UNITED STATES DEPARTMENT OF ENERGY

ENERGY EFFICIENCY & RENEWABLE ENERGY

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TEST PROCEDURE NOPR FOR DIRECT HEATING EQUIPMENT AND POOL HEATERS

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PUBLIC MEETING

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WEDNESDAY

DECEMBER 4, 2013

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The Public Meeting convened in Room 8E-089, Forrestal Building, 1000 Independence Avenue, S.W., Washington, D.C., at 9:00 a.m., Doug Brookman, Facilitator, presiding.

PRESENT:
DOUG BROOKMAN, Facilitator
KEN BELDING, Empire Comfort Systems
RYAN CARROLL, Hearth, Patio & Barbecue Association
ROSALYN COCHRANE, Natural Resources Canada
RUTH ANN DAVIS, Williams Furnace Company
VICTOR FRANCO, Lawrence Berkeley National Laboratory
BYRON HORAK, Intertek
ALEX LEKOV, Lawrence Berkeley National Laboratory
JOHN O'HARE, Hayward Industries
FRANK STANONIK, Air Conditioning, Heating and Refrigeration Institute
DYLAN SULLIVAN, Natural Resources Defense Council
JOHN MICHAEL TALBOTT, P.E.
VANCE WILLIS, Hayward Industries

ALSO PRESENT:
ARI ALTMAN, Office of General Counsel, DOE
ASHLEY ARMSTRONG, DOE
ADAM DARLINGTON, Navigant Consulting
JUSTIN ELSZASZ, Navigant Consulting
WILLIAM HEALY, National Institute of Standards and Technology

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P-R-O-C-E-E-D-I-N-G-S

(9:03 a.m.)

MR. BROOKMAN: Good morning, everyone. Welcome. This is the test procedure and NOPR for direct heating equipment and pool heaters. Today is December 4, 2013 here in the Forrestal Building. My name is Doug Brookman from Public Solutions. Glad to see you all here this morning.

We are going to start with welcoming remarks from Ashley Armstrong.

MS. ARMSTRONG: Hi, everyone. My name is Ashley Armstrong at DOE. I oversee the test procedures here coming out of the Department.

I want to just welcome everyone. Thanks for coming. As you can see, we have a pretty short presentation, just to give you an overview of the proposed rule for test procedures. The important part of this is that we welcome your feedback and any

questions you have. So, we encourage you to participate as much as possible.

And other than that, I will turn it over to Doug.

MR. BROOKMAN: Thank you. We start with introductions, typically. You can get used to turning these microphones both on and off. If you are not using them, please turn them off. And I will start here to my immediate left. Your name and organizational affiliation.

MR. WILLIS: Vance Willis, Hayward Industries.

MR. BELDING: Is this on?

MR. BROOKMAN: Now it is, yes.

MR. BELDING: Ken Belding, Empire Comfort Systems.

MR. CARROLL: Ryan Carroll with the Hearth, Patio and Barbeque Association.

MR. SULLIVAN: Dylan Sullivan with the Natural Resources Defense Council.

MS. COCHRANE: Rosalyn Cochrane,

Natural Resources Canada.

MR. HORAK: Byron Horak from Intertek.

MR. ALTMAN: Ari Altman with DOE's Office of the General Counsel.

MS. ARMSTRONG: Ashley Armstrong, DOE.

MR. BROOKMAN: Please stand. Yes, you. Just say it.

MR. ELSZASZ: Justin Elszasz, Navigant Consulting.

MR. DARLINGTON: Adam Darlington, Navigant Consulting.

MR. LEKOV: Alex Lekov, Lawrence Berkeley National Laboratory.

MR. HEALY: Bill Healy, National Institutes of Standards and Technology.

MR. BROOKMAN: You are just in time, Frank. Introduce yourself.

MR. STANONIK: Frank Stanonik, AHRI.

MR. FRANCO: Victor Franco,

Lawrence Berkeley National Lab.

MR. TALBOTT: John Talbott, consultant.

MR. O'HARE: John O'Hare with Hayward Industries.

MR. BROOKMAN: Thanks to all of you for being here. As Ashley said, it is a rather short presentation content packet this morning. We are just going to go through the packet page by page. And you will note in the packet there are these comment boxes that specifically call out the Department's request that you speak to the issue in that box.

I would ask for your consideration. If you would, please speak one at a time. Please say your name for the record each time you speak. There will be a complete transcript of this meeting available to you on the website. Please keep the focus here. Turn your cell phones on silent mode. Limit the sidebar conversations. You have

already gotten used to turning these microphones on and off. That's good. If you could be concise, share the air time. I will be queuing individuals by name as best I can. I wish to encourage follow-on comment frequently. It is useful for the Department as they are considering the detailed comment that comes in this conversation, the back and forth between individuals sometimes is very helpful.

So, I think that that is about all I need to say. Do we have individuals joining us via the web, Jack? Ten individuals joining us via the web.

Welcome to all those joining via the web. The Department of Energy is trying very hard to make these meetings accessible. And if you would please keep your telephone on mute. And if you raise your hand and the software is working, which sometimes it does, typically it does, then we ought to be able to hear your comment and your question here in the

room, if you raise your hand and our webmaster over there can insert you in the conversation.

So, let's proceed. Ashley Armstrong.

MS. ARMSTRONG: So, just to start off, as Doug mentioned, we have highlighted throughout the presentation a couple specific requests for comment that we are seeking your opinions on. Obviously, we welcome comment throughout. So, feel free to chime in, if you would like to speak to something different.

The only other thing I want to highlight on this slide is that the deadline for submitting written comments is January 7th, just after the holidays.

So, I am going to do a couple brief -- a very brief overview of the history. So, as you know, this meeting is in regards to direct heating equipment and pool heaters. And this just talks about EPCA a little bit of our legal authority, which EPCA established the consumer product provisions and directs

DOE to revise the test procedures. The Energy Independence and Security Act of 2007 requires us to review them and incorporate the standby and off mode provisions. We have dealt with the standby and off mode provisions already, the existing test procedures are found in Appendix O for DHE and Appendix P for Pool Heaters. And today, we are doing a revision to the active mode for those procedures.

This is just the steps in the rulemaking process. What happens is we have issued a Notice of Proposed Rulemaking. It goes out for a 75-day comment period. As I noted, that ends in early January. The next step would be DOE would take all the comments we receive, including those made today, into consideration and that will inform our decisions for the final rule, which we expect to issue sometime early in 2014.

And I am going to pass it to Bill to give some descriptions of our exact proposals in the NOPR.

MR. HEALY: Thank you, Ashley. We are going to split this up. We are going to first deal with direct heating equipment. So we will go through all the proposed updates for direct heating equipment and then we will follow along with pool heaters.

So, the first topic that we are going to discuss is direct heating equipment. There is four key things that we want to discuss that DOE is proposing to update in the direct heating equipment test procedure. We will discuss each one of these in a little bit more detail.

First of all, we are going to add provisions for testing vented home heating equipment using condensing technologies. There are a number of references that were found that appeared to be outdated. So DOE is proposing to update all of those industry standards to more recent ones.

There is a proposed change for floor furnaces to reduce the test burden by

allowing a default value for jacket loss in lieu of testing. And then finally, there are some clarifications and corrections that are proposed that appeared to be in existence in the current test procedure that DOE is proposing to clarify.

So the first thing I wanted to discuss are the provisions for condensing technologies. DOE received quite a few comments to the RFI that a method was going to be needed that deals with DHE that utilizes condensing technologies because right now it is not present in the test procedure.

So, what DOE is proposing to do is to use provisions similar to those that are used in their furnace and boiler test procedure. It would incorporate the method basically that is in ASHRAE 103-2007, which is the method of test for furnaces and boilers. And these would be stand-alone amendments in the DHE test procedure.

So, to summarize this, a separate

test would be conducted for those units that utilize condensing technology. The condensate would be collected and measured.

For those units that may not be designed to collect it, the condensate, DOE would require that those units be designed to actually have some way to collect it for the test method.

Using that condensate, the latent heat loss term that is used in calculating the AFUE would be modified to incorporate the fact that there is condensate. So the latent heat term in the equation for AFUE or the efficiency would be modified to give some efficiency increase because of the use of condensate technology. And these provisions would apply to all types of DHE.

Question?

MR. BROOKMAN: Please say your name.

MR. HORAK: Byron Horak from Intertek.

We are questioning the need that spells out a separate test for the collection of condensate.

MR. BROOKMAN: Is your microphone on, Byron?

MR. HORAK: Excuse me?

MR. BROOKMAN: Is your microphone on?

MR. HORAK: Yes, the green light is on.

MR. BROOKMAN: Thank you. Sorry. Go ahead.

MR. HORAK: On the cooling side of the business, condensate is collected all the time and it is collected during the efficiency test, the performance test. And the guys back in the lab said there is absolutely no reason why condensate on these products couldn't be collected at the exact same time that the efficiency test is being run, rather than having a separate test which extends testing time for everyone.

MR. HEALY: I'm not --

MS. ARMSTRONG: I am not following either.

MR. HEALY: Yes.

MR. BROOKMAN: Go ahead, Frank.

MR. STANONIK: Frank Stanonik with AHRI.

I guess I have got a similar question. The 3.8.1 specifically says begin a steady state condensate collection immediately after the steady state testing. But during the steady state testing, aren't you developing some condensate that should be collected?

MS. ARMSTRONG: So your, I guess, suggestion is that we collect the condensate during the steady state AFUE test, rather than separately.

MR. HORAK: Absolutely.

MS. ARMSTRONG: Okay.

MR. BROOKMAN: Concurrently, as it were. Okay.

MR. HORAK: Concurrent, yes. That's all.

MR. BROOKMAN: Okay, excellent. Frank Stanonik.

MR. STANONIK: Frank Stanonik, AHRI. Just a follow-up question. Since the initial proposal is this way, are you perceiving there is some difference there?

MR. HEALY: We are trying to be very consistent with the furnace and boilers approach. So, that was really one of the approaches that we ended up taking, just to be very consistent with what is currently done on furnaces and boilers.

MR. STANONIK: Oh, okay. Well furnace and boiler test procedure is changing, too. Right? Okay.

MR. BROOKMAN: Additional questions here? Ken.

MR. BELDING: Ken Belding of Empire Comfort Systems.

MR. BROOKMAN: Microphone.

MR. BELDING: Ken Belding with Empire Comfort Systems.

We have, for your consideration, some possible corrections on the equation for MS off in 4.3.3. We feel that it is possibly incorrect and that the 100 there should be a CT*. Also in MF off, same Section, 4.3.3, we feel that the 100 there should also be a CT*.

The next item is: DS is undefined for systems 9 through 12 but is included in the AFUE calculation in section 4.1.17. And this was a source of difference between the Empire and Intertek results in the past.

We now assume that DS is zero. And this is found in AFUE calculation for vented home heating equipment without stack dampers and optional method 3.3. And we feel that Table 1 system number 10 DS should be zero.

Next item is for a power burner direct vent condensing heater. A DF, as in Frank, value is used unless the optional

tracer gas test is conducted. Like some gas furnaces and boilers, Empire's new condensing zone heater has no measurable off-cycle flow. This made conducting a tracer gas test difficult. So, the direct vent heaters should have the same option as described in ASHRAE 103 Section 9.10 for condensing furnaces and boilers. For units with no off-period flue losses, a DF value of 0.05 can be used, rather than running the tracer gas test.

The language from ASHRAE 103 Section 9.10 needs to be included in the revised Appendix O.

Then lastly on condensing is we have a question on multiple control options ship from the manufacturer, specifically on condensing units, and should the efficiency be tested in which mode is the question.

Again, specifically for a unit that has a manual mode and a thermostat step modulating mode ship from the manufacturer on

the same unit. We have a unit we are shipping that has both modes and we need clarification on what to test.

MS. ARMSTRONG: Okay.

MR. BELDING: Thank you.

MR. BROOKMAN: Okay, thank you for those specific comments. Since you have got them all written out there, if you could just type them up and send them in.

MR. BELDING: Yes, we will do that.

MR. BROOKMAN: Okay. To the Department, that would be helpful.

Can you answer his question now or did you need to think about it for a while?

MR. HEALY: No.

MS. ARMSTRONG: I don't think we are going to answer it now.

MR. BROOKMAN: Okay, thanks for that. I am going to return to Bill.

MR. HEALY: The next topic we want to discuss and there will be more time for

question on DHE after a couple of slides here, DOE is proposing to update the referenced industry test standards. There are a number of industry standards that are referenced that are no longer current. So, DOE is proposing to adopt six current industry standards to in some cases they are going to update the exact same standard with a more recent version. In one case there were separate references that have been brought together under a single umbrella. And it covers those other three standards.

And then the incorporation of Standard 103 is proposed in lieu of three older standards.

DOE did check these and believes that this is -- you know there is no inconsistencies and no changes in doing so.

Finally, the last two --

MR. BROOKMAN: Frank Stanonik.

MR. STANONIK: Frank Stanonik, AHRI.

I think in a number of cases we would prefer that you, for gas-fired equipment use, still reference gas-fired safety standards. And I think it may be just a question of looking at different sections of those standards as opposed to where -- I would say one might normally find how to set up the unit for tests in the case of floor furnaces and room heaters. It may be at different sections such as the wall, floor, and in the case of room heaters, ceiling temperature test or something.

But we will submit some comments to either indicate where you could reference the current standard to specify a setup as necessary for room heaters and floor furnaces or perhaps just add the text. It just seems a little -- and I realize it is there already but it just seems odd to reference a oil-fired standard for how to set up a gas-fired unit for test.

MR. BROOKMAN: Got you. Ken?

MR. BELDING: Ken Belding. To just piggyback Frank a little bit here, one of our comments was that specifically on room heaters, floor furnaces, there is really no information in the Z2186 2008 Standard about specifically where to take that exhaust -- flue exhaust temperature. It talks about where to place thermocouples on that to physically take the temperature but not how far away from the exit. I suppose you might know that we use the minimum wall thickness as defined, which is about five inches, round numbers. But obviously, the farther you get away from that exit, the greater the efficiency will be represented. So, there is no real clarification for that. That is kind of what we were looking for on that test.

MR. BROOKMAN: Okay, thank you.

MR. BELDING: Thank you.

MR. BROOKMAN: Other comments here? Byron.

MR. HORAK: Byron from Intertek.

Referencing the safety standards for the installation of these products adds an extra burden which is unnecessary for performance testing. The safety standards require you to set up various walls and floors and paint it all flat black and mount these products in these walls and floors. And that is very much needed for safety testing but for performance testing, it has absolutely no effect and is just an added extra burden to anyone testing these products and really isn't required for performance testing.

MS. ARMSTRONG: Well, I am going to turn that around to the manufacturers to see what they think about removing or the option of removing the false floors and the walls. I mean that is how they are installed.

So, are you onboard with -- for performance testing, would your suggestion be to remove all that as a requirement for their as-tested setup?

MR. BROOKMAN: Frank.

MR. STANONIK: Frank Stanonik with AHRI.

I think, Ashley, that is why I said one of our options, and we need to discuss it, obviously, internally more but we also are considering just actually recommending some actual text to address, as I say, the setup as needed. As Byron was saying, the full structure for a wall, floor, and ceiling test really isn't needed for an efficiency test procedure. But again, flipping it around, you take a floor furnace, the five we test, whatever, but you take it out of the box, you have got to set it up somehow and we agree. And so I think what we are planning to look at is okay, what is in those standards today and again, if needed, we will just give you some text to say --

MS. ARMSTRONG: Right. And what is in the standards today is to build the false walls, floors, et cetera, et cetera.

MR. STANONIK: Right.

MS. ARMSTRONG: So, that is what should be done now. That is not to say that should be propagated if everyone feels that it doesn't impact the measures of efficiency and it can be changed or there is a better way to do it to reduce burden but that is what is there now.

MR. STANONIK: Right.

MR. BROOKMAN: Ken, do you have a comment on this?

MR. BELDING: Ken Belding.

I think that I will wait with Frank. I mean I think we know it is not a big controversial topic. We have to set up the walls anyway to do the safety testing, efficiency testing. We do it at basically the same time.

But I probably need to consult with Frank about what the industry probably wants to do as a whole.

MR. BROOKMAN: Okay, good. Thank you. Okay.

MR. HEALY: So the next topic is related to jacket loss. For the furnaces and boilers test procedure there is an option to, instead of doing a jacket loss test procedure to assign a default value of one percent. DOE is proposing in this NOPR to leave that as an option for direct heating for floor furnaces. So, instead of doing the testing for jacket loss, it can be assigned a value of one percent.

And finally, clarifications and corrections. There were a number of places that were identified in the existing test procedure that were, for example, missing equations. So the first bullet point there, the Section 4.2.4, there was a missing equation. So, DOE is proposing to include an equation there for that.

The tracer gas procedures in Section 3.3 are modified to clarify how it is supposed to be employed for units with thermal stack damper.

And there were some typographical errors that were identified in Section 4.3.6 that are proposed to be corrected as well.

MR. BROOKMAN: Frank Stanonik.

MR. STANONIK: Frank Stanonik, AHRI.

Speaking of typographical errors, and maybe it has already -- I am sure it has been identified. But in the Federal Register notice, that point 3 is floating out there on those equations for $L_{C,SS}$.

MR. HEALY: It should be in the denominator.

MR. STANONIK: Yes.

MR. HEALY: Okay.

MR. STANONIK: Well, no. It is 1053.3 but the point three isn't up like at the end of the calculation.

MR. HEALY: Okay.

MS. ARMSTRONG: I have it.

MR. BROOKMAN: Okay. Additional comments here?

Here you see four issue boxes and some of which --

MS. ARMSTRONG: We have gone through most of them.

MR. BOOKMAN: -- may have been addressed. Maybe just take a peek there. Look at them and see if there is any -- if they cause you to want to make any additional comments at this time.

MR. STANONIK: Frank Stanonik, AHRI.

One of the -- just maybe a confirmation, so the proposed testing for condensing vented heater, that test is just running full fire?

MR. HEALY: No. It is in some of the detail. So, can John speak to that one?

MR. TALBOTT: John Talbott.

MR. BROOKMAN: John, use the microphone, please.

MR. TALBOTT: Okay. When it gets to high fire and low fire and modulating

control, you have to do the condensate collection at both rates, just like it is in 103.

MR. STANONIK: Okay. All right. So, if that is the case, if you look at the equation under 4.1.6.2 for it looks like $L_{C,SS}$ (L sub css), the very last term in the numerator is $T_{F,SS}$ minus 45, where 45, I believe is the design temperature, outdoor temperature.

MR. TALBOTT: Design temperature, that is correct.

MR. STANONIK: Yes, 45 is the average outdoor temperature.

MR. TALBOTT: Yes.

MR. STANONIK: But in the case if this was a furnace boiler test procedure and you had a modulating equipment, doesn't that number reflect that your outdoor temperature at full fire might be different than your outdoor temperature at a lower firing rate?

MR. TALBOTT: Right.

MR. STANONIK: So, it is a variable, right?

MR. TALBOTT: Right, but in the furnace test procedure in 103, it is separately, the modulating controls in there are separately conducted condensate collection procedures. And then in these procedures, they get weighted by the R factor of the percent of heating load that is addressed in the high mode and percent addressed in the low load. And you average them together and that will be your average condensate collection.

So, I mean there is probably some small affect there that could be addressed but it wasn't addressed in 103 as an effect. But it is just following 103 as best it can, until there is some exception that needs to be made.

MR. BROOKMAN: Additional comments on items 1 through 4? And let me remind those of you on the web, if you wish to make comments, we have ought to be able to hear

you in the room.

Okay.

MR. HEALY: So, this concludes the discussion on direct heating equipment.

Next, we will talk about the summary of proposed updates for pool heaters. There are two key ones. The first one is proposed expansion to cover electric pool heaters. Currently, they are not covered in the test procedure. And this would include both electric heat pump pool heaters and electric resistance heaters.

And then we just were, DOE is proposing to clarify that the procedures are applicable to oil-fired pool heaters. There is no changes on that. But just to clarify that they are covered.

So first of all with electric pool heaters, there is a proposal, as I mentioned, to expand that test procedure to cover these electric pool heaters. DOE is proposing to adopt amendments from ASHRAE Standard 1160,

"Performance Rating of Heat Pump Pool Heaters" as well as -- I'm sorry AHRI 1160, as well as ASHRAE Standard 146, "Method of Testing and Rating Pool Heaters."

The proposed amendments for electric resistance type of pool heaters would be specifically from ASHRAE Standard 146. There would be additional calculations for integrated thermal efficiency expressed in terms of percent for all pool heaters. And this is consistent with the current test procedure that includes standby power.

And then there is a method to determine the COP for heat pump pool heaters and then convert that to a thermal efficiency as well.

So, we would seek comment from you whether the proposal for these electric units is appropriate and sufficient. And then any impact on small businesses.

MR. BROOKMAN: Any comments here? No comments here. Okay.

Let me say hello. You have just made it into the room. We are going through the content in this packet very rapidly here. And I want to specifically invite you to ask questions, make comments, get caught up in any way that is going to make you comfortable, since you are one of the manufacturers. So, just weigh in however suits you best.

Okay, we are moving on. We are done, in fact.

Frank Stanonik.

MR. STANONIK: I notice that you have a -- Frank Stanonik, AHRI -- I notice you have a section reserved for hybrid pool heaters. What are you envisioning as a hybrid pool heater?

MR. HEALY: We are not aware of any on the market right now but something like a heat pump pool heater with a gas burner.

MR. STANONIK: Okay.

MR. BROOKMAN: I want to -- go ahead Frank.

MR. STANONIK: Just in certain other product classes, hybrid is being used to describe a heat pump. Okay, maybe it needs a different name.

MR. HEALY: Okay.

MS. ARMSTRONG: Feel free to suggest one.

MR. STANONIK: Okay.

MR. BROOKMAN: So I think we are now finished with the content.

MS. ARMSTRONG: We are.

MR. BROOKMAN: And I invite anybody that wishes to make closing remarks. Any additional issues that, in particular since you joined us, if there is anything you wish to say to add to the record at this point. Additional issues that haven't been covered sufficiently, closing remarks? Frank.

MR. STANONIK: Frank Stanonik, AHRI.

Really more follow-on questions and two separate ones. So, if the test

procedure is planned to be finalized in early 2014, there is certainly a strong suggestion that as far as heat pump pool heaters then the next step would be establishment of efficiency requirements for heat pump pool heaters. So, the question is does DOE have a schedule -- a rulemaking on the schedule for that?

And then the second question, different subject, is it is also very clear in this NOPR that DOE is going to develop test procedures for vented, I will call them fire place heaters in a separate rulemaking. What is the schedule for that rulemaking?

MR. BROOKMAN: Ashley Armstrong.

MS. ARMSTRONG: Loaded questions, Frank, so early in the morning.

I will do the easier one first. Pool heaters. So, I think at this point DOE is required to review its standards rules every so many years. So that is six years. Correct? So, we finished the previous rule in 2010. So, we would have to review it in that

time frame. At that time, during that review, we would investigate whether efficiency standards meet the criteria or we would make a decision at that point about whether we should do efficiency standards for heat pump pool heaters.

Just because there is a test procedure, doesn't mean we have to. So, that is the answer for that one.

I don't know the answer to the other one, as far as vented home heating equipment and the schedule for a separate rule. But I don't have a definitive time table for that one, other than it will be separate and there will be separate notices on that one, coming for it.

MR. STANONIK: Frank Stanonik, AHRI.

This is certainly, at the moment, a theoretical question. But if the comments to this NOPR did include some suggestions on how to test a fireplace heater, I am assuming

DOE would be receptive to that?

MS. ARMSTRONG: Absolutely.

MR. BROOKMAN: Byron.

MR. HORAK: Byron Horak, Intertek.

Were we going to discuss oil-fired pool heaters under this meeting or is that a separate topic?

MS. ARMSTRONG: It is under this one. You know, preliminarily, we made a determination the existing test procedures for gas-fired is applicable to oil-fired as written and we just clarified that.

To the extent that you have comments about that, we welcome them.

MR. HORAK: Okay, good.

MR. BROOKMAN: Additional comments, as we move towards closure here?

Okay, well, I see nothing additional. I thank you all for coming this morning. Very productive. Very crisp little meeting. Back to Ashley for review of

the send-in materials.

MS. ARMSTRONG: So, I just want to thank everyone for coming. I know this was a short meeting. As you go through the proposed rule, if you have any more questions, obviously, we welcome your comments, clarifications, edits. You know, at any point in time, this is just a quick summary about how to submit comments and when the close of the comment period is, which is January 7th, just to remind you once again.

And thank you for participating.

MR. BROOKMAN: Thank you. Safe travels.

(Whereupon, at 9:36 a.m., the foregoing meeting was concluded.)

C E R T I F I C A T E

This is to certify that the foregoing transcript

In the matter of: Test Procedures for Direct Heating Equipment and Pool Heaters

Before: US DOE

Date: 12-04-13

Place: Washington, DC

was duly recorded and accurately transcribed under my direction; further, that said transcript is a true and accurate record of the proceedings.

Neal R Gross

Court Reporter