docket by 4:00 p.m. on June 6th; that is Pacific Standard Savings Time. The Commission encourages interested parties to send information up to five megabytes by email at Docket@Energy.Ca.Gov. Please include the docket number 14AAER-1 in the subject line. And if the file size is more than five megabytes and if the information includes an application for a confidentiality designation, or if you prefer paper copies of responses with electronic information, you can provide it on a CD or DVD and sent it to California Energy Commission, Docket Office, Mail Stop 4, Docket No. 14AAER-1, 1516 Ninth Street, Sacramento, CA 95814-5512. For confidentiality in data, or comment, or information, if interested parties need to maintain the confidentiality of specific data information, they should contact Jared Babula, he's our consult in the Commission's Chief Counsel's Office, before submitting a response to the invitation or a response to the comments, or response to the Staff Reports; otherwise, all

responses received will become publicly available. And Jared's information is given on the slide and his telephone number is 916-651-1462, and his email is Jared.Babula@Energy.Ca.Gov.

With that, I would hand it over to Tuan Ngo for the Water Topics presentation. Tuan, please.

MR. NGO: Good morning, everybody. Can you guys see me? My name is Tuan Ngo, I'm with the Appliance and Existing Buildings Office. And what I have to say today is to make a presentation on our Staff Report on Water Appliance Efficiency.

Let me go real quick into the agenda, what we want to cover today. First, I'd like to quickly mention our progress, then we'll go into the staff reason for going forward with the Standards, then the Environmental, and then the Regulatory settings and the stakeholder proposals. Then I will present the staff proposed Standards, some words on savings and cost analysis, and technical feasibility analysis. And of course, the staff Standards impacts and benefits assessment.

Our progress so far, we have done three major activities to today. We've heard and published (ph) an Order Instituting Rulemaking and two workshops, one is an invitation to participate and the other was an invitation to submit proposals for Standards development.

This slide is a flow chart depicting our pre-rulemaking and rulemaking process. The highlighted box indicates where we are today. And if everything goes okay today, then staff will get ready to finalize and publish the final staff report to be ready for the rulemaking.

But first, why new Standards? Well, we are in a drought which significantly affects our water supply. And on January 17, 2014, Governor Brown proclaimed a State of Emergency and directed State officials to take all necessary measures to prepare for drought conditions.

While we acknowledge that this standard would not provide immediate help to relieve the state's dry conditions, they will help prepare for a future hot and dry future for the state.

Various (indiscernible) 240 to 350 billion gallons of water per year for toilets, urinals, and faucets. Reducing water consumption

is a key component of California's overall water and energy conservation effort, thus providing a need to establish Standards for these appliances. But first, what criteria do we use to establish them? Again, Harinder already mentioned earlier CEC staff amended that any (indiscernible) must be technical, feasible, and it must be cost-effective, which means the Standards must not result in additional costs to the consumers.

This table presents the CEC staff estimate of water and energy consumption of toilet, urinal and faucets in 2013. Using this information provided by the IOU Case Report and the serious assumptions listed in the Appendix B of the Staff Report, staff estimates that California uses roughly 443 billion gallons of water a year.

To get this amount of water to the consumer, approximately 4,500 gigawatts of embedded energy is needed to transport and treating the water. In addition, approximately 4,700 gigawatt hours of electric and about 1,100 million therms of natural gas are needed to heat that water delivered through the consumer faucets. So from this number, a slight reduction

would result in billions of water savings annually. Therefore, staff believes that establishing a standard to restrict the consumption would be beneficial to the state.

The next question is, does the current State Standards, Federal Standards, or other Standards achieve the same reduction without the energy staff going to the effort to establish new standards? To do this, staff needs to look at the current regulatory setting to understand this picture.

Currently, Title 20 Standards set the maximum flush volume at 1.6 gallons per flush for toilets, one gallon per flush for urinal, and a maximum allowable flow rate for lavatory and kitchen faucets at 2.2 gallons per minute. Before 1970, most toilets consumed six gallons per flush or more, and some faucets you had as much as seven gallons per minute.

In the 1980's and the early 1990's, several states including California had established Water Efficiency Standards for toilets and urinals. Congress used the State level standard as a basis to establish water efficiency standard for this appliance. And they

passed the Energy Policy Act of 1992. These Standards took effect in 1994 and set the water consumption level at the same as California Title 20's standard.

In 2007, the California Legislature enacted Assembly Bill 715 which set a schedule for a manufacturer to meet water conservation standards for toilets and urinals, solely installed in the state, such that after January 2014, toilets can use no more than 1.28 gallons per flush, and urinals can use no more than .5 gallons per flush.

In 2009, the California Legislature also enacted Senate Bill 407. This Bill revealed a temporary stop gap to reduce water consumption in appliances in older buildings and will be faded out by the time the appliances will be replaced.

Calgreen in 2013 mandated efficiency levels similar to AB 715 for toilets and urinals. It also mandated efficiency requirements for residential lavatory and kitchen faucets. The 2013 California Plumbing Code also set the same Efficiency Standard by Calgreen; in addition, it required faucets in common in public use areas in homes for a 3.5 gallon per minute.

And lastly, WaterSense, this is like a voluntary basis, WaterSense is a partnership program by the U.S. EPA in collaboration with stakeholders to establish voluntary specifications for high efficiency water consuming appliances, so toilets, urinals, and lavatory faucets. Manufacturers certify and label their products according to standards developed by EPA licensed labs. Third, WaterSense labels make it easy for consumers to find and select water efficient products.

As I mentioned earlier, we have a workshop for Request for Proposals and we did receive some proposals for standard development from California investor-owned utilities, IOU for short, the National Resource Defense Council, NRDC for short, the Plumbing Manufacturers International, with a cooperating agency representing various plumbing fixture manufactures, as well as a proposal from FluidMaster, Kohler, and Moen, Inc. We want to thank you for sending the proposals.

Staff reviewed the proposals, analyzed them, and finally came up with our recommendations which are presented in this

slide. As we can see, the standard for toilet and urinal gallon per flush as mandated by AB 715, with staff's proposal of an effective date of July 2015. We also proposed a standard for replacement valves, also in gallons per flush, for toilets and urinals to match SB 47 mandates starting in 2009, as you see for older buildings that you see in the bottom of the slide.

And for faucets, staff recommends the flow rate restriction in gallons per minute for different types of faucets, including those that in common public areas.

We also recommend a MaP score of 350 grams for toilets. For those of you who are not familiar with MaP scores, MaP means Maximum Performance, and what it does is the higher number of MaP, the higher the MaP score, is an indication of how good the toilet will be able to remove the solid particles.

In this table, it represents the first year savings. As we can see, the total savings is approximately 8,200 million gallons of water savings alone in the first year, and the savings including natural gas and energy resulting from the staff proposal would be roughly in the $111

million in the first year alone.

Stock Change Savings. By the way, when we say “Stock Change,” we just mean if all the products available today comply with the proposed standards, then that will result in the savings. So this table represents what we expect to receive in savings if all the appliances meet our proposed standards. And that will result in roughly about 86.6 billion gallons of water per year, 220 million therms of natural gas per year, about 1,700 gigawatt hours of energy, and about $1.12 billion of savings to the consumer.

In the graphic here, it just presents a backdrop to show the water consumption with the regulations, and we can see that we are probably -- my estimate was that we are roughly getting about 20 percent in water consumption with the staff proposed regulations.

And in this slide, well, we present the individual appliance savings. By the way, the lifecycle benefit here is the product of the annual savings and the design life; we can see from the table that the incremental cost is zero for all of these appliances. What I meant is that the cost of a compliant product, and the

cost of the non-compliant product are not different, therefore consumers can reap the savings immediately after installation. And the savings will continue for the rest of the lifecycle of the appliance.

As for technical feasibility, staff looked at different kinds of design, newly designed from manufacturers, for toilets and urinals, and we are looking at better gravity flush-type tank toilets, we're looking at redesigned flush valve, we're looking at pressure assisted flushometer tanks, we are looking at some flapperless gravity flush, vacuum assisted toilets, and dual flush toilets.

And then I just want to have a word here about the maximum performance testing, that because of these tests, I believe the earlier problem of toilets not performing correctly have been solved because of the new maximum performance testing. Again, the higher score means the toilets will be able to flush more, to better flush the solid particles. And for faucets, because it is based on the existing technology, so by doing just a smaller hole to smaller hole in the gasket to reduce the flow,

and that's not much to say there. But anyway, staff also looked at our database and the WaterSense database, and we see that there are numerous models of appliances currently in use, already met the staff proposed standards. Additionally, manufacturer support of staff proposing standards means that the products are technically feasible and readily available to the consumer.

And here, the Impacts and Benefits. Staff will review and analyze the proposal, the staff proposal, and we see no significant incremental impact to the environment. And in addition, I just want to mention that we are going with the proposed staff standard, we are looking at about 1.9 million tons of equivalent greenhouse gas a year savings by the time of stock change.

And so what are the next steps? We anticipate, and Harinder already mentioned, we anticipate receiving input from stakeholders and interested parties by June 6, 2014. If the comments received require significant revision to the Staff Report, we will have to re-workshop it; if the comments require minimum non-significant

change to the report, then we will go forward with the rulemaking process. In other words, we will finalize the Staff Report and will be ready for the rulemaking.

In the meantime, if you have questions or concerns, please contact staff, even after today's workshop. We will be available to discuss possible solutions right away.

The next slide is the staff contact information and the docket number for the proceeding. I would like to thank everybody for your patience to listen to my ramble.

MR. SINGH: Thank you, Tuan. I just want to make one announcement that if anybody wants to make comments, please fill out the blue cards, and I have a few of them already, and once we go through the blue cards here then we'll open the lines for the people who are on the Web to take their comments. So with that, I have the first card that was submitted to me from Gary Fernstrom from PG&E.

MR. FERNSTROM: Thank you. Gary Fernstrom representing PG&E. I have no comment at this time.

MR. SINGH: Thank you, Gary. The second

card I have is from Fernando. Oh, okay. All right, Jerry Desmond.

MR. DESMOND: Thank you. My name is Jerry Desmond, Jr. on behalf of Plumbing Manufacturers International (PMI). You know, PMI appreciates this opportunity to provide our comments to the Energy Commission in this current rulemaking proceeding on water closets, urinals and faucets under Docket 14-AAER-1.

You know, PMI is the international U.S.-based trade association representing 90 percent of the U.S. plumbing products sold in the U.S. You know, we have made the promotion of water safety and efficiency a top priority and we have included it in our mission statement. PMI's members are industry leaders in producing safe, reliable and innovative water efficient plumbing technologies, and we have supported the water efficiency legislation and codes in both California and at the federal level, as well as the voluntary U.S. EPA WaterSense Program.

PMI acknowledges and appreciates the ultimate goal of this proceeding and rulemaking as set forth in the Order Instituting Rulemaking to reduce excessive energy and water consumption

by regulated appliances in the state. PMI and our member companies have participated in each of the preliminary phases of this docket and proceeding that took place in 2013, including the invitation to participate, the invitation to submit proposals, as well as the workshops and Webinars, and we appreciate that chance to have done so. We also appreciate the approach that's been taken by the Energy Commission staff to analyze the approaches that have been proposed by the IOUs and the plumbing industry and to evaluate the comments from stakeholders, approaches taken at the federal level and other states, as well as the cost-effectiveness and technical feasibility of each approach for California consumers.

In summary, we support the proceeding and the elements of the proposal moving forward, and we have some suggested revisions to several of the provisions in the docket that we'd like to discuss next, and I will introduce that we have two of the representatives, Fernando Fernandez and Danny Gleiberman, who will if possible follow-up on me to talk about those suggested revisions.

MR. SINGH: Yes. I have the next speaker is Fernando, please.

MR. FERNANDEZ: Good morning. My name is Fernando Fernandez. I'm with TOTO, USA. I'm also representing Plumbing Manufacturers International. TOTO USA is a member of PMI.

In general, TOTO agrees with the staff analysis on the water consumption levels reflected in the Draft Report, but we do have some initial observations we'd also like to make at this time.

First of all, on the subject of MaP testing, the Federal OMB Circular A119 establishes policies on federal use and development of Voluntary Consensus Standards. One of the goals is the utilization of Consensus Standards that serve national needs and that are formalized through an open and balanced approach with due process and appeals mechanisms. In that respect, we think it's only appropriate for CEC to follow this model in their rulemaking for the proposed changes in Title 20. Therefore, I am requesting to consider that the multiple references to MaP, MaP testing, and MaP score in Sections 1602, 1604, 1605, and Table A3 be

replaced with references to the ASME National Consensus Standard, 19.2, 2013 Edition; the extraction test in that same standard; a standard indication of pass or fail instead of a score; and that the definition of MaP be stricken from Section 1602.

These changes actually allow for the draft report to retain the same intent it had with the extraction measurement factor in the Draft Report.

Second, on the subject of definitions, I’ve observed several instances where it appears that there are new definitions being created and I’d like to encourage a more effective approach by utilizing the definitions that are in Industry Standards and Consensus Standards.

Some examples of new definitions which should revert to those found in the Standards are the definition for Accessories, Dual Flush, Average Flush Volume, Dual Flush Water Closet, Waterless Urinal, and Fixture.

With respect to these comments thus far, we will certainly be providing them in writing subsequent to this meeting.

On the subject of Section 1605.1(A)(1),

this is a request for clarification we will put in writing, but the reference to Table (H)(1) appears to be a typo and looks like it's more appropriate to be labeled as Table (A)(1) instead of (H)(1).

Next, the references for showerheads meeting the requirement of the ASME Standard, the 1996 version, appears it needs to be replaced with a more updated version of the standard, the 2012 edition. As a result of updating it to the 2012 edition, the clause also would need to be changed to Section 4.11.1. This coincides with the reference that CEC is incorporating to the Federal 10 CFR requirements for fittings.

On the subject of Replacement Accessory as it appears in the Definition 1602 and Table (A)(1), we're seeking a clarification for the new term introduced, "Replacement Accessory." And the simple question we pose in the example of a lavatory faucet, if the Replacement Accessory available in the aftermarket would only be a 1.5 gallon per minute aerator. We will also put that in writing subsequent to the meeting.

On the subject of Section 1605.1(I)(1), there's new language that is being proposed and

we're also seeking some clarification so we can provide comment accordingly. It appears that the intent is to provide an exception in certain applications such as prisons and mental care facilities to allow the use of Blow-Out Toilets, yet the reference to a Blow-Out Toilet in Table (A)(2) is stricken, so we will formalize that in writing to request clarification. Please note that California AB 715 does exempt these Blow-Out Toilets and allows their use; they refer to them as "Institutional Toilets" in the law.

Next, on the subject of Table (A)(2), again, there's some definitions that we would like to see updated, the definition of Effective Dual Flush Volume, the retention of 3.5 gallons per flush for Blow-Out, and also a request for clarification and consideration, instead of using the term "Replacement Valve," which is not only in Table (A)(2), but also in the Definitions, to use "Replacement Flushometer Valve" to add more specificity to the product that we're talking about.

Other than that, again, I just would like to reiterate, we agree with the analysis on the water consumption levels that we've seen thus

far, and we will follow-up in writing with these requests for clarification and observations. Thank you for your time.

MR. SINGH: Thank you. Tuan, do you want to mention a few things, or are you fine? Okay, then we have Daniel from Sloan.

MR. GLEIBERMAN: Thank you, Commissioner McAllister, staff. Thank you very much. My name is Daniel Gleiberman with Sloan Valve Company. We're also members of PMI, and my role at Sloan is Manager of Product Compliance and Government Affairs.

I just wanted to offer a couple of additional technical comments to follow-up on Fernando. We do support in general staff's recommendations. We do encourage the fact that Title 20 needs to be updated, and we really support the idea that it be consistent with AB 715.

I did want to just -- because some of us in this room actually worked on AB 715, it's hard to believe that it was already seven years ago, but Fernando mentioned there are definitions in there, and so for the record, and we will be submitting this in more detail, but Institutional

Water Closets are defined in AB 715 and our suggestion or comment to staff for this Staff Report and for the recommendation is that those same types of exemptions and the definitions be consistent so that Blow-Out Water Closets and Blow-Out Urinals can still be allowed in those instances where in fact they're needed.

So just very quickly, although I can't find it right now, Institutional Water Closet means any water closet fixture with a design not typically found in residential or commercial applications, or that is designed for a specialized application, including but not limited to wall-mounted floor outlet water closets, water closets used in jails or prisons, water closets used in bariatric applications, and child water closets used in day care facilities.

And so the comment would be from a technical standpoint, the Legislature has already identified appropriately that there are certain applications where additional water is necessary, and we would hope to see that Title 20 reflects and is kind of cooperative of that and doesn't conflict with that.

I will keep my comments very brief

because I know we have other speakers, but in general we will follow up in writing per the recommendations of staff before the deadline and, again, we support staff's recommendations for these water use efficiency levels on fixtures. Thank you.

MR. SINGH: Thank you, Daniel. I have John Koeller for the next speaker, please. John is from MaP Testing.

MR. KOELLER: Thank you. I, too, like those speakers who came before me, although I'm not a member of PMI, although it seems like we have quite a few in the room, we support the staff analysis and recommendations contained in this document, but I'm here to talk about a proposal made in Addendum 1 that was rejected by staff and that needs some clarification.

And I want to thank you for allowing me to speak today. My name is John Koeller, I'm a professional engineer licensed in California. I'm also Technical Advisor to the Alliance for Water Efficiency, although I'm not representing AWE here today. I'm the Co-Developer and Co-Owner of Maximum Performance Testing known as MaP Testing.

MaP testing reports toilet flush performance and other characteristics on nearly 3,000 different tank-type toilet models and 500 different flushometer valve and bowl combinations offered for sale in North America and elsewhere. We are not associated with any manufacturer, this is a program that is trademarked, privately owned, copyrighted, and patented. So the procedure that MaP uses for testing in nine different laboratories located in North America and China, that we have contractual relationships with, is a procedure that has been adopted by WaterSense, it's been adopted from WaterSense into the National Standard that the two gentlemen referred to who preceded me, but MaP was developed by 22 water utility-related organizations back in 2003. And I think most manufacturers will agree that MaP testing, again, 11 years old, has resulted in significant improvements in flush performance of toilets since that time, but it's just one measure. And the reason I bring that up is because this addendum in the case report, Addendum 1, proposes some things that are basically based on a faulty premise, two faulty premises, and I'm so pleased

that the CEC rejected what is proposed in this document. The IOU proposal suggested that, by raising the threshold of performance from 350 to 600 grams in terms of a MaP score, or 12 ounces to 21 ounces, that double-flushing of toilets can be eliminated, and nothing could be more wrong.

The primary focus of the IOUs' proposal appears to be this topic of double-flushing; unfortunately, the authors and proponents of this proposal only considered that MaP testing was a measure of every element of performance of a toilet. In fact, there are other causes of double-flushing, and I'm not going to get into that now because I don't think some of the folks in the room would want to hear about double-flushing and the reasons for it. But let me say that MaP only measures one element of flush performance. There are other elements measured in the ASME CSA Standard, and those were never considered in this document.

So the premise that double-flushing can be eliminated by raising this threshold and somehow achieving better customer satisfaction is seriously flawed. In fact, as I said, our experience has shown us that, by increasing the

threshold it will do nothing to reduce water consumption, and therefore will do nothing to reduce energy consumption.

The document also bases all of its findings on one medical study, yet we have shown that there are three medical studies that are posted on the website, our website, that substantiate the thresholds that exist now, either in our own work, in the WaterSense work, in the WaterSense threshold, and the ASME CSA Standard. So selectively analyzing just one study to get to a recommendation by these four utilities is to me somewhat intellectually dishonest.

Other learned professionals, and those of you who know John Swaffield, Professor Emeritus, School of the Built Environment, Heriot-Watt University in Edinburgh, provided his own data on this topic and evaluated the MaP protocol, the thresholds, and so forth. And he's one of the most heralded professors and experts in the field of water closet performance, drain line performance, waste movement, etc., in the world -- and I should say "the late John Swaffield." But in 2010, he reviewed the MaP thresholds and

concurred that they were correct and perhaps even a bit high. So what he's saying is, even 350 is more than is what is required of the normal toilet and normal operations.

And the second premise that I think is flawed is that somehow there are thousands of dissatisfied users out there of these new toilets. And, in fact, the WaterSense Program, and its customer satisfaction is well-documented, customers are satisfied, customers of the water utilities of using WaterSense toilet installations, customers of all the manufacturers, the members of Plumbing Manufacturers International, they're producing outstanding product and the customer feedback is also outstanding, so to say that you're going to increase user satisfaction by increasing a score is incorrect. And I'm going to stop there. I'm going to document all of this in written comments, but I think the most egregious thing about this is that the four energy utilities have suggested that the California Energy Commission take over a private enterprise, take over MaP testing, its trademark, and all the elements of it, and turn it over to the CEC so they can do it

instead. And I find that to be rather troubling.

As one of the owners of MaP testing, I think that perhaps we should all be glad that the staff has rejected such an approach. Thank you.

MR. SINGH: Thank you, John. Next is Tony Brunello from Green Technology Leadership Group.

MR. BRUNELLO: Thank you. Hi. Tony Brunello with Green Tech Leadership Group. Hello, Mr. McAllister. I actually just had a quick question of whether energy used from sensors and toilets and sinks, etc., were incorporated into this analysis at all?

MR. NGO: Yes, it does.

MR. BRUNELLO: They were. And were there full home systems, as well?

MR. NGO: Most of the time, I did not calculate the ones for in homes, just commercial.

MR. BRUNELLO: Okay, great. Thank you.

MR. NGO: You're welcome.

MR. SINGH: Thank you, Tony. Next is Heidi Hauenstein from IOUs.

MS. HAUENSTEIN: Good morning. I'm Heidi Hauenstein representing the Statewide IOU Codes and Standards Team. Thank you for the

opportunity to provide input into this rulemaking. I think that there's a slide that I'm going to try and pull up, and I think we're working on that now. But in the meantime, I will get started.

So California urgently needs to address water efficiency and water conservation. Addressing these water shortages is an urgent matter. With dangerously low rainfall and snowpack levels in recent years and projections that drought will continue as climate change takes hold, it's important that we increase our water efficiency.

As Tuan mentioned, on January 17th, Governor Brown proclaimed a state of emergency and asked all state agencies to take all necessary actions to repair and respond for drought conditions. We commend the Energy Commission for responding to the Governor's directive by prioritizing the updates to the Title 20 Standards for toilets, urinals, and faucets.

After completing our own thorough review and reviewing the Energy Commission's proposal, however, we believe that the Energy Commission

has left significant savings on the table. We encourage the Energy Commission to embrace this opportunity to establish Water Efficiency Standards that will result in the largest water savings opportunity. Establishing more stringent Water Efficiency Standards is a cost-effective intervention to reduce California's water demand. It may actually be the most cost-effective intervention, particularly when compared to solutions that aim to increase the potable water supply.

MR. RIDER: Heidi, would you mind, which --

MS. HAUENSTEIN: You had it open for a second.

MR. RIDER: Which slide were you –

MS. HAUENSTEIN: You can just go to slide 1, that's fine. Thank you. I'll ask you to flip them when I'm ready. Thank you. So we believe that California should continue to lead the way on efficiency standards. California can set more stringent standards because it has a more dire water and energy resource constraint problem than the nation as a whole. Water costs and energy costs are higher in California than the national

average. We also want to point out that California represents about 10 percent of the national market, so if California sets a standard, then a manufacturer that doesn't want to comply with the California Standards still has the opportunity to sell products in the rest of the country which represents 90 percent of the market.

So the Proposed Standards build upon the WaterSense specification. We understand that a lot of time and energy has been spent in developing the WaterSense specification. The WaterSense sets a bar for Water Efficiency Standards for the entire nation, it established a foundation for performance standards, and it helps increase the market share of water efficiency products. WaterSense has done such a good job that the market share has reached at least 50 percent for toilets.

Energy Star, which is the energy consuming equivalent to WaterSense, updates their specifications once the market share reaches about 30 percent. WaterSense has not followed suit and they have not updated their Water Efficiency Standards, even as market penetration

has reached 50 percent.

Given California's dire water situation, we believe that establishing the Title 20 Standards that are equivalent to WaterSense levels is not appropriate for California.

California is best served to set standards that will result in the largest water savings, provided those standards are cost-effective and justified given the products that are currently available on the market.

The IOU Team has presented a number of ways that the Energy Commission can adopt Water Efficiency Standards that will result in higher water savings. I'm going to go into detail on four of the specific proposals today, but our proposal that we submitted to the docket has additional recommendations.

So the four ones I want to focus on are, 1) establishing a maximum flush volume of 1.28 gallons per flush for dual flush toilets, 2) adopting a MaP standard of 600 grams, 3) establishing a 0.125 gallon per flush standard for urinals, and 4) establishing a lavatory faucet standard of one gallon per minute.

The first item is encouraging the Energy

Commission to establish a maximum flush volume of 1.28 gallons per minute for dual flush toilets. If CEC uses the effective flush volume, the full flush volume can exceed 1.28 gallons per minute, it can actually consume as much as 1.6 gallons per minute. We know what dual flush toilets are not achieving the maximum savings because they can use more water in the full volume flush.

ASHRAE 189.1 is in the process of eliminating the use of the effective flush volume and we believe that the Energy Commission should follow suit. As of July 2013, 34 percent of WaterSense products are dual flush.

The second recommendation is that we recommend that the Energy Commission adopt a 600 gram threshold for toilets -- MaP threshold for toilets. Can you flip to the next slide? Thank you.

So it’s crucially important that we would maintain user satisfaction as water efficiency increases. So solid waste events often exceed 350 grams. So if you can look at the slide here, the top slide shows the average flushes per year that exceed 350 grams -- or, let’s see, let me explain this better -- so on the top, the bottom

shows the MaP score, the Y axis shows the number of flushes that exceed that particular MaP score. So at the CEC proposal, at 350 grams, we estimate that two in 10 men or 20 percent of men are flushing more than 350 grams twice a month. So if you average that out, that's 98 million flushes per year that exceed 350 grams. That is a lot of water, it's not nothing. So if you continue on to the right, if you increase the MaP threshold to 600 grams, we anticipate that nobody is going to be flushing more than 600 grams, which means that the double flush will reduce significantly.

On the bottom graph you actually see the percent of products in the MaP database that exceed certain MaP thresholds. So 99 percent of the products in the MaP database exceed the 350 gram threshold. If you move to the right, you see that 91 percent of the tank-type toilets exceed 600 grams, so there's eight percent of the products that do not meet the 600 gram threshold, but by moving that MaP threshold up, you're effectively claiming the savings of 98 million double flushes a year.

I also wanted to point out that the MaP

test procedure doesn't accurately account for toilet paper in their test, they use single ply paper, where we know that it's more common to see double or triple ply paper in residential applications.

We know that increasing the performance threshold to 600 grams would not have a detrimental effect on manufacturers. The most toilet manufacturers already have 600 gram toilet models. Can you flip to the next slide, please? So we looked at the brands that have WaterSense products listed in the MaP database, overall there are 106 brands, 27 brands have chosen not to test their products to failure, so to be WaterSense certified, you can test your product at 350 grams and if it passes that test, then you can get your WaterSense certification. So the 27 brands have chosen to do that. Those 27 brands represent 167 models, and so those 26 (*sic*) brands are not the major players. Most of the major players have chosen to test their products all the way to failure, or at least to the thousand gram test level. So of those 79 brands that actually tested to failure, we found that 75 brands have products that meet the 600 gram

threshold, and only four brands do not have products already on the market that meet the 600 gram threshold. And of those four brands, those are not major manufacturers. Those four brands only have six unique toilet models listed.

The other point is that the IOU proposal would reduce the test burden on manufacturers by eliminating up to three of the repetitions of the MaP test because we would not be testing at 350, 400, or 500 grams.

We also found that increasing the MaP threshold will have a positive impact on consumers. Consumers will have access to toilets that perform better at no increased cost. And then, finally, toilets that use less than 1.28 gallons per flush can meet the 600 gram performance test threshold.

MaP has assembled a list of MaP premium toilets that use 20 percent less water, but still meet the 600 gram threshold. There are already 104 models that meet this MaP premium level. This illustrates that there is still room for improvement in water efficiency while maintaining the high performance.

All right, so the third point I wanted to

make was that we encourage the Energy Commission to adopt the 0.125 gallon per flush urinal standard. As discussed in detail in the case report, 0.125 gallon per flush urinals are readily available, 34 percent of the WaterSense certified products already meet the 0.125 gallon per flush standard, and we've done extensive research and we haven't found any examples where the pint urinals cause damage to drain lines. The City of LA has had a 0.125 gallon per flush standard in effect since 2010 and they have not reported any problems with drain lines either.

I want to reiterate that we believe that the Energy Commission would miss out on 134 million gallons of water savings and 1.3 gigawatt hours of embedded electricity savings by not adopting the more stringent standard. When stock turns over, that savings will be up to 1.7 billion gallons of water and 16.8 gigawatt hours of embedded energy.

Finally, the IOUs encourage the Energy Commission to adopt the 1.0 gallon per minute lavatory faucet standard.

In conclusion, the IOUs encourage the Energy Commission to embrace this opportunity and

establish water efficiency standards that will result in the largest water savings possible, provided that those standards are cost-effective and they're justified given the current market situation.

There are many recommendations in the IOU proposal. We wanted to reiterate the four most important points. We encourage the Energy Commission to adopt 1.28 gallon per flush standard as the maximum flush volume for dual flush toilets, that the Energy Commission should adopt a 600 gram MaP threshold, a 0.125 gallon per flush urinal standard, and 1.0 gallon per minute lavatory faucet standards. Thank you for the opportunity to provide comments and we'll be submitting written comments.

MR. SINGH: Thank you, Heidi. The next card I have is from Tracy Quinn, NRDC.

MS. QUINN: Hi, good morning.

MR. SINGH: Good morning. Thank you.

MS. QUINN: I'd like to start by acknowledging the incredible hard work that the CEC staff put into their report, and so thank you for that effort.

Many people this morning have brought up

the incredible drought that we're experiencing here in California, and I wanted to mention that, you know, this isn't the first drought we've seen, it certainly won't be the last. And with climate change, droughts are going to get more intense and be more frequent. Meanwhile, the population in the state is continuing to increase, so it's important not just for this drought, but for the sustainability of our state to put forth product standards that will help us to use water as efficiently as possible.

I'd like to start briefly just by pointing out the parts of the CEC staff proposal where we support it as written, in general. So we agree with -- we support the CEC staff proposal for toilets, for kitchen faucets, and for public lavatory faucets. There are some areas where we, like the IOU Team, believe that CEC has the opportunity to push forward and go beyond WaterSense, and where it's incredibly not only important and appropriate, but necessary given our current status of water availability in the state.

So I'll start with dual flush toilets. As Heidi mentioned, we would like to see the CEC

establish a maximum flush volume of 1.28 gallons per flush for valve type dual flush toilets, specifically. We also support the IOU proposal for a urinal standard of 0.125 gallons per flush for many of the reasons that Heidi stated. The 1.0 urinals are available now, they're affordable, and they meet consumer expectations in terms of performance and utility. As Heidi mentioned, they've been used, there's been a standard in Los Angeles since 2010, and there are no reported issues with that.

I spoke with Los Angeles staff yesterday and they confirmed that, as well. And we also support the IOU proposal for a home lavatory faucet of one gallon per minute flow rate at 60 PSI in the .5 gallon per minute at 20 PSI. Like the urinals, these are widely available, they are affordable, and both of the urinals and the home lavatory faucets will result in the optimal water and energy savings for the state. I believe in the addendum that the IOU Team provided to their case report, they showed that the savings between the Staff Report proposal and the IOU Team Proposal were credible for the urinals alone -- I hope I have that number. The first year's

savings would be 134 million gallons of water and by 2026, it would be 1.68 billion gallons of water. Given the water situation here in California, I think that we absolutely need to set these standards to the most stringent levels possible. Thank you.

MR. SINGH: Thank you, Tracy. And the next card I have is for Jon McHugh from MEC.

MR. MCHUGH: Good afternoon, Commissioner McAllister; good afternoon, guests. I thought I'd start off today -- this is Jon McHugh from McHugh Energy Consultants -- and I thought I'd start off with, well, my wife used to be a teacher and in teaching a lot of times to teach about certain topics, they used what they call "manipulables," basically physical objects to help understand the issues at stake here. And I was wondering if you could bring up my slides? I've got a couple things here, one is the half gallon per flush that we're looking at for a urinal and comparing that to the pint, and just to think about some common sense about what does it actually take to actually clean a urinal after flushing -- is that -- why don't you go back to the very beginning? There are only two slides?

Oh, okay.

MR. RIDER: Sorry. There we go.

MR. MCHUGH: Next one, please. So as we all know, there is a water emergency on and potentially this is the beginning of more water emergencies, and the question is, is can the state actually provide policy leadership for the rest of the country in terms of water efficiency and also -- and when I talk about water efficiency, I'm not thinking about what Ronald Reagan called -- how he described conservation, which was being too cold or too hot, and being in the dark. So the idea of efficiency is to actually have the same level of amenity while reducing energy or water consumption. And this is, I think, the point of what we're trying to promote here. Next slide, please.

And just to bring it home, you know, there is a water emergency, snow packs, about a third of its historic average is State Water Resources Control Board is looking at a curtailment order, curtailment of water for all the junior owners of these various watersheds and there's a variety of different Water Districts that are looking at curtailment. Next slide,

please.

And more to come. So this is just a description of global warming and the impact on what we expect to be future amounts of water. And so I'm going to talk briefly about, again, using some common sense.

I actually brought what is for the MaP score, what they do is they actually use essentially soybean paste and I've taken the same 350 grams of soybean paste and it's not a huge amount of volume. And Mr. Koeller had mentioned that we use a particular study to look at what is the extrapolation from a study that was done, I believe, over 40 years ago, and that particular medical study is the same study that was used as the basis for the WaterSense, their description -- if you go to their website and you look at the description of how they selected 350 grams, you'll find that they use that exact same study, so we're using that study and it has a study that talks about averages and standard deviation. And you know, my daughter thinks I'm kind of crazy, you know, looking into these things, but it's a very simple statistic looking at averages, looking at standard deviations, and these values

that are listed here on this graph are related to the averages and standard deviations from that medical study.

And the issue is, is that this medical study also looked at women and women in general are smaller than men, and so they are not the basis of designing waste extraction systems. But the men in the household, typically larger, eat more, all those kinds of things, they are the ones that determine when a toilet might fail. And also, counter to what John was just saying earlier, because there might be multiple reasons for a toilet to backup or fail doesn't mean that the particular reason --

MR. RIDER: Can you keep at the mic because people online won't be able to hear what you're saying.

MR. MCHUGH: Oh, sure. Okay, I was going to stand by the graphic.

MR. RIDER: I can point to something.

MR. MCHUGH: Okay, yeah, why don't you point to the Y axis there? So the Y axis indicates how many times per year do we expect that the flushing, the very procedure that John uses to identify whether waste is fully extracted

from the toilet, how many times per year is the waste not fully extracted. So this is not describing all the other things that, indeed, other things do cause toilets to backup, but what this does indicate is that if the state actually adopted a standard that was based on 350 grams, and there was a significant fraction of the market designed to that level, we could expect that for the top 20 percent of men, that they would experience a failure every two weeks. So the issue is, is this acceptable?

Now, John and I have had conversations before about the MaP test and the example that he gave is, you know, setting the score at 600 is like having a car that goes 200 miles per hour, you know, you can’t drive 200 miles per hour on the highway, but I actually look at it differently, I look at it that the MaP test, actually what it’s doing is that setting the standard at 350 grams is like having a car that is acceptable for the car to stall every two weeks.

And so this is really what the issue is, it’s about failure as opposed to being able to flush more than you normally would, it’s those

times when it fails. And what does that do to the market? It basically provides a situation where you have less amenity along with lower flow rates. What we want to do is actually make sure that we have equal or greater amenity for the reduced amount of flow. And if you look at the data in the database, this is very similar to what Heidi has, I actually broke this out by both tank type models and flushometer models, those are the two top lines, what you see is that in both cases, of the products that are listed that list their extraction value, that over 90 percent of the products meet this. And you really have to look at what the market actually has available and also what makes sense. And so if the market only had 10 percent of products, we wouldn't be recommending to set something that knocks out, you know, 90 percent of the market. But the reality is, for reasons that I don't understand why manufacturers would be in opposition to actually potentially removing some of the low quality competitors in the market, because all this really does is it says I should be redesigning my toilet so that it works. And 90 percent of the products already work. So what is

the value to the industry to actually set a low standard, and potentially having people upset with the quality of low flush toilets? Now, the argument is made that, you know, we're not getting a bunch of complaints, but tell me something --

MR. SINGH: Jon, please speak into the mic and also we have a limited time, actually, we have the people on the --

MR. MCHUGH: Thank you. When people are experiencing the toilets backed up, are they immediately calling up the manufacturer and saying, "I'm going to find out the model number and I'm going to call up the manufacturer"? No, they just suck it up, they're tired with it, but also what happens is that plumbers and various people start going, "Yeah, you know, you don't want to get the flush and pump toilet, the flush and brush toilet," all the various negative things that can be ascribed to modern toilets. We do not want that. That is not desirable for the manufacturers, it's not desirable for the market, and it's not desirable for the state.

And then finally, just going back to urinals, it doesn't make common sense that we

really need half a gallon to flush a couple of ounces of urine out of a toilet. Thank you very much for your time.

MR. SINGH: Thank you, Jon. I'm sorry that I had to cut you off.

MR. MCHUGH: That's all right.

MR. SINGH: And the next card is for Eddie Moreno from Sierra Club.

MR. MORENO: Good morning, Commissioner McAllister and staff. I'd like to thank you for hosting this very informative workshop and giving Sierra Club the opportunity to participate. Sierra Club would also like to thank you for drawing greater attention to the water and energy nexus with the transportation and treatment of water and disposal of water, and the energy used to heat and consume water account for 20 percent of the total electricity and 30 percent of the demand side natural gas burned in California. Holding household appliances such as toilets, urinals, and faucets to higher standards and water use efficiency saves water in a state plagued by drought, and it yields energy savings while cutting greenhouse gas emissions.

The Sierra Club will submit written

comments and supports the staff recommendation, but would like to support some of the statements made today, as well. For the toilets, we support the 1.28 gallons per flush maximum for the dual flush toilets, but we'd like to see a MaP score a little higher than 350. We got some excellent information over the last week and today we'd like to sort of review that, but 600 grams might be more appropriate and able to ensure that the products maintain utility while continuing to conserve energy and water. There are products that will not meet these proposed standards, but the majority of the products that are available today already do so. Though there are many factors that contribute to double flushing, increasing the MaP threshold to 600 grams helps cut away the approximate, I guess, 125 million gallons of water wasted due to double flushing. And we believe that it will help prepare the industry for future standards and it will continue to encourage consumers to buy water efficient products. Thank you.

MR. SINGH: Thank you, Eddie. I think this was the last card I had, so we'll open the lines for the people who are on the web, so can

you please?

MR. RIDER: Yeah, folks on the line, we're going to mute. I don't see anyone who has raised their hand. If you'd like to speak, raise your hand, but I have not seen anyone. I'm going to mute these lines, so if you could mute your phone before I do that, so you don't get caught in the middle of a conversation -- oh, I do have one person raising their hand. I'll take the people who raise their hand first, and then move to generally. So again, if you're not planning on saying anything, please mute your line now, otherwise you may say something to the entire Commission. So I have Marianne Di Maseio. I'm going to go ahead and unmute her. You should be unmuted, Marianne.

MS. DI MASEIO: Okay, hi. Thank you. Hi, my name is Marianne Di Maseio. I work for the Appliance Standards Awareness Project. We're a nonprofit advocacy organization working to advance appliance lighting and equipment efficiency standards at state and federal level. And we've been doing this work since 1999. Because of our exclusive focus on efficiency standards nationwide, it feels like we're in a

unique position to comment on the California Standards, their importance, and their impact on the whole country. We appreciate the work the CEC has done over the many years, and in particular on this docket for water using standards. So thanks for allowing me to speak today. And I don't know if you know, but the hearing falls on the same day that President Obama unveiled an assessment of how climate change has already affected and will continue to affect the U.S.

In the report today, you noted that increased incidents of drought in California, the Southwest, and the Midwest, and I know California already knows the danger and the urgency of these drought conditions, and it's great that you have the opportunity to really do something about it with this docket. So I'd like to make three points in my short comments today, 1) that the more stringent standards for the water using products are warranted, 2) that California has led the country in this area and hope they continue to do so, and 3) the timing is right for the strong standards, given the context, the drought and market conditions.

So first I would like to thank the CEC for their extensive research and they've really done a lot of outreach to stakeholders in this rulemaking. And while the standard levels that CEC proposed will save water and energy, I believe they fall short of capturing the cost-effective savings, particularly in the context of the drought and the availability of these products in the California market. So I'd like to express our strong support for the more stringent standards levels proposed by the California IOUs, NRDC in the case report. I won't go into detail on the report because Heidi and Tracy have already done that, but I would like to make a couple of points. One is about the performance standards for toilets, I just want to have it be really loud and clear that we do not want any kind of repeats of the earlier toilet standards when poor toilet performance made the headlines.

Just a couple years ago, I was listening into a hearing on lighting standards when a prominent U.S. Senator vehemently complained about a poorly performing toilet that he had purchased after the standards went into effect

more than 20 years ago, and he was still mad about it 20 years later, talking about it at a hearing. So I think the implications of having something that doesn't work well are really large. So we need to really set the performance standards to prevent this kind of backlash. And I know Heidi was already saying that 91 percent of the toilets in the database already made the MaP threshold that they were looking at, so it's clearly an attainable goal.

For urinals and faucets, I won't go into details, but I urge the CEC to go with the more stringent standards proposed in the case report, that are available to the California consumer, they're affordable, they're technically feasible, and they would increase the potential water and energy savings.

The second point I wanted to make pertains to California's role in influencing the standards in other states and in the country as a whole; it's really a vital role that CEC plays and I hope you all understand the impact. I talk to state leaders and utilities and people around the country who literally wait for California to act on standards so that they may follow suit.

And I know your primary job is to think of what is best for the state and the residents of California, but I really think it's important to think about the impact on the rest of the nation, it's really too big to ignore. You've been a leader in setting efficiency standards, tremendous implications for standards throughout the country from refrigerators back in the '70s and '80s to the TVs and battery chargers more recently, and there's a long list of products in between, and California has taken the lead and other states have followed, and in many cases National Standards. So as you make your decisions, I urge you to also consider the implications for energy and water savings for the entire country and with particular thoughts to also the changing climate and that there are now many other drought stricken regions.

And as a non-Californian, we hear about the intense drought in California and think what an opportunity you really have to do this right, to set standards that will really be able to save huge amounts of water, save energy, save residents money. So I know there is pressure to set uniform standards to keep with the

WaterSense, but from the specifics presented today and with the industry already moving in the right direction for the more efficient products, it really seems like you're in such a unique moment in time, it's the right time, the right place, the right market to set the more stringent standards, and it's also the right thing to do with this environment. So I urge you to take bold action and go for the greatest impact for both California and for the rest of the country. So thank you for allowing me to speak and we will submit comments.

MR. RIDER: Thank you. We don't have a whole lot of time left, so there are a few other people who would like to comment on the phone if you could keep it fairly brief. I've got next George Nesbitt. Just one second, George.

COMMISSIONER MCALLISTER: Ken, can I just make a quick comment?

MR. RIDER: Yeah, go ahead.

COMMISSIONER MCALLSISTER: I just want to jump in. So I want to acknowledge all the folks who are talking -- I was remiss in not mentioning the drought in my opening comments, but I think I just want to let everybody know that definitely

is on the radar screen, and the Governor has made it a priority, we are clearly in a state of emergency that now covers the whole state. And Chair Weisenmiller here at the Commission has highlighted this on a number of occasions in our release about this rulemaking and in other fora about, you know, we have to keep water and climate at the forefront of our minds when we're making policy in this front. So I want to just reassure in some sense those who are rightly highlighting the drought as a driver of some of the urgency here. And just wanted to note that so that all of you know that that is actually something that we're focusing on. Again, we have to interact with the marketplace, we have to make sure that what we do takes into account all the constraints in a way that makes sense, so the process can hopefully move forward to do that. So thanks for all of your on point comments.

MR. RIDER: Great. So George, I'm going to go ahead and unmute you and you should be able to speak.

MR. SINGH: One of the requests I want to make is that please keep the comments short because we plan to finish by 11:00 and we're over

the time limit, so we still have a few more speakers here. So if you could keep it up to two minutes, would appreciate. Thank you.

MR. RIDER: Go ahead, George.

MR. NESBITT: Yes, George Nesbitt. I'm a HERS Rater for Green Rater. First a question, was the 1.28 gallons for toilet a maximum or an average that would allow dual flush 1.6.8 toilets?

MR. NGO: For dual flush?

MR. NESBITT: Yeah.

MR. NGO: Dual flush could be a combination of one large flush and two small flush, then when you average it out, it should be 1.28 gallons per flush.

MR. NESBITT: Okay. So I noted on your chart on energy use, there was no electric use for commercial lavatories. It's not uncommon that you either have an electric instantaneous and/or electric pump recirculating in commercial buildings, and so there is electrical use and savings to be had there. My understanding of Cal Green is that it now includes existing buildings, so when you replace your toilet and your other fixtures, you have to meet the current

Cal Green and that there is a deadline for upgrading all those fixtures if they haven't been updated to the 1992 Federal Standards.

I have also seen on some new multi-family projects that should have been Cal Green and 1.28, and they were 1.6 toilets. So if it's available on the market, it has a way of getting put in. I definitely think we need to ratchet down from the fixture use as much as we can, but I do think we have to be careful with the performance issue and make sure that the products perform and meet people's needs because, as most people pointed out, bad equipment doesn't help us.

The other thing is, we have to work on the plumbing code. As we've gone to lower flow fixtures, we're still sizing water distribution systems, as well as flow rates, as well as drain waste and vent, and some of my plumbers tell me that smaller drains actually work better with the lower flow fixtures, rather than large drains. So we need to work on that, too. Thanks.

MR. RIDER: Thanks, George. I have Jim Kemper here. I'm going to unmute you, George – or I mean Jim, sorry.

MR. KEMPER: Hi, hello. I'm Jim Kemper with the Los Angeles Department of Water and Power. Our organization authored the local ordinance to mandate the one pint urinals for new construction and when fixtures are replaced in existing constructions. And I can confirm that our group has not received any reports of any problems with these since the ordinance went into effect in 2010. Thank you.

MR. RIDER: Thank you. So I'm going to just do one of these ugly end mute all's and see if anyone who only called in has anything to say, so bear with me on this. Everyone is currently unmuted, so if you had something to say, speak now. Okay.

MR. SINGH: Thank you, Ken. I have PG&E, Gary Fernstrom.

MR. FERNSTROM: Thank you. I have a brief closing comment on behalf of PG&E, so Commissioner McAllister, staff, interested parties, I'd just like to say that we're acutely aware that California has a dire water problem. We and several others have shown objectively on the record that we can have appliances offering better performance and less water usage, those

are available in the market today, and they are cost-effective. And we encourage the Commission to look at the objective facts presented in the record and act accordingly on behalf of the public and California. The issue seems to be whether to remain consistent with existing standards or again to step forward and exercise state and national leadership, we believe that it's time for the Commission to again step forward and do what's right for the state. Thank you.

MR. SINGH: Thank you, Gary. Fernando, do you have some comments?

MR. RIDER: I'll take one second here.

MR. FERNANDEZ: I'd like to add a few more comments here on this wonderful subject, and sorry to ruin lunch. The IOU proposals are predicated upon a one-dimensional approach to energy savings. You save water, you save energy. In a perfect vacuum, I would agree with that. I think the one thing that's being missed clearly, grossly neglected is this is about a balanced approach and there's something called the plumbing infrastructure, there's waste and drainage that also needs to be taken into

account. In front of you, you see the effects of water consumption on a urinal, water consumption using something that we call fuzzy logic, what we were experimenting with as low as one point to one-quarter of a gallon per flush, with about 200 uses per day. And if you would actually zoom in on that, the second row, you will see that plumbing fixtures don't work in a vacuum, they work in a system, and therefore you need to realize what the cause and effect will be with this approach. And those pictures speak for themselves.

Next, with respect to 1.28 gallons per flush on toilets and 600 grams, the notion that 600 grams is going to eradicate double flushing is a misnomer and, again, a gross underestimation of how a product is designed. It's very interesting to see how people here can use statistics for their own suitable purposes, and no one here had actually worked for a plumbing manufacturer. I've worked for a plumbing manufacturer who makes great toilets for 19 years, and the fact of the matter is at 350 grams, that is an ideal threshold to design a toilet not only to industry standards, not only

to EPA WaterSense specifications, but it allows manufacturers the design parameter room to address other flushable wastes. You have floating media, various types of floating media, you have rim wash, and you also have various type of sinking media, including what we have come to know as MaP. TOTO was the creator of this soybean paste media, and so we know very well how it is best utilized, and by promoting a 600 gram approach, you're actually promoting this horserace to go higher and higher and higher, and create an unbalanced approach for toilet design. So that is something that I would like the Commission to take into account. Okay, very good, thank you.

MR. SINGH: Thank you.

COMMISSIONER MCALLISTER: I had a quick question here actually on that front. Fernando, do you have any observations about the difference between a retrofit applications and new construction in terms of --

MR. FERNANDEZ: For example, with urinals, one pint has certain applications where it can be proven very effective. I believe plumbing codes are changing to address those

concerns. Where you want to have ideally fixtures that introduce water into the plumbing system just upstream of those one pint urinals, so that you help get the added flows in the drain line. When it is improperly applied, and unfortunately no one can see through walls, no one knows what the plumbing waste line configuration is, or how many fixtures are indeed upstream of one of these very low one pint urinal fixtures. But again, when it is in its proper application, it works. When you don't have water coming upstream to help with the flow, you do have issues like this where you have the struvite formation buildup, it's basically the urine scale that builds up.

COMMISSIONER MCALLISTER: I guess the reason I ask is I'm kind of just interested in, you know, there is this system, and a couple of people have pointed out that it is a system issue and not just a fixture issue, and so I think that's something we wrestle with. But those issues are going to play out differently in retrofit applications by and large where you're coming in to a system you don't maybe understand as well versus a new construction where you have

control over the system, at least in theory. So I guess it would be interesting if you have any observations on that, you know, it's broader than just Title 20, probably, it also goes to Title 24, but in any case it would be good to sort of help us understand that issue.

MR. FERNANDEZ: Understood, Commissioner. And TOTO Company is more than willing to help out with additional comments.

COMMISSIONER MCALLISTER: I really appreciate your presence. Thanks very much.

MR. FERNANDEZ: Thank you.

MR. SINGH: Thank you. With that, I think we move to the next topic, Ken. You're next.

MR. RIDER: Great. And I want to thank that last gentleman for that presentation because I was really hungry and now I think I've got the fortitude to make it through for the next until we get to lunch. So we're a little bit behind, so I'll try to get through this fairly quickly.

I'm Ken Rider. I'm an Electrical Engineer with the California Energy Commission and I'm working on some standards on heat pump water chilling packages. I'm going to talk a

little bit about the pre-rulemaking process, the purpose and intention that we have in proposing these regulations, what the regulations include, and what pieces of data we are looking to collect, and also next steps in the process.

So we are in the workshop stage of the pre-rulemaking process. We've released a Draft Staff Report which is what this workshop is about, and hopefully the folks here have had the opportunity to review that. That Staff Report contains the Proposed Regulations and the rationale behind the proposals.

And so these Water Chilling Packages are an interesting group of equipment where the refrigerants actually directly cool water and some really neat pieces of equipment that combine with water heaters and space heating are being designed today, and some of them are some of the most advanced pieces of equipment that are being looked at for ZNE buildings in the future.

COMMISSIONER MCALLISTER: Hey, Ken, can I interrupt just quickly?

MR. RIDER: Okay.

COMMISSIONER MCALLISTER: I want to manifest that I'm really excited about this group

of technologies, that's my own little techy chiming in, so heat pump technology has really come a long way and I think there's a lot of great applications going forward. I have to step out and this is a staff workshop, so I don't actually need to be here, I'm really just here for my own info. But I wanted to point out that my advisor, Pat Saxton, is in the back of the room and he is my eyes and ears on this, as well, so if you have any needs to communicate with my office, you can communicate with me or with him, probably even more effective to communicate directly with him. And I wanted to just say thanks to staff again and the rest of the staff in turn for doing such a great job putting together the workshop and teeing up the issues and on the staff reports that are the source of the conversation. Anyway, have a good rest of the workshop. Thanks.

MR. RIDER: Thank you, Commissioner. So one thing that any piece of equipment that is used in California, especially the larger pieces of equipment, is the need to have consistent ways of testing and verifying performance and modeling performance, especially as software becomes more

prominent in building designs.

Right now in the marketplace, these pieces of equipment don’t really have a reliable central place to find performance data. Folks come to the Energy Commission and describe situations where they could not find some of the key measurements of energy efficiency for this equipment despite them being very energy efficient. The Title 24 Building Code includes requirements and aspects for this equipment in Table 110.2-D, and they currently have created a certification process temporarily for these products so that there is a central repository. However, Commission staff proposes to move these requirements and testing standards into Title 20 Appliance Standards so that they will be incorporated in our larger appliance efficiency database where other equipment already resides, such as split system air-conditioners, water heaters, all of these common products already are in that database. And we’ve proposed to make this change in this move on January 1st of 2016. We propose that these products be tested using ANSI AHRI 550 590, the 2011 version, and we propose that all equipment that is covered in

110.2(D), well, that also incorporates a heat pump, would be covered and be certified. And I've put the definition here, it's also in the Staff Report, but this is the definition that will determine whether a product meets the scope and whether it would be something that could be certified at the Energy Commission. So I recommend you review and make comment whether this is an adequate definition. It is mostly taken from definitions in AHRI 550 590 to try to align with the industry standards. I just wanted to show you Table 110.2-D in the Building Standards. You can find this, the 2013 Building Standards are available online, and you can find this table within that.

I think the majority of equipment that would probably be certified would be some of this top category here, but some others could be certified as well. As you can see in Title 24, they are using the same test procedure, AHRI 550 590.

So there's several pieces of data that we are looking to have reported to us from manufacturers of this equipment. Some things that aren't listed here that we require for all

manufacturers are things like brand name, manufacturer name, model number, but I put here on this slide some of the key pieces of efficiency that we're looking to be reported to us such as the heating and cooling capacity, some of these systems are reversible, can do both heating and cooling. The EER for cooling, integrated part load value of available coefficient of performance for heating, and COPR of heat reclaiming if that's part of the system and the test results. And so the idea would be that manufacturers would provide this information to the Energy Commission through the Appliance Efficiency Certification process and we would put all of these pieces of information online such that building designers and inspectors can use this for verification modeling, etc., and create a kind of even playing field for performance reporting, as well.

So next steps, so we're going to take written and oral comment -- oral comment today in the workshop. Written comments will be due by June 6, 2014. And staff will take all these comments on the proposal and change the proposal if it makes sense and, if not, we will move

forward into the formal rulemaking process and get these into law.

I encourage anyone who has any questions about this proposal, feel free to contact me, my email and my phone number are provided on the slide. In case you can't see it, my email is Ken.Rider@Energy.Ca.Gov, and my phone number is (916) 654-5006. And again, I'm always available to answer questions or to discuss the proposal.

MR. SINGH: And I want to mention here, the docket number is 14-AAER-1.

MR. RIDER: Yeah, actually, this is the incorrect docket number. Okay, well, I'm just not going to leave this slide up is what I'm going to do because I don't want anyone to get confused about that. So please send it -- use the notice, the announcement of the workshop to get that docket number, it's 14 -- and it's at the end of every other single presentation we have today -- it's 14-AAER-1, not the other number that appeared there. So that concludes my presentation. We'll take comments in the room first and then move to comments on the phone, so, Harinder, do you have any blue cards on this?

MR. SINGH: I do. If anybody wants to

make comments related to this issue, please bring your blue cards. The first one is from Randall Higa from Southern California Edison.

MR. HIGA: Hi. I'm Randall Higa, Southern California Edison. I had a question just on the title, purpose and scope of this measure. It's titled Heat Pump Water Chilling Packages, but in the proposed language, or in the definition, it says it could remove heat from air or water, so if it's removing heat from air, I mean, I don't know, are you considering that a chiller? Because in my mind that's not a chiller, you're not chilling water, you're pulling the heat out of air, so you're cooling air, not water. So --

MR. RIDER: I guess the idea is that some of these are reversible and so in some cases they have to be able to chill, but in some cases since it is reversible, you could have instances where you'd have the flipped case because it's a heat pump so you could run it either way in some cases, I think.

MR. HIGA: Right, but if you're pulling heat out of air, it's not a chiller, that's all I'm saying.

MR. RIDER: But so that heat goes from the air into the water and now it's hot water, right? And so you can use it for -- right, it's not a chiller in that case, that's the definition of the equipment in -- so I'm being consistent with 110.2-D, they've labeled this entire table, this is current Title 24, water chilling packages. So it wasn't really a term that I had chosen for it, it's just one that I borrowed from Title 24 to be consistent.

MR. HIGA: Because I think the way it's written, it could include heat pump water heaters because -- and is that the intent?

MR. RIDER: The sole intent of this is to take pieces of -- because I think heat pump water heaters are already federally regulated and I believe that they are already are certified.

MR. HIGA: Right.

MR. RIDER: So I don't think we want to duplicate that, and we definitely don't want to cause confusion that they be double-regulated or something like that, so if you think this definition is confusing, and if you think that a heat pump water heater could fall under this where it's already regulated, then if that's not

the intent, please provide some comments on how to fix the definitions so that it doesn't do that because that's definitely not the intent.

MR. HIGA: Okay, thank you. I think you answered my question and we'll submit comments to that effect. Thank you.

MR. RIDER: Thank you.

MR. SINGH: Please come to the podium and announce your name.

MR. SADLER: Hi, my name is Mark Sadler and I'm with Daikin and we make the Daikin Altherma which is near to a water heat pump system, and maybe I can kind of clear up what that is referencing. It's extracting energy from the outside air in a heating mode, ensuring that with the water circuit. In the cooling cycle, it's taking the energy out of the water in the water circuit and shedding it to the outside air through the heat pump circuit. So the definition seems to be correct in that regard, but the one area that I would like to call a little bit of attention to, and there might be other systems out there that are using the rejected heat off of the condenser to heat water, but that's not the way these systems are designed, they're either

producing heated water or chilled water. The heated water is going through an indirect loop in the domestic hot water tank to heat the water in the vessel. So that's how that's happening, but it's just in one mode or the other, so it's chilling water or heating water.

MR. RIDER: Great. Thank you.

MR. SINGH: Anybody else in the room who wants to comment on this topic?

MR. RIDER: There are a few folks on the phone, if not.

MR. SINGH: All right, let's open the phone lines, then.

MR. RIDER: Okay, let's see. We've got several. I don't know if folks from the last -- if you raised your hand in the past and don't intend to continue, because I see a few people from the last call, go ahead and lower your hand. So I'm going to unmute Pat Splitt. He's written that he would like to speak, and then there are a few others after that. Pat, you should be unmuted.

MR. SPLITT: Okay, can you hear me?

MR. RIDER: Yes.

MR. SPLITT: Okay. One, to respond to

the first comment, this initially, this whole thing got started as basically just to get air to water heat pumps added into the Appliance Directory and added into the Table 110.2. In the past, AHRI 555 90 has been a CEC reference standard for years, but in Table 110.2-D, only the cooling side of the equipment was tested because 555 90 didn't initially have a test for heating. Then AHRI developed a test for heating basically because companies were coming up with this equipment and, you know, they needed a test. So now there's an AHRI 555 90, the title of which is now Performance Rating of Water Chilling and Heat Pump Water Heating Packages Using Vapor Compression Cycle. So initially I was just trying to get a place in 110.2-D where we could list the requirements for Air to Water Heat Pumps, and it seems to me in the new standards it should actually, if we're going to put a place in there, it should be in Table 110.2-B, Unitary and Applied Heat Pumps Minimum Efficiency Requirements, and not in Water Chilling Packages. And in 110.2-B, there's actually broken down, they separate the water chilling versus the water heating mode, so it would be entered twice, both

referencing 550 90. That would put it into 110.2-B as far as the minimums.

And right now, the Energy Commission in this section takes their minimum efficiencies from AHRI 90.1, and 90.1 hasn't been updated recently to include a minimum heating efficiency for air to water heat pumps. They just have a minimum cooling EER and IPOB. So initially I'm assuming that if we did put these entries into 110.2-B, the minimum heating efficiencies would be listed as a 9.562 EER and 12.5 IPOB, and the minimum cooling efficiency would be listed as zero until such time as the AHRI came up with a number. If the Commission felt that they had to have some other number, you know, I don't know how you would go about this, I would just suggest as a starting point, say a COPO of 2.5, a fairly conservative number that most people should be able to meet.

So now once this gets into the Table 110.2-D, then there already is a requirement in the Appliance Database that says the database is the directory published by the Commission, will then the meaning of Title 24 CCR Part 6, Subchapter 1, Section 100(h), and 100(h) then

refers back to these tables. So there isn't any -- once we get it into the table, there is no other reason to have a rulemaking to put it into the Appliance Director because, by definition, anything in these tables already is in the Appliance Directory. And if you haven't actually physically listed it there, that's just a mechanical problem and the Executive Director has authority in the Appliance Standards to amend those tables, and to amend those databases. So other than getting an entry into Table 110.2-B, that's all that's needed, other than for the Executive Director to go ahead.

And then, as far as if you wanted to include everything in this table 110.2-D and move it in the Appliance Database, I'm saying, well, the law already requires it and says this is sufficient. Now, if you don't actually have a space in the database, that's just a tactical problem that somebody hasn't followed your rules. So you don't need a rulemaking to do that, they're already there.

And then finally, as far as the listing of information to be put into that database Excel file, all those were taken from these 555 90, but

just in regard to air to water heat pumps. The 555 90 specifically states in the scope that one of the pieces of equipment that is regulated is air to water heat pumps. They call their equipment air to water heat pumps, everybody that makes this equipment, they call them air to water heat pumps, not this crazy definition that you just grabbed, which is just a definition of a term that's used somewhere in one of the Appendixes to the test. It's not describing any equipment that can be sold, it's describing a particular test in the Standard. And the database information was taken from a section in the Standard 555 90 that specifically in Section 6.28 deals with air to water heat pumps. And the data that is in that spreadsheet is the data required in Section 6.28 for air to water heat pumps only, not any of this other equipment. I didn't do any work on that other equipment, there's all kind of other equipment, there's water cooled, air cooled, or back burn cooled, condensers, water cooled heat reclaimed condensers, water to water heat pumps, it goes on. So I don't know that that database information is correct for that equipment. It

was only put in there for air to water heat pumps because that's what was required in 550 590 for air to water heat pumps. So as far as I'm concerned, the only thing we're adding is an entry into Table 110.2-B for air to water heat pumps, and a Section in the Appliance Database someplace that people can find when they go looking for it to get the efficiencies they need to plug into the modeling equipment, which now after July is going to include not only the cooling efficiencies, but also heating efficiencies at both 47 and 17 degrees, that's data that's going to be required to do compliance modeling and that's data that is listed to be culled out in this database so people can look at the database and they'll find all the information there they need in one place to model the equipment, which is what the goal is.

MR. RIDER: Thanks, Pat. I can't really speak to the changes in Title 24, but we're definitely trying here to set up that spot in the Appliance Database that you were referencing. Title 24 has already set up a certification spot for this equipment, but we want to kind of get it in the Code of Title 20 here so that way we can

–- everything else that’s in the Appliance Efficiency Database is in the Title 20 Code and Section 1601 through 1608. So we just want to be consistent and include that there.

I have a few other people who have -- oh, someone asked online if there will be transcripts and copies of the presentations made available online. Transcripts will be made available and put online, it will probably be a few weeks after this before those will be available. The presentations are already posted online and you can get there through the Commission’s website.

So I had here also that Mr. Roy would like to speak. Let me see if I can find him. Oh, you unmuted yourself. Well, great. Well you go ahead and speak.

MR. ROY: Hi, thank you. I am Annirudh Roy with the Air-Conditioning, Heating and Refrigeration Institute. One issue with respect to requiring this data to be reported is that currently the existing labs that are out there cannot test some of the larger air to water heat pumps and that’s going to be a significant issue for the manufacturers to be able to report that data if they’re relying on these labs for that

information. So what are the CEC's thoughts on that if it just cannot be tested by these third-party labs which the manufacturers are relying on?

MR. RIDER: Yeah, so, I mean, if that's true I would ask, if you could, identify some of those labs and we could have a conversation. Also, if you want to submit in comment what the ramp-up time would be. So the Regulations wouldn't become effective, I think, until -- we propose January 1st of 2016. So the question would be, by that time could these labs be ready? If not, why? And once we've got that settled, we can figure out whether it makes sense to set a cap size on the scope of this, or not. So I think my response to that is we would need more information and maybe some discussion to figure what to do about this issue you've raised.

MR. ROY: Okay. Would the CEC also be open -- we do intend to submit written comment, but would the CEC also at that point be open to having a discussion with the industry on the several issues that may exist with this reporting?

MR. RIDER: We are all available at any

point during this comment period into this process to have a discussion like that, so today, tomorrow, you know, until this finally becomes live, we'll be open to that kind of discussion.

MR. ROY: Okay. And Ken, for this particular proposal, you are the point of contact, right?

MR. RIDER: Correct.

MR. ROY: Okay, thanks.

MR. RIDER: Thank you. I also have Adam Meddaugh. Let me see if I can find him. Okay, Adam, I am unmuting you. You're unmuted.

MR. MEDDAUGH: Yes.

MR. RIDER: Okay, go ahead. Adam, are you there?

MR. MEDDAUGH: Oh, I'm sorry, I didn't really -- I wasn't really prepared to ask a question, sorry, I stepped away for a second.

MR. RIDER: Did you have a question? You wrote that you were wondering if we were going to answer any --

MR. MEDDAUGH: Well, initially I wasn't sure if you were going to be taking questions on this subject, and so the presenter was just going to present and then after we were going to submit

questions.

MR. RIDER: Okay. But you didn't have any questions?

MR. MEDDAUGH: No.

MR. RIDER: Okay. I'm going to mute you. Oh, Pat would like to speak again. I'm going to unmute Pat. Pat, you are unmuted.

MR. SPLITT: Okay, just to clarify that previous comment, the proposal doesn't require that this testing be done at an independent testing lab. The proposal only requires that the equipment can be self-certified by the manufacturer, so they can do that at their own manufacturing and test facilities, they don't have to go, at least at this time, to a certified testing laboratory to get this done. And in the sense that these companies are all claiming they have these efficiencies, I would assume they must have someone testing the equipment.

MR. RIDER: Yeah, that's a great point, Pat, and it's absolutely correct; you may do in-house testing, we do require you to certify your own lab if you do that, and that's as simple as basically telling us who you are, where you're located, and attesting that you have the correct

equipment to conduct the test. Thanks, Pat. I'm going to re-mute you.

So I don't see any other questions or comments. George has got his hand raised, actually, and also Eddie, so let me take George first. George, did you mean to -- I'm going to mute him again. Eddie, I don't see where you -- are you one of these call-in users? I don't see audio for you. If you can unmute yourself, go ahead, otherwise I'm going to have to guess which call-in user you might be. I'll just unmute all of the call-in users. Eddie, are you there?

MR. RODRIGUEZ: Yes. Can you hear me?

MR. RIDER: Yes, you are call-in user 6, yes. Go ahead, continue.

MR. RODRIGUEZ: Okay, yes. Hi, this is Eddie Rodriguez with Daikin Applied. As was mentioned earlier, that AHRI 555 90 currently has a testing procedure for reversible cycle heat pumps, so my question is, if a manufacturer likes to certify this product for a first Standard AHRI 555 90, will that meet the proposed testing requirements as being asked, or being requested through this program?

MR. RIDER: Let me make sure I understand

your question correctly. You're saying if a manufacturer tests per the 555 90, per basically the directions, instructions, and just the way it's written, if someone tests per that test procedure, will that satisfy the testing proposed here? Was that the question?

MR. RODRIGUEZ: That is correct, the test and certifies the product per AHRI 555 90, will that meet the requirements as being proposed here? Because from our perspective it seems like it would be a lot of unnecessary effort, a waste of resources if we have to test to multiple standards if the ultimate goal is to certify performance as requested through this program.

MR. RIDER: Yeah, so the only thing that we're proposing in these Regulations here is to test the 550 590. You would then, after you perform the test, you would need to take that data, the results, and submit it to the Energy Commission through the certification process. There's no cost to that. Basically you enter it into an Excel Spreadsheet and we take that information and we upload it into the publicly available database. So there's an additional step that you have to get the results to us, but

that's essentially it.

MR. ROY: Okay, thank you.

MR. RIDER: Okay. Re-muted. I can try Eddie one more time. Eddie, are you there? Did you want to say something on this? Mr. Roy, did you want to speak again? No? Okay.

MR. ROY: No, thank you for the opportunity to submit written comments by June 6th, thank you.

MR. RIDER: Great. Well, I guess that means we all get to go eat lunch. So thank you to all the stakeholders for taking the time to come here and discuss this proposal. I look forward to talking to you up through the process as we continue to try to get these products into the Appliance Efficiency Database. So thank you very much.

MR. SINGH: Thank you, Ken. And we'll be back at 1:00. Thank you.

(Recess at 11:44 a.m.)

(Reconvene at 1:01 p.m.)

MR. SINGH: Good afternoon. We are back again and our next topic is air filter labeling and Josh Butzbaugh is going to present that. Josh, please make your presentation. Thank you.

MR. BUTZBAUGH: Thank you, Harinder. My name is Josh Butzbaugh. I'm working with the California Energy Commission on air filter labeling, and today I will go through some of the contents of my staff report, analysis, and the proposed requirements.

So first we will start off with a little background on Pre-rulemaking, then background on air filter labeling, the objectives of air filter labeling, regulatory approaches, proposed requirements, the supporting analysis for these requirements, and then finally next steps.

So the Commission kicked off the pre-rulemaking with an Order Instituting Rulemaking in March 2012, and then in March 2013 the Commission released an invitation to participate, offering interested parties an opportunity to provide information to the Commission on product, market and industry characteristics. And then the Commission released an invitation to submit proposals, for interested parties to submit proposals on standards, test procedures, labeling requirements, and other measures to improve efficiency for those products that were identified in the OIR.

This is a diagram of our rulemaking and pre-rulemaking process. As you can see in the blue box, that's the stage we're in today, we're having a workshop on the Staff Report and the Proposed Regulations.

So why air filter labeling? Well, air filters prevent the build-up of particulates and HVAC equipment by capturing these particulates from the airstream before they reach the components and the HVAC equipment. And by doing this, air filters allow the equipment to run efficiently and they prevent damage to the components. However, in doing so, air filters decrease air flow in the HVAC system, and if this decrease, or this resistance is excessive, it can damage HVAC equipment and increase energy use. For example, with brushless permanent magnet motor, if the resistance is excessive, the motor will increase power and that will increase energy.

So people need the information on particulate capture and air filter resistance to make rational decisions on air filter selection.

So a little background on current labeling. It is focused predominantly on

particle efficiency, not pressure drop. Some common ratings you'll see in the market are Minimum Efficiency Reporting Value, or MERV, which indicates a filter's ability to remove particles .3 to 10 microns in size from the airstream. There's also Micro Particle Performance Rating, which is exclusive to 3M air filters, it focuses on small particulates. And then there's filter performance reading, which is exclusive to the home depot, which is our weighted performance rating between small particulates, large particulates, and air filter lifetime.

So the California IOUs did a market survey in 2012 and the results indicated that 28 percent of air filters on the market had no label and, then, of the rest they had a combination of only MPR, only MERV, and only FPR, or sometimes they had two labels on them.

Now I'd like to go through the Title 24 air filter requirements. So Title 24 requires air filters to have a MERV 6 or greater, or a particle size efficiency rating equal to or greater than 50 percent in the three to 10 micron range. In addition, Title 24 requires pressure

drop to conform to the maximum allowable clean filter pressure drop as determined in some other sections which state the initial pressure drop needs to be .05 inches water column at the design airflow rate, or the air handler unit needs to have efficacy equal to or less than .58 watts per cfm, or cubic feet per meter.

The problem is that each vac system designers do not have the information on air filter models to determine pressure drop. So they aren't sure how to comply and design their systems to meet Title 24.

Title 24 also requires a label on the return location where the air filter is installed, and this label would include airflow rate and then the initial resistance in inches water column (in. w.c.) at that design airflow rate. And this is an example here on the slide.

And then last, but not least, Title 24 requires the system to be provided with an air filter that's labeled to disclose the efficiency and pressure drop readings that demonstrate conformance with the other requirements. And the issue with this is that this requirement only applies to new HVAC installations, it does not

address air filter replacements, and the vast majority of air filter purchases are replacements.

So for objectives of labeling in general, this is a mission statement, but in summary we want the right air filters to go in the right equipment. And we'll get a little bit more specific with our different actors. First we have consumers: we want consumers to be able to identify the appropriate air filter for their HVAC system, this means having a label at the point of purchase on the air filter itself, as well as a repository of air filter performance information. We want a level playing field for comparing air filter products, and we want the label easy to use and not overwhelming for consumers, so that way they feel comfortable using this label.

For HVAC designers, we want them to have a repository of air filter performance information so that way they can identify the filter for HVAC equipment and system design when they are in the process of designing these systems. So this means we want them to have the ability to balance filter airflow resistance with

HVAC equipment size, duct work, and other device losses. We want to make it easy for HVAC system designers to comply with Title 24 regulations and we want them to have a level playing field for comparing air filter models.

And then last but not least, Building Inspectors, we wanted to make it easy for them to facilitate the enforcement of Title 24 Regulations and this means aligning the label with measurements included in the Title 24 requirements.

So the Commission looked into different regulatory approaches for this labeling initiative. The manufacturer of 3M submitted a proposal recommending the Commission to use PM 2.5 as the efficiency metric and to use average lifetime resistance as the pressure drop metric. The California IOUs and NRDC recommended using MERV for particle efficiency, and initial pressure drop in inches water column measured at phase velocities of 300 and 500 feet per minute for pressure drop.

The Commission also looked at the AHRI 680 Standard Rating. This is the label that's included in the Standard. It includes initial

resistance across airflow rates and 400 cfm increments. It also includes final resistance at the maximum rated airflow rate, dust holding capacity and particle size efficiency across three particle size ranges.

So after looking at these regulatory approaches, the Proposal's AHRI's Standard 680 label, and considering our objectives, we came up with our proposed requirements that I'm going to go through right now. The first part is Data Certification and then the second part is the label itself.

So for Data Certification, we are proposing requiring MERV Particle Size Efficiency for 4.3 to 1 micron particle sizes, 1 to 3 micron particle size, and 3 to 10 micron particle size, so the three particle size bins that you see in the test procedures. And then also dust holding capacity. And to align with Title 24, we're providing manufacturers with the ability to choose which standard they would like to use for these metrics, so either AHRI 680, or ASHRAE 52.2, whichever one they decide to use, they just need to make sure they declare it.

These are other data certification

requirements that the Commission has proposed requiring: maximum rated airflow rate and cubic feet per minute, initial resistance at 400 cubic feet per minute, 800 cubic feet per minute, and 1,200, 1,600, 2,000, or the maximum rated airflow rate, and these are in inches water column. And then also final resistance at 2,000 cubic feet per minute, or a maximum rated airflow rate in inches water column. And the test procedure we're requiring would be AHRI 680, which also aligns with Title 24.

I do want to raise that size was not included in the proposed requirements and I'd like to receive your feedback as to whether or not size should be included. It was something that we happened to miss and something that some folks had voiced that should be included, so I'd like to get your feedback on that.

So moving from data certification to the label format, this is an example of the label in our proposed requirements. We would like it printed or labeled on the air filter itself and if the packaging obscures the label, then also print it on the packaging. And the idea is that consumers and retailers can use this label to

match a spent air filter with a new replacement air filter, and we'll get to that in our next slide.

So this is a hypothetical example. You have a 16″ X 24″ X 1″ air filter, it has a MERV of 10, and then it has these initial resistance metrics across these airflow rates. And in this particular example, I cut off the 1,600 and 2,000 bins because the maximum rated airflow rate for this particular hypothetical example is 1,400. And if this seems like the right approach, I'd like to hear feedback as to whether or not the additional bins that are not applicable should be included, or we should cut those out of the label.

So a consumer deciding how to replace his or her air filter would first look at an exact match for size, then look at an exact match or less for the pressure drop across the airflow rate or rates, then, last but not least, look for an exact match or greater for MERV. A building inspector would look to see if the MERV is equal to or greater than six and then the initial pressure drop for the design air flow rate is an exact match or less compared to what's on the

filter label.

So I'm not going to go through my entire analysis since I don't want to bore you to death, but I did include it in this in case anyone has any questions. First, I determined the energy consumption of residential HVAC in California that uses air filters, and then I determined the savings using 50 percent non-compliance and one percent energy savings, these were relatively conservative metrics that I found in my research. Then we determined the cost based on the information submitted into our docket. And then we reached our cost-effectiveness analysis indicating that the net benefit is $1.20 per year per household, or nearly $10 million to the state.

So for our next steps, we will consider input from today's workshop and written comments. The written comments are due June 6th. We will revise the staff report analysis and proposed requirements as necessary based on feedback. And Commission staff are available at any time to discussion questions or concerns. Please feel free to get a hold of me or Harinder or Ken or Tuan, anyone on the team, and we will address

your comments. So with that, this is my contact information and we'd like to open up the mics for verbal comments.

MR. SINGH: Thank you, Josh. Anybody in the room wants to make comments, please submit your blue cards.

MR. RIDER: Yeah, and also anyone on the phone, if you want to raise your hand to speak as earlier, I will unmute you and I'll call your name, and we're going to do people in the room first.

MR. SINGH: Yeah. Jeffrey from California IOUs, please go ahead.

MR. STEUBEN: Thank you. Good afternoon, everyone. My name is Jeff and I'm representing the California IOUs. Thank you, Josh, for that great summary of your Staff Report. As you mentioned in the background, that the IOUs had proposed a slightly different label proposition, and in further review of the Title 24 language, and sort of looking at the AHRI 680 test method that was specific in Title 24, we do find that the CEC Staff Report does provide the best possible way to get to Title 24 compliance, so we do support the CEC proposal.

I wanted to make sort of two quick other comments. So you raised a question around filter size, so as you mention, a consumer going to buy a filter, that that information is clearly specified on the product because that's sort of the most important information from the consumer perspective, it may be something that you would want to include in the label itself, but I would definitely agree that it should be included in the online data submission so that that information is available in that database, and an HVAC designer can convert cubic feet per minute into phased velocity using the area of the filter.

I also just wanted to mention that, you know, there was some discussion around the use of MERV for filter efficiency, as well as the particle efficiency bins. We do think that the MERV is the best possible option for consumers to talk about filter efficiency rather than a series of percentages with the particle efficiency bins, so where possible, we think that MERV should be used instead of particle efficiency.

And lastly, just there are some clarifications that we'd like to make in the

Title 24 language, which we will provide in our written comment, but since we're talking about Title 20 today, I'm not going to go into great detail there, but we do think that there is some language that we can update to provide sort of better clarification around the way that these two standards would interact. Thank you.

MR. SINGH: Thank you. Anybody else in the room? Okay, Ken.

MR. RIDER: Yeah, George would like to make a comment, so I'm going to go ahead and unmute him. I think he just wanted to know some information about the size, but I'll let him ask the question. George, are you there?

MR. NESBITT: Yeah. George Nesbitt, HERS Rater. Can you hear me?

MR. RIDER: Yes.

MR. NESBITT: Okay. Yeah, I didn't quite understand what you were saying in reference to size, whether, I mean, I would think you need data that is dependent on the size of the filter, and so that wasn't quite clear.

MR. BUTZBAUGH: I agree with what you've just said and it was an omission on our part. I just wanted to hear comments as to whether or not

others supported the idea of including size in the data certification and the label. So it sounds like you believe size should be included.

MR. NESBITT: Yeah, I mean, I think that if -- I mean, obviously size is relevant. From a consumer standpoint, they're going and looking for a filter of a certain size. I also think probably MERV is the easiest, you know, simple metric for them to figure out one number is easier and in that sense I think because of the new labeling, they do also need the pressure drop, those are really the only things they need. From a designer standpoint, you know, I need to know pressure drop at velocities, that's information that is often hard to find. I may or may not care more about detailed particle sizes. The MERV rating is required, you know, Calgreen, ASHRAE 6222, various other green, you know, so many things are pointing to MERV that that is probably most important. I'm just thinking, and obviously size, and I think giving data for a specific filter or a specific size, so say giving airflow information that wouldn't match that filter, so too many cfm for the size of the filter, that would go beyond, say, a phased

velocity of 500, we shouldn't do because I think we partly need to reinforce that proper design requires proper sizing and you can't put too small of a filter on your system and get proper airflow, and that's the whole point. So those are my thoughts.

MR. BUTZBAUGH: Thank you, George. Do the airflow rates work for you in 400 increments? Are you saying that those do? Or that those don't work for you?

MR. NESBITT: As someone who designs and installs HVAC, yes, that information is just often not available; so, yes, I need to know. And I think perhaps even the consumer -- I'm not sure if the labeling -- the thing is, I think for consumers the labeling requirement is actually not just for new installs, it also applies to Alterations and Changeouts, that section of the Code is part of Alterations and Changeouts. I guess it's specifying a pressure drop, but what they don't necessarily know is the airflow. And so I'm not sure if airflow is part of that label. So a consumer would have to be looking for a MERV, a pressure drop at the airflow their system is designed at. And as a designer, I'm designing

for an airflow, I'm looking for a pressure drop. And 400 increments is probably okay because you can always interpret, you know, that or a chart that shows it through the range of airflows. But obviously it's not useful or good to have cfm's that are really not valid for the filter. So, yeah.

MR. BUTZBAUGH: Thank you, George.

MR. RIDER: Thanks, George. Let's see if we have – I don't know how to say his first name, but last name is Roy. Annirudh, maybe. I think that might have been from earlier.

MR. BUTZBAUGH: I think he's delved into this, as well.

MR. RIDER: Okay. Well, you can go ahead and speak, then, you're unmuted.

MR. ROY: Okay, thank you. So I would just like to state that AHRI, the Air-Conditioning, the Heating and the Refrigeration Institute does represent a significant amount of air filter manufacturers and, although the proposed requirements, you know, they seem to have significant energy savings, we feel that requiring manufacturers to provide this information on the packaging would make it a very

California specific and be onerous for manufacturers because they typically tend to make a label that is shipped to several states, and is not region-specific. Also, you know, requiring this information on the air filter label could in some instances because of the amount of information they are requiring, make it illegible and serve no value to the customer over a period of time. So how we feel this could be addressed instead is by requiring this information to be presented in a website and manufacturers, particularly on the packaging, that they provide their website information, as well, on those packages. And that way, you know, that information would be available readily to the consumer. These days consumers can access the Internet from anywhere, and so if they wanted to see that information, they could just scan the QR code or just go to the manufacturer's website and get that information. Also, you know, I've heard that some of the stakeholders over here would prefer to deviate from the requirements in Title 24 and we would recommend that CEC consider keeping those requirements consistent, the Title 20 requirements consistent with the Title 24

requirements, as they are just about to go into effect on July 1st and so it would be very onerous for our manufacturers to try and comply with two separate requirements when it's the same state. It just doesn't make sense for them to make air filters that comply on one hand with Title 24, and then there's a separate set of requirements that they have to comply with for Title 20 just a year and a half later. So I would recommend that you keep that in mind and we'll make sure to submit that in our written comments, as well.

MR. RIDER: Yeah, that would be great if you could submit that in written comment because, when we design these requirements, we wanted them to work with the Title 24 requirements. So if you can detail that in your written comment, we'd appreciate it, and so we could take a closer look at what you're getting at.

MR. ROY: Okay. Thank you.

MR. RIDER: Great. I don't see anyone else with a hand raised, so maybe what I'll do is I'll just go ahead and unmute everyone. If you're not intending to say anything at this time on air filters, just make sure your phone is

muted so you don't accidentally say something you regret.

MR. BUTZBAUGH: And if you're looking for other ideas for your comment letters, we'd like to hear whether or not the label should be standardized on one edge of the filter or another edge. We'd like to hear about the cfm increments of 400, whether or not those make sense. So if you're looking for ideas, those are two that you can address.

MR. RIDER: Okay, I'm going to unmute the lines. If you would like to respond to what Josh just said, or something from earlier on air filters, now would be a great time.

MR. NESBITT: This is George Nesbitt.

MR. RIDER: Hi George. Go ahead.

MR. NESBITT: I think what edge or what surface it's labeled on the filter itself doesn't matter because there is no standard -- I mean, it depends on the filter, location of the filter grill. I mean, I suppose the phase the air enters makes more sense, but if it's a filter that goes into a slot, there's no convention for which edge faces out. So, you know, it may be just on the inlet face is the one that makes the

most sense certainly for like a drop-down filter grill.

MR. BUTZBAUGH: So in those cases, someone would actually have to take the spent air filter out to see the size dimensions and the label information. Is that what you're saying?

MR. NESBITT: Yeah, unless it's on the face that the air enters the filter, but that only works in, say, a drop down filter grill where you can open up the grill and then you're actually looking at that surface; whereas, in a filter slot, which is also common, you're looking at the edge, or you're looking at the short edge or you're looking at the long edge.

MR. BUTZBAUGH: Right.

MR. NESBITT: Yeah, unless you label it on all edges. But for a consumer, it may be more of a package label. I mean, there could be a package label as well as what's on the filter, and obviously how they package it would affect whether or not you could see the label with it packaged.

MR. BUTZBAUGH: All right. Thank you, George.

MR. RIDER: Also anyone in the room, I

mean, I think if we don't get any further comment, we'll wrap this up.

MR. SINGH: Okay, thank you. I don't see anybody with further comments. We have scheduled dimming ballasts at 2:30, so we'll take a short break for an hour –

MR. RIDER: Short long break.

MR. SINGH: Yes. And then we'll be back at 2:30. So, thank you.

(Recess at 1:31 p.m.)

(Reconvene at 2:31 p.m.)

MR. SINGH: Good afternoon, we are back. And now the next topic is dimming ballasts and Ken Rider will present that. Ken?

MR. RIDER: Yeah, hi. I'm Ken Rider, an Electrical Engineer with the Appliance Efficiency Program, and I'm going to be making a presentation on the Dimming Ballasts Staff Report that was released a few weeks ago. I'm going to go into the Pre-rulemaking first, and then some background on dimming ballasts, and then talk a little bit about the efficiency opportunities out there to improve dimming ballasts, discuss some of the regulatory approaches I analyzed in trying to figure out how to write the regulation, then

I'll get into what staff did propose in the Staff Report, the cost and savings associated with that proposal, and then next steps.

So the Pre-rulemaking process, we started with an Order Instituting Rulemaking back in 2012 that identified dimming ballasts as a measure, we then asked for data and an invitation to participate and received data for dimming ballasts, and then we also did an invitation to submit proposals in June of last year and we received proposals to adopt minimum efficiency standards for dimming ballasts.

Those steps are shown here and you can see that the box we're in right now is to host the workshop, and this is that workshop. The goal is to discuss the content of the Staff Report that hopefully everyone has had the chance to read and digest a little bit. And then the next step will be to receive comments.

So what is a dimming ballast? A dimming ballast, and specifically a fluorescent dimming ballast, is a ballast designed to operate a fluorescent lamp at less than 100 percent output. And today we're specifically talking about dimming ballasts that can dim to 50 percent or

less of the lamp's full output. And these are the types of fluorescent ballasts that are currently not regulated by the U.S. DOE. Other ones are fixed-output and dimming ballasts that dim, but not below 50 percent or currently regulated by the U.S. Department of Energy.

There's a few different kinds of dimmable ballasts. There are dimmable ballasts that can dim in continuous ranges, there are ones that can do discrete steps like full, and then 30 percent, and that's it. And there are also kinds that switch a certain number of connected lamps on or off, so you might imagine a four lamp ballast that can just turn off two of those lamps that would be like a 50 percent dimming ballast.

There are also a number of different control mechanisms for setting the dimming levels, some examples of those include low voltage DC, usually zero to 10 volts, phase chopping and digital communications.

Historically, dimming ballasts have represented a fairly small fraction of all ballast shipments. DOE's analysis back in 2005 showed about one percent of all fluorescent ballasts or dimming ballasts by shipments.

However, California's Title 24 Building Efficiency Regulations that will come into effect in July of this year will cause a market shift toward a greater number of those dimming ballasts.

Dimming ballasts themselves are an energy saving technology, an opportunity. They allow light tuning, they allow daylight adjustments, and just all sorts of different dimming opportunities where full light output is not necessary. However, dimming ballasts in certain situations can cause energy consumption increase where they're put into fixtures that do not need dimming, or cannot be dimmed because full light output is necessary.

This is just a section of Title 24 that requires the use of dimming ballasts and I just thought I would include that. You can see that it requires that those dimming ballasts have the ability to dim below 50 percent, so, again, not only does it encourage dimming ballasts, but it specifically encourages the type of dimming ballasts that do not have standards for them.

The California IOUs, I learned this number is incorrect, it's 34, but the IOUs show

test data for 34 continuous dimming ballasts, and those ballasts were tested across the entire dimming range at five percent increments of input power. And the data revealed significant efficiency variation and opportunities. For example, dimming ballasts can be as much as 10 percent less efficient, one versus the other, and also when compared to fixed-output lamps.

So what I've got here are two -- these are two three lamp products that were tested, they have similar functionality. You can see that the Y axis here is input power that is power coming into the ballasts, the X axis is arc power, so that would be power leaving the ballasts going into the lamp. You can see that this top line here is far less efficient than the bottom line across the board, so one that shows an opportunity to be more efficient at any dimming range, but also this particular product has Cathode Cut-out which you can see this odd bend right here is actually Cathode Cut-out, and I think I'll discuss that a little bit later in this presentation.

There is also some opportunity in standby power, you can see there are a few of the

different lighting technologies here, and LVDC is just shorthand for Low Voltage DC. You can see that the technology type used to control the ballasts correlates with the amount of standby power, so the Y axis is the Standby Power, the X axis is Max Arc Power, and so these are more powerful lamps and less powerful lamps. But you can see even within kind of the technology with the highest standby power quite a bit of variation and, you know, the ability to use as little as it looks like about 0.4 watts, whereas some are almost near 2.0 watts, so you can see there's quite a number of different power levels there and opportunity.

This is a plot of energy use versus max arc power. This is in kilowatt hours here on the Y axis and this is in watts on the X axis. And so the dots represent the test date that I mentioned, the 34 test points, and the red line represents what staff is proposing in the staff proposal. And then you'll notice that the blue dots have different sizes, the larger the dot, the more expensive the ballast is, the smaller the dot, the least expensive. So this would be around $25.00, $30.00, whereas like this dot, or

this dot, or this dot might be like more than $110.00 or $100.00. So what this graph kind of shows is that there's not -- it's not the more expensive products that use less energy, in fact, it looks like it's a mish mash, there's expensive cheap products on both sides of this line, so it didn't really seem like there was a lot of correlation between price and energy use.

So the opportunities again, just to summarize, Improved BLE -- BLE is short for basically ballast efficiency and you can get better efficiency using better components, better designs of the ballast. Cathode Cut-out is an opportunity and what that is is essentially these lamps have a heater that allow the lamps to operate at dim states without getting a lot of flicker or failure. And that's necessary at certain levels of dimness, but in other parts of the dimming curve, it's not necessary and so some ballasts go ahead and turn that heating off when it's not necessary, others don't. And so there's an opportunity to improve efficiency by turning off this heat when it's not necessary. And lastly, there's an opportunity to increase the standby power, and because a lot of the high

standby power ballast were digitally controlled, the opportunities are to introduce sleep modes and enhance software protocols and communication protocols.

So with that data, the Energy Commission investigated several different methods of regulating or trying to compel increased energy efficiency in these products. We looked at just expanding what's currently required for fixed output ballasts, just expanding that requirement to dimming ballasts with only full output. The IOUs submitted a proposal to regulate BLE at 180 and 50 percent. It says "output," I think that's actually a mistake, I think it was on "input power." They recommended a separate standby mode power limit and also requirements to minimize flicker.

I also investigated and staff investigated a design standard that would just require Cathode Cut-out, and we also looked at an annual energy use performance standard, which was on a few slides back, and that would aggregate the BLE efficiency at 180 and 50 percent dimming points, along with the standby power.

And in considering these alternatives, we

looked at how much energy each of these approaches would save and also how many of the -- and again, this should be 34 -- products complied, and found that the annual energy use performance standard saved the most amount of energy and that's why we decided to select it. It also happened to have the largest number of products in that test data that complied.

So the scope of the standard would include, as I said in the beginning, all dimming ballasts that dim to 50 percent or below, and they would have to meet –- their annual energy use would have to be less than or equal to this formula here.

And so how is annual energy use calculated? So the annual energy use is calculated by taking the input power measurements from the test procedure and multiplying them by time constants. And so this equation here shows how that could be done. P_{100} stands for the power at 100 percent, like full light output, P_{80} would be like the power consumption at 80 percent dimming, and so forth, and then P_0 is the standby power. And then all these ts are the amount of time expected to be spent at each one of these

power levels. And in the Proposed Standards, you don't measure the t values, they're provided in a table in the Proposed Regulations. And this is that table. This table also -- not all dimming ballasts that dim below 50 percent will be able to dim 80 percent and 50 percent, and so there's some adjustments here if for some reason that ballast doesn't have that functionality.

The test procedure proposed is the current DOE test procedure for fixed output ballasts, it's found in 10 C.F.R. 430.23(q), but staff proposes some modifications to that and I'll actually get into it in a lot more detail about those in the next slides.

So one is the selection of appropriate control for the dimming ballasts. The proposed standards set an order of preference on which lighting control to select first, and the highest priority is a lighting control made by the same manufacturer as the ballast. If the manufacturer does not make a lighting control, then a lighting control recommended by the manufacturer should be selected. And if the manufacturer of the ballast neither makes nor recommends a lighting control, then a lab technician should select an

appropriate control. And that control should be compatible with all of the features of the ballast, which should have the minimum amount of additional features outside of what the ballast can do.

The DOE test procedure only tests at full output, so staff is proposing to amend that and also take measurements at 80 percent and 50 percent of maximum arc power, and that is to be achieved using the controls, the selected controls. For dimming ballasts that cannot be tuned to those levels, the idea here is that you would use the next closest level, so at 80 percent, if your dimming ballast could dim to 82 percent, but not 80, then you would test at 82 percent. And the Proposed Regulations define a tolerance range, and so if your dimming ballast can dim to 80 percent, then the next closest value between 65 and 90 percent should be used for that test point. And for the 50 percent testing point, the range is 35 percent to 65 percent.

The staff also expanded on standby mode testing, which is I believe in the DOE test method. It describes how to set the controls to

achieve the standby mode, it also requires a 90-minute waiting period before measuring the standby mode and really the idea behind that is to allow digital communication and smart controllers to go to sleep. It also sets a minimum sampling rate and test period to determine the average standby mode power.

The proposal would also require manufacturers to submit data to the Energy Commission, report it, to be included in the Appliance Efficiency Database. There's some basic information not shown in this slide that would be required, like manufacturer name and model number, and things like voltage, and just some background information on the ballasts. And we would also require that the power be reported and information necessary to show that the ballast complies with the Regulations. And we also propose to require power factor be reported at full output.

And was shown in that graph with the red line and the different sized blue dots, the market information and analysis did not show any correlation between cost and efficiency. And staff also looked into potential costs by looking

to other sources. We looked at the DOE analysis on Cathode Cut-out and improved efficiency for Program Start ballasts, and the DOE did characterize some costs for those. Specifically, they characterized a $.89 incremental cost for program start ballasts to incorporate Cathode Cut-out and to improve their BLE. And so that DOE data was for a two-amp ballast and was $.89, and to adjust for three, four and one lamp ballasts, we assumed a $.10 differential by the number of lamps just because more powerful components usually are more expensive components.

So the lifecycle analysis shows that the Proposed Regulations are very cost-effective. You can see that for four lamp ballasts, the improvements from a non-compliant product to a compliant product saves on average over the lifetime -- and note, these are not discounted numbers, so with a grain of salt, but it's $34.58 of savings for four lamp ballasts that moves from non-compliance to just complying, with annual savings of $2.66. So you can see the payback is quick and many-fold, the incremental costs.

When scaled up to the entire state, you can see that -- and this was in a previous slide

-- that the energy savings would be 388 gigawatt hours a year. This is assuming some pretty high number of shipments and, again, this isn't consistent with historical shipments, this is assuming quite a number of new ballasts being dimming ballasts because of the Title 24 Regulations, Building Standards.

So with that, the next steps in this process are to take input from today's workshop and from written comments received by or before June 6, 2014, and we will take all that input on our proposals and our analysis and update them accordingly. And then we'll go to the next step in the process, which was shown in that earlier slide.

And I also want to emphasize that staff is always available to discuss the proposal, any questions, any concerns, anything you want to discuss about it, please contact me, I'm the Lead on this product, I've put my email and my phone number on this slide. Just below that is the emails address to the Docket to submit written comment, and also the Docket number, be sure to include that Docket number in the subject line. And we look forward to receiving your comments

both today and in writing. With that, that concludes my presentation, so Harinder, did you get any blue cards?

MR. SINGH: Thank you, Ken. Yes, I have Stephen Irving from Lutron Electronics.

MR. IRVING: Thank you. My name is Steve Irving. I'm representing Lutron Electronics. And on behalf of Lutron, I thank you for the opportunity to provide comments on the draft proposed regulations for fluorescent dimming ballasts.

In these brief comments, I will identify key areas where the proposal may actually work against California's goal of lowering overall energy consumption. In addition to these comments, we intend to provide specific written comments before the June 6th deadline.

First, proposed annual energy usage limits do not properly account for different applications of fluorescent lighting systems, namely ballasts that can operate more than one lamp, often referred to as multi-lamped ballasts. A common three lamp fixture using one three lamp ballast will always use less power than the same fixture using three single lamp ballasts of the

same efficiency. However, the proposed standards strongly favors single lamped ballasts which will result in a higher overall energy usage. This can be seen in the CEC data as the total wattage increases beyond one lamp configurations, the percentage of compliant ballasts decrease significantly. Although there were fewer samples tested, it still appears that the common configuration of three lamp 32 watt ballasts only has a single sample which complies. We need to ensure that there are multiple models at every application which meet the proposed standard, otherwise multiple ballasts may be installed, increasing overall energy usage.

Second, the proposed annual energy usage formula discourages the use of digital dimming ballasts. These ballasts have a number of energy saving advantages, including the ability to program occupancy sensed and daylight zones, and to implement demand response functions. These ballasts do have an on-state power consumption, and therefore would need to have an even higher operating efficiency to comply, compared with their analog counterparts. These ballasts should not be punished for their expanded utility, as

the effect will be to lose these advantages and all associated energy savings.

Working through NEMA, Lutron is collaborating with Energy Solutions to continue to make improvements in the proposal. We are also happy to work directly with the CEC to discuss this topic. Thank you for the opportunity to make comments today.

MR. RIDER: Of course, thank you.

MR. SINGH: Thank you, Stephen. Next is Daniel Young from IOUs.

MR. YOUNG: Hi. I'm Daniel Young representing the California Investor-Owned Utilities, Statewide Codes and Standards Team. So first I wanted to just commend the CEC on their efforts in developing the analysis that was presented today and for proposing highly cost-effective stringent standards that we believe will make a big difference on energy use in California.

And so, before I start with some of my more detailed comments, I wanted to kind of reaffirm some of the assumptions that Ken has laid out here and, you know, namely that with new revisions to Title 24 California Building Codes,

starting July 1st of this year we expect to see a very significant increase in dimming ballast shipments in the State of California, and without a standard in place in the State of California, these are otherwise unregulated products and savings from the Title 24 Standard may actually fall well short of expectations because, when operating at full output, these products are not more efficient than fixed output ballasts, particularly with no standard to enforce.

The other thing I wanted to mention is the significant opportunity for energy savings through better control of Cathode heating which Ken also has already mentioned, but, actually, do you mind flipping to slide 9? So this is the graph of two example ballasts that came from the SCE test data that shows, again, the red ballast less efficient than the green ballast here, and that wedge that Ken described as Cathode heating up at around 60 watts of arc power and above. It shows a pretty significant opportunity there for improvement. And so this opportunity is actually fairly well documented in a NEMA document, LL9, which we'll reference in comments that we'll submit for this rulemaking. But basically that

document shows about a 5.6 watt per lamp gap in what is required versus what could be used to operate a lamp when it's above 155 milliamps, so basically anywhere from 100 percent down to it could be from, you know, 60 percent to 70 percent of full output. In that whole zone, there is a 5.6 watt per lamp buffer that you either could use, or you don't have to use, and so that in and of itself is a significant energy savings opportunity. When you're looking at one lamp valves, that's 5.6 watts, but when you're looking at four lamp ballasts, that's over 20 watts just right there. And that's just through better control of cathode heating and that speaks nothing to just the general efficiency gains that you're seeing in this example, below 60 watts of arc power where the green line is just clearly below the red line everywhere. So I wanted to just emphasize that point.

The other comment we wanted to make was about a proposal for a weighted or integrated BLE metric for consideration, and that takes us away from the annual energy use metric, which we believe is less useful for kind of integrating with the Title 24 requirement and the modeling

that's required of system designers for meeting those requirements, and so we believe that a weighted BLE with a separate standby mode component is a better metric for evaluating the efficiency of these products.

A couple other things here, so power factor, CCS proposed that power factor should be tested and listed, we would actually like to see that as a requirement of 0.9 power factor at basically all three operating mode measurement points, so 100 percent, 80 percent and 50 percent, and we would like the requirement to be 0.9 power factor which, according to our test data, none of the products that were tested should have any issues with meeting that requirement; all of them were well above that. But the goal here is, again, just to ensure that new products also maintain that level of performance and so there's no drop-off.

We also would like to add a flicker requirement to the standard, so during testing we did observe flicker in the very low dimming ranges, so basically for every single ballast we measured the power consumption, we measured the efficiency until we dimmed it to where the lamp

started flickering and, so, it was assumed to not be able to dim any further. And so that suggests that not only is the lamp flickering when it's at its very lowest operating point, but also somewhere above that there might also be some "non-perceptible flicker" that may still have negative impacts and is something that we would certainly want to address because, if flicker is a problem with these systems, then people will not be dimming them when they're installed. And then they're not generating the energy savings that they're designed to generate.

And so the IOUs are going to continue to work on this very important issue and will be starting flicker testing on fluorescent ballasts later this month. And so for the time being, we would recommend that the flicker specification proposed in the case report, which was matching the previous Title 24 requirement and the current Title 20 controls requirement of 30 percent maximum amplitude modulation for frequencies under 200 Hz, be adopted as part of the standard and, as I said, once that testing is completed we'll submit that to the CEC for consideration and we can work on how that will be implemented.

Finally, I think the last thing here we wanted to just be careful a little bit that we make sure that the actual standard levels being proposed by CEC are achieving the desired efficiency and stringency. And as an example, I think it's Slide 20 here, if you don't mind, the very bottom bullet here, there's a window of 65 percent to 90 percent for a ballast that can only dim to 80 percent, and likewise for ballasts that dimmed to 50 percent, there's a window from 35 percent to 65 percent, and I think there might be a slight issue here where that range actually advantages or disadvantages certain ballasts that can only hit either on the high or the low end of that range, it makes it either easier or harder for them to meet the standard. And so there's small things like that that, again, they're certainly solvable, but need to be carefully vetted before the Standard is finalized.

With that, again, I'd just like to thank CEC for the opportunity to provide comment today and for the hard work that went into the proposal and the great energy savings that are sure to be achieved through this Standard. Thanks.

MR. RIDER: Thank you, Dan. Anyone else

in the room? Okay, Pierre.

MR. SINGH: Pierre.

MR. DELFORGE: Pierre Delforge, NRDC. I would like to thank the Energy Commission for developing this proposal and for the opportunity for stakeholders and for NRDC to participate in the process.

As previous speakers have commented, this is a fast growing market with a Title 24 requirement that's coming into force very soon, and given that there is a clear difference between products, in terms of efficiency, these products are a great candidate for standards and this is the right time to set the standards.

We are in general support of the CEC proposal and we encourage CEC to move forward rapidly on this proposal. I would just like to make a few specific points.

On power factor and flicker requirements, we support your comments on setting requirements for these two points. You know, power factor is an important way to save energy and there is no reason, especially given the test data that was shown, that we wouldn't put a .9 requirement on those. Light quality requirement is also very

important for customer satisfaction and for the success of standards, and we also very much support this requirement.

My last point is talking about standby power and, while we appreciate the additional functionality of digital dimming ballasts, this should not be at the expense of low power standby. There are technologies today available to have very low power standby and we think it's important, given the growing standby power in homes and businesses today that everything is done to minimize this, especially in new standards. Thank you.

MR. RIDER: Thank you.

MR. SINGH: Thank you, Pierre. Jon McHugh.

MR. MCHUGH: Thank you. First off, I'd like to voice my support of the Standards. I was involved in the 2013 Title 24 development and the requirements for essentially dimming ballasts in all locations is one of the largest measures that was in the 2013 standards. And this Title 20 Standard actually helps us secure those energy savings, so I want to acknowledge all the effort and all the potential savings associated with

this standard.

I've also been involved over the years in the requirements for daylighting controls in both Title 24 and the ASHRAE Standards, so this is something I've worked on for years, actually going back to -- I was in graduate school working on my thesis on daylighting, so a long history associated with this. And as part of this, I've done a number of research on the issues that make for successful and unsuccessful daylighting systems. And the two primary issues associated with successful daylighting systems, at least in terms of the controls, has to do with the placement of the control and the adjustment of the control. The third one is the issue of flicker. A number of very well engineered, nicely designed systems that basically took a lot of thought, a lot of additional expense, I don't know if you know this story about, you know, for a lack of a nail, the horse's shoe was lost, the issue associated with flickering fluorescent systems has been the downfall of a number of daylighting systems where essentially the controls were disabled due to flickering of lamps when the dimming was below a certain level. So

my recommendation is that flicker be part of the standard, that it be at the very least a test and list standard at different dimming levels, and similar to what Energy Star has, which they're collecting this information, but I would say the difference is that I'd like to see that we not only collect information in terms of amplitude modulation, but amplitude modulation filtered at different frequencies because, as was mentioned earlier by Dan, the current definition of low flicker operation is amplitude modulation, which some people would call percent flicker, at frequencies less than 200 Hz. So if we could be collecting the information, potentially unfiltered data, and the California Lighting Technology Center has worked with us in terms of developing a public domain, filtering software that would take the time varying lighting information and then filtering that by frequency, then would be available to all users and would be filtered identically for all people submitting data. So I'm recommending that, in addition, I think this idea of an integrated ballast luminous efficiency is desirable so that we have a metric that is roughly equivalent, regardless of the

number of lamps being used. And this actually has a history that is actually fairly similar to what was in the Title 24 Standards, which they called relative system efficacy, that wasn't at different dimming levels, but it's still the same idea that you're normalizing the result so that you can use this across ballasts that are serving a different number of lamps. Thank you very much.

MR. SINGH: Thank you, Jon. Gary Fernstrom from PG&E.

MR. FERNSTROM: Thank you. Gary Fernstrom representing PG&E. I'd like to emphasize some of the points that Daniel, Pierre and Jon raised with respect to the Utilities' interest in fully understanding the performance of these products and accurately being able to estimate for rebate program purposes the savings associated with them.

So the use of BLE facilitates comparing one ballast to another and that metric would be useful to us. Secondly, having the power factor reported at different levels of lighting output is also an important metric for determining energy savings from our point of view. Thank

you.

MR. SINGH: Thank you, Gary. Anybody else in the audience who wants to make a comment?

MR. RIDER: I would just like to point out on that BLE, so the current proposal for data collection does not include directly that BLE be submitted, however, because it does require input power and arc power be reported, we can calculate BLE from those numbers. So we're not having it directly reported currently, and you may submit comments that you think it ought to be, I just want to bring up the point that you can get there from what we are proposing to collect.

MR. SINGH: Ken --

MR. RIDER: There are people on the phone.

MR. SINGH: Okay.

MR. RIDER: Let's see, earlier Alex Boesenberg with NEMA typed in a comment and asked me to read it when we got to this point, and I will read it exactly as he has written it: "We have identified two key concerns regarding the proposal and have been working with the IOU consultants and SCE employees who developed it: 1) we are concerned that the very high frequency

and very low power levels being measured have inherent potential for substantial inaccuracies, potentially as much as 100 percent. This represents a concern for reporting, repeatability, and enforcement; 2) Cathode Cut-out is central to the proposal and is a matter intertwined with intellectual property claims. Were the proposals to be adopted as is, there is potential that CEC would end up favoring a single manufacturer/patent. We are working within NEMA and with the SCE Proposal Team to see if we can reach a compromise." And he also said that both of these issues will be expanded on in greater detail in their written comment. And let's see, I've also got some other folks who want to speak. Richard Haring, I believe. Let me see if I can find you and unmute you. It looks like you're a call-in user, hold on a second. All right, Richard, if you're there?

MR. HARING: Hello.

MR. RIDER: Hello, we can hear you.

MR. HARING: Hi, I'd like to thank the CEC for the opportunity to participate in the rulemaking process.

MR. RIDER: Richard, could you introduce

yourself and your affiliation real quick?

MR. HARING: My name is Richard Haring and I'm working with Philips Lighting.

MR. RIDER: Great, go ahead.

MR. HARING: I would just like to echo the comments made by Alex. We have been working with the consultants and we have some concerns about the accuracy of some of the measurements given the high frequency and low currents involved. As Alex indicated, we will be providing written comments to address those concerns and we would appreciate some feedback on that once we submit them.

MR. RIDER: Great, and thanks for taking the call, thanks for your comments and for your time. So anyone else on the phone, if you could raise your hand if you'd like to make a comment, I will unmute you. If I don't see anyone in the next minute or two, I will unmute all the lines and see if we miss anyone. And while I wait for folks to raise their hands, I just want to say that I look forward to seeing your written comments and please include a complete rationale behind the proposals, for example, flicker, or moving the annual energy use to a different

metric, you know, the next step is literally for us to take all that and figure out what the best thing to do is for California. And the more data and the more information, the better rationalized it is, the better that I think staff will be able to realize that that's true and we will make those changes. The goal here is to save energy and so, as long as we're doing that, I think then we are open to alternative approaches.

So I don't see anyone else with raised hands, I want to unmute all the lines. So everyone is unmuted. If you couldn't raise your hand and wanted to say something, now would be your chance. Okay, not hearing anything, it looks like we have one more comment in the room. And so, Jon, if you would care to?

MR. MCHUGH: Hi. This is Jon McHugh. We heard two commenters describing the concerns about measurement accuracy with the issues associated with high frequency and low currents. I'd like to encourage folks to share their measurements, you know, essentially do a Round-robin and identify if indeed there is that discrepancy, and if they share basically their measurement method, the equipment they're using,

etc., then we could actually hopefully narrow in on a solution. So I thought I'd throw that out there.

MR. RIDER: Yeah, that's a good idea. And again, that is just exactly what I was trying to get at, which is if you have a comment, or you want to contest the analysis or the data, or the savings, or the costs, or any other aspect of the proposal, it always is better to include either an alternative proposal or data to show why that is correct, or a study, or something like that, because at the end of the day, when we rationalize and we put potentially this into law, we need to show exactly what the basis of all the decision points were. So the better substantiated it is, the more likely that we will make the change that is requested in the comment. Yes, Dan.

MR. YOUNG: Daniel Young representing the California Investor-Owned Utilities. And just to tag onto Jon's comment there, we would also like to know kind of the exact threshold of where the last two commenters suspect that measurement and accuracy may be an issue, so our understanding is that we're measuring incrementally higher

frequencies than what we're measuring at full output; likewise, marginally lower lamp currents than we would be measuring at full output. So it's not we're not jumping orders of magnitude in either direction for those two measurements. So it would be nice to know exactly where those concerns are and what our opportunities are to mitigate those.

MR. RIDER: And I would like to also point out, I've graphically represented here the input versus arc power in the test data, and you can see there's not a lot of weird wiggles or anything odd that you would expect to see if frequency, you know, when you increase arc power, with that increased frequency, you're not seeing any bending here in the data at all, so it doesn't look like that would be -- the test results certainly do not seem to support that there is this large variation. And also, you know, products didn't vary -- while there is a gap here, there wasn't a large amount of variance, you know, between similar products from similar manufacturers. So I would encourage everyone to take a look at the dataset online, as well as generate more data. But I think the

dataset that we have right now doesn't seem to suggest wide variability, especially not at the 50 and 80 percent points – and 100 percent point. Okay, again, thank you everyone for your time and for those of you who took the time to travel, I especially thank you for being here in person. Oh, there's one more comment, I'm sorry. Richard Haring. Go ahead. Oh, I have to unmute you. I think you were 27, I'm going to guess. Okay, go ahead.

MR. MENDOZA: This is Alberto Mendoza with Philips.

MR. RIDER: Oh --

MR. MENDOZA: This certainly is a very interesting opportunity to look very close to this fascinating topic, very interesting for engineers and scientists. I'm just curious, when I look through the --

MR. RIDER: Would you mind speaking a little bit more directly into the speaker? I'm having difficulty hearing you.

MR. MENDOZA: I'm sorry. It is a very interesting topic to look closer. It's a very interesting topic for scientists and engineers to understand the fundamentals for dimming even

deeper. I really appreciate the opportunity. When I'm looking at the chart on the screen between the red and the green, I wondered if one of the differences we can find when looking at the data will be the running at different frequencies. We will be doing, as you suggested, some research in terms of that, and it will be an interesting opportunity to look at how frequencies are affecting these measurements.

MR. RIDER: You mean sequences like testing from 100 percent down versus starting at zero and going up?

MR. MENDOZA: When I look, for instance, you are saying data at 20 percent of 20 watts, if the two ballasts are running 20 watts, but one may be running to, say, a number of 80 Hz and the other one is running at 70 Hz, so I wondered if that's what you see this difference is, what -- it would be an interesting thing when we have data to compare different testing from different ballasts.

MR. RIDER: Yeah, it sounds like something that could be proven scientifically, so as an issue, so I don't know if you have access to a lab or anything, but a point could be made,

I think, without a great deal of cost or time in testing this. So I look forward to hopefully getting some more information on this in the written comments that are due on June 6th.

MR. MENDOZA: Absolutely. Thank you very much.

MR. RIDER: Thank you.

MR. SINGH: Thank you very much. Ken, if you could put the slide where the Docket address is?

MR. RIDER: Yep. I did, the docket number is there. Are you thinking about some different slide?

MR. SINGH: Yes. Well, that's fine, I guess. Thank you. We recommend that you submit comments to us by June 6th and, you know, our transcripts for today's workshop will be available in a week or two, we'll try to get it as soon as possible so that if somebody wants to look at what was said in the workshop, so it's going to be available soon, and so that can be used to make comments if necessary.

So we want to thank you and we are always going to be available to answer any questions or clarifications, so we want to thank you for

participating and looking forward to your comments. Thank you and have a nice time back home. Thanks.

(Whereupon, at 3:24 p.m., the workshop was adjourned.)

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