CALIFORNIA ENERGY COMMISSION

STAFF TECHNICAL WORKSHOP #2 to DISCUSS

POSSIBLE EFFICIENCY STANDARDS AND LABELING REQUIREMENTS for

LANDSCAPE IRRIGATION EQUIPMENT

In the Matter of: _____ _____)
_____ _____) Docket No. 09-AAER-1A
AB 1881 Proceeding _____ _____)

CALIFORNIA ENERGY COMMISSION

HEARING ROOM A

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

TUESDAY, JUNE 30, 2009

1:30 P.M.

Reported by:
Peter Petty CER**D-493
~~Contract Number:~~

CEC STAFF PRESENT

Lorraine White

Peter Strait

PRESENTERS

Peter Mayer, Aquacraft, Inc.

Andrew Davis, Weatherset

STAKEHOLDER COMMENTS

Peter Carlson, HydroPoint Data Systems, Inc.

Chris Brown, California Urban Water Conservation (CUWCC)

Tim Schaadt, The Metropolitan Water District of Southern CA

Brian Lennon, Irrometer Co.

Marsha Prillwitz, CUWCC

Matt Lyons

Scott Sommerfeld

Carlos Michelon, San Diego Water Authority

Warren Gorowitz, Ewing

Jeffrey Kremicki, Hunter Industries Incorporated

Amanda Stevens, Energy Solutions, Consulting to PG&E

I N D E X

P R O C E E D I N G S

JUNE 30, 2009 1:33 p.m.

MS. WHITE: Good afternoon, everyone. I would like to welcome you to the Energy Commission and the second of the Staff's Technical Workshops to define Irrigation Equipment Efficiency Performance Standards and Labeling Requirements. My name is Lorraine White. I am going to be overseeing this workshop today. I am also the Project Manager for this proceeding, and would like to just welcome you all. For those of you on the WebEx, rather than a Web Cast, we are having a lot more interaction opportunities with our WebEx system, but I hope you will all be patient with me since this is actually the first time I get to run it myself. So hopefully we will have no glitches and I have appropriate back-up. But the idea is that we have a lot more interaction and opportunity through the WebEx Meeting Manager and we will be taking advantage of that from here on out at the Commission.

Just a couple of housekeeping items for people here within the building. We have a snack bar on the second floor. You can go up the big steps and underneath the awning, if you need some refreshments, you can find them there. In the event of an emergency, an alarm will sound, and we ask that you exit the building calmly through either of the two exits, the one here to our left, just outside

the double doors to the hearing room, or to the right. We will ask that you also meet with the rest of staff, across the street at the park, until such time as we are able to return to the building. So let's get started.

As I mentioned, my name is Lorraine White and today we will be following up on some of the items that were discussed at the June 1st workshop, in particular, we are going to be focusing a lot on the key questions that we posed back then, and so if there are no questions about any logistics here, I would like to just go ahead and get started.

As I mentioned, we are utilizing the WebEx tool, and the idea is that people can participate as a call-in only, and for those that have called in only, we will be able to have you engage in some of the questions. Right now, I have everybody muted so that we can go through the initial materials pretty quickly. There will be points throughout the discussions where we will ask for comments, and the idea is that we have an order to try and get through all of the discussion, and the idea being that those that are on the WebEx service can raise their hand, we will take questions and comments from people here in the hearing room participating in person, then those participating via WebEx, then we will unmute the phones and ask that people who are on the call-in only go ahead and

ask their questions or make their comments.

In addition to the materials outlined on the agenda, we are also going to get a brief update on the Controller Study that was discussed at the June 1st workshop, the idea being that some revisions have been made and we would like to ensure that people are current on the results of that work, so we will again have Peter Mayer providing information and updates on that work. I am going to be providing a quick summary of some of the responses we got to our key questions, and then we will be presenting some information on where we think we are going as far as the landscape irrigation language and the specific requirements, in hopes of stimulating some discussion and getting some additional input, in particular, we are looking for a lot more specific data and recommendations. We are pretty clear that we are all going roughly in the same direction based on some of the general comments that have been made to date, but we need to get down to particulars at this point, and then we will have an opportunity towards the end of the day for general comments and I will be making some wrapping up remarks and define some of the next steps.

So just to touch on a few of the main points about what it is we are trying to accomplish here through this proceeding, to establish landscape irrigation efficiency

performance standards and labeling requirements, the idea is that we establish the floor for this performance requirement and get those standards in place by January 1st, 2010. Our overseeing committee, two members of the Energy Commission's five Commissioners, have issued a Scoping Memo that defines the type of devices we are going to be looking at; primarily, it will be the controllers and sensors, as specified in Assembly Bill 1811, but we are also going to be having the flexibility of looking at other components in the system that may be required to ensure that those devices can achieve the efficiency we hope to set for them. The idea, of course, behind all this is that, by 2012, only those devices that meet the standards are available for sale or installation in California. The overall purpose of this action is to essentially reduce waste, uneconomic, inefficient, or unnecessary consumption of water or energy. So our analysis is looking not just at the water we can save in the landscape irrigation system improvements, but also potentially any energy savings we can achieve for what the energy trade-offs might be.

I want to touch on this slide again because it is very important that, as part of our proceedings, what we establish can save a significant amount of water or energy is feasible, can actually be done with what is available to customers today, and that it is cost-effective to the

consumer over the lifecycle of the products. And those are some pretty high bars and thresholds that we have to meet, so the purpose of drilling down into the specific information that we need is to ensure that whatever we decide to establish as far as regulations for standards and labeling requirements is substantiated by evidence, and can in fact achieve the types of things that we hope to in setting these standards.

So are there any questions on some of that beginning information? Okay. Do we have any hands up? Okay, good. We are just going to unmute the call-in folks in case anyone has a question. Okay, at this point, before we get into some of the key questions and responses, I want to back-up and I would like to actually call on Peter, who is on the line. Peter Mayer, are you on the line? Can you unmute him?

MR. MAYER: Can you hear me?

MS. WHITE: Hi, Peter. Yes, we can hear you.

MR. MAYER: Hi, Lorraine.

MS. WHITE: Hi. I am going to go ahead and pull up your information so that we can get an update on your work. All right, can you see that, everybody? Great. Okay, Peter. Peter?

MR. MAYER: Hello, can you hear me now?

MS. WHITE: Yes, we can.

MR. MAYER: Okay. Great, I feel like I am in a television commercial.

MS. WHITE: Hi, call-in user 3. I will go ahead and advance the slides based on your direction.

MR. MAYER: Okay, so let's go ahead to the first slide. After the presentation, at the beginning of this month, an error was found in the calculations that somehow ~~was~~were flipped in between the first and the fifth draft of the report, so the numbers changed and actually will reduce from what was reported. We thought it would be important just to review the water savings numbers, in light of this. So the key thing -- the overall findings of a relatively small reduction in actual water use in the almost 300 slides in this study would not change, but the magnitude was changed. So if we look at the table, a total of about 330 acre feet of water savings were achieved and pretty evenly split between the northern sites and the southern sites. The southern sites actually were getting more controllers installed there, but the northern side tended to be larger sites, more commercial, non-residential sites. So the actual total savings were quite similar. On average, the change in water use per site was a reduction of 47.3 kilogallons per site. That amounted to a 6.1 percent change vs. their pre-installation outdoor use, and you can see that, again, these results were somewhat

similar in terms of percentage change between northern and southern, although the volume change was much larger in the northern site because they were much larger. The change overall was statistically significant at the 95 percent confidence level, although it was not for the northern site for the 95 percent confidence. It was significant at the 90 percent confidence level among the northern site, and it was also significant at the 95th percent confidence level at the southern site. Next slide, please.

Just to look at these a little bit differently, just so you can sort of see the difference in the area, the average area of all the sites was about 28,385 square feet; the northern sites averaged 73,000 square feet, so quite large site, and we have the average in the south with an 18,000 and, again, the medium -- to fill in the picture a bit more, you know, the average of a medium site in the southern sites of 4,313 feet was much more typical of what you would expect of a single family residence. And then we also present the change in gallons per square foot, but it was evened out across all sites as to a reduction of 1.7 gallons per square foot per year. And that is really all I have to talk about today was the summary of the results. Was there one more slide?

MS. WHITE: Yeah, there is. The comparison.

MR. MAYER: One more additional slide. We did

divide up the group between sites that have a wide -- below what was a theoretical irrigation requirement before they got the controller, and above that. So it was essentially sites that had historically under-watered and sites that had historically over-watered because what we had found was that, you know, the level and extent of over-watering was a significant factor in determining water savings. So people without the -- well, what if we just looked at the sites that over-watered, what would the results -- that would be the far right-hand column, the sites with the three application ratio greater than 100 percent, that was 1,215 sites, which represented about 53 percent of the entire sample. Those sites reduced water use by an average of 90,000 gallons, which represented almost 8 percent of their pre-installation outdoor water use. And that is the summary of what I wanted to go over today.

MS. WHITE: Actually, Peter, I have a question for you. What does the 100 percent represent? How did you guys calculate what was the break even point?

MR. MAYER: That represents -- as a theoretical irrigation requirement. So we take the lot, a particular lot, we assume that it covered in the turf graph, and then we take the ET, the prevailing evapotranspiration rate for that site, and then utilize the California what we will

call methodology, we can develop essentially a water budget for the site.

MS. WHITE: Okay, but it was based on 100 percent of turf, even thought he sites may not have been 100 percent or --

MR. MAYER: That is right, yeah, we assumed 100 percent coverage. The (indiscernible) methodology applied the .7 factor, so it does reduce the ET somewhat, but it is not assuming 100 percent of ET, it is like about 70 percent of ET.

MS. WHITE: Okay.

MR. MAYER: Then we also netted -- there was also a process of netting out the daily precipitation.

MS. WHITE: Does anyone in the room have questions for Peter? Anyone on the WebEx? Any hands? Any call-in folks with questions to Peter? Okay. Yes, sir. Please come to the microphone.

MR. CARLSON: So just to be clear --

MS. WHITE: Please announce yourself.

MR. CARLSON: Peter Carlson from HydroPoint Data Systems.

MS. WHITE: Thank you.

MR. CARLSON: What were the values before and what did they change to? Is this a percent change of what they were to what they are to? Or is this the final --

MR. MAYER: This is the final water savings.

MR. CARLSON: And so what was the previous --

MR. MAYER: You have to look on the -- I am not going to repeat what the erroneous results were, but, you know, if you have a copy of the previous report, you can look at it yourself.

MS. WHITE: Any other questions? Okay, thank you, Peter. I appreciate the update.

MR. MAYER: Thanks, Lorraine. And if anyone has any further questions, please feel free to contact me.

MS. WHITE: Okay. Sounds great. Thank you, Peter. Okay, so we are going to pick up where I left off for key questions and responses. I would like to thank everyone who filed information for us, provided some feedback to these key ~~questions,~~questions and it has been very helpful. We have been able to identify a few more documents that we need to spend some time with, so that has been a benefit to us; but then also to identify where we might be diverging in terms of views, it has been a very good thing for us to become aware of.

Essentially what we are trying to achieve in posing these questions and in trying to stimulate discussion is that, obviously, data, data, data, data. And in the notice, we identified that we need data related to the current amount of even estimated water waste by residential

and commercial irrigation systems, the types of analysis, or supporting documentation that has been used to identify that waste, characterize it, ~~measure~~and measure it, those types of things. Information related to how we know the controllers are, in fact, saving water, and what features about them are really responsible for, in part, this water savings. And information on energy, the energy consumed by these devices, maybe some refined information on some of the embedded energy that may be associated with the water savings, all this kind of information we can work into our calculations and analysis. Of course, we need to have a lot better information on costs. We have found some information on, you know, average cost of water, the marginal cost of some new water supplies, but some of the cost information related to the devices and installation that people have to have professional installers, that kind of information we also could benefit from. Understanding the metrics and why these metrics to measure the performance of these devices are preferred by the industry, or installers, or third parties, is also very important. We got some feedback, especially on the SWAT protocols, but, in particular, any specific measurements or metrics related to specific features that we could start looking at would be very helpful. And Peter is going to talk a little bit more about that in some of his discussion.

So definitions of waste, of course, they fell into two categories in terms of the comments we received, so some of it is that you know it when you see it, it is the run-off, it is the stuff going down the storm drains, it is watering during a raining period, but the harder to measure things, the things that tend to be a bit more nebulous and people have less numbers for, is that estimate of how much is associated with the deep percolation, how much is associated with leaks in systems, what is the implication of poor system designs, you know, how much of the waste is associated with that? So the idea is, in order to set some of these standards, figure out what these standards can affect in terms of reducing a particular type of waste. We got some feedback on that, and that was very helpful, but we need to understand the features about devices and how they specifically address one or the other of these aspects.

And then we were looking for -- this gets into my last comment about what these features really help to reduce these wastes. And the types of responses we got in this section of the filings was a little hard to wrap our hands around; I mean, sometimes you can look at the types of things that a controller does if you set it properly, whether it is a smart controller or a more conventional one, you could -- based on good knowledge, you could have

it apply only what you want. And there were many comments made about that very thing. You want to make sure your device is calibrated correctly and that the person setting the schedules, or setting up the controller, knows what they are doing so that they can actually operate it the way they have been designed. But no controller can do everything and that good information makes a big difference about how the device operates, and the idea that even good controllers can be inefficient if they are not set up properly.

The third question was trying to get at some of the specific terms and definitions. We do need those types of definitions as part of our regulations. And we were grateful that there was a lot of consensus referring us to the Irrigation Association's definitions, and the definitions contained in the model ordinance.

In terms of the fourth question, we were looking at this issue that was raised in the study that Peter has been talking about, where there is some increases in water use based on certain conditions, and there are some decreases in water use of certain devices, and the idea is figuring out what characteristics and features about these devices can ensure that we minimize the water increases and maximize the water savings. And we got feedback that it is really about having good information about the irrigation

practices of whatever site you are doing the work at, understanding that the controllers cannot do it all, that you need to have some kind of a water budget to understand when you are over-watering, and when you might be under-watering, those kinds of comments were illuminating.

The test of measurements and protocols, we will need to define in the regulations so that people can compare their devices and ensure that they meet standards. So this question is getting at what types of protocols or measurements are out there, that we can actually rely on. Of course, we were referred to the SWAT protocols, but there was not a lot of -- there was not complete consensus because some of the comments mention that the SWAT protocols were not necessarily designed to ensure conservation, but to address water adequacy and that there may be, even if you pass the protocols, it does not necessarily mean that you will always be saving water, that we need to look at some of the EPA performance standards, and that we need to do field verifications so that, when you do start seeing increases in water use, you can track it down because the existing SWAT protocols will not necessarily provide you that information.

The sixth question got to whether or not there is enough evidence out there for us to rely on in order to set some standards and this is where we were directed to some

additional studies and reports that we actually had not identified yet. That was helpful. That there is this issue that we do not know enough about some of these devices and how, when they are installed, we have actually started to see increases in water use vs. decreases in water use, and what is actually causing that, and that there is some information out there that supports the idea that some of these conventional controllers, if people program them properly, can in fact be used efficiently and conserve water.

Whether there are common differences, or common elements between these types of devices, it was pretty clear that more of the conventional devices, more of the conventional controllers are human adjusted. They require human intervention to have them operate properly, and that the smart controllers tend to be automated and allow for automatic adjustments based on either climatic conditions or some other feature built into the programming. I do appreciate a lot of the responses that we got about what are some of the elements that we need to either mandate or require in terms of these efficiency standards, and they ranged quite broadly from just mandate all smart controllers, period, to actually looking at specific features; you would like to have something that can be self-adjusting, eliminating the human intervention

requirement, that we need to look at how these devices actually operate in a system, and try not to set standards that essentially ignore the other components that may be required for a device to operate properly; for example, looking at pressure, looking at the other valves in the system and how they interact with whatever device efficiency standards we are requiring.

And then there were some comments that got into, in addition to setting standards, you also have to do some training, education, get people out to do audits, and to work with some of the existing regulatory programs that exist when there are water shortages, and that the standards should not foil or impede any of those actions. Of course, there is the question of, if we were to set some standards for new devices, or devices that would be installed in California, how that might interact with existing systems because elements of different systems may need to be replaced over time, but not the whole system, and there was some general consensus that there is compatibility between the new devices and existing systems, but that, because some of these systems may have other inefficiencies in them, such as design problems, or valves not working properly, or other elements of the system not working properly, that whatever standard we set for sensors or controllers may not achieve the maximum savings

expected. And so we will need to consider that in terms of our estimates of what some of the potential segments are.

We wanted to look at what some of the net savings might be, and I realize that some of the studies do start to estimate the savings, in particular this recent study, and getting a sense of what the studies were actually able to achieve, what maybe some of their challenges were, and what additional work may need to be done to ensure that, if we do rely on any of these studies, or reports, or protocols, that we are able to gauge, measure, how much we could actually save, so that we can do the calculations we need. And, of course, there are some differing opinions here. Some say there are adequate studies, we do not need to do anymore, and there are others that say, you know, the estimates of the savings are very all over the place, and we do need to start looking at some of our assumptions about some of these devices, and do some additional work.

Then we started asking some questions about the labels, themselves. We will probably need more input from parties on this -- actually, I know we will need more input from parties on this because I am interested to understand better what is meant by some of the comments related to confidence labeling, and some of the irrigation rating. I know that we will be hearing a little bit later from Mr.

Davis on what he means by the ratings system, but there were comments also on proper directions to the consumers so that they know how to actually run these things. So that gets into a bit more than just a labeling identifier, and also clear direction to folks that they need to look at the whole system. So we will be looking for more information and more specific information, like what would it look like on a label, from parties over the next couple of weeks.

And then, of course, the question, is there adequate evidence and, again, this is a bit repetitive to a previous question, but essentially some say, yes, there is plenty, and some say, no, we need to start looking at some things and that we need to reexamine some of our assumptions. This will probably be the area where we need the most specific data, and that is to get a better consensus from people on what water cost information should we actually be using. I know there were some people who say we should be using the avoided or marginal cost of new water, well, what would that be? And what studies are out there that actually demonstrate what that is? We should be using average water costs for different regions. Well, how would we break that out if we ended up going that route? And what would those estimates be? There is also the opportunity, because some of it is published, to use California's average cost of water, but that may not be

indicative of what people are actually paying in certain parts of the state. So it might under-estimate some of the costs associated, or the benefits associated with water conservation. And, of course, there is information on energy embedding costs, but we still need to do more work, the idea being we have some information now on stand-by and we will be looking to the energy utilities to help us refine some of that, and also on some of the embedded energy with the current studies that are being done through the PUC's program.

And then there was also some really good input on other types of things that people would like us to consider in terms of some of the cost benefit analysis, benefits to programs and infrastructure, and the cost savings associated with those types of programs and infrastructure benefits, looking at maybe opportunities to delay the need for new water sources, and hopefully those new water sources would then be a bit more cost-effective. So there was a good amount of information on that, and also some of the greenhouse gas emission reduction cost benefits. We get a lot of different estimates of operational life of different pieces of equipment, and I think this gets to the variety of devices that are available on the market, anything from, you know, a couple years to 20 years, so we will need to pin down for these devices what the average

operational life of some of these devices are, so that we can start to develop the assessment on what the overall life cycle costs to the consumers are going to be, because that is one of those key things that we definitely have to show, and that our standards will increase that lifecycle cost to the consumer over time. So this actually is a very important bit of information, and we are really hoping that some of the manufacturers and retailers can really help us with this.

To the extent that we are able to respond to some of the comments on the types of methods to actually enforce the AB 1881 requirements, we got some good suggestions about identifying ways that we can coordinate or collaborate with the existing planning and construction processes, look at doing different kinds of awareness or educational campaigns, look to third parties, look to some of the existing organizations to help us with the enforcement, such as Department of Water Resources just through their model, ordinance programs, some of the local water districts through SWAT and some of the industry organizations themselves, as well as the California Urban Water Conservation Council.

We did need to ask this question about recycled water. There is a significant push to actually increase the amount of recycled water that is used in California.

And irrigation is identified as one of the main opportunities for the use of recycled water, and so I was happy to hear that a lot of the devices do not normally have a problem with that, and that it should be fairly easy to, especially in the labeling requirements, address any of the Department of Public Health's requirements for purple pipe, so we are hopefully not going to have to worry about the recycled water use.

In terms of ongoing data collection to show that we are actually meeting our objectives with these regulations, we had some suggestions, not many, but that we would be actually able to mandate reporting, periodic reporting by the retailers, manufacturers, or distributors, and that we look to installers or water districts to identify water budgets and to possibly use a water budget compliance method, which of course we will want to explore more, to ensure that we are demonstrating that whatever regulation or standard we put in place is achieving the conservation objectives that AB 1881 lays out.

So I was contacted before the workshop by a couple of folks who wanted to have the opportunity to maybe expand a little bit more on their comments, and we have a couple of presentations, and then I will open it up for folks to provide us anymore explanation than what may have been included in the written comments, or any new information

that you would like to share as a result of knowing what some of the other folks are saying. And so I am looking for Mr. Davis. Can you release -- actually, is Mr. Davis here in person? I do not think he is here in person.

MR. DAVIS: Yes, I am on the call.

MS. WHITE: Okay, great. I am going to pull up your presentation, then.

MR. DAVIS: Okay, thank you.

MS. WHITE: Do you see it now?

MR. DAVIS: Yes.

MS. WHITE: Okay, great. And I will advance it for you.

MR. DAVIS: Okay, that is my contact information there, and this is the presentation, a recommendation for standard. You can advance to the next slide. I suppose a new name for the standard, ICE Rating, which is an acronym for Irrigation Controller Efficiency, so it could be called "ICE Rating" on the controllers, it would be an easy term for people to know and understand. Next slide, please. To develop -- the last pv members who expressed interest, which I thought was very good on the part of the Energy Commission, to develop these tier-type rating for irrigation controllers. For that purpose, do not use the IA SWAT testing ~~results,~~results; use the 315 gig report on ET controllers that Peter Mayer has been talking about

recently. Next slide. These are the published results of the SWAT test on the irrigation controller. Please note the irrigation accuracy. This chart shows that all of the controllers for the 100 percent irrigation adequacy, and then [indiscernible] irrigation, most of them scored around zero percent; the highest one was 3.6 percent. So in looking at this chart, you would conclude that any kind of rating system based on these test results would be equal for all of these controls. Next slide, please. Based on the SWAT testing, the ICE rating of these controllers would be the same. The problems with the SWAT protocols are subtle; one is that the SWAT protocol allows the manufacturers to suppress results and retest until the manufacturer is happy with the result. The published result cover only 30 days, the published result -- even though in the lab, these controllers may be tested six to nine months if, for example, they are submitted in the month of April, it could be quite some time before it gets the required amount of range to meet the SWAT protocol. And another problem with the SWAT protocols is that it only tests one controller that has been programmed and installed by highly technical people, not by the contractors, not installed program by contractors and homeowners in the field. Next slide, please. Use the 315-page report that does not have the defects of the SWAT testing, the report

shows wide variance of water statements which is important to develop this tier-type rating system. It covers more than a year out for installation, it covers a thousand controllers installed and programmed by homeowners and contractors, and that is extremely important to get at the issue of how these devices will perform in the hands of homeowners. The proposition funded 13 controllers will be monitored and water savings analyzed for five years, not the simple 30-day test that is a snapshot of the performance under the SWAT testing. Next slide, please.

From the report, you can see wide variance in the controllers. Down at the bottom, the second row from the ~~bottom, that~~bottom, which shows the average computed water savings. The tall vertical lines are a measure of the variance, and in the report it says that variances, for example, for Rain Master, which was up over +30 in line with 50 percent on that vertical line, the variance was so wide that statistically Rain Master and ET Water [indiscernible] conserve saved no water. Next slide, please. To quickly develop an ICE Rating using the above charter, I propose the following: give a zero rating to controllers with too large of a variance; on the other ones, take the average, divide it by 25 percent -- the maximum savings on the previous chart was 24.9 percent by Hunter Industries -- so you divide that by 25 percent and

multiply it by 100 TPF (phonetic) and ICE Rating. Next chart, please. Okay, so using the data from the previous chart and the method that I just outlined here, an ICE rating for the controllers is shown in the right-hand column. Next chart, please. Since two manufacturers have ICE ratings well above 90 percent, I suggest a minimum ICE rating of 80. This, then, in the model can easily be supported by the evidence in the 315-page report. This high level of [indiscernible] necessary to protect water resources and to reduce embedded energy demand. Next.

What are the deficiencies of this report and its sequel? The 315-page report and its sequel only covers five years and will not provide the ongoing evaluation sought by the Energy Commission. The report and the sequel focus only on the retrofit of ET controllers and ignores new construction. The report compares pre- and post-installation water use. Next.

Beyond the Proposition 13-funded studies, the 315-page report points the way for techniques to be used beyond the five-year period. The report discusses theoretical irrigation requirements which can provide the basis for an ET rating on new construction. And I think new construction is where the ongoing evaluation needs to turn its attention to because, when rating controllers, one of the things that has been thought up before is the wide

variance in the performance that the spray had, the valves, the pressures, and the other factors that can affect the performance of the controller. For new construction, these factors are less significant to the system as new [indiscernible] and the landscape is properly designed to help one valve watering plants with the same [indiscernible] not been planned into. Next slide.

A suggestion to the Energy Commission. There are (inaudible)in California that restrict access to utility records. The EC will need to seek changes in building codes or law to gain access to water consumption records, and this five-year period over which this Proposition 13-funded installations will be studied will provide the Energy Commission with an answer by the, you know, very soon, before the January 1, 2012 deadline, and beyond that, but that will give the Energy Commission time to work on these issues of getting access to changes in the law necessary. Next slide.

The people of California are to be thanked for the funding of this large study of irrigation controller efficiency. The Energy Commission is lucky to have this report of this field study in hand for this phase of developing meaningful standards for Irrigation Controller efficiency. And I think that is the last one, isn't it?

MS. WHITE: Yes. Thanks, Andrew. Do we have any

questions or comments, and we can kind of cover the material I went over in terms of questions, or any of Andrew's presentation. I am interested to hear if anyone has any particular reactions. Chris?

MR. BROWN: Chris Brown from the California Urban Water Conservation Council. I was just concerned with one interpretation of the graph showing the bars by manufacturer, and the interpretation that the variance in the data suggests that there is zero water savings. I think the bars below zero indicate that all of these controllers, as subsamples, show some savings, that the variation is an indication of the confidence that you can have, that you will achieve those savings in any particular application. It is not fair to say that variance in a subsample like that is an indication of no savings.

MS. WHITE: Okay.

MR. DAVIS: Well, this is a statement that was in the report, that statistically -- and maybe Peter can clarify this a bit more, and more accurately, as part of that, that the variance was so large in these three controllers that there was no confidence in those -- there was statistically no confidence in the large savings that was measured. That is the way I read the report. And I think there is at least two places in the report that it explicitly says that.

MS. WHITE: Okay, yes?

MR. SCHAADT: Good afternoon. Tim Schaadt from the Metropolitan Water District of Southern California. In setting these standards, I would caution the Commission from using a report that has a sample size for one; in this regard, I am speaking from a scientific perspective that it seems to be a misguided step to assume that 17 controllers did not have enough human interference to maybe alter the results that are given on this particular graph, for instance. While I will agree that the SWAT protocol does not necessarily address all the needs of that the Commission is looking for, I would highly recommend, in cooperation with either EPA, SWAT, the Council -- I am sorry -- California Urban Water Conservation Council -- that the Commission, if looking to set a standard would use a scientific-based test that would, in fact, make sure that the controller works under the correct circumstances. It is not fair to assume that every one of these particular controllers was not only installed correctly, but then maintained properly during that amount of time, and that is sort of a two-fold process that is not captured in this study that has been done through the Prop. 13 funding. And so, in considering setting a standard and later a requirement in something that is going to affect every manufacturer in the state in considering scientific

application, or scientific standard that could be established not solely based on one that was put out in the field. Field studies are good for comparison of what happens when they are out there, but you really need to know that the controller has the ability to save water. Even this graph here shows that every controller in this study had the ability to save water. Some of them did better than others, but every controller had the ability to, and therefore the standard should be set that, if it has the ability to, the question is how does it get to that ability? Does it achieve it this easily? Does it achieve this great percent because it changes more rapidly than others? A lot of other requirements should be considered before just choosing any field study or just the SWAT protocol, or whatever the EPA and water studies comes up with, and that would just be my comment from this study and what I have seen so far in the other workshops.

MS. WHITE: Would you then agree that, even the conventional controllers, if operated properly, have the ability to save water?

MR. SCHAADT: Absolutely. If somebody were to go out there, it is evident, actually, in some of these comments --

MS. WHITE: Yeah, and I was trying to actually get to some of those because these were more automated ones.

MR. SCHAADT: One of the comments did actually note that a conventional controller, when operated most likely on a weekly basis, would achieve the same amount of water savings that any weather based controller or soil moisture controller could do, and that is true. It is obviously going to be consumer friendly to have a controller that does it on its own or some sort of device that does it on its own, and I would again just -- and from the Commission's standpoint, setting a standard in a label that is going to affect business in the state and other manufacturers, consider more scientific tests. This is a good characterization of what happens when controllers are installed, but speaking from the Southern California perspective on our study, essentially the goal of our end, being Metropolitan, was we gave the controllers to whoever came in to do a direct install, or to install their own. There was no control over whether they were programmed corrected, programmed at all. It was what -- they were more interested, they took them in mass droves, and it is obvious from the numbers that many more controllers went out in Southern California. Now, the great part about the Northern California part of the study is that it shows when you target the individuals and spend a little more time with them, the water savings potential is much greater. But if you just give it out, it also works. I do not know

if that is a good way to set a standard, that either I can do it, or I do not do it, but I caution, especially in this particular graph that it seems to -- it is a little misleading. I have a hard time believing that 17 ~~controllers,~~controllers or 22 controllers really should set a standard for a particular controller brand.

MS. WHITE: Actually, I think there were a lot more than just 22.

MR. SCHAADT: Of a particular brand.

MS. WHITE: Oh, one brand. Okay, right.

MR. SCHAADT: Rain Master -- they have got the biggest error bar right now --

MS. WHITE: Right, okay.

MR. SCHAADT: -- or variance bar. There are only 22 controllers. Unless somebody went to every one of those 22 sites, measured the site to make sure that it had all the proper requirements, it is an indication that Rain Master may be more difficult to use, or the 22 individuals or homeowners that got these controllers did not know what they were doing for the first six months, maybe. I think there is too much of an information gap there to set a standard that says, "Rain Master does not save water."

MS. WHITE: Right.

MR. SCHAADT: Or Calsense does not save water. And I really would caution the Commission on those particular

items.

MS. WHITE: Do you have any suggestions or particular scientific studies that tend to point to better information already available?

MR. SCHAADT: No, unfortunately not right now, although I would think that the Center for Irrigation Technology would have a method that would work in this sense, although I am not familiar with everything they do there, so I am still trying to catch up on that stuff.

MS. WHITE: Yeah. Are you referring to the protocol for evaluations?

MR. SCHAADT: The SWAT --

MS. WHITE: The SWAT protocol.

MR. SCHAADT: -- protocol. One of the things they do, they do a lot of irrigation research and it is hard for me to imagine they have not done more than just what the SWAT protocol was there.

MS. WHITE: Thank you. Anyone else?

MR. DAVIS: Okay, I basically agree with his comment about the limited number of controllers and I do not mean to belittle the decisions of the Energy Commission, the ratings of the Energy Commission, to just this kind of study. I agree that more controllers of each kind need to be done. But where we disagree with you is that it is precisely those kinds of people that you talked

about that do not know what they are doing, who are programming and wasting water right now, and these controllers were put in the hands of non-professional people through the MWD give-away. They ended up in the hands of the great American public, is in fact the one that is used in all of our water, and to me that is the most important measure, is what can be done with the people who do not know, do not care, do not have time to fuss with the sprinkler timer, not the professional people. And to me, this kind of study gets at that kind of information. It not only -- it also gives in a more general way in how the controller is to program, that could be another factor that is not addressed directly here, but in the water savings, to get a complicated controller that requires a lot of input to a person who is untechnical, and ~~unexperienced~~inexperienced in landscaping, they are going to have problems with it, and they are going to wait, and that is what this kind of study reveals. And to me, that seems to be the most important factor, is how these controllers performed in the hands of the people who do not know, do not care, ~~do~~and do not have time to study the sprinkler timer, not the professionals.

MS. WHITE: Thank you.

MR. MAYER: This is Peter Mayer. Can I weigh-in here?

MS. WHITE: Yes, Peter.

MR. MAYER: Yeah, well, I wanted to say, first of all, I agree with the comment that Chris Brown made and the gentleman from the Metropolitan Water District. This study was never designed to develop, utilized to develop some sort of a rating system for grading controllers. And it was only with some reluctance that we even included information, you know, comparing the controllers directly. You know, if you wanted to do a field study to compare controllers, I think you would look at a very different research design as exactly what has been shown that the MWD was trying to get at, I think, with this comment. I think there is a lot of useful information in terms of how these controllers actually perform the deal and there may be some things related to how certain controllers are easier to operate, easier to program that could also be perhaps teased out in these results, but I agree with you, it would be a mistake to set up any kind of a rating system for a labeling program, or for any kind of a standard based on ~~th~~the results from this study.

MS. WHITE: Thank you, Peter.

MR. LENNON: Good afternoon. My name is Brian Lennon with Irronmeter Co. in Riverside, California. And Lorraine asked about specific studies. Of course, we are on the soil moisture side of things, and maybe we have a

slight advantage that, from the agricultural side, for years we have been embraced by the research ~~people,~~people and folks at the universities and such. But specifically, there is a study that was done in Boulder, Colorado in the mid-'90s, and it addressed some of the very things that we are talking about here, and that is usability, and true savings, and the effect of every day operations. Specifically, I wanted to address some comments that were made in previous meetings in terms of the longevity or effectiveness over a period of time, and that study pretty much proved over five years, actually, zero sensor failure. So there is a fair amount of research out there. I think we probably have to ferret it out and I understand what we are talking about here, specifically with the weather-based controllers. But to underestimate the impact of the kind of activities that the people who are operating these systems is important because, both from the professional or practitioner side, as well as the individual folks having influence on the controller, it is going to have a huge impact on the results. So, again, we go for simplicity and we go for long-term performance.

As long as I am up here, if I can mention a couple of other things. You also asked about power usage. I asked our technical folks to give me some kind of outline, they talked about things I do not know about, but they

generally told us, for our device, which works in conjunction with a controller, as long as the valves are operating, so that might be a one or two-hour period throughout a week, during that time, our device would use approximately the same amount of energy as an iPod battery recharger. And then, specifically to go to metrics and methods, I know this is a huge issue, where do we start, and how do we count who wins and who loses here, and again, I would go back to some of the research that is available. There are several studies out there, particularly in our type of technology done in Florida, done in Texas, done in Georgia, that really weigh out the net savings, and I think that is essential that we recognize that the net savings is only going to be impacted if, in fact, the device is simple enough to use and manage and maintain, and that there is a return on investment for the consumer because, as you can see from some of the results, even from the rebate programs, there really have been kind of luke-warm results, and that is -- part of the problem is the cost of water, but as a homeowner, if there is a device, or an investment required for a device, and the payback is eight or 10 years, it is hard for a homeowner to justify that. So we need to focus on usability, overall cost-effectiveness, and how it impacts the net results. Thank you.

MS. WHITE: Thank you, Brian.

MS. PRILLWITZ: Marsha Prillwitz with the California Urban Water Conservation Council. I just wanted to mention something that the Commission might want to consider, and that is perhaps having -- establishing a standard for the programming of these controllers. As it is now, we do not really know what the default values are of the different controllers, and how they affect the running of the controllers themselves. So if we had some standardization in terms of what the default values would be, it might help in the long-run for us to better evaluate how the different controllers are working. So somehow to at least have some just closure in terms of what those default values are, and how they affect the irrigation scheduling might be helpful.

MS. WHITE: Uh, in your work with some of these devices, has it been -- is some of this programming pretty varied? Are there certain characteristics that are consistent throughout? You know, can actually some of the manufacturers possibly illuminate on some of these programs and default values, in addition to Marsha, when she is done?

MS. PRILLWITZ: I could just comment on the one controller that I have at home. I will not mention a brand name. But I was pleased to see that the baseline for my particular controller was set at 80 percent of ET_o, but I

had to myself go through each one of the things that you set in the program, and think about each one, and I did not know exactly how much was considered in the total irrigation amount based upon the numbers that I selected for plant material, for example, or for the precipitation rate of my irrigation system. So I am sure that it varies from one controller to another, but at least if we knew more about the default values, it would be helpful. And I think that most homeowners are not going to take the trouble to go through and read through all of that stuff, but I think that if, in fact, we are establishing some standards, that if we had some standardization of that, the default values, that it would really help all of the professionals, especially, who are setting these controllers, as well as the homeowners, because we would be able to give the information from the water districts, from the irrigation manufacturers, and from the irrigation installers, to the customers and the users, as to how much water -- how they should schedule these things.

MS. WHITE: And were you able to adjust the ET_o? Or is that kind of hardwired in?

MS. PRILLWITZ: Well, I have had my controller for about a year and a half, and I am having a lot of fun playing with the different settings of it, and tracking my water use, and so I am having really good results with my

controller. I think I am irrigating at 61 percent of ETO and my whole backyard is a farm, basically, producing fruits and vegetables.

MS. WHITE: Okay, great. Thank you. Did we have any other comments?

MR. DAVIS: This is Andrew Davis again.

MS. WHITE: Oh, thank you, Andrew.

MR. DAVIS: I want to make a couple closing comments on this. I agree that this is not the best study in the world. And I agree that more study needs to be done, in fact, the last couple of slides even point to that. But the Energy Commission has the pressing problem of coming up with a standard that could be used by the great American public who does not know, does not have time, does not care about water conservation, particularly with the sprinkler timers. Those are the people that are wasting our water right now. These controllers went into the hands of many of those people. These are the best field results. You can talk about all the scientific tests you want, and those are all good if you are trying to do a soft landing on Mars. But when you are talking about the practical problems for saving water, the people who do not know, do not care, do not have time to play with a little sprinkler timer, this kind of field study is the best available information that can be used for studying any

kind of standard. That is my closing comment.

MS. WHITE: Thank you. Anyone else on the phone that might have some comments? We have, actually, unmuted all the call lines, so --

MR. LYONS: Hello, this is Matt Lyons. I am with the Long Beach Water Department.

MS. WHITE: Hi, Matt. Thank you.

MR. LYONS: And I really appreciate all the work you are doing here and all this discussion about weather-based irrigation controllers, it is really important that we discuss these. One of the questions, or issues I had with the study, especially since you are going to make policy based on it, is we know from the study that some of the WebEx -- a large portion of them -- led to water use increases, and some of them to water use decreases, which is a good thing, but my question is that there does not seem to have been a control group in the study, and so one of the things that we can take away from the study is that under certain conditions when you get somebody a new controller, or you have a professional go out there and install a controller, they reduce their water use. And we do not know if it is the fact that it was a weather-based irrigation controller, or if there was a traditional controller, at least I do not think that the study addressed that. I think most of us assume that a weather-

based irrigation controller is installed and programmed correctly, and it is going to save more water than a traditional controller, but we do not know how much, maybe it is one percent more, maybe it is five percent more, but from what I understand about the study is that it really does not tell us the difference in water savings between a newly installed program, traditional controller vs. a weather-based irrigation controller.

MS. WHITE: Thank you, Matt. Anyone else on the line that may have a comment at this time?

MR. SOMMERFELD: Yeah, this is Scott Sommerfeld.

MS. WHITE: Hi, Scott.

MR. SOMMERFELD: Hi. I kind of agree with Marsha that the -- I think that the technology that we have is quite good, and I think that some of the protocols that SWAT has developed, mainly what it is showing is that it can follow basically a curve, an ET curve, so that if it set up properly, it has the potential to save water, it is not a guarantee of the water savings, as I think we are all starting to understand more. These things are just tools. The conventional controller is a tool that, if it is used properly, has the potential to save water. I think some of the new smart self-adjusting controllers are probably a little bit better tool because they are able to adjust the water every day, which would just not be practical, you

know, for a conventional controller. So I think the self-adjusting aspects are extremely important, but I think one of the problems that we are running into is that it is just a tool, and we have to kind of focus on how do we use that tool properly, and I think that is what Marsha was kind of getting at. And one of the ~~tool~~tools that would be very useful is to have some type of a water budget, and I think the model ordinance goes a long way to kind of show us how to establish that water budget. And I think one thing that demand manufacturers could help us with, and maybe it is something that we should focus on, is how do we -- once we set the default parameters of the smart controller, how do we get an immediate defect, or a sense of how much water that is going to be applying and does that fit within the budget, is that over-budget, under-budget, and that should give us some immediate feedback as to how to potentially adjust the settings on the controller more quickly. So I am in the camp that sort of says that I think the technology that we have, in fact, almost all of the technology, even in the report, shows that it has the potential to save water. And somehow we have to focus on, as an industry, how to get more information out about the proper set-up in monitoring. Something that was not talked about in the report, and I wish it would have been presented in a much stronger way, is this whole concept of

fine-tuning. So I think with all of the defaults, to have to be so general because there are so many different variables, irrigation programming is very very complex, and it is almost -- I do not know that it would ever be possible to completely automate it, there is always going to be the human component, so I do not think it is difficult, I mean, I think we need to work on a procedure for fine tuning the controller once it is installed, and some of that is just purely trial and error, it is actually just going out after the fact to see if this particular site is too wet, is it too dry, or is it just right, and then just making some adjustments for some period of time, and then once you find those adjustments, and I think if you let it go, I think we are going to see that the savings could be much higher, I mean, that is a theory, but I think that it is based on the fact that we have these studies and that, when they are professionally set up, that they do save water. So I really think the technology is here. I think we need to have a fairly broad definition of -- or a broad specification in the beginning, and perhaps every three years, as the technology changes and advances, we kind of tighten that specification. I am not sure if we can hit it perfectly this first time, but even the SWAT protocols have a three-year review, where every three years they go back and they kind of review the protocol, and they

say, you know, this is what we need to do to make it better, and we would have to be flexible enough to adopt a changing technology.

MS. WHITE: Thank you, Scott. Anyone else on the line? All right, we are going to move on and Chris Brown, with the California Urban Water Conservation Council asked to make some follow-up remarks, as well, in response to the key questions.

MR. BROWN: Okay, there were a number of comments made in the letters and there has been discussion about the 40 percent in the study where water use went up, and there has been this response in a number of the letters that people perhaps were not adequately -- and that was a term that was used a number of times -- irrigating their lawns beforehand. It really does not fit with what we know about crop science, about the plants themselves. And so this presentation is to just briefly address the issue of what plant water needs are, and the fact that they are not equivalent to ET_o, nor are they actually equivalent to ET_o times a crop coefficient. ET_o is data selected from the ~~atmosphere,~~atmosphere; it does not have plant data in the equation. The KC is an attempt to adjust based on empirical studies of that number so that you get closer in your estimation or approximation of what the plant water need is. And it is really important that we understand

that because, in fact, it is likely that many of those people who used less water before were watering completely adequately to what their landscape was, and this is a study which I excerpted, because we would be here way too long, it is from my Masters research, it is published in Hort Science in 2002 if you are looking for the scientific paper for it, but this is about actual ET on tall fescue turf grass, a cool season turf grass in a desert environment, so maximum stress during a growing season. The temperature is in excess of 110° in the hottest weeks. We deliberately stressed the plants by giving them most of the treatments of less water every week than the plant actually used, and we evaluated actual evapotranspiration, not ET_o, by using draining lysimeters, so we knew the total volume of water going in, the total volume of water in the soil profile, using neutron probes. We had a drainage area that basically the water was pulled out of, so we knew how much water was percolating below the roots, and all this was very carefully measured, so we are looking at actual plant water demand in this study. And what we found here is that, essentially, the irrigation following the ET_o curve, ET_o is a decent predictor of this kind of an approach, it is a useful tool to compare to turf grass, but it is not an actual measurement and you will see that here in just a second.

First of all, how do we rate the plants, what we were doing? And you will see here, we used a -40, .4 leaching fraction on the most severely stressed plants. In the top graph, there are three levels of nitrogen given, there is the recommended level, which are the green diamonds, there is half of that, and then there is zero nitrogen, zero fertility given during the experimental period for the little black circles, and you see the different turf quality ratings. So we are not rating based on agronomic principals of how much yield, we did not care how much tissue you got from this turf, which the original ET_o equations were built on, we said, hey, what would a homeowner think of their lawn, so we rated it based on color and cover, and you can see that the ratings here which are just color for the bottom three graphs were essentially straight lines across, and the most stressed of those is the middle graph in the entire study of the -.5 leaching fraction, so every week that plot received 85 percent of the water those plants used the week before, all right, it constantly went down every week in terms of how much water was given. And here it is twice weekly. So we did a daily, and twice weekly. There is pretty much no real difference in terms of color. You can get a cool season turf grass in a desert, 85 percent of its actual water demand the previous week, and it will not change

color whether you are giving it every three days, or every day. So, really, the argument that a number of people make in their letters, that it is better to have fewer shorter irrigation periods, again, it does not really jive with what we know about plant biology, that plants develop deeper roots in healthier plants if they are watered less frequently, and they develop deeper root systems. We know this from agriculture where it is studied in very much greater detail than we have on turf grass and landscapes. In fact, our Secretary of Agriculture, the other day in a conversation I had with him, we were talking about this approach, which is called "deficit irrigation," it is commonly used in Agronomy to grow wheat and other crops, including grapes and strawberries, it is referred to as "pushing roots" in strawberries, you deliberately withhold some of the water that plant could be using, and that is the key idea here -- it could be using that water, but it does not need it, and that is the key concept that I want to get across here. People are using less water in the pre-application probably because they have figured out over time, just by visual, that they did not need to run the irrigation system so often. And we can see that here. Here are the amounts of water that were actually used, and this is in centimeters, you can see that when they used a .15 or, in other words, 115 percent of the plant water

demand, they used about 127 centimeters of water over the growing season when they used it right at actual demand, you can see it is about 112 for daily and just over 100 for twice weekly. So, again, something we need to know about crops, if you water less frequently, the plant actually adjusts to that and uses less water. So there is actually less water use in plants that are irrigated less frequently. The -.15 is right about 90 and 95 centimeters. And the really stressed plots, and those are the ones that we did see some changes in values on the top two graphs, the color and cover did change over time, but you will notice that they all recovered in the fall. Those lines go back up to the between 8, 9 and 10 values, except for the low nitrogen -- or zero nitrogen, rather, I should say. That stays low, especially for the twice weekly. So, at any rate, what happened in terms of the actual water demand? So here is what we actually gave it, so what did the plants actually use? Here, the purple bar is ET_o. Only in the daily irrigation at, well, at 100 percent ETA, you are replacing the actual water demand, did it approximate ETO. In all other cases, it is less than that and, in fact, this is where these recommendations of using a crop coefficient for a cool season turf grass of .80 comes from, because the plant actually does not need 100 percent of the ETO value. So that is where those ~~kind~~kinds of numbers

come from for those of you who are interested. But you can see also that the actual water demand is higher if the plant is irrigated every day. If it is given the water, and the water is available, it will transpire it. More water will be lost to the atmosphere through evaporation and transpiration if it is available every day. If it is given it, well, twice a week here, the yellow bars show less water moves out except in the very lowest and the very highest. And then finally, so what happened to all the extra water? And this is just for those of you who are interested in the difference between irrigation amount and the actual evapotranspiration amount, and you can see that in the very highest amounts, most of it is lost to percolation or drainage. You capture that water if you have a way below the root zone, and that is where it is going. So how did the plants survive that were getting less water? They use it out of storage, and those are the maroon bars there, the water in storage changes over time. And how you replenish this reservoir in an irrigation strategy is, in the fall or winter, when the plants are not transpiring very much, you apply some extra leaching fraction and that refills the reservoir at a time when the plant is not just going to push it back out into the atmosphere. So it is irrigation control. And, you know, what one perspective would say is, perhaps people just see

that their lawn is green and realize that is enough water, they do not have any of these measurements available to them, they do not know what the plant is actually transpiring, but it is certainly not an issue of whether or not we have to give .8 ET_o in order to have adequate water; in fact, if you do the IA equation on these particular experiments, the ET adjustment factor for these plots at .8 is actually .6 because none of those calculations was an irrigation efficiency coefficient used, so in that case you would actually multiply by the inefficiency of the irrigation and you would find that your ET adjustment factor was lower than the .7 currently being recommended by the state, the DWR model landscape ordinance. But you can see here some of the water savings found here in terms of this particular study, it is consistent with other studies that have been done of irrigation demand on plants in scientific, but also of irrigation scheduling studies that have been done in the West, the most famous of which was done in 2004 in Colorado, comparing multiple cities, and the fact that the less frequent -- for cities that used irrigation restrictions, they saw a greater water savings than those that did not use irrigation restrictions. So this is just a response to some of the comments that we saw using terms like "adequacy." I think what we know if we look at the plant biology is there is a range in which the

plant is healthy. The plant can get more water and be healthy, it can get less water and be healthy, it is really not a question of whether or not those people whose water use went up were not getting enough water, ~~they~~and they may have been getting just the right amount of water. They were certainly getting less than they did in the post, and that is the key thing in terms of the challenge for the CEC, is if that is the results here, I mean, do we really have a technology that we can look to for saving water. That, ~~afterall~~after all, is our core goal here, is to save water at the end of the day.

MS. WHITE: Do we have any questions for Chris?

MR. SOMMERFELD: Chris, this is Scott Sommerfeld. Was the turf grass that was used in the desert, was that a warm season turf, or a cold season turf?

MR. BROWN: It was a cold season, a tall fescue.

MR. SOMMERFELD: Okay.

MR. BROWN: Pretty common for California.

MR. SOMMERFELD: Right.

MS. WHITE: Anyone else? Anyone on the telephone? Okay, let's take a five-minute break before we go into some of the work that Peter is going to do, kind of give ourselves a comfort break, and we will be back at 3:05. Sounds good. Thanks.

[Off the record at 2:55 p.m.]

[Back on the record at 3:06 p.m.]

MS. WHITE: Actually, Peter wants to hold questions until the end, so we will go through his presentation and then I will unmute everybody and then we can have some discussion about the types of issues that he is going to be raising.

MR. STRAIT: Hello everyone, this is Peter Strait with the California Energy Commission. The presentation I put together is basically a very preliminary discussion of some of the language and requirements that could go into a standard that we could consider, and this is going to be just material for the sake of discussion; none of this is to be taken as Gospel or things that we are going to do, just thing that we consider possibilities.

The first thing we want to discuss is the terminology. We know that there has been a push to move away from the, for lack of a better term, in terms of art, of smart and dumb controllers; first off, the terms are considered to be too broad and too vague as to what would qualify as one category or the other, they are somewhat misleading as to what a concern might be getting at, and the term is denigrating to a large class of controllers that, as we have shown, are perfectly capable of saving water, even if they may not be quite as automated.

The California Energy Commission recognizes the

need for better descriptions and what we see is that too broad of classes of controllers do seem to exist. There are controllers that perceive and react to the outside world and controllers that do not, that do not sense what is going on around them. For those that do sense what is going on around them, some rely on direct sensors that are attached wire to them, may communicate wirelessly, but that sense the immediate area, and there are others that rely on subscription services, indirect sensing that you have someone that is in communication with several weather stations, with satellite data, and that is getting transmitted to the controller remotely. For those that do not sense what is going on around them, there is a potential to actually build in a certain amount of pre-calibration for certain information templates. This could be relying on soil templates, plants, ET_o, ETA, but basically something that has several set-ups so that the consumer would simply be saying, "I have this sort of soil, I have this sort of lawn," and that some of that computation would be done for them. For this reason, the California Energy Commission is proposing the following terms for discussion. We see direct sensing capable controllers, we see indirect sensing capable controller, we see pre-calibrated controllers, and we see manually calibrated controllers. And our question -- and, again,

these questions we want to hold until the end of the presentation, but they are going to come up when the topics are raised -- is we need to know, are these sensible distinctions? Do we need to be more specific in these terms? Do we need to be less specific? Is there some other way that these should be phrased? How do people feel about these? And I will point out that these terms were not, in these terms, getting into whether something might be an add-on device, or anything of that nature, just what are the basic capabilities, and that these are not exclusive terms. Something could very well be both direct sensing capable and indirect sensing capable, or we could have a direct sensing capable unit that is capable of indirect with an add-on device. And we are already having feedback from the audience. I would suggest we hold all laughter until the end of the presentation also, thank you.

Landscaped irrigation, basic features. Despite the wide variety of controllers on the market, and the wide variety of irrigation in considerations and needs, there are some basic features that could apply to all units. All units have a clock and thus should know the time, and hopefully the date, and nearly -- and a large portion of the units on the market are microcontroller-based. Clock and microcontroller potential features -- and these are features that we see that all controllers could

incorporate, regardless of other technologies they might use -- all controllers could accurately track the time, the day of the week, like a Monday, a Thursday, and the times of sunrise and sunset. All controllers could allow for black-out days to be set, and for the displacing if there is a water budget that it keeps track of, to displace the water into the next available day. And that goes in line with the landscape ordinance requirements that, if you have certain days when you are not allowed to water, if you have an automated controller, it should or could be able to track that. Allowing a manual weather override that does not disrupt scheduling and can be set for multiple days in advance, this is for those that may not sense the environment, but if I am a homeowner and I receive the morning paper and it says that it is going to be raining tomorrow and for the next three days, I can go to my controller and, at the press of a button, tap it two or three times and block out, say no more watering for the next three days because I know we are not going to need it -- just basically an easy way to do that. Allowing stuttered watering -- this is where, if I have normally a 20-minute irrigation cycle, rather than putting the water on for 20 minutes, that I might have it on for six minutes, and then off for three to give it some time to soak in, on for another six minutes, off for three, that sort of a set-

up, where that can be part of a single program and not having to basically put in three or four different six-minute programs back to back. Not watering between specific day-time hours. This is a basic requirement that someone could not set up their controller to water when it would be a bad idea to water, like 1:00 in the afternoon in August. The example given of why our after sunrise or before sunset is simply an example; I know that, in some cases, the landscape ordinance proposes specific times and there might be other ways that manufacturers may want to set something like that up.

Adjusting watering based on date. This is something where we know that, in practice, people do tend to set their controller to the largest amount of watering needed and may not return to it, but because -- unless some problem is noticed in our lawn -- for that reason, if there is something that is set, a certain watering level, or a certain schedule is set in July, and the controller knows that it has now gone from July to August, but no one has returned to reset it, or change the amount, that it might have an automatic alteration that it does, knowing that, okay, now that it is August and September and October, we are just going to adjust this amount automatically.

And the last item is retaining settings of power is interrupted. This is for those controllers, if they have a

complex program that someone has taken the time and the care to program in, that it will not be knocked out of there or erased if there is a minor power interruption. This could be set at a level that maybe it has to retain its settings for three days without power, or possibly seven, but this would not be retain settings if power is interrupted indefinitely.

So our questions to manufacturers are, are these features feasible in terms of basic features that could apply to nearly all types of controllers? Are any of these features already common in controllers that are on the market, currently? And are any actually prohibitive? Are any harder than they look or harder than they sound? We are hoping to get a really good feel for what some of these would mean to manufacturers, and if there are ones that raise a big red flag in someone's mind, then we would certainly like to know.

Add-on devices. Just as a note regarding add-on devices, many controllers are now sold in a modular format and a significant market of that on irrigation control devices, apart from modular controllers, does exist. And we wanted to know, are there any current industry standards or common formats for add-on devices, such as specific plugs that we know are going to be compatible or specific communication formats that allow a specific add-on device

to be compatible with a wide range of controllers by other manufacturers? Should all controllers be easily upgradeable? Would it be sensible to save it for a controller that does not possess certain sensing capabilities that have a common and inexpensive to integrate type of plug, by which an add-on device could be incorporated; and, in that case, how would that be best done and how costly would it actually be in practice? If a simple plug can, in theory, cost maybe $.10 to produce, but actually integrating it into a device can be much much more expensive, and given that we can only approach manufacturers and ask, you know, how hard would it be for your products to integrate something like that?

Landscape irrigation and estimating water use. As I note, this presentation was put together before the presentation of the gentleman in front of me. For ET_o discussions, other than the slide that is going to immediately follow, which is going to be a discussion regarding CIMIS, the California Energy Commission is not predisposed to the idea of a specific ET_o or ETA calculation method, nor have we made any decisions in that regard, but we do see that there is a potential for some estimated information, some calculations to be done in the formulation of energy budgets for these devices, and some of that calculation may be able to be incorporated into the

devices themselves. So what we were looking at initially was the California Irrigation Management Information System, and they provide data and estimates of evapotranspiration, as well as equations for estimating landscape water needs. These estimates and equations could enable more accurate calibration of controllers that lack direct and indirect sensing. And our question is, can controller actually be improved by this sort of mechanism? The CIMIS equation looks something like this, in a very general form you have a species factor, you have a density factor, you have a microclimate factor, and when you multiply all of those together, you come up with a total landscape factor, and then you take your reference of evapotranspiration and you multiply that by your landscape factor, and that will give a general estimated landscape evapotranspiration. Now, this does not incorporate in it such things as, you know, irrigation efficiencies and efficiencies of the system, it does not incorporate that a 15 percent reduction for actual plants' need as opposed to maximum plant use, but it asks a basic equation, it can serve to illustrate what kinds of information can go into formulating a water budget, or a water estimate on the part of the controller. So our questions are, should the controller be required to allow settings according to the CIMIS formula, or to another formula, not to say that they

were required only to allow in that mechanism, but should they be capable of allowing somebody to specify those types of factors and then, from that, automatically calculate how long and how often to run water. Should controllers contain the referenced ET_o table published by CIMIS? Should sensing controllers, particularly those relying on subscription broadcasts, be able to use this data as the back-up? And this is a question, because there is concern by the California Energy Commission for those devices that require a subscription, if a consumer decides not to continue the subscription, what does that controller then do? How does it behave? And we would prefer that the controller continue to behave in like its last known good settings, or some default that actually continues to be a good controller for the landscape it is installed to manage. So would this be one way of achieving that? And last question, can controllers know, in practice, how much water is emitted? If we are going to be talking about water budgets and ET_o, how do we make sure that the controller is aware of how much water is passing through it? What mechanisms, mathematical, by building certain sensors, in any mechanism you use, how does the controller keep track of how much it is actually putting on the landscape?

And landscape, irrigation and slope. An accurate

estimation of water needs is only part of achieving water savings. Irrigation efficiency also results from minimizing runoff and deep percolation. While not all causes of runoff and deep percolation can be addressed by the controller, the most common ones can. It is worth pointing out that the actual phrase "irrigation efficiency" in industry and agriculture refers specifically to runoff and deep percolation issues. But at the same time, given the phrasing, it may be worth just defining it a little more broadly for our discussion. We know that runoff often results from applying water too quickly, that is faster than the soil is able to absorb, and that will depend on soil composition and slope. Deep percolation often results from applying too much water at one time, and it will depend on soil composition and root depth, both can be reduced by proper timing and a scheduling of the irrigation events. As a note, regarding the last presenter, deep percolation that we are talking about here is -- it would be similar to saying we know we can figure out how much a tree is going to need over the next three months and apply it all in one afternoon in June; we know that there needs to be some spacing out of events. Whether it is better to have them two or three times a week versus a constant drip irrigation is not something the Energy Commission is going to necessarily determine at this point, but we know that,

as a capability, we are going to want good controllers to be able to address these issues. So our question is to what extent can all controllers address these issues? We see that stuttered watering, which is on for a few minutes and off for a few minutes to allow absorption, can address runoff, but would need to be adjusted to match different soils and slopes. We know that deep percolation can be reduced by increasing the number of irrigation events over a given time, but would need to be matched to different soils and plant root depths. So the question is to what extent should controller be for these kinds of scheduling adjustments? Should there be, as before, some sort of information template where someone can specify, "I am using this type of turf grass and it is this general type of soil," and thus have the controller actually calculate roughly what sort of scheduling would be appropriate, or is this the kind of thing that should ultimately not be something the controller handles, but be handled by the homeowner or the installer?

Landscape irrigation. The next steps are where do we go from here. The controller is only one part of a landscaped irrigation system. This presentation has hopefully shown how the California Energy Commission is currently looking at this portion of the landscape irrigation efficiency picture. Our goal is to determine

what the minimum requirements of an efficient system should be. And that is worth specifying, that the California Energy Commission is here setting minimum requirements. We understand what best practices would be and what an ideal system would look like, but really what we want to establish is a baseline for an efficient system. What sorts of capabilities should it have? What sorts of capabilities should it be able to provide to the consumer for actually enabling them to engage in efficient irrigation practices? Not everything needs to necessarily be automated by the controller, but as long as those tools are available, so that proper irrigation can be engaged in, I think that we can establish at least that kind of a minimum.

And at this point, I would like to open it up to some questions or responses that people might have based on the topics raised during this presentation. Yes, sir.

MR. MICHELON: Carlos Michelon at the San Diego County Water Authority. I just wanted to probe a little bit more to better understand a statement you made that the Commission was not predisposed to follow a particular water budget formula, if you will. It raised a little bit of a concern for me. I think the information you presented to us is accurate, I am not questioning it. What I am asking, going back to AB 1881, the parallel process by the

Department of Water Resources and the rather extensive process the Department followed in establishing the formula, that actually exists on the books since 1992, through AB 325, I just want to know, did I hear correctly in your statement that you are contemplating a more involved methodology? Because, to put this in perspective, if you take a snapshot today where our marketplace is, we are not really keen on splitting hairs, we want to get people into the ballpark first, and there is a measure of simplification involved in what took place with the, I think, the ET adjustment factor and the MAWA Calculations, and I think you are contemplating an order of complexity that is much greater, and potentially more impractical. So just to balance out the discussion, weighing the pros and cons of -- I would almost assume that you were coordinating more closely with the Department to ensure consistency and that you are, indeed, trying to implement a basic approach.

MR. STRAIT: I can answer that by saying that one of our goals, actually, is to coordinate as strongly as possible with the landscape ordinance, with the model landscape ordinance and the work that has been done there. But for the purpose of this, of moving forward now, we do not want to necessarily stifle any discussion or debate, so what I meant by that statement was that we do not want anyone to feel like they cannot raise an issue, or bring

something to the discussion, but we are very aware of how this -- how our regulations will coordinate with, and be implemented alongside a lot of the work and regulations that are being done by other agencies, and that does -- we do give that a great deal of weight. Does that answer your concerns? Basically our goal is -- we want this to be a collaborative process and we want to foster as much discussion as possible. Is there anyone else with any additional comments or questions?

MR. SOMMERFELD: This is Scott Sommerfeld again.

MR. STRAIT: Greetings.

MR. SOMMERFELD: Yeah. I think I would add, I am not sure if you included it in some of the terms that you used, but some method of fine tuning the settings once the default settings are put in, some of the controllers that are available today are easier to fine tune than others.

MR. STRAIT: Yes.

MR. SOMMERFELD: And I think that, because the defaults are so broad, to adapt to a wide range of conditions that we find out there, that there is an apparent need to fine tune the system. And another feature that I have discussed with some of the manufacturers and some, I think, are starting to work on it, but I think one of the ways, in answer to your question, is it possible to estimate how much water each station is applying, I think

the answer is yeah, and the manufacturers can probably address it. But one of the things that is missing is that we often look at how many gallons for a plot, or how many CCF we are applying, rather than something that might be more intuitive, that would be how many inches are applied to each zone, I do not think in this day and age it would be hard to, if you just knew some simple input like the precipitation rate of a sprinkler in a gross way, or you can actually calculate the actual precipitation just using a mechanical water meter in the set-up, and once you have that, you have, say, some zone is on turf, and some zone is on shrubs, I mean, you should know that you would have immediate feedback, and you should know that over a week, or a month's worth of time, that the shrubs are getting half as much water as the turf, and if they are not, then there is some adjustment that needs to be made. And I think with all the technology today, I think it would be not that difficult to get to that point, and I think it would relate directly to ET. So wherever you are in the state, if you know what your local ET is, a controller should be able to give you that feedback. Now, you do need some input, you do need to know how much area each zone is so it does involve a certain amount of set-up, but I think it is well worth having that capability. And another feature that I am not sure if you mentioned or not was

skipped days.

MR. STRAIT: Yes, that was -- "black-out" days, I called them.

MR. SOMMERFELD: Well, what I mean by a skipped -- a black-out day is a day that, if you are going to play soccer on the field, you of course, or if your landscape maintenance company is coming on Wednesday, you do not want to irrigate that day. But you can also use a skipped day to spread out the irrigation to infrequent irrigation, and most of the clocks today have this feature, I think, but it is a very important one for like Mediterranean or native California plants, some of them only need to be watered, you know, every two weeks, or even the trees once they are established once a month, so to be able to get from 1 to 30 days is a feature that is actually available on many many controllers now, but that is one that I would include in your list of important features.

MR. STRAIT: Sure. And I can say that, in terms of your comment regarding gallons emitted vs. inches emitted, the question that we have is that, if a controller is operating on a certain calculation to where it has an internal budget it is tracking, how does it know how much of that budget is has actually emitted? Is there a direct feedback mechanism by which it knows, "Since I have calculated this much water is what is needed for this

landscape, and I know I have run for a certain duration, am I actually directly sensing how much water I am putting out? Or is it an indirect sort of -- I know that I would run for this much, and I think that this much pressure is on the line, and there is this many heads, and at four, I must have put out this much water." Whether to express that in inches vs. gallons is -- is a different discussion, I think. I should point out, too, that when we are talking about the equations being used and such, really what we are looking at is what is inside the black box, in that we have this controller that a consumer is putting some information into, and then what is coming out of it is good irrigation, adequate irrigation, maybe not adequate irrigation. We are really not looking at -- we are looking at trying to find out what goes on inside those boxes right now, that the different manufacturers have programmed and what sorts of -- as mentioned before, default behaviors there might be, what are the industry norms when it comes to those calculations? Coordinating those with some of the things like the model landscape ordinance is definitely a goal, but that is another reason that we are at this point, really not looking at making a final determination as to which direction to go. We want to know from the people that make them, and from the people that use them, what is going on, what are going on with these devices. So…. Are

there any other -- actually, it was suggested -- and who is that?

MS. WHITE: Caller 9?

MR. STRAIT: I think that is just making that noise because they have probably hung up. If you just mute that line. Thank you.

MS. WHITE: Thanks.

MR. STRAIT: It was suggested I quickly run through and go back to these questions, just to ask one at a time if there were any questions related to these topics, because I know I did run through them fairly quickly, and there is a hand up. Yes, sir?

MR. LENNON: Peter, Brian Lennon with the Irrometer Company. I do realize that they were very vague categories for the four, I guess, families of controllers; but as a manufacturer, as an add-on device, and then also many of the OEM, Original Equipment Manufacturers, have some sort of sensing device that is a subsequent type product to the controller. Where do you see the role of an add-on device that perhaps could take a conventional controller and do some of the things you are looking for it to do?

MR. STRAIT: In terms of role, I cannot say that we necessarily envision a specific role; insofar as what our regulations would say is that an add-on device that is going to be there to improve an existing controller will

have some of these same features, perhaps, maybe a subset based on what type of feature it happens to be adding, but insofar as it is adding that feature, that features is as adequateness robust as what is required for a full system. So we would hope that the role of add-on devices would be to enable consumers to upgrade their systems at a much lower expense, gaining the advantage of some of these capabilities, without requiring as large of a monetary investment, thus increasing to them the return on investment and making it more likely for these to be installed.

MR. LENNON: So then, would you see a separate labeling requirement or set of standards for add-on devices?

MR. STRAIT: Possibly. Again, since a given add-on device may be targeted for a specific purpose, that is, this is an add-on rain sensor, this is an add-on sunlight sensor, this is an add-on temperature gauge, that it may only be required to be marked and labeled and meet the requirements of that specific set of functions for which it is designed, possibly. On the other hand, it really depends. We plan doing a little bit more investigation of the marketplace and find out -- are most add-on devices single purpose, or are there many of them that are kind of general purpose, like here is something that adds nearly

entire weather station in a single plug.

MS. WHITE: Let me also add onto that, one of the things that we would also want to consider as part of any standard is, in these different classes or categories of devices, is there a functionality that we should consider that allows them to use some of these add-on devices if they already are not capable of doing that function themselves? So when he is talking about even some of the plug-in characteristics, is there a standardized industry method to ensure that, you know, rain sensors can plug-in to this category of devices? Is essentially a certain kind of programming framework required so that it could actually interpret information that it gets from one of these add-on devices? And, you know, is there an industry standard for that kind of thing that we need to be made aware of, that would possibly be appropriate for a baseline standard, that any device that falls in a "can't do it itself" category, should have as a feature? Sorry -- we actually unmuted everybody, so the kids are on the line. But those are the kinds of things that we are also looking at because, you know, this slide looks at the controllers, but then we also will have a category for the sensing devices, but is there something about some of these controllers that, if they cannot do that function themselves, they should at least be able to interconnect with something that could do that for

them? You know, make the device smart.

MR. LENNON: And are you looking at something that would be proprietary by manufacturer, or something more universal, for example, as I am sure you are aware, many of the currently manufactured controllers have a sensor terminal, if you will, or sensor area that are an add-on device, or a rain sensor, or a solar sensor can connect to, so is that what you are looking for, is something more standard, so that you have more flexibility with the after-market, as well as the OEM?

MS. WHITE: Right, because if it was proprietary, then we would move the market to that one manufacturer, and that is not what our intent is.

MR. LENNON: Okay, thank you.

MS. WHITE: Anyone on the -- yes?

MR. GOROWITZ: This is Warren Gorowitz with Ewing. And my question, based on, Peter, on your presentation today, and just so I have a better understanding, is your thinking to come up with minimum level feature sets for the products vs. -- because we have been spending a ton of time on, oh, the controller has to get a certain score, or has certain performance standards, versus a feature set standard. Is that the next step after this?

MR. STRAIT: Really, we are looking at both, and what we are going to be constrained by, ultimately, is the

cost analysis that we are able to engage in because the general framework these are going into contains a requirement that any efficiency standard does not result in any added total cost to the consumer over the design life of the appliance, meaning that we can only require things that are paid for in the savings that result from that particular feature. And at the same time, we also have a general goal of being as technology neutral as possible. So on the one hand, we are very much interested in performance standards, and we would like to see -- we would like to be able to set up a performance threshold. But the question of how to get there, and if there are very inexpensive mechanisms that can also result in water savings, or at least empower consumers and give them the tools they need to engage in water savings, then we do not want to miss those opportunities.

MR. GOROWITZ: Okay. Thank you.

MS. WHITE: You want to move on to the next?

MR. STRAIT: Sure. Moving on to the next set of questions. The question is, of the features that were discussed, are they feasible? Are any of them already common? And are any of them prohibitive? Are there any comments or questions that people have about the proposed baseline features that were discussed? We do have one person here.

MS. WHITE: Yes.

MR. KREMICKI: My name is Jeff Kremicki. I am with Hunter Industries. From a controller design standpoint, I do not see any of the features that you are asking for, these basic features, difficult for manufacturers to incorporate in their products. The terminology, like stuttered watering, is really for us, is a common cycle and feature that is built in our controllers. Non-watering periods, we can essentially program controllers to do anything you want them to do, turn any days off, turn any days on. There was a comment in regards to an extended period of time between waterings -- that is interval watering on our controllers. We can do it from 1 to 30 days, let's say, or 31 days. So retaining settings in controllers, that is common too. We do [inaudible] memory in pretty much every product we design, so from our standpoint that feature set is pretty easy for us to accomplish.

MS. WHITE: So was there a need for more standardization of some of these terms?

MR. KREMICKI: No, I think most of the industry gets this, that is not a problem. I think we all understand kind of where you are coming from, from a feature standpoint, and I do not think any of the manufacturers have issues meeting these basic features.

MS. WHITE: So we will need some education on, "For your device, what is it called to do these things?"

MR. KREMICKI: Yeah, and give us a little bit more definition of what you are looking for.

MS. WHITE: Okay.

MR. STRAIT: I think I can say what we are looking for. Some of the feedback we have had from individual consumers is that they will have devices that will be inconsistent in how they handle certain features. One of them, for example, the only way that the person could get it to water for six minutes on, four minutes off, six minutes on, four minutes off, was to have X many individual programs, and how to program them on, I think, eight total programs, so just for watering one area, it was using six of eight of those.

MR. KREMICKI: Yeah. You can get controllers to accomplish that task by doing that, but we do not consider that to be a feature.

MR. STRAIT: Oh, exactly, and that is where we are coming from, too, is to say that we are not going to consider that to be meeting what we are asking for in this features.

MR. KREMICKI: Exactly. And there are features like that built into some controllers that will allow the end user to easily program that sort of functionality in

the controller, instead of going through what you said, a lot of different start times to accomplish the same thing. So that can be done.

MR. STRAIT: Cool.

MS. WHITE: Thank a lot. That is good to hear. Anyone on the phone in response to these questions? Okay, move on.

MR. STRAIT: All right. So moving on to the next one.

MS. WHITE: Whoops, back up.

MR. STRAIGHT: Okay, add-on devices. I think there was some discussion just a moment ago about add-on devices, but are there any current industry standards or common formats for add-on devices? And in this case meaning communication or data formats, standard plug formats and sizes, standard ways that these add-on devices will communicate with the main control unit? Should all controllers -- and this was part of the discussion a second ago -- should all controllers be easily upgradable? Should they have plugs and terminals that are ready to accept? And should they be of common formats that manufacturers of add-on devices can easily adopt? And if we do move to establishing common formats for the communication for these devices, how costly would it be to implement? We would prefer not to use a proprietary solution, as Lorraine has

specified, so hopefully that would not be part of the cost being considered here. But I know that for computers you have certain connections that become practically ubiquitous. But some of those, despite being ubiquitous, are still proprietary, so we are aware of that as a potential issue. Are there any comments or questions related to these that have not already been raised?

MR. SOMMERFELD: This is Scott with East Bay MUDD, Scott Sommerfeld.

MR. STRAIT: Sure.

MR. SOMMERFELD: I think that somebody mentioned that most controllers today have a sensor terminal, and oftentimes it is used to connect like a range shut-off device, or some other sensor. I think, as we get into more water efficiency, I think that the number of sensor terminals could possibly be increased, and maybe one of the standards should set a minimum number. I do not know exactly what that would be, but I think -- I have been involved with projects where you wanted to have more than one sensor terminal, and you only had one to work with. So as we have more interest out in the field or rain shut-off devices, or wind sensor devices, I think the need for just like the early computers had one USB port, now we have, you know, six USB ports, oftentimes, I think it would be helpful to have a higher number of sensor terminal standard

controllers.

MR. STRAIT: Thank you.

MS. WHITE: Anyone else on the line? Oh, four.

MR. DAVIS: This is Andrew Davis. On that, Scott, one of the problems that I see with that, we manufacture irrigation controllers; one of the problems I see with that is you would have to specify what the signal condition is coming in with something like a rain sensor, it is a pretty tough try to [inaudible]. It can have different kinds of signal conditioning, and some of them even need to be power controlled by 12 volts or something, for example, flow meters that are commonly made by Dean Industrial, it is a three terminal -- or two terminal device, but one of them is power. It is just more of a number of terminals. You know, with USB, it is standardized because there is IEEE committee that studies this process and gets all the manufacturers together to come up with the specifications. In the irrigation industry, there is no such thing as an IEEE Committee that gets all the manufacturers together to come up with the standard for a communication port, for example.

MR. SOMMERFELD: Perhaps there should be.

MR. DAVIS: Maybe some day there will be.

MR. SOMMERFELD: But actually, most -- many sensors are just simply on an off switch, it is just suspending the

controller from operating and I think my comment still stands, that there are some special cases, but I think that we still need to have more standard sensor terminals.

MS. WHITE: Warren.

MR. GOROWITZ: This is Warren Gorowitz with Ewing again. This is a general comment. One of my concerns is -- let's see if I can explain this so it actually makes some sense -- having the basic feature set, I think, is fine, but one of the concerns I get is, if we have so many requirements, it is going to inhibit the creativity of future innovation and advancement in technology for the better things that are going to come on the market in the future, and I feel like we are going to push all the manufacturers -- I am not speaking for the manufacturers in general because I am not one -- but I feel like we are going to push them all into the same corner, where all the controllers have to be programmed exactly the same way, and do exactly the same thing, and I think a VCR, a television, is a little different than an irrigation controller with what we are inputting into the controller, and so I guess I get a little concerned with everything looking exactly the same because I know that the manufacturers, a lot of them, do different things with the weather data that either they are acquiring with their sensors, or information, so, again, I get concerned that everything is going to look the

same.

MS. WHITE: Okay, I want to stress that this is the baseline. What we are looking at are basic features in order to ensure water conservation and water savings, or energy conservation, energy savings, that we should be looking, whether it is one standard for all, or a couple of different standards for different categories of devices, that will ensure that they are the most capable of being able to save water. And so we do not want to stifle ingenuity or innovation; the idea is that we are wanting to have that floor in functionality, that floor in terms of capability, so that if someone purchases a given device, it will at least be this good. Now, everything can be quite unique and quite different above that, but we want to make sure -- and that is predominantly what our appliance and building standards are -- everything is going to be at least this good. And so, to the extent that we are teasing out some of these things, and some in general, some specifics, the idea is they are a particular set of basic things these devices should be able to do, that allow them to function efficiently and end up conserving water or energy. So that is where we are going and we are not trying to make all of them the same, and we recognize that there are differences in the market, and one of the reasons we are actually kind of thinking of things and categories,

but the idea, though, is still getting that baseline in place to start saving in terms of landscape and irrigation watering.

MR. GOROWITZ: Okay, thank you.

MS. WHITE: Okay. Amanda.

MS. STEVENS: Hi, Amanda Stevens. I am a consultant for PG&E. So I just had two points and I know a lot of people in this room may be better qualified, but I encourage the Commission, as they think about different features, to also take into account whether these are going to significantly increase the complexity of programming, which may run counter to the real world of water savings that we want to see, and then the second thing was, I know that some data was presented at the last workshop on the standby energy use of these, and I was just wondering what the current thinking was on whether that could be addressed in the standard proceeding, and we definitely would like to see it addressed.

MS. WHITE: Yes, we are hoping it can be addressed. I actually have chatted with another representative from PG&E in trying to help us look at features, in addition to, you know, water recycles and things like that, is there an opportunity for especially like stand-by power to get the kind of needed functionality that we would like to see in these devices, at the lowest opportune stand-by power

because we did see in the information presented that there is a huge range, and that the idea is that we would like to also make sure that how these devices operate from an energy standpoint, is as efficient as it can be. And some people said, well, it might be the solenoid, it might be the transistor, it might be this, it might be that within the devices that are the cause for the huge variation; well, we would like to get to the bottom of that, and so if there are those willing to provide us information on what about some of these devices really bump up that stand-by power, or that operating power demand, and what might be some of the opportunities for lowering that, we definitely want to know because there was a pretty good sizeable variation both for operational power and standby.

MS. STEVENS: Can I get some follow-up?

MS. WHITE: Yes.

MS. STEVENS: I just want to add that, you know, internationally there is a lot of movement for a lot of different appliances, for a one-watt standby, so I just wanted to put that on the record. You know, I understand that is a technically feasible, very level, but for controllers, I do not know the added cost. But in terms of sort of a target, that seems like a reasonable thing to start thinking about.

MS. WHITE: Thanks.

MR. STRAIT: There was one other person -- no, okay.

MS. WHITE: Anybody on the phone? Okay.

MR. STRAIT: Okay, moving on. I am just going to tackle the estimation of water needs all at once. Is some form of calculation that we are estimating of water needs incorporated into a device a -- should this be part of the standards or requirements? Is this the kind of thing that the Energy Commission should be looking at, requiring it to be incorporated into these devices? And would the devices actually become more efficient, or easier to program, or any of that, or more accurate in their application with this sort of data pre-programmed, essentially? Again, setting aside the discussion of a particular formula, just given -- this is the feature itself of having some form of calculation run, the microcontroller, the programming cost that the manufacturer would have to bear to come up with something that does this, would it be roughly equivalent regardless of the specific equation that might be used? Do people have any comments related to this being a portion of the regulations?

MS. WHITE: Warren? If you would like you could just sit up there. I know this room is not exactly the most conducive for open dialogue, but we will try to get there.

MR. GOROWITZ: I think the concept is good, but I think what concerns me is these controllers are going to be smarter than the people that are programming them.

MS. WHITE: Okay, so maybe this should not be a part of the floor. Okay.

MR. DAVIS: This is Andrew Davis. I agree with that last comment about putting this ability in to program in all the CIMIS data beyond the capability of the people who do not know, do not care, ~~do~~and do not understand irrigational plant. I want to remind people that, when the Orange County Water District had a program to install 1,500 timers with consumption with the U.S. Bureau of Reclamation, at first they were just providing payments for the controllers, and they got such a low participation rate that they started giving away free installation. They got such low participation rate with that, that they literally sent out second and third reminders in the mail, and they were so desperate to get people to subscribe to this free time, or free installation for the USDR Runoff Study, that they actually had the Boy Scouts going around and putting little things on people's door knobs, and they still did not get it, and then they extended the date for when they were going to get the subscribers. So the huge great problem that we have is that, while most of the people in the state feel that the state has a water problem, they in

particular do not feel the need -- most of them -- do not feel the need of what they can do to change the timers. Most people do not know, do not care, ~~do~~and do not have time to fiddle with the sprinkler timer.

MS. WHITE: Thank you, Andrew. Someone else was trying to talk on the --

MR. SOMMERFELD: Yeah this is Scott Sommerfeld again. I do not think it is so critical that there be awareness of the equation, whether it follows [inaudible] but I think the idea that it be self-adjusting and that there is some standard, you know, under the radar, like XY or something, is basically giving somebody the other party's evaluation that this controller at least follows the curve and has the potential to follow the curve. I think that is the part that is important.

MR. STRAIT: Okay.

MS. WHITE: Yes.

MR. MICHELON: Carlos Michelon again, San Diego County Water Authority. I think Scott covered it, but I wanted to re-state kind of in my words what I think this slide is doing, it is addressing kind of two distinct objectives, as I see it. One is the overall performance metric that can be used to assess how the different devices perform relative to an absolute standard. And it may be appropriate -- I was suggesting that the state's water

budget methodology is probably, you know, a calculation of a MAWA is good enough, but the notion that articulating or imposing standards on manufacturers that prescribes how their different black boxes should operate is kind of a troubling concept, some of the technologies -- I am not a manufacturer, I work for a water utility, but working closely with industry, I mean, they run the ~~gamet~~gamut of devices that try to approximately that ET curve through some type of local sensing without these types of calculations, or conducting them manually, you know, to all fully automated ET calculations. So can you clarify what you are getting to? Is this intended to ask the question, will CEC impose design standards on the manufacturers that they must incorporate this? Or is this just speaking to the benchmark that, you know, how are we going to assess the performance?

MR. STRAIT: Actually, I can say that my thought process when I was going through these slides and the issue that I [inaudible] this way, was that is there a better way to figure out what my yard requires and guess in check that, if I go in to Lowe's or Home Depot, or wherever, and I buy a control device, and I take it home and I hook it up myself, is there anything that it can do to help me figure out how much and how long it should be running to keep my lawn healthy? At a certain level, maybe it should remain

completely in the hands of the consumer, that if they should set up and try watering three days a week for 15 minutes, and see if that is good enough, and then maybe dial it back, or maybe dial it up, but on the other end of things, there is a potential -- and this is why -- only because the potential is there, not because we feel this is necessarily the best route -- we want feedback, we want this exact sort of feedback on these ideas, that is there something that can be, you know, calculated and built in that will help guide the consumer in establishing what their basic conditions are, and in coming up with the schedule that will be following and practice. This also goes to what was being discussed in terms of people that may not have the keenest awareness or motivation of getting their watering tailored to the needs of their plants. At what level do we say the controller is smart enough, it puts enough capabilities in the hands of the consumers, it is now the consumer's responsibility? We are going to have to draw that line somewhere, so the question really is where, and where different stakeholders are comfortable with that line being.

MR. SOMMERFELD: Well, this is Scott Sommerfeld. I think you are talking about, you know, something that the water agencies do to some degree in setting water budgets. I mean, the water budget is sort of the upper limit of how

much water should be applied to the landscape, and that can be broadly defined by just gross area of irrigated landscape, or it can be fine tuned to lawn versus garden turf, and then it gets even more complex if you want to refine it further. And I think, you know, it is a little beyond most homeowners and even a large number of professionals to really have that level of sophistication today. That may change in the future that the industry ensures, but I think -- I do not think we can get too detailed, but I think a water budget and how it is defined in the model ordinance, is a good starting point. I think a controller, if you could program in the amount of area, of irrigated area just by town, it should be able to come up with an upper limit and send you a warning that says, you know, "Your program is going to exceed this water budget and you may want to make some adjustments."

MR. STRAIT: Yeah.

MS. WHITE: Actually, that is an interesting thought I would like to have you provide more input on, and actually some of the manufacturers. This was one of the comments, that we should look also at ways that we could use water budgets to help, and is there a feature, a capability that these devices could either incorporate, or that some already have, that if you gave it a water budget, plus you gave it some information on your landscape, that

it would be able to take some of the guesswork out of how much, how often. And what would that feature look like?

MR. STRAIT: Especially because I can say that there is a concern that, absent some form of calculation, that you will end up with some form of calculation that you will end up with essentially Congressional style spending of, if you are told this is your water budget, you will water up to that budget because that is obviously how much water you have been given, so this is obviously the amount that must go onto your lawn, otherwise you would not be given this much. So there is that -- there is a little bit of that concern and just in only having a water budget, and only have just kind of that raw number there.

MS. WHITE: Chris, you were going to say something.

MR. BROWN: Yeah, I actually had a different observation to this question that you have in terms of -- the way you are posing the question is a little difficult to know exactly where you are going with this, but essentially, as some of us have discussed the results of the ET controller study, one concern that we have is that there is such variation among the different products that it is really not clear, in view of the large sample size, what -- that there is a real clear indication that user error or some external effect caused this. There are people who estimate that, but there is really not -- no

hard data for that. That is what myself and Marsha mentioned earlier, and I know some of the other analysts did, that the concern that the Commission should focus itself when it looks at this particular question of the calculation of evapotranspiration, having some sort of open book, open source criteria, so that you are not busy mandating a standard that you really do not know what is driving those underlying numbers. So whether or not it is contained in the ETO table published by CIMIS, one of the fascinating statistically insignificant differences found in the analysis was the difference between controllers that used historical ET_o vs. those that try to track ET_o on a real time basis, they did not really show any difference between those two kinds of approaches. Well, you can think through the reasons for that, but what it says to us is that we do not know enough yet what is in the black box, you know, and you are setting a standard here that, you know, I heard the concern that manufacturers would all be required to meet the same. Well, you know, that is what we do with toilets now, you know, we do require them to meet performance standards and there it is. And I think it may be that that is the exact place to go eventually with this. It is not clear to us that the study tells us what that is, and perhaps the only way to find that out is just to open up the black boxes.

MR. STRAIT: Thank you.

MS. WHITE: Do you want to move on?

MR. STRAIT: Sure. The last set of questions was regarding soil and slope. And this is -- and I think this was partly answered under the general featured discussion in that stuttered water, which I understand is not the industry's term, but is something that most controllers could easily integrate and the timing, and like the general number of the irrigation cycles, there was some discussion as to whether -- what the particulars of that might be, but that there are controllers to where it would be a problem to have irrigation events in a certain spacing, and that there probably should not be a requirement in regulation as to what this spacing ought to be, or anything like that, but they actually retain at the functionality, yes, you can have a three-day or five-day, seven-day spacing, and are required to have, like if I said for it to come on at 7:00 a.m., it is coming on every 7:00 a.m. that rolls around. But are there any questions that do relate -- questions or comments that relate specifically to the discussion of soil and slope, and plant root depths and those things?

MS. WHITE: I do not think so.

MR. STRAIT: I do not think so either. And those were the topics raised in the presentation.

MS. WHITE: Okay. Actually, do you want to unmute

everybody? Actually, you need to restate your comments. We did not realize everybody was muted, so please go forward. Sorry.

MR. SOMMERFELD: Oh, this is Scott again.

MS. WHITE: Oh, Scott, and I bet it was a brilliant statement, too, we just missed. Sorry.

MR. SOMMERFELD: No, not really. I just want to reinforce this idea of a cycle and soak and the fact that it is common in many controllers now, even inexpensive controllers, it just gives you the ability to set the total run time so that if you know that, based on ET, that that zone has to water for 15 minutes, you can tell it, I only want it to water for one minute, and then I want it to rest, or soak for, say, 20 minutes, and that is adjustable to whatever you want. And then it will go and irrigate something else while it is waiting for that, and come back to that station so it does not use up the watering window. But that is a very useful feature for exactly what you are trying to deal with, it is common in many controllers, and I think it should be one of the minimum standards. It is a very valuable feature to have.

MS. WHITE: Thank you, Scott. Yes.

MR. MICHELON: Mine is a question. So far we have had an interesting exchange of information that revolves around the control aspect of the overall landscape system,

and you know, just in your process, at what point do we cross over to the emission devices to the distribution of informative questions? Your previous slide, if you could go back there, I think, makes an allusion to deep percolation and, you know, kind of addressing the losses exclusively in the context of controls. But, you know, when we actually get to the actual system design and head-to-head coverage, irregular geometry of sites, there is a lot of waste through poor design, and the application of some obsolete technologies, and where in your process do we begin to address high precision, low volume systems?

MS. WHITE: There are two answers to that question. First is, a lot of the overall system design —is being addressed in the model ordinance. The appliance standard proceeding is looking at the devices in the context of the overall systems, and because we are short on time, and we know we cannot look at everything within a six-month period in order to go through the regulatory proceedings for establishing standards, our scope in this portion of the proceeding was narrowed to certainly the controllers and the sensors, and then perhaps a couple of other things that we know you actually need to have in the system to make those controllers and sensors work properly. And we were given latitude by the Commissioners, if evidence was available, that we could set a standard for some of these

other pieces of equipment by January 1st, 2010. In order to ensure the design question is addressed properly, we are in fact meeting with Department of Water Resources more regularly now, as we have come up to speed on some of these issues to better coordinate what we are doing with the specific devices, with what they are doing on the system design and the model ordinance as a whole, the goal being, of course, to make sure we are truly complimentary. And, as we go forward, when they make an update, it incorporates stuff that we have done in the appliance standard proceeding, and vice versa. So over time we are going to be getting more and more at that design question. But we know the limits of the model ordinance, we know it predominantly affects new construction; it does not get to a lot of these issues on existing. And certainly not a lot on the smaller systems. So there are other things that we are going to have to do outside of what the appliance standard proceeding can accomplish, such as education, such as doing some partnerships with local agencies on their audit programs, and things like that. A lot of the comments that we saw did not necessarily come up with a feature aspect of it in the filings over the last couple of weeks. And we are hoping that we can get to better ways of doing those things and incorporating the results of those things, where appropriate, in the appliance standards. So

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in terms of the emitters, and in terms of some of the other components of a system, it will be in our next cycle of these appliance standards that we are looking specifically at the irrigation system. And one of the things we are obligated to do by January 1st, 2010, is lay out what that schedule is going to be. My question for people is, I mean, if we are finding the amount of variability as we have in controllers and sensors, now we talk emitters, we need to really start thinking now about all the information and analysis we are going to need for appropriate standards in those devices, as well. And that was actually mentioned in the Scoping Order because there is so much more to choose from. You have got sprinkler heads, you have got drip irrigation systems, you have got, you know, the new MP rotors and all these other kinds of emission devices, and we know we are going to need more information than we currently have, and we are going to need help in doing additional analysis. So just putting you on notice, putting me on notice, and everybody else, that we are aware of that, but there is a lot more work there, and we knew we could not get a good job done by January 1st, 2010. So now we would like to really make sure that we are doing the right thing on the controllers and the sensor devices, and would like to at least get those minimum standards in place for that, then we can move on to

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the other devices. I know it is probably not what you wanted to hear, but we recognize that this is not the end of it. Any other comments?

Okay, in a little bit, I am going to kind of wrap some things up, but if there are any general comments right now, I mean, we are actually pretty well on our schedule, we are a little bit ahead. So if there are general comments from anyone on the call, or in the room, on anything else? All right.

So at this point, I would like to get into the next steps. So we have asked for additional comments based on the discussions we have had today, plus any responses that people have to other folks' comments that were filed around the 15th of this last month. We would like to have any follow-up discussions provided by Friday, July 10th, 2009, and that is a ballpark. If people cannot get their information to us by then, just let me know and we will try to work it out. The information for where you send it is in the notice. But, in particular, we are really looking for some more of the real data, some more of the specific information on what some features might look like, and if you were to require that feature, how would we actually word it so it reflects appropriate industry terminology. And that, in terms of some of these performance metrics, you know, whether we are using the ICE Rating, or whether

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we are using the SWAT protocol, where should the performance mark be placed? Because we have heard already that, just because you pass SWAT, does not necessarily mean you are going to save water, it just means that you can water plants adequately. And we have also heard that adequate watering is not necessarily water conservation. So if we were to use some of these existing things, or some of these new proposals, where should that performance mark be, the idea being, if the evidence is out there, if the studies have shown that we should be shooting for a particular mark in California, that we do so. And, in particular, I am looking for specifics and real data that could help substantiate some of those recommendations. In terms of the overall schedule, we are going to start writing a report. We have got some stuff that we have already pulled together; we have lots of suggestions for studies, reports, documents that we can rely on. If there is anything that people want to make sure we are looking at, you need to let us know as soon as possible, and we probably will not be able to meet the end of July, 2009, for the final report, but we are certainly going to try and get some draft materials out by then. And the idea being that we are going to present this report to the Committee in August and hopefully have some workshop discussion on it. So we would like, if people have specific things they

want to talk to us about, if we have to have follow-on discussions, we would like to know. If there is a specific information you want to see us focus on, please let us know, and then we will be able to address it in the report, where we try to pull all of this stuff together in something intelligible and comprehensive. The target date for providing specific regulatory language that defines a standard, and the test methods, our target date for publishing what that would look like is going to be, you know, coming up really quick. We have identified initially an August 14th date. And that was in order to meet the statutory deadline. So our goal is still there, and I am sure everybody appreciates the fact that it is a tough goal to reach, but we would like to get there. And we are going to need some additional input from you to do that.

Overall, the goal is to take what we have collected so far, take the information that you have given us, draft up the report which defines what the language is, get some additional input on that, and refine it so that we can actually get it into the official rulemaking process, which, when you look at the formal rulemaking process, is likewise a very tight schedule, try and get something done within a three-month period. And, you know, there are regulations that have been able to get through that process, but in order for us to meet the statutory

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deadline, that is what we had to define. So if we can count on folks to help address some of the more specific questions that we raised today in Peter's presentation, and/or more detailed responses to the other questions that we raised at the June 1st workshop, that would be helpful. So you guys have this information, of course, but I am particularly interested in people providing more information to the record and, if there are follow-up questions that people have, do not hesitate to call me, especially if it is in order to improve whatever you can provide around July 10th.

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So that is it, unless there is any further comments today. Anyone else on -- yes?

MR. CARLSON: Do you have a draft of his presentation?

MS. WHITE: yes. And it is going to be on the Web.

MR. CARLSON: Okay.

MS. WHITE: We actually had some copies on the table in front, but all this information is going to get posted, all the comments have been posted on the Web, and so we will also be identifying some of the reports that we are already aware of, that we are going to be including in the documents section of our Web page so that people know what we are already looking at.

Okay, thank you everyone. We will be signing off

the Webcast, and discontinuing the call.

——(Whereupon, at 4:20 p.m., the workshop was adjourned.)

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CERTIFICATE OF REPORTER

I, PETER PETTY, a Certified Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Energy Commission Staff Technical ~~Joint Committee~~ Workshop; that it was thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said workshop, nor in any way interested in outcome of said workshop.

IN WITNESS WHEREOF, I have hereunto set my hand this 7th day of July, 2009.

PETER PETTY CER**D-493