ILLINOIS POLLUTION CONTROL BOARD
AUGUST 22, 2006

IN THE MATTER OF:	)	
	)	
PROPOSED NEW 35 ILL. ADM. CODE 225 CONTROL OF EMISSIONS FROM LARGE COMBUSTION SOURCES (MERCURY)	)))	R06-25 (Rulemaking-Air)

Report of proceedings had at the hearing in the above-entitled cause before HEARING OFFICER MARIE E. TIPSORD, called by the Illinois Pollution Control Board, pursuant to notice, taken before Martina Manzo, Certified Shorthand Reporter and Notary Public within and for the County of Cook and State of Illinois, at the James R. Thompson Center, 100 West Randolph Street, Assembly Hall, Chicago, Illinois, commencing at 1:00 p.m. on the 22nd day of August, A.D., 2006.

APPEARANCES:

ILLINOIS POLLUTION CONTROL BOARD

Ms. Marie E. Tipsord, Hearing Officer
Mr. G. Tanner Girard, Acting Chairman
Mr. Nicholas J. Melas, Board Member
Mr. Timothy J. Fox, Board Member
Ms. Andrea S. Moore, Board Member
Mr. Anand Rao, Board Member
Mr. Thomas E. Johnson, Board Member

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

Mr. Charles E. Matoesian
Mr. John J. Kim
Mr. David E. Bloomberg
Mr. Christopher Romaine
Ms. Michelle Rousey
Mr. Kevin Mattison
Dr. Thomas C. Hornshaw
Mr. Jeffrey W. Sprague

SCHIFF, HARDIN, LLP

Mr. Stephen J. Bonebrake
Mr. Sheldon A. Zabel
Ms. Kathleen C. Bassi
Sears Tower
233 South Wacker Drive
Suite 6600
Chicago, Illinois 60606
Phone: (312) 258-5646

ENVIRONMENT ILLINOIS

Mr. Keith I. Harley
205 West Monroe Street
Suite 400
Chicago, Illinois 60606
Phone: (312) 726-2938

MR. BONEBRAKE: Madam Hearing Officer, before the break, we had skipped 21 subparts (e), (f), (g), and (h), moved on to question 22, and we'd like now to return to Question 21, subparts (e) through (h.)

HEARING OFFICER TIPSORD: Okay.

DR. CHARNLEY: 21 (e) and (f) have to do with a study that I've already discussed as in response to Question Number 17 earlier, and I would have no different responses now than I did when it was Question 17. So I would like to refer (e) and (f) to my responses 17(a) and (b).

Question (g): Are you aware that about 16 percent of women in the U.S. have hair levels above the EPA reference dose?

And I'm going to quote from the Centers for Disease Control, Morbidity and Mortality Weekly.

MR. MATOESIAN: I'm sorry. Just one thing. I think (e) and (f) are phrased somewhat differently. Could you maybe just state for the record your answers exactly to (e) and (f), please?

DR. CHARNLEY: All righty.

Are you aware --

MR. BONEBRAKE: Are we going to start --

DR. CHARNLEY: This is (e).

MR. BONEBRAKE: Thank you.

DR. CHARNLEY: Are you aware that in the study of infant memory in Massachusetts, effects were found in a population that was not chosen on the basis of high fish consumption?

Response: That is what the authors reported, yes.

(F): Are you aware that in the Massachusetts Study, infants of mothers with hair levels above the EPA reference dose, 1.2 parts per million, performed more poorly than infants of mothers with lower hair levels?

Response: Yes. The 14 women whose hair mercury level exceeded EPA's reference dose had children who performed somewhat more poorly than the children of the women who had lower hair mercury. The authors concluded that, quote, these findings based on a relatively small group of women merit further investigation and verification in other populations consuming moderate amounts of seafood, end quote. In other words, the authors concede that their results are basically preliminary due to the small sample size. Their results are not confirmed by the results in the

Seychelles which involve significantly higher methylmercury exposure, 6.9 parts per million hair-growth methylmercury on average, 779 infant-mother pairs, and no effect on VRM scores.

MR. MATOESIAN: Thank you.

DR. CHARNLEY: Sure.

(G): Are you aware that about 16 percent of women in the U.S. have hair levels above the EPA reference dose?

I'm quoting from the Centers for Disease Control, Morbidity and Mortality Weekly, dated March 2nd, 2001, which, to my knowledge, is the last time the CDC analyzed mercury in hair in a representative cross-section of U.S. women of reproductive age. They report that the 90th -- this is quote. The 90th percentile of hair mercury for women was 1.4 parts per million -- Yeah, the 90th percentile. Geometric mean values could not be calculated because so many of the values were below the limit of detection. So if the 90th percentile of hair mercury is 1.4 parts per million, I'm not seeing how we get to the 16 percent of women in the U.S. That is inconsistent with what the Centers for Disease Control has reported.

In any case -- My response: In any case, exceeding the EPA reference dose, as I've noted in the answer to -- answers to quite a few of the earlier questions, exceeding a reference dose is not an indication of status of risk and does not suggest that there is a risk to the women or the children of the women whose hair happens to exceed a reference dose, if, in fact, it does.

And I would remind you that the CDC also reported that none of the women who had been examined for blood mercury levels had levels that approached the levels that are associated with toxicity based on the Faroe Study.

HEARING OFFICER TIPSORD: (H).

DR. CHARNLEY: (H): Are you aware of any epidemiological studies in Japan exploring potential neuropsychological consequences to the offspring of maternal fish consumption for methylmercury exposure in the general population? If not, of what relevance are data from Japan?

I -- Without going to -- Without doing literature searching right now, I can say that I am aware that much of the information that we have about the effects of methylmercury in offspring of

exposed women comes from Japan as a result of the Minamata poisoning incident. Now, that, of course, is a poisoning incident, which means that the exposure level was much higher than we would expect in the general population. But I think that there, of course, would have been a gradation with some group of the women in that area exposed to lower levels than others. So without actually looking up the literature, I can't respond to -- I can't cite specific studies, but I can certainly say that there's information from Japan.

Of what relevance are the data from Japan? I'm not sure of what relevance to what exactly. But if the question is, of what relevance are data from Japan to the United States' general population, I would have to respond that they are about as relevant as data from the Faroe Islands and the Seychelle Islands.

HEARING OFFICER TIPSORD: Question 24.

DR. CHARNLEY: All right. You discussed the evidence for cardiovascular effects related to fish consumption and methylmercury exposure.

Response: Yes, because I found the discussion of that subject in the TSD to be biased towards identifying only negative impacts, ignoring the large literature demonstrating the cardiovascular

benefits of fish consumption.

(A): Are you aware that the Physicians' Study recently identified increased atrial fibrillation related to increased fish consumption in men?

Response: I am aware that the Physicians' Health Study has failed to find associations between fish or Omega-3 fatty acids and changes in coronary heart disease risk in general. I am also aware that studies other than the Physicians' Study have failed to find an association between fish consumption and increased atrial fibrillation specifically.

For example, in the Rotterdam Study of 5,184 subjects, intakes of long-chain fatty acids and the consumption of fish were not associated with the onset of atrial fibrillation. According to Kris-Etherton, et al. -- that's K-R-I-S, dash, E-T-H-E-R-T-O-N -- one explanation for the apparent inconsistency among studies is that studies failing to find an association between fish consumption and beneficial coronary effects tend to have only small fractions of their study populations, like three percent, reporting little to no fish consumption. Only

studies including sizable non-fish-eating populations have reported an inverse association between fish consumption and coronary mortality. Other explanations include the varying coronary heart disease risk status of the populations studied and the types of fish consumed.

Overall, however, the weight of the scientific evidence clearly demonstrates beneficial cardiac effects associated with fish consumption.

(B): Are you aware that in an analysis of multiple clinical randomized control trials with consumption of fish oil on cardiovascular health that no beneficial effects were observed (Hooper, et al., British Medical Journal, 2006, on-line)?

Response: Once again, IEPA mischaracterizes the authors' conclusions. Hooper, et al., did not conclude that no beneficial effects were observed. They concluded that, quote, Long-chain and shorter-chain Omega-3 fats do not have a clear effect on total mortality, combined cardiovascular events, or cancer, closed quote. In other words, Hooper did not say that fish oil does not protect against heart attacks or that it has no beneficial effects. What it said -- What they said was that at

present, their analysis of the evidence found it insufficiently strong to be sure that such an effect exists.

An expert committee convened by the International Society for the Study of Fatty Acids and Lipids to review Hooper, et al., disagreed with the authors' conclusions. In its report, the expert committee found that Hooper's results are consistent with the Null Hypothesis primarily due to the inclusion of a single study known as DART 2. That's capital D, capital A, capital R, capital T, 2.

Apparently, the DART 2 Study was well-designed but poorly conducted due to serious under-funding. The expert committee's report provides a detailed analysis of the problems with the DART 2 Study, problems with which the study authors themselves agree. The expert committee also provides a detailed analysis of the flaws in the Hooper Study. When DART 2 was excluded from the Hooper, et al., metanalysis, the overall decrease in relative risk with Omega-3 consumption became similar to that reported in a previous metanalysis by Bucher.

In other words, other metanalyses have reported beneficial effects of fish oil with

regard to coronary heart disease; and when you eliminate a single flawed study from the Hooper analysis, it does, too.

In addition, according to a report by Hibbeln -- that's H-I-B-B-E-L-N -- n-3 long-chain fatty acids have been specifically recommended for the secondary prevention of cardiovascular disease and are the focus of considerable attention for the prevention and treatment of a variety of other disorders with an inflammatory component, including Type 2 diabetes, irritable bowel syndrome, macular degeneration, rheumatoid arthritis, asthma, several cancers, and psychiatric disorders.

The International Society for the Study of Fatty Acids and Lipids has concluded that there is a worldwide deficiency in Omega-3 fatty-acid intake and makes specific dietary recommendations regarding the minimum required to maintain cardiac health.

MR. BONEBRAKE: Excuse me. I believe you referred to Bucher Study. Could you spell that for the court reporter?

DR. CHARNLEY: B-U-C-H-E-R.

(C): Are you aware that the amount

of Omega-3 fatty acids in fish oil capsules is greater than that -- greater than what could reasonably be consumed through fish consumption?

Response: Yes. Of course if the beneficial effects have a threshold, excess fish-oil intake would not be helpful.

(D): Isn't it true that the randomized control trial design of these studies in which people are assigned randomly to fish oil or control eliminates problems associated with letting people choose their own behavior (to eat fish or not)?

Response: Presumably. However, Brouwer, B-R-O-U-W-E-R, concluded that evidence on this subject from such trials is inconsistent, pointing out that in two open-label trials in patients with a previous myocardial infarction, intake of fish or fish oil prevented fatal coronary heart disease while, in contrast, a trial in patients with angina suggested a higher risk of sudden cardiac death in patients taking fish oil.

(E): Is it possible there are other lifestyle choices by people who eat fish that may be responsible for or contributing to the observed correlation between fish consumption and cardiovascular

health, such as decreased meat consumption or increased exercise?

Response: It's possible, but many studies attempt to control for those differences.

For example, Mozaffarian, M-O-Z-A-F-F-A-R-I-A-N, controlled for lifestyle choices and still found a beneficial effect to fish in a cohort of 5,096 men and women. As I have outlined above, the weight of the scientific evidence clearly supports a positive association between fish intake and cardiovascular health.

(F): Are you aware that other studies, in addition to the Finnish Study you discussed, found an association between methylmercury levels and increased risk for adverse cardiovascular effects?

Response: Yes, and I am also aware that the Finnish results were considered preliminary by the American Heart Association which has concluded that when consumed, according to the established FDA EPA guidelines, the cardiovascular benefits of eating fish far outweigh the risks for middle-aged and older men and women after menopause.

And as I have stated in my

publications, although the evidence that mercury is associated with coronary heart disease risk is contradictory and there is insufficient evidence to conclude that mercury is associated with risk, these suggestive positive findings and the plausible biological modes of action warrant additional research.

(G): Are you aware that there are studies in which Omega-3 oils from plants rather than fish have been found to reduce cardiovascular disease?

Response: I think that question overstates the results of the very limited research in this area. I am aware of the Lyons, L-Y-O-N-S, Heart Study which found a dramatic drop in death rate in the group treated with the so-called Mediterranean Diet which is an-Alpha-linolenic-acid-rich diet due, in part, to lots of fruits and vegetables. An Alpha-linolenic acid is an Omega-3 fatty acid derived from plants.

That study has not been replicated, however. A few other very limited studies of the effects of plant oils have been reviewed by the Agency for Healthcare Research and Quality which concluded that results are unclear.

The end.

MR. MATOESIAN: I just have a couple more, please.

On page 6 of your testimony --

MR. BONEBRAKE: You said page 6?

MR. MATOESIAN: Yeah, 6.

(Continuing.) -- of your testimony, you mention a map generated by USEPA which you include as Exhibit 2.

HEARING OFFICER TIPSORD: Mr. Matoesian, you need to speak up.

MR. MATOESIAN: A map generated by USEPA which you include as Exhibit 2.

DR. CHARNLEY: Yes.

MR. MATOESIAN: Looking at that exhibit now, which is attached to your testimony, this says it's a USEPA map from 2005, deposition from U.S. power plants in 2001. Then next to it, it shows the effects after CAIR, CAMR, and other Clean Air Act programs 2020. And the 2020 map obviously shows a decrease in deposition, but for Illinois and the upper Midwest and the Great Lakes region in general, and particularly for Illinois, it doesn't particularly show a large decline. There is some decline, I see, in Chicago and maybe the southeast border with Indiana. But do you agree that

it doesn't show a great decline for Illinois?

DR. CHARNLEY: Well, I think you have to look at these maps in the context of the other two maps which the TSD includes, and then it omits these maps. And I should have included those other two maps, I guess, in this exhibit, but I didn't. My recollection is that what's interesting is that when you look at -- when you zero out the power-plant contribution of mercury, that there's still substantial deposition from power plants -- I mean, substantial deposition from all other sources and that that doesn't change much when you -- Well, that wouldn't change much one way or the other. Not having -- Oh, wait. You have the color version. Thank you. Let me look at it.

Yes, they look similar.

MR. MATOESIAN: But considering this map is solely deposition from U.S. power plants, wouldn't it suggest -- or wouldn't it be reasonable for states such as Illinois or even Indiana to seek additional reductions on their own, considering the benefits of CAIR seemed to be based mainly on the East Coast and Southeast region?

DR. CHARNLEY: Well, only if seeking additional controls actually did lead to lower health

risks, and that's, as we've been discussing with a number of the experts, a pretty big leap, as a general matter. What I think is a good idea is as I've discussed, is a reasoned restriction on mercury emissions based on science and based on whether there are going to be actual benefits.

HEARING OFFICER TIPSORD: Excuse me. I have to ask a follow-up to that statement.

Dr. Charnley, do you believe that there are going to be health benefits based on CAIR/CAMR?

DR. CHARNLEY: I think that there will be -- I think that the levels of methylmercury in fish will go down in some places as a result of CAIR/CAMR or your rule -- proposed rule. I think that in other places, the levels of methylmercury in fish probably won't go down. And then whether there are health benefits will depend on who eats those fish compared to now. If there are people subsisting on methylmercury-contaminated fish now and their exposures are above -- are associated with potentially the -- the potential for developmental neurotoxicity in their children and the methylmercury levels go down in those fish for those people, then yes. But as I said

earlier, I think generalizing that to all of Illinois is probably inappropriate.

HEARING OFFICER TIPSORD: Okay. And just to back up, you said CAIR/CAMR or our rule; is that correct? Is that what you said at the very beginning --

DR. CHARNLEY: I don't see a big difference, basically, in the benefits between the two. I mean, we've been talking about the four percent additional drop in deposition, I think, is what we talked about yesterday. And a four percent reduction in deposition then has to be translated into an actual reduction in methylmercury in fish. And then that has to be translated to people actually catching and eating those fish at a level that is associated with toxicity. And because of the complexity of those relationships, it's very difficult to predict where benefits might occur or what extent those benefits might be, which is why I think it's hard to distinguish between the benefits of CAIR/CAMR and the Illinois proposed rule.

HEARING OFFICER TIPSORD: The Illinois rule is an additional four percent over and above the five percent that CAIR/CAMR would give. So in effect, from the 2006 baseline -- and I believe I asked Mr. --

asked Krish this yesterday -- the -- in effect, then, the difference in deposition will be nine percent --

DR. CHARNLEY: Okay.

HEARING OFFICER TIPSORD: -- from 2006 to 2010 if the Illinois rule is adopted because there would be five percent from CAIR/CAMR and then an additional four percent. So we're actually talking about, really -- I guess my thing is -- my concern here is that you're talking about the four percent, but really, you can't discount CAIR/CAMR because the way that the modeling was done -- or at least my understanding of what he did -- and I apologize if I'm mischaracterizing his testimony -- was that it's five percent and four percent. So that would be --

DR. CHARNLEY: I think that's right.

HEARING OFFICER TIPSORD: -- nine percent from 2006 to --

DR. CHARNLEY: That's right.

HEARING OFFICER TIPSORD: -- to 2010.

DR. CHARNLEY: And my point is that distinguishing between the health benefits of five percent reduced deposition and nine percent reduced deposition -- distinguishing between those benefits, should there be any, will be virtually impossible, I

think.

HEARING OFFICER TIPSORD: But you can distinguish from zero to five percent?

DR. CHARNLEY: Not necessarily.

HEARING OFFICER TIPSORD: Okay. Thank you. That's the point I was trying to get at. Thank you.

Mr. Matoesian.

MR. MATOESIAN: I guess my concern is if we know that we have statewide mercury consumption warnings for fish and, according to the EPA's estimation, the reduction of mercury in Illinois will be fairly minimal as a result of CAIR/CAMR and other Clean Air Act programs, again, since we know that the -- as you say, the site-specific conditions for a creation of methylmercury exist in Illinois, wouldn't there be value in going from a public policy and public-health standpoint of making that additional reduction?

DR. CHARNLEY: Only if that additional reduction translates into health benefits. I mean, there's a cost, of course, in making a reduction; and so if -- before you decide to do that, it would seem to me you'd want to have a pretty clear idea about what

the benefits are that you anticipate as a result of that cost.

MR. MATOESIAN: But the populations at issue -- subsistence fishermen, pregnant women, and children -- those would have, I guess, a much greater stake in seeing those reductions occur --

DR. CHARNLEY: The --

MR. MATOESIAN: -- not just -- I'm sorry. Let me strike that.

(Continuing.) -- not just any amount but in the additional eight years -- eight to ten years, I guess, really, that our rule comes into compliance with earlier.

DR. CHARNLEY: Well, as I've said --

MR. BONEBRAKE: You're building an eight-to-ten-year difference into your question, and I don't know what the legal predicate is for that.

MR. MATOESIAN: Well, I'm just saying if our compliance date is 2010 and CAIR -- the 70 percent level in CAIR doesn't even take effect until 2018 -- or I'm sorry, CAMR -- and I believe that in the CAMR, EPA said that it wouldn't take full effect, actually, for another eight to ten years, then isn't it -- it's not just the extra reduction we're getting but the fact

that we are getting a whole reduction so much sooner, that's causing the benefits -- I mean, part of the benefit.

DR. CHARNLEY: Well, I can't comment on when the reductions occur, where. What I can comment on is that making the connection between reduced emissions, reduced deposition, reduced methylmercury in fish, and reduced health risks is a very complicated one; and you cannot simply assume that if you do one, you get the other. So I'm saying that understanding the benefits, I should think, would be very important from a public policy point of view.

MR. MATOESIAN: I understand. It's just that if EPA has done the work of determining deposition will still be there in 2020 and if we know that the -- that we have statewide mercury -- methylmercury warnings for fish consumption already, then it seems like we've got two of the pillars already achieved. It's just a question, will people actually eat that fish and would not subsistence -- for instance, subsistence anglers be low on the economic status; in other words, be of low income, typically?

DR. CHARNLEY: I've read some places where that assumption is made and other places where

that -- the -- well, let's see -- that there's an association between income and being a sports angler, I guess. And I don't --

MR. MATOESIAN: But I mean subsistence-type people who depend on fish, wild-caught fish.

DR. CHARNLEY: Okay. I'd like to read from my testimony.

MR. MATOESIAN: I'm sorry. Do you have a page?

MR. BONEBRAKE: And I might just also put on the record for clarification, I think Mr. Matoesian's questions have been assuming that Exhibit 2 is showing no decrease in mercury deposition in Illinois based upon the color shadings, and I note that both in 2001 and 2020 charts, as I read this, are in scales of one to five micrograms per square meter. So it may well be that within that range, there's a reduction but it's not being reflected because of the range shown on the map. So just a clarification on the questions Mr. Matoesian is asking.

MR. MATOESIAN: Okay.

DR. CHARNLEY: I'm looking at the full paragraph on page 8 which says that USEPA has concluded

that after CAIR and CAMR are implemented, the only people who would remain potentially at risk from utility-attributable fish methylmercury would be 99th percentile recreational fishers and mean Native American subsistence fishers who consume solely freshwater fish contaminated at the 99th percentile level.

So EPA is concluding that after CAIR and CAMR, that there is a very small likelihood that there will be people still at risk from utility-attributable emissions.

MR. MATOESIAN: But that small percentage out of a population of 12 million, that one percent, are those not the people who would deserve greater protection from the State?

DR. CHARNLEY: Are there -- I don't know. Are there Native Americans in Illinois?

MR. MATOESIAN: Well, I'm sure there are. The state's named after a Native American.

DR. CHARNLEY: Good point.

MR. MATOESIAN: I know there are subsistence fishermen.

DR. CHARNLEY: Are there any reservations, or just people --

MR. MATOESIAN: I don't believe there are actual reservations.

DR. CHARNLEY: Okay.

HEARING OFFICER TIPSORD: Yet, yet. I believe that they're trying --

MR. BONEBRAKE: Oh, you're saying "yet."

HEARING OFFICER TIPSORD: Yet.

MR. BONEBRAKE: I thought I was hearing Russian, too.

MR. MATOESIAN: I mean, I'm just concerned we're forgetting that small group who may be most, from a public-policy standpoint -- I mean, perhaps even --

DR. CHARNLEY: I have said in a few places that just because only a few people will benefit doesn't mean that they don't deserve to be protected. But my concern is that Illinois has not characterized well who those people are who are at risk and would, therefore, benefit to the extent that you can distinguish between the EPA rule and the proposed rule.

HEARING OFFICER TIPSORD: Can I ask a question?

So your concern here, really, is the difference between CAMR and Illinois rule and that

you don't think that there's a health --

DR. CHARNLEY: The additional benefit.

HEARING OFFICER TIPSORD: -- that there's not an additional health benefit to justify going beyond CAMR?

DR. CHARNLEY: It's not my place to make a decision about what justifies something. But what I'm trying to say is that I think that the incremental health benefits of the Illinois rule will not be distinguishable from CAIR/CAMR or are unlikely to be distinguishable from CAIR/CAMR.

HEARING OFFICER TIPSORD: What about CAMR? Forget CAIR. What if CAIR wasn't implemented?

DR. CHARNLEY: I can't address that.

HEARING OFFICER TIPSORD: Okay.

MR. MATOESIAN: Now, I can't remember. Earlier, did you say you thought there was a health benefit from CAIR/CAMR, the federal CAIR/CAMR?

DR. CHARNLEY: I said that in some places, there probably will be; and in some places, there probably won't be. But because of the very complex relationship between emissions, which is all that CAIR/CAMR addresses, and deposition and methylmercury formation and uptake and -- you know, and

so forth ...

MR. MATOESIAN: Well, assuming we have that deposition in Illinois, again, because of the fish advisories from testing, at the very least, then, in those areas where you think there would be a health benefit from CAIR -- or from CAIR/CAMR, we would be achieving that ten years -- roughly ten years earlier in CAIR/CAMR. I mean, that benefit at least will occur.

MR. BONEBRAKE: Is your question assuming that fish advisories in Illinois are a result of electric-generating-unit emissions?

MR. MATOESIAN: I'm just saying if -- We seem to show that there is a deposition of methyl- -- a production of methylmercury, I should say, from the sediment site-specific factors in Illinois. And, again, I have this Exhibit 2 from the USEPA showing that, yes, there is some deposition from U.S. power plants in Illinois today and in 2020. I'm saying since we seem to know that that's there, at the very least, that health benefit in places where you think CAIR/CAMR will occur would be happening in places in Illinois --

DR. CHARNLEY: But this actually doesn't show that there's a benefit from reducing emissions

from Illinois power plants. This shows the -- what happens if you implement CAIR/CAMR nationwide. So a lot of what's there is probably coming from somewhere else.

HEARING OFFICER TIPSORD: If I may, Mr. Matoesian, let me take a shot at this.

Dr. Charnley, you have agreed that under CAIR/CAMR, there will be some places where deposition of mercury and methylmercury production will decrease; is that correct?

DR. CHARNLEY: I think that that's likely, but I think it's very difficult to predict where.

HEARING OFFICER TIPSORD: But it could happen?

DR. CHARNLEY: Yes.

HEARING OFFICER TIPSORD: So if it can happen under CAIR/CAMR in Illinois where we are going to be at 90 percent in 2009 instead of waiting till 2020 to be at 70 percent, the question I think he's asking you is: Where you agree that the production of methylmercury may decrease because of CAMR, that will happen ten years sooner in Illinois; isn't that correct?

DR. CHARNLEY: Say the last part of the sentence again. It's --

HEARING OFFICER TIPSORD: Where you have agreed there will be a reduction in the production of methylmercury due to the emissions standards in CAIR/CAMR, if we implement a 90 percent reduction ten years before CAIR/CAMR reaches its 70 percent reduction in Illinois, won't Illinois have gotten that benefit, in effect, earlier?

DR. CHARNLEY: Again, that's difficult to predict because of the temporal issues. I mean, it -- I don't know whether -- if you reduce power-plant emissions today, that methylmercury will be down tomorrow and people will be at less risk. I just think it's really difficult to predict as far as the additional benefit. That's all I'm saying.

HEARING OFFICER TIPSORD: Right. But that's not what the question is. The question is not about the additional --

MEMBER MOORE: It's the timing.

HEARING OFFICER TIPSORD: It's the timing.

If you agree that under CAIR/CAMR, there is going to be a health benefit somewhere,

sometime, somehow, if that health benefit were to occur in Illinois by implementing the provisions ten years earlier, don't we get that benefit ten years earlier?

DR. CHARNLEY: If there is a benefit.

MS. BASSI: May I ask a question of the questioner?

HEARING OFFICER TIPSORD: Sure.

MS. BASSI: Does the MPS alter your line of questions at all?

MR. MATOESIAN: To a degree, but I think the general proposition would stay the same when you look at the numbers in the MPS.

MS. BASSI: Yeah. But you no longer have ten years; isn't that correct?

MR. MATOESIAN: For that small percentage, it would only be a four-year -- I assume, three to four years.

MR. ZABEL: I'm sorry. Two amendments that the Agency supports is half the power plants in the state. I don't know what you mean by a small percentage, Mr. Matoesian.

MR. MATOESIAN: I believe there would still be the 90 percent reduction in all but a small percentage of power plants, if I understand that

correctly.

MS. BASSI: Okay. And is that because of the requirement to put on ACI equipment at these other places, at whoever opts in?

MR. KIM: I'm not sure if this is the appropriate way to debate the legal interpretation of a Multipollutant Standard.

HEARING OFFICER TIPSORD: I think the Board will take notice of the fact that under the MPS, it will not be 2010 or 2009 for 90 percent reduction throughout all power plants in the state but, rather, 2015 if the MPS is adopted by the Board, as with any of this rule. So I think we can take notice of that.

Mr. Matoesian.

MR. MATOESIAN: Just a couple more.

That potential benefit, timewise, I believe on page 5 of your testimony, you quoted the -- The full paragraph begins on that page. You quoted the Massachusetts Study as finding that reported decreases in fish methylmercury occurred within, roughly, three to four years after the mercury emissions decreased.

So in that case, could we not -- Well, for what it's worth. I know it's not directly transferable -- but suggest that there would be,

timewise, decreases occurring earlier that would occur even before the CAMR deadline of 2018 comes into effect?

DR. CHARNLEY: Well, that's -- This is, you know, as you've just pointed out, a study of perhaps questionable relevance to your situation. So I think extrapolating on that basis is not appropriate.

MR. MATOESIAN: Now, just -- Sorry. Going back to Exhibit 2, which is solely deposition from U.S. power plants, if I remember right, in CAMR, there were only three states to the west of Illinois that had particularly large mercury emissions, and that was North Dakota, Missouri, and Texas. I believe that's correct from page -- well, from CAMR. They have the budgets listed, just working off that.

Now, in 2018 -- or 2020, Missouri still has a significant emissions -- depositions from U.S. power plants.

Considering the prevailing winds, would that not suggest that a great deal of this Illinois deposition is from Illinois power plants?

MR. BONEBRAKE: I'm --

DR. CHARNLEY: I'm not qualified to --

MR. BONEBRAKE: I'm going to go ahead

and object to that.

Are you asking her to make the assumption that she agrees with what you think is the interpretation of CAMR and where other heavy deposition might be in the nation? I mean, you started that question out with a series of assumptions about your interpretation, and I wasn't clear at all where you were going with your question.

MR. MATOESIAN: Well, I thought she said a while ago that this shows deposition from all power plants in the U.S., so it wouldn't necessarily be Illinois power plants. And I was just suggesting that based on where power plants are, according to the CAIR and the wind patterns, wouldn't it suggest that the Illinois power plants are contributing significant amounts of the deposition in Illinois, as Illinois EPA, I guess, suggests?

DR. CHARNLEY: I'm not qualified to answer that. I don't -- I'm not a deposition expert, as you know.

MR. MATOESIAN: Okay. That's fine. If I could just have a moment.

HEARING OFFICER TIPSORD: Mr. Harley, has some questions. So we'll go ahead to Mr. Harley.

MR. MATOESIAN: Okay.

MR. HARLEY: Dr. Charnley, there's one statement in your prefiled testimony that I don't want to lose, and it's not something that you necessarily elaborated on in response to the questions today. It's the statement found in the first full paragraph on page 6, the first sentence.

MR. BONEBRAKE: Hang on just a second, please.

DR. CHARNLEY: Okey-doke.

MR. HARLEY: Could you read that first sentence, please?

DR. CHARNLEY: The TSD makes a plausible case for reducing power plant mercury emissions, as a general matter. What it does not do is make a case for reducing emissions faster or deeper than would occur if federal regulations were implemented instead.

MR. HARLEY: As to that first statement, the TSD makes a plausible case for reducing power plant mercury emissions, as a general matter, what are the aspects of the TSD that help make this plausible case, as you describe it?

DR. CHARNLEY: Well, as I recall the TSD, it talks about the nature of the toxicity of

methylmercury in fish and why it would be a good idea to reduce that, as a general matter. It makes a case for some portion of what's in -- of the methylmercury in fish may be attributable to Illinois power plants and then assumes that if you reduce one, that it will lead to the other. And it's, as I've said, certainly possible that in some places that will occur.

MR. HARLEY: Your next sentence that you read suggests that you have real questions about how fast reductions should occur, and you have questions about the method through which reductions should occur; is that correct?

DR. CHARNLEY: Yes. I mean, there are feasibility issues, I gather, as well that are involved in this.

MR. HARLEY: That's not -- That's based on what you've heard as opposed to your own --

DR. CHARNLEY: Yes.

MR. HARLEY: -- analysis?

And it's your testimony that CAMR/CAIR is a more appropriate approach in terms of how fast and how to achieve the benefits from reducing mercury emissions from coal-fired power plants?

DR. CHARNLEY: I think that 30 years of

experience in controlling and regulating air pollutants in this country has shown that trading-based approaches attain much deeper cuts in pollutants at much less costs than do command-and-control-technology-based approaches. That's --

MR. HARLEY: Is that the assumption that underlies your testimony, that policy judgment that you just described?

DR. CHARNLEY: That's not an assumption. That's actually a fact.

MR. HARLEY: You believe that that's the fact which then generates the conclusion that a federal trading program is to be preferred to a state-specific command-and-control program?

DR. CHARNLEY: I believe that a trading program will be more effective and more efficient.

MR. HARLEY: What is the basis for your conclusion that trading programs generally result in more significant reductions than command-and-control regulations?

DR. CHARNLEY: Well, based -- As far as air pollution is concerned, based on 30 years of experience in the United States, I can point to the acid rain trading program as a particularly good

example.

MR. HARLEY: Have you ever done any analysis which compares the results of the acid rain trading program by comparison to a command-and-control program like I found in New Source Performance Standards promulgated by USEPA?

DR. CHARNLEY: I haven't done that personally, but it's been done.

MR. HARLEY: Can you cite to any specific study --

DR. CHARNLEY: I'd be happy to supply that.

MR. HARLEY: I beg your pardon?

DR. CHARNLEY: I can supply that to you. I can't quote it off the top of my head, but I can certainly track it down.

MR. HARLEY: And so this factual reality that you're describing, that trading programs are preferred over command-and-control approaches to pollution -- to control pollution, is -- what is behind your preference of a federal program to the state program?

DR. CHARNLEY: Yes. And Byron Swift -- Actually, the work of Byron Swift at the Environmental

Law Institute is one of the sources for my conclusion.

MR. HARLEY: Thank you for those answers.

I'd like to, if I could, take one more stab -- For purposes of clarifying the record, I have a line of questioning that the hearing officer was addressing.

If the reductions achieved by CAMR/CAIR after 2018 are beneficial and could be achieved in Illinois years earlier, isn't this a reasonable approach for state regulators to take?

DR. CHARNLEY: If those benefits can be achieved years earlier and you've determined that there are benefits and that they justify the costs and that they're -- it's feasible and -- I mean, there are a whole lot of "if"s that underlie that.

MR. HARLEY: But if those things are true, if this Board concludes that those things are true, it would be a reasonable exercise of its authority to make the choice to accelerate those reductions for Illinois?

DR. CHARNLEY: Well, if everything falls into place perfectly and one action actually does lead to the reduction in risks, then sure. But that's,

again, based on many, many assumptions and, as you just said, a hypothetical case. So ...

MR. HARLEY: Assumptions based on the weight and value of testimony as they --

DR. CHARNLEY: I meant assumptions about the extent to which reducing -- the nature and extent to which reducing emissions leads to reduced deposition, leads to reduced methylmercury, leads to reduced health risks, and where.

MR. HARLEY: Thank you, Dr. Charnley.

DR. CHARNLEY: Mm-hmm.

MR. KIM: I just have one or two questions.

Dr. Charnley, I believe you testified that it was your opinion that there was a slight -- I don't want to put words in your mouth.

Just for clarification, could you, again, state what your opinion is as to the difference in benefits that would be achieved between CAIR/CAMR and the Illinois rule in terms of health benefits?

I believe you testified that there was -- You made a -- sort of a qualitative analysis of that, and I think you based it on a four percent figure that we've been talking about today. Do you recall

that line of answers?

DR. CHARNLEY: Yeah. I think that what I said was that because of the very complex nature of these relationships, that it will be very difficult, if not impossible, to distinguish between the benefits of one compared to the other.

MR. KIM: And was that based in any way upon this four percent figure that was testified to by --

DR. CHARNLEY: That is an opinion I held before. I heard four percent versus five percent, and I have not changed my opinion based on that testimony.

MR. KIM: Okay. That's all I have.

MR. MATOESIAN: No more questions.

MR. BONEBRAKE: I do have a follow-up.

Dr. Charnley, on page 8 of your report -- I believe you read this into the record before, and I'm looking at the paragraph beginning "obtaining specific data" -- there's a sentence that reads: In its CAMR reconsideration decision, USEPA has concluded that after CAIR and CAMR are implemented, the only people who would remain potentially at risk from utility-attributable fish methylmercury would be the 99th percentile recreational fishers and mean Native

American subsistence fishers who consume solely freshwater fish contaminated at the 99th percentile level.

After you read that, there was some questions that I had at least interpreted to mean that the comparison of the 99th percentile recreational fishers at the 99th percentile contamination level would represent one percent of the population.

Do you read that statement to mean that there would be one percent of the population of the United States that would fall within the risk category described in that sentence?

DR. CHARNLEY: No, that's not what that means.

MR. BONEBRAKE: It would be something substantially less than one percent?

DR. CHARNLEY: Yes.

HEARING OFFICER TIPSORD: Thank you, Dr. Charnley.

And we are ready for Mr. McRanie.

MEMBER JOHNSON: Prairie State questions.

HEARING OFFICER TIPSORD: I apologize.

Prairie State Generating offered

questions, and I believe you've answered all of these. If you want to take a look. If you want to add anything additional.

DR. CHARNLEY: I think I've answered all except 2, really.

HEARING OFFICER TIPSORD: Okay.

DR. CHARNLEY: So if I could just do 2.

HEARING OFFICER TIPSORD: Absolutely.

DR. CHARNLEY: All righty.

Question: If Illinois EPA had critically analyzed the methylmercury health effects data, how would it have changed their analysis?

Answer: Of the dozens of excruciatingly detailed questions involving the minutia of scientific studies I've been answering today, this is really the one that matters the most. A more critical analysis would show that the extent to which people are, quote/unquote, at risk from fish methylmercury contamination depends very much on the assumptions that are made about toxicity, exposure, and risk and that those assumptions are driven by policy choices, not science.

My testimony -- prefiled testimony includes a table showing that using reference doses

that are different from USEPA's but that are used by other organizations and in other countries or different assumptions about fish consumption that are different from USEPA's produces fish methylmercury concentration limits -- acceptable limits that vary by ten times. I show that reference doses determined by other organizations are as much as ten times less stringent or risky than EPA's. That means that you can use any of the assumptions used to assess risk by other organizations which are perfectly valid scientifically but reflect different policy decisions or assumptions and come up with a completely different answer in terms of the extent of risk; potentially, from ten to maybe as much as 100 times less risky than has been concluded by the Illinois EPA.

For example, if the USEPA were to make an adjustment for the difference between cord blood and maternal blood methylmercury concentrations, which they are apparently considering doing and which I discussed in my answers to the earlier questions, the methylmercury RFD would be twice as high or less stringent than it is now. In that case, the CDC's data on blood mercury levels could indicate that there are no U.S. women with levels that exceed the RFD. If that

turns out to be the case, it would be a lot harder to make claims about there being hundreds of thousands of babies born in the U.S. each year supposedly, quote/unquote, at risk. It could show that there aren't so many fish contaminated above the methylmercury criterion as we think there are now.

So my point is, a more critical analysis of the methylmercury health effects data would show how much different valid assumptions would change conclusions about risk, virtually all of them in the direction of potentially less risky than asserted by the TSD.

HEARING OFFICER TIPSORD: Anything further?

MR. MATOESIAN: No.

HEARING OFFICER TIPSORD: Thank you very much, Dr. Charnley.

DR. CHARNLEY: Thank you.

MR. KIM: Can we take a short five- to ten-minute break to reconfigure --

HEARING OFFICER TIPSORD: Well, actually, I believe Mr. McRanie was going to do a slide presentation and a summary; and I thought that after his presentation, we would do that, if that sounds

good.

MR. KIM: That's fine.

HEARING OFFICER TIPSORD: Did we lose Mr. McRanie?

Perhaps we'll take a break right now, then. Let's take a break.

MR. KIM: Thank you very much.

(A short break was had.)

(Witness sworn.)

HEARING OFFICER TIPSORD: If there's no objection, we'll mark the prefiled testimony as Exhibit 132. Seeing none, it is Exhibit 132.

And then we'll enter as Exhibit 133 the slide presentation -- the PowerPoint presentation, if there's no objection. Seeing none, the PowerPoint presentation is Exhibit 133.

MR. McRANIE: Thank you very much. My name is Richard McRanie. I am a principal at RMB Consulting & Research in Raleigh, North Carolina. We're a small consulting company that works primarily in the industry. One of our specialties is measurements, compliance measurements, and methodology for measurements.

I want to spend just a second --

HEARING OFFICER TIPSORD: Mr. McRanie, you need to face the court reporter.

MR. McRANIE: I want to spend half a minute trying to get everyone calibrated to the difference between -- the numbers we talk about in regulations and the numbers we talk about when we make measurements. I'm going to be talking about measurement numbers and measurement numbers of mercury that are made in terms of micrograms per cubic meter.

To try to make things a little bit simpler for us -- And, of course, your rule is written in pounds per gigawatt hour -- or proposed rule or in terms of percent reduction.

There's a fairly simple conversion that we use to try to make the numbers jibe, if you will; and that is, that .008 pounds per gigawatt hour, it's approximately equal to .8 micrograms per cubic meter. You just move the decimal point a couple places. That's not exact, but in terms of what we're going to discuss today, I think it's more than adequate. That assumes a unit heat rate of 10,000 BTU per kW and a stack CO2 concentration of 11.3 percent. Both of those are fairly reasonable numbers and consistent with where units typically run.

So .8 micrograms, please write that down because you're going to hear it a lot as I go through this discussion. That is the equivalent to your .008 pounds per gigawatt hour.

Under the hard cap emissions control program, you really have to take precision, accuracy, and bias into account when you're looking to establish such rules. For many, many years, we didn't worry about it because we used something called a reference method to actually set the standard. That's the way, virtually, all of the NSPS standards are approved. We're now in the stage of getting where we keep pushing the levels down, and we're getting to the point where we're can't hardly make the measurements any longer. The precision and accuracy are starting to impact in our ability to show compliance.

Measurements are where the rubber meets the road. If you wanted to administer a cap -- hard cap program or a percent reduction program, you have to be able to make the measurements precisely and accurately. The reason for that is if you do not, you will end up with false positives. People will be considered to be out of compliance when they're really not.

Let's take a look at what is in the rule relative to compliance, a true compliance measurement determination. This rule suggests an emission limit of .80 -- and that last zero is important -- micrograms per cubic meter. What that says is if I measure .804, I'm in compliance; and if I measure .806, I'm out of compliance. It's just that simple.

Now, we've got a problem. The biggest problem we've got is that we cannot measure the difference between .8 and .9, much less the difference between .804 and .806. That measurement -- That differential measurement is impossible to make. In one case, it's in compliance; and in the other case, it's not in compliance.

We've got a little problem with mercury. Mercury doesn't act like SO2 and NOx and CO2, things that we used to regulate in the past. Mercury is hugely variable. Not only is it variable in the mercury that comes in with the coal, it is hugely variable with respect to everything that happens in the power plant. Everything you do in the power plant makes the mercury change. If you go below, the mercury changes. If you go above, the mercury changes.

Anything happens, any trouble, the mercury changes. These are real data.

Most of you have probably seen the real mercury data. I'm going to show you some real mercury data today. These are real mercury data for the Trimble County plant; three mercury CEMS -- the red diamonds, the black squares, and blue triangles -- over a period of, what do we got here, seven days.

Now, the first thing you notice is those three analyzers don't sit on top of each other. They're kind of random with respect to measurements. The second thing you notice is they do seem to track in relative terms, but they're tracking from two to 12 micrograms per cubic meter. That's a lot of variance in comparison to what we normally see in things like SO2 and NOx, a big variance. If I have to have a control system to control that mercury, I've got to be able to track that with the control system.

Continuous working measurements are really hard to make. That's a given today. Someone asked -- And we'll be answering questions later. Someone asked whether EPA had appropriate information when they wrote the 40 CFR Part 75 mercury monitoring. The answer is, the EPA didn't have complete

information.

90 percent of the mercury monitors that exist today did not exist when those regulations were written a year ago. They weren't even in existence. The low levels we're talking about with respect to the proposed Illinois rule, .8 micrograms, is equivalent to about a tenth of a part per billion if we were looking at it on a volume-volume basis. That's in contrast to SO2 and NOx numbers of several hundred parts per million. So we're looking at a tenth of a part per billion and our ability to make these measurements.

At this point in time, the precision and accuracy of mercury measurements with CEM are totally unknown. We do not have a clue. I have some guesses that I'm going to give you in just a moment based on observations, but we don't have a clue what the true number is.

Now, what we do know, the Part 75 rules contain an allowance in calibration and a relative accuracy test audit allowance of plus or minus one microgram per cubic meter. That allowance says that I am acceptable, from a calibration standpoint or from a relative accuracy test standpoint, if I agree

between the monitor and the reference method within plus or minus one part per million.

How do you implement a command-and-control program at .8 micrograms per cubic meter when you have an allowance of one microgram per cubic meter?

Where this comes from is from the Ontario Hydro method which happens to be the roughest test method for this program, the mercury program. The Ontario Hydro test method, below three micrograms, below three, has a precision of 34 percent or plus or minus one microgram. By definition, that's the best measurement I can make with that measurement.

Now, recent evidence suggests that the precision and accuracy of these monitors is in the range of about a half a microgram per cubic meter, and that's empirical -- Well, that is not scientific evidence. The reason it's not scientific evidence is because we do not have a standard for mercury. There is no recognized standard device to calibrate these estimates. And until we have a standard device and we have a method that will measure more precisely than we have, then we have no way of running the test to determine the precision and accuracy. So the only

thing that we can do is look at these data and try to figure out where it is.

We have four analyzers on this graph, four mercury analyzers. This was, up until 6/30, the absolute best week of operation we have had at our test site, absolutely the best week of operation we've had. And we were running fairly low. If you see, we were down in the one-microgram range, and we actually got all four analyzers running, which is another small miracle.

What I've done is I've taken this -- Now, these slides take every piece of data coming off these monitors. This has not been edited, corrected. Notice that you see right down to zero, or zero checks. The numbers you see below the main trace but above zero are below that period. The numbers you see way up high, the spikes, those are calibrated through all the QA/QC tests we were running. But I'd like you to focus on the band of data, the real data. I've taken that previous slide, and I've blown it up. I've expanded it from zero to ten micrograms up to zero to three where you can get a little bit better feel after it's spread and scattered when you look at it.

If you look at this trace, every

one of these analyzers is working as damn good as we can make it work on these days. You will see that the width of those traces is about half a microgram. So anything in there is good.

One analyzer, Mr. Black -- And I like Mr. Black this week. He's reading low. Well, here, he's running about .8. Up here, we're about 1.2, 1.1. That's where the plus or minus .5 comes from that I quoted you a little earlier because every data point there in that main trace is considered, by the rule, by Part 75, to be a good number. They're all good numbers.

I want to make a few other points. Mercury CEMS equipment is more complex than SO2 and NOx. This is laboratory equipment that's been put in a case and called a mercury CEMS. They are hard to operate. They are hard to maintain. They have lots of downtime, lots of downtime, about 50 to 60. Some weeks, we get up to 70 percent on one of the analyzers. That's about our level of availability on these monitors at this point in time.

Will they get better? Yes. They've already gotten better. Six months ago, we were at 30 percent availability, but we're getting to the

point now where we've knocked out all the obvious problems. And things are getting tougher to go forward.

One thing that escapes a lot of people is that mercury monitors are in their infancy, as I said earlier. The three out of four monitors we have at our test site did not exist a year ago. Those monitors didn't even exist. And so we're trying to start up an infancy measurement program. With SO2 and NOx, we had 30 years of experience, 30 years of experience. Those SO2 and NOx monitors are now, what, about 99.9 percent of the time -- they're very good.

Will these ever reach 99.9? Probably not. They're just too complex. There's too much junk in them. There's too much stuff. Barring any fundamental change in technology, we're not going to get to 99.9 with this equipment.

I've already mentioned that the reliability is poor, failures -- This is the other problem. It takes days to repair these things. Most of these things have 100 tubing fittings in them. If you get a leak, it could take you three or four days to find it. This stuff is complex, and it's hard to run. We need some major design changes, frankly. The

analyzers need to do a better job.

One problem we have that I touched on just a moment ago but I'll mention again, we do not have any fundamental standards for mercury analyzers. We have calibrators, but none of those are traceable to NIST, the National Institute of Science and Technology. The protocol that they're considering implementing to me has an awful lot of holes in it anyway. Therefore, in the future, once we do get a protocol -- and this is promising that we're going to have a protocol one of these days -- we don't know how reliable that standard is going to be. We don't know how precise it's going to be, how accurate it's going to be, or what the stability is going to be.

I know that everybody thinks that long averaging times solve all the problems of variability. That is only true if all you have is random error and variability. Long averaging times help, but they don't solve the problem, in particular when you have what we call a log-normal tail. In every emissions control file that we look at where there's a control system present, we have a log-normal curve and we have a log tail.

Use of missing data substitution,

which is a feature of the Illinois rule, is something that's going to (inaudible), it's going to add to the log-normal tail, and, in fact, if you have poor CEMS reliability, compliance would be literally mathematically impossible, mathematically impossible.

This is what a normal distribution looks look. I've drawn it around .8 micrograms per cubic meter, which is the magic number. If all we had was random error, then I could control right at .8. I've got some high numbers. I've got some low numbers. But they're all on the same side of the mean point.

This is what we see when we look at data from (inaudible). One of the reasons it is, is because this long tail out here on the right is generated by problems within the control device and problems within the system.

Now, to compensate for those problems that happen, to get to Point A, we've got to operate somewhere above .6. To achieve 90 percent removal, the source has to stop right at 92, 93, 94 percent.

Now, I said mercury was a different animal. This is the mercury trace from, what, back in February before the SCR was put in. You see we were

running at about three. This is a calibration sequence. You get this big spike after you come out of calibration. A lot of the analyzers just do that. We haven't really quite figured out why they do that.

Now, look here. It went up to 30. So we went from three micrograms to 30 micrograms. Why? We have pulverized fire and a unit trip.

Now, if I'm a source and I'm sitting over the mercury control device and I'm controlling right on my .8 limit and I have that, I'm dead meat for several days.

This is the same unit two days later, and we don't know what caused this madness. But you see we have this at 16, back down to two, back up to 16, down to two, and then finally things settle down. We don't have a clue what caused that one.

This is even more interesting. Here we have a case where the unit came off-line. We're running at about one and a half micrograms. Again, we've got three analyzers running. You see right here the unit came off-line down almost to zero. We got this bump in the mercury, and then when we finally put the coal-fire back in -- the important thing to note here is that three perfectly fine

calibrated analyzers don't read the same thing -- one peaked at about two and a half, the other one peaked at about three and a half, and another one peaked a little bit over four micrograms. And that's a fairly significant difference.

I want to skip this one. We'll come back to it later if we need it.

Final point, the first and very important final point is, to my knowledge, a successful nine-run-mercury-round relative accuracy test audit has never been performed by anyone in this country or any other country. EPA hasn't done one. We haven't been able to do one. They just about cannot be done.

I want to make a point again that the reference method has a precision of about plus or minus one microgram, and, by definition, it's impossible to make measurements more precise than the reference method, by definition.

And we'll save this one for later in case we need it, too.

That's it.

HEARING OFFICER TIPSORD: Let's take a ten-minute break and come back with questions for Mr. McRanie.

(A short break was had.)

HEARING OFFICER TIPSORD: Before we start, I notice at least one new face at the EPA table.

Can we have you identify yourselves for the record?

MR. MATTISON: Kevin Mattison with the Illinois EPA, certified emissions specialist.

HEARING OFFICER TIPSORD: Thank you.

MR. BLOOMBERG: David Bloomberg with the Illinois EPA, compliance unit manager.

HEARING OFFICER TIPSORD: Thank you.

MS. ROUSEY: Michelle Rousey, Illinois EPA, toxicity assessment unit.

HEARING OFFICER TIPSORD: Thank you.

Mr. McRanie, before we start with the questions from the EPA, I do have one point for the record. The charts and materials that you included in your overview that you did for us on PowerPoint --

MR. McRANIE: Yes, ma'am.

HEARING OFFICER TIPSORD: -- are those included in your testimony or are these additional?

MR. McRANIE: Most of that is additional information.

HEARING OFFICER TIPSORD: Thank you.

MR. KIM: And Madam Hearing Officer, I understand that Exhibit 1- -- the slides to the -- that accompanied the presentation that was provided by Mr. McRanie are marked as Exhibit 133; is that correct?

HEARING OFFICER TIPSORD: That's correct.

MR. KIM: And they have been admitted, then, I assume.

HEARING OFFICER TIPSORD: Yes.

MR. KIM: And I apologize. I did not have an opportunity to look through them until I was, frankly, watching the presentation, and I would have voiced an objection as to the documentation within the slide show that is not in, as you've noted, his testimony. There are a number of graphs and charts that predate the date for filing prefiled testimony. So obviously to the extent that that information is new to the Agency, we have not been able to have an opportunity to review that fully and formulate the types of questions that we otherwise would have.

So only as to those documents, I would object -- I would have objected, I guess, had I been quicker on the draw and ask that those documents at the very least be stricken.

HEARING OFFICER TIPSORD: And, Mr. Kim, you can certainly enter your objection, and we will take that as an objection.

MR. KIM: Thank you.

HEARING OFFICER TIPSORD: Mr. Zabel.

MR. ZABEL: There's been a good deal of information introduced into the record. In response to questions, I think this was Mr. McRanie's attempt to lay out some background and explanation for his testimony that -- some of which was included in his testimony and some of which is just really an elaboration of his testimony.

HEARING OFFICER TIPSORD: And I think that's true. I think that we've seen a lot of information introduced at the hearing that might have been available before the hearing. Given the tight schedule and the attempts on all of your parts to get as much information to the Board as possible, that's not always been the case. So with that, I'm going to allow the information in.

You obviously have the opportunity, in any final comments, to respond to any of the information that's new.

MR. KIM: And because some of the

information is outside of his testimony, before we get to the -- before Mr. McRanie begins answering prefiled questions, could we have an opportunity to just walk through just a few of the slides here?

HEARING OFFICER TIPSORD: Sure.

MR. KIM: Okay. Should we go ahead and proceed then.

HEARING OFFICER TIPSORD: Please, do.

MR. KIM: Sorry.

Mr. McRanie, I believe you stated -- and I just want to make sure this is clear for the record --

MR. ZABEL: Mr. Kim, so we'll all be on the same -- The pages, I realize, aren't numbered, and I apologize for that.

MR. KIM: That's okay.

MR. ZABEL: We numbered the cover page 1 so we're all counting the same way.

MR. KIM: And that's what I was going to suggest.

Beginning -- If the cover page is 1, on what I believe would be page 5, which is, I think, is the first chart that's stated one-hour average mercury readings -- Do you see that?

MR. McRANIE: Yes.

MR. KIM: Okay. Could you, again -- I know you did, but -- And I apologize. I didn't have it written down, or I didn't write quick enough.

Could you identify the facility or unit that this was -- from which these readings were taken?

MR. McRANIE: I'll be glad to. All of the data that I am presenting are from the Trimble County plant Louisville Gas Electric, Trimble County, Kentucky.

MR. KIM: Thank you.

On the next page, which I guess would be page 6, you made a statement, as to your second bullet point -- That bullet point reads: The precision and accuracy of mercury emissions at this level are unknown; and then you said, "We don't have a clue as to the accuracy," something to that effect.

When you say "we," who are you referring to as "we"?

MR. McRANIE: I guess I'm using the collective "we," those of us that are trying to make this technology work.

MR. KIM: Do you think that we -- the

royal we would include vendors as well?

MR. McRANIE: I don't know. I have not queried the vendors. I have not seen any experiments run that are designed to quantify the precision and accuracy.

MR. KIM: And to the best of your knowledge, because I'm assuming you work with vendors or on a regular basis.

MR. McRANIE: Absolutely.

MR. KIM: Do you think it's safe to say that a vendor, if asked, would likely not want to state that he had no idea as to the precision or accuracy of emissions that may be generated as a result of a product that he's marketing?

MR. McRANIE: I expect any of the vendors would debate that subject and would try to quantify it in some manner.

MR. KIM: They would certainly try and put their best foot forward, wouldn't they?

MR. McRANIE: Oh, absolutely.

MR. KIM: On that same page, the last bullet point that begins "recent evidence suggests," what are you referring to when you made reference to "recent evidence"?

MR. McRANIE: I'm actually referring to two pages further, the second graph where I've expanded the scale and tried to identify, just by eyeball, the precision and accuracy that we could expect. And I've lumped them together basically by looking at the width of that combined trace that we're looking at there, and I've eyeballed at around a half a microgram per cubic meter.

MR. KIM: And, again, this is all information taken from the Trimble County station; is that correct?

MR. McRANIE: Absolutely.

MR. MATOESIAN: Just to be clear, so the recent evidence is all from one facility?

MR. McRANIE: Yes.

MR. MATOESIAN: Okay.

MR. KIM: You also -- Okay. The first page after those two graphs that begins with bullet points -- And I apologize, Mr. Zabel. I've now lost track of page numbers.

MR. ZABEL: I think that would be 9.

MR. KIM: Okay. And that begins -- That has the heading of mercury-monitoring technology. Do you see that page?

MR. McRANIE: Yes, I do.

MR. KIM: And you have listed five bullet points; is that correct?

MR. McRANIE: That's correct.

MR. KIM: And I assume, in listing these bullet points, you were attempting to identify certain problems associated with mercury-monitoring technology; is that correct?

MR. McRANIE: It terms of output problems, yes, but they're actually -- I would better characterize them as distinguishing features that are different from SO2 and NOx.

MR. KIM: Okay. And certainly that's probably better.

It's correct, then, that these distinguishing features that you have listed would apply equally to mercury-monitoring technology that would be employed under the federal CAMR; is that correct?

MR. McRANIE: That's absolutely correct.

MR. KIM: Now, you're going to have to bear with me because I'm a little in the dark on some things. So you're going to have to, frankly, dumb down your testimony for me.

On that page, the second-to-last bullet point, no NIST elemental or oxidized mercury standards, do you see that?

MR. McRANIE: Yes.

MR. KIM: Okay. Could you -- And I know you touched on this during your presentation. Could you either, I guess -- I apologize -- repeat or expand on what you mean by that?

MR. McRANIE: Yes, and I will try to keep it short because it is a long story.

The only mercury standards that exist under NIST auspices -- and, of course, NIST controls all of the standards in this country -- is a mercury-in-water standard that is used for various analytical purposes, probably fish-tissue analyses as well as mercury-in-water analyses.

The calibration equipment for mercury analyzers is quite different from the calibration equipment for SO2 and NOx. SO2 and NOx, we used compressed-gas cylinders that contain known amounts of SO2 and NOx to calibrate those analyzers. That does not work well for mercury. Mercury does not like to be put in a compressed-gas cylinder. Even worse, it doesn't like to come out of it once you put

it in.

So in general, what we use for elemental mercury is a device called a head-space calibrator, and I describe one of the head-space calibrators. All of them are essentially the same type of device. I've described one in some detail in my testimony, my written testimony. And they use a pool of mercury at a constant temperature, and you pass gas through that -- over that pool of mercury. And because the vapor pressure of the mercury, you can supposedly extract known amounts.

Unfortunately, there's a big debate about what temperature vapor pressure curve to use in those devices. And so NIST has now decided that they don't like any of the curves, and they're going to individually calibrate master calibrators. And then there's going to be a protocol to transfer that calibration downstream to the production line. But we -- we do not have that yet.

MR. KIM: Do you know if they have set forth any kind of projected timetable for how they intend to proceed along that line, that plan of action?

MR. McRANIE: Sometime before the rule goes into effect.

MR. KIM: And when you say "rule," do you mean the federal CAMR?

MR. McRANIE: Federal rule, yes.

MR. KIM: Now, are you aware of any kind of commercial ventures that have worked with USEPA or NIST to try and come up with a commercially available traceable standard?

MR. McRANIE: All of the vendors that make analyzers also make a head-space calibrator, and all of them are working on oxidized mercury calibrators, which is an entirely different device. But you have to have both under the Part 75 rule.

Traceability is going to depend on NIST and what they do for a protocol. So there are a lot of devices out there. It's just that you've got a device and it's got a curve in it and it may or may not be right and it may or may not be stable. That's the state today. Hopefully, we'll be in better shape a year from now.

MR. KIM: Okay. Thank you for that explanation.

MR. McRANIE: Okay. I'm sorry. I got a little ...

MR. KIM: Moving just a few slides

forward, then, I'm looking now at one of your charts that's entitled "Log Normal Distribution."

MR. McRANIE: Yes.

MR. KIM: And I believe -- And, again, please correct me if I'm wrong. I believe you stated that that was something that was generated from data from units with control devices?

MR. McRANIE: This particular curve is one that I created, but when we look at emissions data from units with control devices and, in fact, even without control devices, emissions data is almost always log-normally distributed.

MR. KIM: So this is basically something of your own creation that is based upon historical data; is that --

MR. McRANIE: Yes, experience.

MR. KIM: Okay. I'm going to now flip -- I think it's two charts beyond that -- to a table that's captioned "2/12/06" at the top.

MR. McRANIE: Yes.

MR. KIM: Do you see that?

MR. McRANIE: Yes.

HEARING OFFICER TIPSORD: For the record, that's page 14.

MR. KIM: Thank you. I should be numbering as I go along, but I'm not.

Did you state that there was a problem that was evidenced -- And, again, we're still talking about Trimble County, correct?

MR. McRANIE: Yes, yes. All this is Trimble.

MR. KIM: Did you state that there was a problem that was observed for several days, but -- and then this chart is intended to reflect a spike that occurred over a few hours?

MR. McRANIE: This -- Can we back up one chart?

MR. KIM: Please, do, yes.

MR. McRANIE: The first chart is one -- there's a day missing in between those two charts. One is 2/10, and you'll notice that the next one is 2/12.

MR. KIM: Correct.

MR. McRANIE: The day that's missing is uneventful, so it's just not there. The event that we observed this excursion that occurred around 1912 to 1915 on the chart labeled "2/9/06" was a result -- we can identify the cause of that excursion in mercury. And the cause was a pulverize of fire followed by a

unit trip -- very rapidly followed by a unit trip, within minutes. So that entire excursion was created by that.

The second chart labeled "2/12/06," those two excursions that show up right at the first of the day, we could never identify a cause of those excursions. We have those frequently, every few days.

MR. KIM: Okay. So referring to the gap -- the uneventful data that you referenced, is it correct, then, that there could be at least one table between these two that you provided that would reflect data points that would be where?

MR. McRANIE: They would look more like the first part of 2/9.

MR. KIM: Okay.

MR. McRANIE: If you recall, we start off reading around two-and-a-half micrograms. Then we have a zero check, a three level span check. Then we have this weird excursion that we always get, and then you can see -- But the base mercury concentration is very flat, about two-and-a-half, three micrograms. That day that's missing, that entire day looks that way.

MR. KIM: Okay. I'm going to count

backwards now. The third-from-the-last page --

MR. McRANIE: Yes, the last chart.

MR. KIM: -- I know you said that this is something that you were going to possibly get to, but I'm now very much in the dark as to what this particular chart shows or -- Again, this goes back to sort of my objection, and I understand the ruling. But as to what we are supposed to be making of this ...

MR. McRANIE: Are you talking about the table with the dates May 1 through May 25th?

MR. KIM: Yes, correct.

MR. McRANIE: Okay, fine.

MS. BASSI: It's Slide 16.

MR. McRANIE: Yeah. This is a table of zero and calibration error test results for one of the analyzer systems for those dates at Trimble County. One of the primary QA/QC features of the Part 75 rules are that you perform a daily zero and calibration error test on your analyzers. It doesn't matter what kind they are.

This is the best analyzer and the best month that we've had at Trimble County. You will note the two that are notated in yellow are failures of the span response. That was the only two failures we

had that particular month. I go into some more detailed discussion in our -- in the written testimony. In fact, I have a table there for all three of the analyzers that we had in service when that report was prepared.

The point that I was going to make about -- with this particular chart, if the issue came up, was that if you will look at the zero response, you will notice numbers that vary from minus .1 to around .3 micrograms, and that zero offset impacts the entire range of the analyzer. So in the days when we're showing .3 positive, every reading we take for that entire day is, in essence, biased high by .3. And that's about as good as we can do on a day-by-day basis to make the adjustment to the analyzer. You just can't hardly get it any closer than that.

And so --

MR. KIM: Can you identify which CEMS analyzers were used for that presentation?

MR. McRANIE: I cannot identify the specific analyzer that's on this chart. That's proprietary information.

MR. KIM: Oh, okay. Is it a commercially available --

MR. McRANIE: Yes.

MR. KIM: -- analyzer?

MR. McRANIE: It is being sold and is commercially available.

MR. KIM: And I apologize. I'm going to -- I skipped over some of my notes. I'm going to backtrack with you a little bit.

And just for clarification, when you say it's "proprietary," you mean you are just not at liberty to identify your client or the piece of equipment or --

MR. McRANIE: No. I can identify the client. I can show information in -- In other words, I can show you all four of the analyzer graphs together on a page, but I'm not at liberty to identify a specific analyzer for competitive and contractual reasons.

MEMBER RAO: Just a point of clarification, are all these four analyzers made by the same equipment manufacturer?

MR. McRANIE: No. There are three different manufacturers represented with four analyzers. One manufacturer has two machines on-site.

MEMBER RAO: So you indicated that the

data here is from your best analyzer out of the four that you have?

MR. McRANIE: This chart is the best analyzer we've got out of the four during this month, during this month.

MEMBER RAO: Have you done similar analyses for the other analyzers --

MR. McRANIE: Yes.

MEMBER RAO: -- to see how they compare?

Can you tell us?

MR. McRANIE: I think I have included three of these charts in my written testimony, and -- This is the best one. The worst one had about a 75 percent failure rate, and the one in the middle was -- I forget -- 40 or 50 percent, something of that nature. All three of those charts are in the written testimony.

MR. KIM: I'm referring back to that table with the May dates.

Is that a privately funded or a -- What -- I guess, what's the --

MR. McRANIE: Well, the project in Trimble County is being funded by EPRI, the Electric Power Resource Institute, under a tailored

collaboration project which is, in turn, being supported by about 18 utility companies.

MR. KIM: Okay. Thank you very much.

MR. ZABEL: Just for the record, the three charts that he referred are pages 32, 33, and 34.

MEMBER RAO: Thank you.

MR. KIM: And then when you were making reference to the different analyzers, looking at your two charts where you made reference to Mr. Black --

MR. McRANIE: Yeah.

MR. KIM: -- that's going back to the different types of analyzers. Those are -- Each different color data point represents a different analyzer --

MR. McRANIE: A different analyzer system, that's correct. All of these totally complete systems. They're not just analyzers.

MR. KIM: These are all made by different companies, then, or different systems or --

MR. McRANIE: There are three different manufacturers with four systems. One vendor has two systems there that have different probe designs.

MR. KIM: Okay.

MR. McRANIE: And if you'd see a period

of time when there's not four traces, that means that whichever analyzer is not there was out of service on that day.

MR. KIM: Okay. When you -- Page 4 now of your slide show, mercury measurement issues, you make reference to the -- under the first bullet point, to the different -- what you describe as a difficulty in measurement going down to .00 -- the difference between .804 and .806 micrograms per cubic meter. Do you see that?

MR. McRANIE: Yes.

MR. KIM: Okay. And I probably missed this in your testimony.

Is that a measurement of detection limit, or is that a different measurement?

MR. McRANIE: The proposed Illinois rule has a limit that translates into .80 micrograms per cubic meter. That second zero is significant because it is included in the rule. Therefore, I have to be able to measure one significant digit beyond that, and I have to be able to resolve it accurately to be able to round to the second.

MR. KIM: Now, is that, then -- So obviously you're saying to meet that, you need to have

something that can measure down to .001 micrograms per cubic meter; is that correct?

MR. McRANIE: That's absolutely correct.

MR. KIM: Is that something that's described as a detection limit, or is that something that's described as a different type of -- If you're looking at a CEMS, C-E-M-S -- if you're looking at a monitoring system, what specification would you look at to find out if someone -- if that piece of equipment could measure down to .001 micrograms per cubic meter?

MR. McRANIE: You cannot determine that from any instrument specification. You have to determine that from experience and from the actual measurements being made. No mercury analyzer can even get close. As I said earlier in my short presentation, I -- it's virtually impossible for me to tell the difference between .8 and .9, much less to get to three significant figures.

MR. KIM: I've got a document -- Are you familiar with Thermo Electron Corporation?

MR. McRANIE: Yes, I am.

MR. KIM: Okay. I'm going to pass something out.

HEARING OFFICER TIPSORD: I assume you

want this to be entered as an exhibit?

MR. KIM: Yes, please.

HEARING OFFICER TIPSORD: We will mark this as Exhibit 134, if there's no objection.

MR. KIM: And I apologize. We don't have color printers in the building. So this is a black-and-white as opposed to a color picture.

MR. KIM: Would you look at page -- Well, first of all, what is Thermo Electron Corporation?

MR. McRANIE: Thermo Electron Corporation is an integrated instrumentation manufacturer. They build instrumentation for a lot of different industries' measurements, and they build air-monitoring equipment, stack-monitoring equipment, a variety of different analyzers for those purposes.

MR. KIM: So you're familiar with the company on a professional basis? Have you ever dealt with them --

MR. McRANIE: Oh, absolutely, yeah, 20 years.

MR. KIM: Okay. And what this is -- And I apologize. You know what? As I think about it, I didn't write down the website address. But I

downloaded this from their website. This is, as you can probably confirm, a marketing brochure from one of their pieces of equipment.

If you look at page 4 of that brochure --

MR. ZABEL: Again, we're deprived of page numbers. Your turn, Mr. Kim.

MR. McRANIE: Yes.

MR. KIM: In the middle column there, the top paragraph that states "high sensitivity" --

MR. McRANIE: Mm-hmm.

MR. KIM: -- could you read that paragraph into the record, please?

MR. McRANIE: Certainly.

This is from a Thermo Electron brochure -- advertising brochure. The first paragraph is titled "High Sensitivity:" Follows detection limits down to one nanogram per cubic meter. Allow high sample dilution 100 to one, reducing moisture heat and interfering pollutants.

MR. KIM: Now, this is where you'll have to sort of, perhaps, educate me again.

When I read that, my understanding of that or my interpretation of that is that they

can -- their detection limit reads down to as low as one nanogram per cubic meter. And my very quick and rudimentary math shows that that is approximately -- Well, that is .001 micrograms per cubic meter.

So would this -- Based upon the information they're presenting, would this piece of equipment be able to make the detection that you're describing here, between .804 and .806?

MR. McRANIE: No.

MR. KIM: And can you explain why?

MR. McRANIE: All right. Here's why. The first thing that you have to do when he -- they mention detection limit in this context, there are two things that we need to know about detection limit.

Number one: I cannot measure anything at the detection limit. There is a fairly lengthy discussion on detection limit in my written testimony. Detection limit means that I can only tell that something is there. It's like being in a field on a dark moonlit night with the fog rolled in and you see something move in the distance. You can tell something's there, but you can't tell whether it's a man or a woman, how big it is, how much it weighs. But you can feel it's there.

The classical spectroscopy says that I have to have a level at least 3.3 times the detection limit to get to what's called the quantification limit, okay; and that's where I can possibly, possibly make some measurements. I have enough signal over and above the background noise to try to make a measurement, okay.

Now, besides that 3.3, you've got to multiply by another hundred because they're taking their detection limit after 100-to-one dilution ratio.

MR. KIM: Okay. Thank you. And I recall that there was something in your testimony about that, but I appreciate distinction.

If you look at that --

MR. McRANIE: And that's also measured in a laboratory, by the way, not up on a smokestack.

MR. KIM: I'm not trying to make -- I'm not asking to you make an apples-and-oranges qualification, but now that you've clarified what the detection limit is and the distinction, on page 23 of your testimony --

MR. McRANIE: Yes.

MR. KIM: I'll give you a chance to get to that.

(Continuing.) -- in the second paragraph on that page -- it's actually the first full paragraph that begins "in its sales literature" --

MR. McRANIE: Yes.

MR. KIM: -- I'll just read it in.

Tekran -- which, I assume, is a vendor; is that correct?

MR. McRANIE: That's correct.

MR. KIM: (Continuing.) -- quotes a detection limit for the mercury analyzer of 0.05 micrograms per cubic meter; is that correct?

MR. McRANIE: Yes.

MR. KIM: So is it an apples-to-apples comparison to say that if Tekran is comparing its data that they've got at .05 micrograms per meter detection limit and the brochure that I just provided you as a one nanogram, which is a .001 microgram per cubic meter, that the brochure that I gave you would be a much more sensitive piece of equipment from a detection-limit standpoint?

MR. McRANIE: No. I think that what that means is that Tekran has included their dilution-ratio effect in their detection-limit statement.

In other words, they've taken into account their dilution ratio with talking about their -- in talking about their detection limit.

You've got to be very, very careful looking at detection-limit numbers. In particular, with mercury and with the trapping analyzers, which Tekran happens to be one -- there are others -- those analyzers can actually be set up and are set up as ambient monitors for detection limits done in the picogram range. They can go very, very low.

MR. KIM: From your statement in the testimony, the assumption that you just made is that that's not clear from that statement in the testimony, is it, the added qualifier that you just provided?

MR. McRANIE: Not fully, no.

MR. KIM: And then still on page -- I believe it's page 4 of that brochure that I gave you, and in that same bolded or shaded column, could you read the second-to- -- third-to-last and second-to-last paragraphs on that, the one that begins "easy to use"?

MR. McRANIE: Yeah. This is the third-to-the-last paragraph in the center column, page 4. It's headed "Easy to Use:" Fast intuitive navigation, simple menu-driven programming, common

interface with all new Thermo I Series Analyzers.

The next paragraph is headed "Easy to Maintain": Key components are readily accessible for quick maintenance or change-out.

MR. KIM: Now, understanding that you have a certain perspective in life and a vendor has a certain perspective in life, just reading those statements, those statements are at odds with your bullet point on page 9 of your PowerPoint slide that -- in which you state mercury CEM equipment is very complex and difficult to operate and maintain; is that correct?

MR. McRANIE: That's correct.

MR. KIM: I don't think I have anything else on your slides. Thank you for your indulgence.

HEARING OFFICER TIPSORD: Let's move to the prefiled questions, then.

ACTING CHAIRMAN GIRARD: Can we go back to the slide for a minute, then? Let's go to Exhibit 134, the Thermo Electron Corporation brochure.

Now, going back to talking -- You're talking about detection limits of this machine, .001 microgram per cubic meter, and you said we have to multiply that by 3.3 to get to a measurement limit and

then multiply by 100 to account for the high-sample dilution that they mention there.

Now, when I put those figures together, I come up with -- You're saying that in the real world in a lab, you would have a detection limit, then, of .3 or .33 micrograms per meter?

MR. McRANIE: Approximately, yes, and that's consistent with the observations that we've made in the field. Somewhere around .2 to .3 is our -- is our measurement quantification limit, not detection limit but quantification limit, where we can actually start making measurements.

ACTING CHAIRMAN GIRARD: So if you can start making measurements at that level, what's the problem with having a regulatory limit of .8 micrograms per meter cubed? Is it just that the equipment is not to the point where it's been tested enough to be reliable?

MR. McRANIE: Not exactly. The measurements -- Once you get to the measurement, the quantification limit if you will, those measurements probably have error bands of 2- or 300 percent. That's just the way it is. There's so much noise still there, you can make a measurement but not a good one.

ACTING CHAIRMAN GIRARD: Do you expect that noise level to be reduced through time as we build more of these machines and take more measurements?

MR. McRANIE: Perhaps. We're doing better than we were a year ago. I don't know how much farther we're going to go. See, one of the problems is getting the sample to the analyzer itself. I've got to get it out of that stack. I've got to dilute it. I've got to take all the HCL and sulfuric acid out of it and transport it down to the analyzer and get there at a tenth of a part per billion concentration without contaminating it in any way, shape, or form. It's very difficult. And I don't know -- I don't know what our level of progress is going to be over the next year or two.

Frankly, I think we need a different technology. The machines we're working with just are not up to these very, very low measurements. The Part 75 rule contemplates the lowest measurement of around 5 micrograms.

MEMBER JOHNSON: Mr. McRanie, in your prefiled testimony, you said that you've been involved in every major rule-making for the last -- air emissions rule-making for the last 20 years.

Have you ever been put in this situation before?

MR. McRANIE: Not quite this pressing a situation as far as trying to make low-level measurements. The two part per million NOx measurements we have to make on gas turbines is very, very hard but not as hard as this.

MR. KIM: And I apologize. Some members of our panel did have some additional questions on your slide presentation.

ACTING CHAIRMAN GIRARD: Actually, could I just ask sort of a summary question?

We have two utilities in the state that have agreed to meet this .8 microgram per cubic meter standard.

What would you advise them?

MR. ZABEL: I don't know that he's totally familiar with the MPS. They've agreed to meet it in 2013 -- or 2015. Excuse me.

ACTING CHAIRMAN GIRARD: How are they going to measure it in 2015?

MR. ZABEL: They've got nine years to do it, but I'll let him answer.

MR. McRANIE: They're basically putting

off the MPS -- I mean, putting off the compliance measurement for six years. Instead of having to do it in 2009, now they've got till 2015 before they have to make those measurements. The compliance measurement in the intervening years is just the pounds of carbon that are being blown out.

ACTING CHAIRMAN GIRARD: Thank you.

Go ahead.

HEARING OFFICER TIPSORD: Identify yourself for the record.

MR. ROMAINE: Christopher Romaine for the Agency.

In your presentation, you stated that a unit must be operated at 92 to 93 percent control proficiency to comply with the standard of 90 percent.

What is the basis for that statement?

MR. McRANIE: Experience.

MR. ROMAINE: What particular experience?

MR. McRANIE: Well, experience with lots of units, with lots of scrubbers, many other control devices, SCRs. You always have to control below the

control point or the emission limit to account for the unexpected.

MR. ROMAINE: Which of those examples that you named have limits that apply on an annual basis?

MR. McRANIE: None.

MR. ROMAINE: So this is based on experience with limitations that apply on a short-term basis, typically a 30-day average?

MR. McRANIE: But with proven equipment also. So if -- You can do the calculation however you want to, but if a utility is sitting there operating at 90 percent reduction on the last two weeks of the month and it loses its carbon blower, he's going to be out of compliance.

MR. ROMAINE: But, again, you described the last two days of the month, not addressing the annual standard in this case.

MR. McRANIE: It's a 12-month rolling average, I believe. It rolls every month.

MR. ROMAINE: You also stated in your presentation that by definition, it is impossible to make a measurement more precise than the reference method.

What definition are you referring to?

MR. McRANIE: By definition, the reference method is the gold standard, and its precision and accuracy are immediately transferred to whatever other measurement you're trying to make.

MR. ROMAINE: What is the regulatory basis for that statement?

MR. McRANIE: It's not a regulatory basis. It's just the way it is.

MR. ROMAINE: So it's your opinion?

MR. McRANIE: No. I believe if you will take a look at the RATA test calculations, you will see that there's a confidence coefficient number there which transfers the total measurement variability associated with either/or the analyzer running the test or the reference method. All of that gets thrown into a term called the relative accuracy.

MR. ROMAINE: So does that evaluation address both potential variation in the reference method accuracy and the continuous monitoring method accuracy?

MR. McRANIE: It buries them all together. That's right. You can't separate one from

the other.

MR. ROMAINE: Is it possible to modify the accuracy of reference method testing by simple techniques such as extending the duration of test runs?

MR. McRANIE: The accuracy?

MR. ROMAINE: Yes.

MR. McRANIE: The detection level. I'm not sure about the accuracy. I don't think so. If you're having problems with detection, you can extend the run time.

MR. ROMAINE: Is it a routine practice, when you're measuring low levels of emissions, to have longer test runs than when you're having higher levels of emissions?

MR. McRANIE: Yes.

MR. ROMAINE: Thank you very much.

HEARING OFFICER TIPSORD: Are we ready to go -- Mr. Harley.

MR. HARLEY: My name is Keith Harley. I'm an attorney with a group called Environment Illinois.

Did you have the opportunity, following up on Board Member Johnson's question, to develop public comments as part of the CAMR rule-making

process related to the monitoring issues in your presentation today?

MR. McRANIE: I don't think I followed that. I'm sorry.

MR. HARLEY: Did you develop public comments as part of the CAMR rule-making process --

MR. McRANIE: Yes.

MR. HARLEY: -- related to the monitoring issues that you described today?

MR. McRANIE: Yes.

MR. HARLEY: Did USEPA alter its final CAMR regulations to address any of the concerns you raised regarding monitoring?

MR. McRANIE: I believe there were some modifications made, yes.

MR. HARLEY: Can you describe the modifications the USEPA made in response to your comments?

MR. McRANIE: I, frankly, do not remember those in detail. There were quite a number of comments. And some they implemented. Some they didn't. I just don't remember the details.

MR. HARLEY: Did USEPA issue a response of the summary when it issued its final CAMR

regulations?

MR. McRANIE: I believe there was a response-to-comments document issued with the final regulations.

MR. HARLEY: Were your comments regarding your concerns about monitoring addressed in that response of the summary?

MR. McRANIE: Yes.

MR. HARLEY: Can you describe how USEPA responded to the concerns that you raised?

MR. ZABEL: I think he answered that.

But go ahead, Mr. McRanie.

MR. McRANIE: I believe I stated earlier that EPA -- I may not have stated it earlier.

EPA was put in an unusual position in having to write regulations around monitoring equipment that no one knew anything about, and I think they did a pretty good job all in all. We do believe there will be some additional modifications to the regulations to accommodate some of the peculiarities of this type of equipment where it's different from SO2 and NOx. But, fundamentally, EPA did not do a bad job in putting those Part 75 monitoring regulations together.

HEARING OFFICER TIPSORD: Excuse me, Mr. Harley. If I may, Exhibit 47 in this rule-making is the response to significant public comments from the USEPA I think you're referring to.

MR. HARLEY: Thank you, Madam Hearing Officer.

In terms of the actual physical monitoring devices that will need to be installed under the Illinois rule, is there any difference between the devices that need to be installed in the Illinois rule and the devices that need to be installed in order to comply with the CAMR monitoring requirements?

MR. McRANIE: Not as far as the emissions -- the stack mercury emissions go. The equipment is the same.

MR. HARLEY: And is it fair to say that coal-fired power plants throughout the United States will have to monitor mercury emissions understand CAMR, not just plants here in Illinois?

MR. McRANIE: Yes.

MR. HARLEY: Thank you.

HEARING OFFICER TIPSORD: Then I think we're ready to go to the prefiled questions.

MR. ZABEL: We'll start with the

Illinois EPA's, Madam Hearing Officer.

HEARING OFFICER TIPSORD: Yes.

MR. McRANIE: Question Number 1: On page 6 of your testimony in the section titled General Discussion on the Portable" -- by the way, that should be "probable" -- "Monitoring Issue," you state, quote, It appears that the State of Illinois has proposed these new mercury control regulations without seriously considering any of the mercury emission measurement issues, end quote. What is the basis for this statement?

Answer: As stated in my testimony, there is no mention of mercury measurement issues in the technical support document prepared by the State. In addition, the State did not produce any testimony with significant discussion of mercury measurement issues. Therefore, I concluded that these issues were not given serious consideration.

MR. MATOESIAN: So you didn't actually talk to anyone at Illinois EPA?

MR. McRANIE: No, I did not.

HEARING OFFICER TIPSORD: Question Number 2 -- Oh, I'm sorry. Mr. Harley. I apologize.

MR. HARLEY: Isn't it true that

throughout the Illinois rule, there is explicit reference to the Part 75 monitoring requirements that are contained in the federal CAMR?

MR. McRANIE: That's correct.

MR. HARLEY: Thank you.

HEARING OFFICER TIPSORD: Question Number 2.

MR. McRANIE: Question 2: In the next paragraph, you state, quote, Unfortunately, virtually all regulators assume that emissions measurements can be made at whatever level might be desirable with no accuracy, precision, or bias problem, closed quote. What is the basis for this statement?

My basis for this statement is over 30 years of experience in dealing with regulatory personnel on emission measurement issues. The regulator's position is driven by the desire to never have to deal with accuracy, precision, or bias in an enforcement proceeding. Dealing with measurement issues is a difficult undertaking in a compliance-determination proceeding. Unfortunately, as emissions are driven lower, measurement issues become very important in the setting of emission limits and the demonstration of compliance. They cannot be

ignored.

MR. MATOESIAN: Now, doesn't the compliance time periods selected in both CAMR and the Illinois proposed rule -- that is to say, compliance determined on a calendar-year basis -- show consideration of the issues proposed by the mercury emissions?

MR. McRANIE: They're different. A trading program like CAMR or Part 75, as I like to call it, has a tremendous amount of flexibility, including the trading, purchasing, buying, selling of allowances. There are a lot of escape hatches and degrees of freedom within that regulatory format which you're not given in a hard cap regulatory format. Your only choice is to over-control or be out of compliance.

So I don't think you can rationally compare the two based on averaging time. That just doesn't make any sense.

MR. MATOESIAN: So to be clear, this statement was just -- it wasn't based on a particular fact; it was -- the previous statement that the question's about? It was your opinion?

MR. McRANIE: Sure.

HEARING OFFICER TIPSORD: Question

Number 3.

MR. McRANIE: Question Number 3: Are you claiming that USEPA did not have proper technical knowledge to write the Part 75 mercury-monitoring provisions?

Answer: I do not believe that the word "proper" in the question is totally appropriate. Better words would be "sufficient" or "complete." It is now clear that no one had sufficient, much less complete technical knowledge to write the Part 75 mercury-monitoring provisions. Frankly, I think that EPA did a rather admirable job given the information available at the time.

At the time the regulations were written, there was almost no experience with mercury continuous emissions monitoring on a 24-7 basis. Virtually all of the continuous mercury measurements had been made by research personnel with research grade instrumentation. In fact, many of the mercury CEMS being sold today did not even exist when the Part 75 regulations were written. There was zero experience with relative accuracy Test Audits, calibration error tests, integrity tests, oxidized mercury calibrations, or any of the other operational and QA/QC criteria now

contained in Part 75. The capability and reliability record of Hg CEMS is still being developed as we discuss this today, and it is still not clear whether all of the QA/QC criteria can be met.

HEARING OFFICER TIPSORD: Question?

MR. MATOESIAN: Sorry. Now, if the Illinois rule is disproved, won't all sources have to use the same monitoring provisions under CAMR?

HEARING OFFICER TIPSORD: I didn't get all of the that question. I'm sorry.

MR. MATOESIAN: If the Illinois proposal is not adopted by the Board, all affected sources would still have to use the same monitoring provision under CAMR, correct?

MR. McRANIE: That's what I would assume, yes.

MR. MATOESIAN: And isn't it true that similar arguments were made when USEPA adopted these rules, and it was determined at that time that the monitoring regulations were appropriate?

MR. McRANIE: I don't think I agree with your assertion that the monitoring provisions were appropriate. I think the decision was made by a lot of people that we were going to have a mercury trading

program which was going to be something that was desirable. We had to have a way to measure them, to measure mercury, under that trading program. And the decision was then made by EPA to pattern that after the SO2 and NOx monitoring provisions. They're almost a direct carbon copy, as you know, and that's all we knew at the time. That's all EPA knew at the time.

MR. MATOESIAN: Okay.

HEARING OFFICER TIPSORD: Yes, Mr. Harley.

MR. HARLEY: Are you familiar with the term "technology forcing"?

MR. McRANIE: Yes, I am.

MR. HARLEY: Could you, please, describe what that term means?

MR. McRANIE: "Technology forcing" means that -- in a regulatory perspective, that if a regulation is passed for technology that might not be ready, that industry will then figure out a way to make it work.

MR. HARLEY: Is that a strategy that is, from time to time, used by USEPA in its regulatory approaches?

MR. McRANIE: I'm not familiar with all

of the regulatory approaches that EPA uses. I think it's fair to say that some of the regulatory activities turn out to be technology-forcing.

MR. HARLEY: If USEPA had decided, as part of CAMR, to employ a technology-forcing strategy for mercury monitoring, wouldn't you expect to see 90 percent more mercury monitors existing today than existed at the time that the rule was passed?

MR. McRANIE: I don't know the answer to that question.

MR. ZABEL: That's the answer.

MR. McRANIE: I'm sorry. I don't know the answer to that question.

MR. HARLEY: What was the answer? I'm sorry.

MR. McRANIE: I don't know the answer to that question.

MR. HARLEY: Thank you.

HEARING OFFICER TIPSORD: Question Number 4.

MR. McRANIE: Question 4: On page 7 of your testimony, you claim that trading programs spread out any possible monitoring bias. Isn't it true that a trading program allows averaging across both time and

multiple units?

Answer: As I suggested earlier, a trading program is quite different from a hard cap emission program in many aspects. A mercury trading program is not an averaging program. It is a nationwide, market-driven, block summation approach. It is not averaging. The multiple degrees of freedom associated with a nationwide trading program cannot be rationally compared to a hard cap emissions limit on a unit-by-unit or system-by-system basis.

MR. BLOOMBERG: When you say -- I'm sorry. David Bloomberg, Illinois EPA, bureau of air compliance unit.

When you say a trading program is not an averaging program, isn't it true that if you emit 200 ounces too much and I emit 200 ounces less, I can sell it to you?

MR. McRANIE: Yes, you can.

MR. BLOOMBERG: So then, on average, we've met the necessary reduction?

MR. McRANIE: No. You sold allowances, and I bought them.

MR. BLOOMBERG: And on average, the amount of emissions is the same than if you had

reduced --

MR. McRANIE: But that's not the same as averaging at one site.

MR. BLOOMBERG: No, it's not the same, but isn't the effect?

MR. McRANIE: Of course the effect's not the same.

HEARING OFFICER TIPSORD: Question Number 5.

MR. BLOOMBERG: We have one more.

HEARING OFFICER TIPSORD: Okay.

MR. MATOESIAN: But, now, the Illinois rule, isn't it true it allows averaging across both time and multiple units that would be similar to a trading program?

MR. McRANIE: I didn't follow the first part of that.

MR. MATOESIAN: Isn't it true that the proposed Illinois mercury rule allows averaging across both time and multiple units that is similar to a trading program?

MR. McRANIE: There -- I'll be very frank with you. I did not study some of those particular provisions of that rule. I was asked to

look at monitoring, period. There appear to be some limited averaging within confined spaces, and it was, frankly, a little confusing to me and so I didn't spend a lot of time on it. So I can't comment on it very well.

MR. MATOESIAN: Well, if a system, like, all of the pieces are owned by one company --

MR. ZABEL: I'm sorry. I can't hear you, Mr. Matoesian.

MR. MATOESIAN: Within a system, say -- that's the term we use -- all the units are owned by one company, so multiple plants throughout the state and so on, if those can average amongst themselves, wouldn't that be somewhat similar to a trading program?

MR. McRANIE: The problem with that sort of approach is that big units dominate that average and, therefore, small units can't do anything to offset the averaging process relative to a big unit. So you either have to over-control like crazy on your big units or -- and do nothing on the smaller units or you have to control all your units the same. It just gets totally unbalanced by large units.

MR. MATOESIAN: But wouldn't that be similar to a trading program where the big units would

have most of the allowances; and if they don't control properly, then you have to find --

MR. McRANIE: That's the way most people operate them. They over-control the big units. Of course.

MR. MATOESIAN: So it's kind of the same?

MR. McRANIE: Yeah, in conceptual thought maybe.

HEARING OFFICER TIPSORD: Question Number 5.

MR. McRANIE: Question 5: Again, on page 7 of your testimony, you state regulators have developed the habit of adding significant figures to emission limits in an attempt to tighten the limits. What is the basis for this statement?

Answer: The addition of trailing zeros and additional significant figures to any emission limit serves to tighten the emission limit because of significant figure and rounding practice required. The form of the emission limit in the proposed Illinois rule is a classic example. Why is there a trailing zero?

Another example is a plus or minus

1.0 microgram calibration criteria contained in Part 75. Both imply measurement accuracy that is impossible, impossible. I have also seen numerous permits that contain emission limits that contain trailing zeros at levels that cannot be measured. A notable example are on many gas turbines with 2.0 parts per million NOx limits. This limit implies that I can reliably quantify every individual NOx measurement to an accuracy and precision of .01 parts per million, which cannot be done. One can only quantify NOx to about the nearest 0.5 parts per million, but since a computer takes the data and performs the calculations, we can display 15 to 30 digits if we so require. Any extra digits beyond a whole part per million are not real and are just artifacts of computerized data collection and spreadsheet calculations.

MR. MATOESIAN: Now, from your statement that regulators (inaudible) --

THE COURT REPORTER: I'm sorry. I couldn't hear you.

MR. MATOESIAN: -- that regulators develop a habit of adding significant figures, did you talk to anyone at Illinois EPA about that?

MR. McRANIE: No, I did not.

MR. MATOESIAN: So is that, therefore, your opinion?

MR. McRANIE: Yes.

MR. MATOESIAN: Okay. Thank you.

HEARING OFFICER TIPSORD: Question Number 6.

MR. McRANIE: Question 6: On page 10 of your testimony, you claim that there have been hardware failures in mercury monitors. Isn't it true that if such failures occur, they would occur whether sources are subject to the proposed Illinois regulation or CAMR?

The answer is yes.

HEARING OFFICER TIPSORD: Question Number 7.

MR. McRANIE: 7: Also on page 10 of your testimony, you state, quote, I am always amazed that regulators sit down at their desks and write mercury-monitoring regulations without ever having seen a mercury CEMS or having any reasonable level of knowledge about how they work, closed quote. Did you actually talk to any Illinois EPA employee who participated in the development of these regulations?

Answer: No.

MR. MATOESIAN: This again, is just an assumption, then?
MR. McRANIE: Yes, it is an assumption.
HEARING OFFICER TIPSORD: Mr. Harley.
MR. HARLEY: Since the Illinois monitoring requirements are the same as the monitoring requirements that are in Part 75, did you have an opportunity to talk any USEPA employee about the concerns that you have about the accuracy of mercury-monitoring equipment?
MR. McRANIE: I am in routine and regular conversation with EPA personnel associated with mercury.
MR. HARLEY: On the issue of monitoring equipment?
MR. McRANIE: Yes, absolutely.
MR. HARLEY: And how did they respond to your concerns?
MR. McRANIE: I believe that they are also concerned, perhaps not to the extent that I am.
MR. HARLEY: And why aren't they as concerned as you are?
MR. McRANIE: I don't know.
MR. HARLEY: Thank you.

MR. MATOESIAN: Can I ask, have they -- how have they responded on the record officially to your concerns?

MR. McRANIE: EPA, I don't believe, has responded on the record to anyone, including me. "On the record" are the key words.

HEARING OFFICER TIPSORD: Question Number 8.

MR. McRANIE: Question Number 8: On page 13 of your testimony, you claim that mercury CEMS are difficult to work on. Even that statement is presumed -- Excuse me. Even if that statement is presumed to be correct, wouldn't that be the case whether sources are subject to the proposed Illinois regulation or CAMR?

The answer is yes.

HEARING OFFICER TIPSORD: Question Number 9.

MR. McRANIE: Question Number 9: On page 17 of your testimony, you state, I hope the issues are resolved by the time mercury calibrations have to be done under a regulatory program, closed quote. Isn't it true that the supposed technical issues in question are the same whether sources in Illinois would

be subjected to the proposed Illinois regulation or CAMR?

The answer is yes, but they have a decidedly different impact. Under CAMR, there are multiple flexibilities and escape hatch in the form of purchasing additional allowances. Under the Illinois regulation, a determination of "out of compliance" is out of compliance, no matter if the determination is correct or incorrect.

HEARING OFFICER TIPSORD: Mr. Harley.

MR. HARLEY: You previously testified that you were not familiar with the provisions of the Illinois rule that allow for averaging among units; is that correct?

MR. McRANIE: Not in detail, no.

MR. HARLEY: Are you familiar with the provisions of the Illinois rule contained in the provisions of the Temporary Technology Base standard?

MR. McRANIE: Not in detail, no.

MR. HARLEY: Is it possible that those provisions of the Illinois law might provide the flexibility that would avoid the compliance issues that you're describing?

MR. McRANIE: I would have to study them

in more detail to respond to that question.

MR. HARLEY: Thank you.

HEARING OFFICER TIPSORD: Question Number 10.

MR. McRANIE: Question 10: You describe on page 22 of your testimony to an example of the need to conduct a NOx CEMS relative accuracy test audit. If USEPA already requires combustion turbines to control NOx to levels that you argue are below the RATA -- that's R-A-T-A, all caps -- reference method accuracy levels, do you agree that under the same principle, RATA reference method accuracy shouldn't be an issue for mercury either?

Answer: I believe my testimony has been misinterpreted. I am not making the argument that USEPA requires control of NOx below the reference method accuracy or that low-level NOx RATAs are not an issue. The two part per million limits discussed in my testimony are a result of State permitting activities, and RATA at this level are a serious issue. I also note that this question implies that if it is done incorrectly under the NOx rule, then doing it incorrectly under the mercury rule should be okay. Surely, this is not a serious suggestion.

HEARING OFFICER TIPSORD: Question Number 11.

MR. McRANIE: Question 11: On page 25 of your testimony, you state, quote, We have not detected any bias in the continuous mercury CEMS measurements, closed quote. You then claim that, quote, A small bias would be virtually impossible to detect. In such a case where no bias has been detected, would it be scientifically valid to assume that a bias might be present or, in fact, wouldn't the correct conclusion be to have simply said that no bias has been detected?

Answer: No, that is not the correct conclusion. The correct conclusion is that we cannot make the mercury measurement with enough accuracy and precision to detect a bias even if one is there. The Part 75 regulations, by allowing a plus or minus one microgram per cubic meter allowance on the RATA or daily calibration error test, explicitly state that a bias of plus or minus one microgram per cubic meter cannot be detected.

One has to remember that the reference method only has a precision of one microgram when making measurements below three micrograms. It

should also be noted that virtually all of the mercury measurements on the proposed Illinois rule will be well below three micrograms per cubic meter.

HEARING OFFICER TIPSORD: Question Number 12.

MR. McRANIE: Question 12: In the next paragraph on page 25 of your testimony, you discuss biases in SO2 monitoring. Isn't it correct that, in fact, this has nothing to do with the proposed Illinois mercury rule and you are only discussing it because, as you admitted, there has been no bias detected in mercury CEMS?

Answer: Actually, the referenced discussion on page 25 was related to biases in stack flow measurements which caused a related bias in SO2 tonnage emission calculations. Actual SO2 measurements were not effected. This same flow bias, by the way, can affect the calculation of mercury percent reduction. However, the percent reduction calculation is not shown in the proposed rule; therefore, cannot determine how the State proposes to make that calculation.

HEARING OFFICER TIPSORD: Question Number 13.

MR. McRANIE: Question 13: On page 29 of your testimony, you discuss some CEMS tests and state by the 40 CFR Part 75 rules, the RATAs were invalid. Isn't it true that these test results would be the same whether the sources in Illinois are subject to the proposed Illinois regulation of CAMR?

The answer is yes.

HEARING OFFICER TIPSORD: Question 14.

MR. McRANIE: Question 14 --

HEARING OFFICER TIPSORD: Hold on.

MR. MATOESIAN: One second.

(Brief pause.)

MR. MATOESIAN: Thank you.

HEARING OFFICER TIPSORD: Question Number 14.

MR. HARLEY: Madam Hearing Officer, I have question.

HEARING OFFICER TIPSORD: Oh, I'm sorry, Mr. Harley.

MR. HARLEY: Since this is the last opportunity to ask this question to make it clear for the record, you testified that the monitoring requirements in the Illinois rule are the same as the monitoring requirements that are in the USEPA CAMR

regulations; is that correct?

MR. McRANIE: To a great degree until you get to percent reduction sides. If you're working on just the emissions side, they're pretty much the same.

MR. HARLEY: And you testified that as part of the CAMR rule-making process, you were given an opportunity -- or took an opportunity to express your concerns about the monitoring provisions of the federal rule?

MR. McRANIE: Yes.

MR. HARLEY: And those regulations were finalized and contained monitoring requirements; is that correct?

MR. McRANIE: That's correct.

MR. HARLEY: Isn't your testimony and your presentation, in fact, much more about CAMR than it is about anything in the monitoring requirements that are contained in the Illinois rule?

MR. McRANIE: My discussion here today has been about monitoring, period, mercury monitoring.

MR. HARLEY: Thank you.

HEARING OFFICER TIPSORD: Question Number 14.

MR. McRANIE: Question 14: On page 37 of your testimony, you wonder how Illinois proposes to calculate input pounds of mercury. Can this calculation be made given that on page 36 of your testimony, you quote Section 22 -- 225.265(a)(4) regarding the measurement of mercury content in coal as being in pounds per trillion BTU and given that EGUs know how many BTU they generate?

Answer: The point of my testimony comment was that applicable equations for input pounds of mercury were missing from the regulations, and the chain of calculations to obtain the final percent reduction values was unclear. If the calculation chain is, as implied by this question, a propagation of error analysis should be done.

MR. MATOESIAN: Couldn't just a multiplication calculation arrive with a figure for input of pounds per mercury?

MR. McRANIE: It very much depends. There are a lot -- an awful lot of variables in that equation when you're trying to do input/output-type measurements. I really think that you should sit down and do a propagation of error analysis on that calculation because I think you will find the total

error associated with it to be astounding.

MR. MATOESIAN: All right. Thank you.

HEARING OFFICER TIPSORD: Question 15.

MR. McRANIE: Question 15: On page 38 of your testimony, you state that a source of error is typically ignored by regulatory personnel, and I expect this is the case for the proposed Illinois rule. What is the basis for this statement?

Answer: I see no evidence in the technical support document or the regulation that any source of measurement error has been investigated or addressed in the proposed Illinois rule. The word "error" is not contained in either document.

MR. MATOESIAN: Again, I would ask, did you actually speak to anyone at the Illinois EPA about this?

MR. McRANIE: No. But I could do a word search on my computer, and the word "error" is not contained in either document.

MR. MATOESIAN: Okay.

HEARING OFFICER TIPSORD: Question 16.

MR. McRANIE: Question 16: On page 39 of your testimony, you claim that a carbon injection system will not stop excursions because of the time lag

in increasing the carbon feed rate. Isn't it true that an averaging period over 12 months, as contained in the proposed Illinois rule, will mitigate any short-term potential issues like this due to the much longer-term averaging time?

No, this is not the case. Any excursions above the emission limit or percent removal limit add to the long tail of the log-normal distribution. See page 24 of my testimony. The ability to recover from such excursions depends on the ability of the control device to over-control above the control point during other operational periods of time. If the control device does not have the over-control capability needed for recovery, then averaging time is irrelevant. A longer averaging time only allows more time for over-control. That's all it does for you. That's why the source has to stay ahead of the curve and routinely over-control so as to achieve a long-term average of 90 percent.

MR. ROMAINE: I'd like to -- This is Chris Romaine for the Agency.

I think we, in a previous exchange, concluded that you didn't know the exact extent to which over-control would be necessary with an annual

stint?

MR. McRANIE: No, I do not. It depends.

MR. ROMAINE: Okay. And the other aspect of this I want to pursue is on Figure 12 on page 24, this log-normal distribution of mercury measurements, this table is displaying a variation of performance of a unit for mercury machines?

MR. ZABEL: Could you read that back?

MR. McRANIE: Yeah, I didn't --

HEARING OFFICER TIPSORD: Mr. Romaine, you need to --

MR. ZABEL: Back off.

HEARING OFFICER TIPSORD: Now repeat your question.

MR. ROMAINE: Figure 12 of your testimony on page 24 displays a log-normal distribution of mercury emissions from a unit. I want to confirm that this display, the variation of mercury emissions from a unit -- how it varies in performance for the level of emissions or the control of mercury emissions.

MR. ZABEL: Do you understand?

MR. McRANIE: Not really.

MR. ZABEL: Do you want to read that back, please?

(Record read as requested.)

MR. ZABEL: Do you understand the question?

MR. McRANIE: I'm not sure. Can I sort of take a stab at re-explaining what that figure is?

MR. ROMAINE: Yes, you can.

MR. McRANIE: As I stated earlier, that is a made-up curve that I created which is generally shaped like virtually all of the curves that we see on units with control devices. And the reason why you have that long tail out to the right, those high emission numbers, a small percentage of the time, well, they can be very high. If we look at the PowerPoint presentation I did a little earlier today and you look at the curve dated 2/9/06 in that presentation, what you see is the type of long-tail excursion that shows up on the log-normal curve. And in this case, it's about ten to one. In other words, we have an emission that goes from three to 30 micrograms.

Now, over some period of time, somebody's -- that control device is going to have to compensate for that, and that number -- I only went out to four micrograms. If I would have extended this chart out to 30, it would have been most interesting.

MR. ROMAINE: So you're describing performance of the control device?

MR. McRANIE: I'm describing the results of having a control device.

MR. ROMAINE: Are the events that cause high levels of emissions random?

MR. McRANIE: I'm not going to answer that simply because of the fact that I haven't tabulated -- I have an opinion, but I don't think I should just throw that on the floor.

MR. ROMAINE: Well, are the events that cause high levels of emissions random in the same sense that you have random errors in measurements?

MR. McRANIE: No. Random errors and random events are two entirely different things. Random events --

MR. ROMAINE: I understand that.

So what is the relevance of Figure 12 for discussion of continuous emission mercury monitoring?

MR. McRANIE: Well, when you're already pushed up against the 90 percent reduction level, which is where that red line is, you can't go much lower. I can't go beyond 100 percent reduction. So any hours

I've got above 90 percent have to be offset by hours between 90 and 100.

MR. ROMAINE: Are you -- But, again, in terms of your testimony on continuous emission monitoring, are you familiar with how much better mercury emission control technology can do than better than 90 percent?

MR. McRANIE: I'm not an expert on mercury control technology.

MS. BASSI: Can I ask a follow-up here?

HEARING OFFICER TIPSORD: Sure.

MS. BASSI: If it's difficult to measure consistently and accurately and all that, 0.080 micrograms, which I believe you said is the limit, is it even more difficult to measure whatever those micrograms would turn out to be to get the more than 90 percent reduction needed to balance or to average out those periods that are greater than where you exceed the limit?

MR. McRANIE: The lower you go, the harder the measurement is to make. That's just the rule of the game.

MS. BASSI: Is that part of the relevance of Figure 12?

MR. McRANIE: Well, no. I -- Everybody's struggling with Figure 12. Figure 12 is just a demonstration of the fact that you have to -- because emissions look that way when you have control devices -- Because control devices fail. People make mistakes. You cannot -- You just cannot control at 90 and end up at 90. You've always got to be below it. You've always got to provide that insurance policy and that insurance margin. And that's all Figure 12 is trying to show, is that you've got to control below your emission limit. You have to.

MR. ROMAINE: Then this Figure 12 is misplaced in your testimony as it's contained in the section discussing random errors in continuous emission monitoring?

MR. McRANIE: One could possibly make that argument.

ACTING CHAIRMAN GIRARD: Could I ask a question on this Figure 12?

You've given one example of the way you could engineer a process to try to be in compliance; and that is, if you run into this log-normal distribution, you set your operation point at a higher standard so that your averages still come

out at the compliance point.

But aren't there other mathematical ways of dealing with a log-normal distribution?

MR. McRANIE: There are mathematical ways of dealing with it, but I'm not sure how to deal with it in real life when I've got a control device out there that breaks down.

ACTING CHAIRMAN GIRARD: Couldn't you write a regulation, for instance, that would discard a certain number of outliers and would classify outliers in a certain way that if you got a reading that was ten times what you've been getting a certain percentage of the time, you would throw that data point out?

MR. McRANIE: Absolutely.

ACTING CHAIRMAN GIRARD: So could the -- I mean, I don't know that we would do it, but could you tweak the regulations in a way to come up with definitions of outliers of that type so that you wouldn't have to move your operational point so far to the right on your Figure 12?

MR. McRANIE: The safest way to deal with it and the way that it's been dealt with in traditional rule-making is just to move the compliance point up to provide more room. I mean, that's, in

essence, what was done in all the NSPS because you have the measurement error buried in the regulation number.

ACTING CHAIRMAN GIRARD: Or the corollary of that, what you're saying; if you think 90 percent is such a hard target to meet, we could also move the compliant point to 88, 85, 70, and then --

MR. McRANIE: That's an approach, yes. I have not made the argument that 90 is easy or hard to make, by the way. I'm just talking about making measurements. But one of the ways of doing it is moving it, obviously.

ACTING CHAIRMAN GIRARD: Thank you.

HEARING OFFICER TIPSORD: Mr. McRanie, are you familiar with measurement for other media; water, for example?

MR. McRANIE: I don't think I want to claim that level of expertise any longer. I used to do work in that area some, but it's been a few years.

HEARING OFFICER TIPSORD: Thank you. We're ready for Question 17.

MR. HARLEY: I have a question.

HEARING OFFICER TIPSORD: Oh, sorry, Mr. Harley.

MR. HARLEY: Are you familiar with

regulations on either the federal or the state level which address issues of monitoring equipment malfunction periods?

MR. McRANIE: Yes. The -- I keep referring to NSPS. The old NSPS subpart (d), subpart (d)(8), monitor malfunction was just basically thrown away. If you collected 75 percent of your data, they didn't care about the other 25 percent. And, in fact, under the NSPS today, they specifically exclude this exercise of data substitution, this practice under the acid rain trading program.

If we were talking about SO2 and NOx, it would certainly be hard to justify throwing a lot of those data away nowadays because they're 99.9 percent reliable. But, yes, there is precedent for just ignoring periods of time when the monitors; broken.

MR. HARLEY: And are you familiar with regulatory programs on the federal or state level in which periods of equipment malfunction allow operators to notify the State through incident reports and other mechanisms that the monitoring equipment was not operating properly and, therefore, the data was unreliable?

MR. McRANIE: Yes.

MR. HARLEY: Thank you.

HEARING OFFICER TIPSORD: Question Number --

MR. BLOOMBERG: Related to that and related to some things that you had said about missing data substitution, which seems to come in here, on page 35 and 36 of your testimony, you discuss why you believe the use of missing data substitution is incorrect because the proposed Illinois rule is not a trading rule. Here we go with this again.

However, isn't it true that the averaging provisions of the proposed Illinois rule are, in fact, a form of trading -- similar to trading and, as such, are different from the federal rules that you cited that excluded the use of missing data substitution?

MR. McRANIE: You can take that position if you'd like. I don't like missing data substitution under any circumstance simply because you're making up high-bias data. The data are false. They're incorrect. That's the end of the discussion as far as I'm concerned.

MR. BLOOMBERG: But without the use of

missing data substitution, isn't it true that companies could essentially -- you know, you talked about the 25 percent downtime -- they could have 25 percent downtime or whatever percent downtime. If mercury emissions start to rise, they wouldn't need to account for the excess emissions and they'd avoid the intent of this proposed rule.

MR. McRANIE: If one were inclined to think along those lines, I guess you could make that argument.

MR. BLOOMBERG: Thank you.

HEARING OFFICER TIPSORD: Question Number 17.

MR. McRANIE: Question 17: In Appendix 2 of your testimony, you used a CO2 value of 11.53 percent. Why did you choose that value, which you admit in the calculation is being assumed?

Answer: I believe the value of CO2 I used was 11.3 percent, not 11.53. This is a reasonable value for stack CO2 concentration and, of course, ultimately makes the .008 pound per gigawatt hour come out exactly 0.80 micrograms per cubic meter.

HEARING OFFICER TIPSORD: Question Number 18.

MR. BLOOMBERG: We have a follow-up.

MR. McRANIE: Question 18 --

HEARING OFFICER TIPSORD: Wait. Hang on.

MR. MATOESIAN: Now, based on your calculations, a stack CO2 value of 15 percent would produce a value of 1.07 micrograms per cubic meter.

Is this not within the manufacturer's accuracy and precision you stated in your testimony?

MR. McRANIE: I don't think I've ever seen a coal-fired power plant with a stack CO2 concentration of 15 percent, is the first response to that. I think you'd have to be burning almost -- I'm not sure you could burn pure carbon and get 15.

And I didn't understand the intent of the second part of that question.

MR. BLOOMBERG: Basically the point was simply that your 11.3 percent -- and you're right that was a typo. I apologize -- you know, had to justify in your information and -- so just the small-percentage difference would be the difference between meeting the accuracy and precision and not meeting it. And so that was the question, was -- That was the basis of

question.

MR. McRANIE: Okay.

HEARING OFFICER TIPSORD: Are we ready for Question 18, then?

MR. McRANIE: Question 18: Do CAMR and Illinois' proposed rule allow for sorbent trap monitoring as an alternative to CEMS?

The answer is yes.

MR. BLOOMBERG: So then did you leave out this significant option from all of your testimony because sorbent trap technology is capable of providing accurate precise data sufficient to comply with the standards stated in the proposed rule?

MR. McRANIE: We don't know what precision and accuracy of sorbent -- We know less about sorbent traps than we do about monitoring.

Now, since you've opened the sorbent-trap door, I'd like to make a few comments in response to that question, if you don't mind.

HEARING OFFICER TIPSORD: Go right ahead, Mr. McRanie.

MR. McRANIE: Sorbent traps are nothing but activated carbon in a tube. And then you suck flue gas through the tube and reabsorb the actuated carbon,

and you measure the amount of flue gas you suck through it. And, therefore, you can get a time average concentration of mercury going up the stack.

It does not -- It has several disadvantages. It does not give you real time numbers. Therefore, if you have a control device, you don't know what's going on. You don't know how to turn your knob to adjust your carbon flow.

Another disadvantage is the analysis -- conventional analysis takes a long time, four or five weeks, before you have answers. We're working on some enhanced analysis procedures that would give us much more rapid turnaround. I actually think where the method had promise is as a reference method. Of course short-term measurements as opposed to long-term measurements, most people that look at carbon traps, or sorbent traps, think about running them five to seven days and getting this long-term average and then sending the trap off and getting it measured. I like it much better as a replacement Ontario Hydro where we can get faster turnaround on RATA tests and certification tests. But we still do not know how they perform. Those data are being looked at right now, but I'm not in favor of them for CEMS replacement.

MR. MATOESIAN: Just a quick question.

We have quite a bit of follow-up on this. Should we begin it now, or did you want to wait until the morning?

HEARING OFFICER TIPSORD: Define "quite a bit."

(Discussion off the record.)

MR. BLOOMBERG: Okay. According to your testimony, you serve as a primary consultant for the Electric Power Research Institute, or EPRI; is that correct?

MR. McRANIE: Yes.

MR. BLOOMBERG: As a primary consultant for EPRI, are you aware of the evaluation of mercury monitors development program offered by EPRI on their website?

MR. McRANIE: No.

MR. MATOESIAN: We'd like to introduce an exhibit. This is a separate document.

HEARING OFFICER TIPSORD: Mr. Matoesian, you cannot be heard at all. You need to speak up.

MR. MATOESIAN: I'm sorry. We'd like to introduce an exhibit now. This is some documents -- some screens from the EPRI website.

MR. BLOOMBERG: It's printouts from the EPRI website leading up to -- It shows the screens getting you to the point of a document that I'll be asking about in a couple minutes.

HEARING OFFICER TIPSORD: If there's no objection, we'll mark this as Exhibit 135.

Seeing none, this is marked as Exhibit 125.

MR. BLOOMBERG: 125?

HEARING OFFICER TIPSORD: 135.

MR. BLOOMBERG: Okay.

HEARING OFFICER TIPSORD: Sorry. It is late in the day.

MR. BLOOMBERG: I'll give you a minute to skim over it.

HEARING OFFICER TIPSORD: It might be more helpful if you let us know what kinds of questions you'll be asking about it than just to look at it.

MR. BLOOMBERG: Are you familiar -- And I probably know the answer to this already. But are you familiar with the document that comes at the end of these website screens titled -- it starts "77" and then it's "Continuous Emissions Monitoring" -- just "Continuous Emissions Monitoring" which is found on the

EPRI website? And it's this document here (indicating).

MR. McRANIE: Program 77, yes.

MR. BLOOMBERG: Yes. Are you familiar with this?

MR. McRANIE: Yes, I am.

MR. BLOOMBERG: Okay. Isn't it true that this document says that participants can save up to $80,000 per installation and reduce capital costs for mercury monitoring by using sorbent traps such as QuickSEM versus continuous mercury monitors?

MR. McRANIE: I don't find that statement, but I wouldn't be surprised if it's not in here.

MR. BLOOMBERG: It's in the second paragraph.

MR. MATOESIAN: About midway through the second paragraph on the first page.

MR. McRANIE: Okay. All right. I've got you.

MR. BLOOMBERG: And isn't it also true that this document indicates that the use of sorbent trap systems for mercury monitoring is based on EPRI's QuickSEM and that EPRI developed and demonstrated

QuickSEM?

MR. BONEBRAKE: Can you point us to a particular provision or paragraph you're referring to?

MR. BLOOMBERG: Unfortunately -- The reference to QuickSEM is mentioned throughout the document. There's a historical perspective, and, Mr. McRanie, you mentioned you were familiar with it. So I --

MR. McRANIE: Yes. I mean, let's -- Can we cut to the chase? EPRI has been a supporter of sorbent-tube sampling for a long time. All of us that are associated with this program are supporters for carbon traps given their limitations.

MR. BLOOMBERG: Okay. And isn't one of the 2007 deliverables listed in this document, which -- Let's try to find it for you. It's on page 2 near the bottom. "In 2007," it starts. It's listed as, quote, Commercially available, reliable, robust sorbent trap mercury measuring system satisfies Appendix K criteria with training services to allow operation by plant instrument technicians.

MR. McRANIE: Yes. We have been pushing EPRI for a long time to work with the vendors -- in fact, we're also working with the vendors -- to develop

a robust sampling system. The sampling system that came with the original QuickSEM was a piece of junk, and we have been working to try to get something more robust built.

MR. BLOOMBERG: Okay. So given -- Again, given your association with EPRI and the fact that sorbent trap systems are allowed by the proposed Illinois rule and the fact that EPRI promotes the use of these, I guess, I'm still a little confused as to why it wasn't mentioned even briefly in your testimony to point out that this is, in fact, an allowable alternative.

MR. McRANIE: I was asked to discuss mercury CEMS.

MR. BLOOMBERG: So you were asked by your client?

MR. McRANIE: Yes.

MR. BLOOMBERG: So really it's a matter that your client didn't want this addressed?

MR. McRANIE: No one told me not to address it. Let's be clear on that.

Based on my experience and my work with the various utilities that we're involved with, I don't find a lot of interest in the carbon trap as a

CEMS process. The few utilities that appear to be interested in that are guys that have real low capacity factors. They don't run very much. They don't want to invest $600,000 on mercury CEM. They want something cheap that they can run out and stick in the stack on the few days, you know, they run it. It's just got too many downsides; in particular, loss of samples. I mean, if you lose a week's sample, you've got seven days of missing data, you know, and that's just not a desirable feature for larger utilities. And I just -- I don't consider it a serious competitor, frankly, for continuous monitoring.

MR. BLOOMBERG: Okay. Regarding losing a sample, it's true that if you're using a CEMS and your computer goes down, you lose a week's worth of data --

MR. McRANIE: Same difference, absolutely.

MR. BLOOMBERG: But you said some companies are interested in it.

MR. McRANIE: Yes.

MR. BLOOMBERG: So it is true that any company that is interested could, in fact, make use of this under the proposed Illinois rule and wouldn't have

to worry about any of the concerns that you raised for CEMS?

MR. McRANIE: Other than the fact that you don't have data to run your control equipment with.

MR. BLOOMBERG: Okay.

MR. ZABEL: Just to be clear, if I may ask a follow-up question.

Mr. McRanie, you mentioned, I believe, it takes several weeks to get the results on a sorbent trap?

MR. McRANIE: It can, yes.

MR. ZABEL: And if you're running a 12-month rolling average, that could be a problem in responding even on a non-real-time basis, couldn't it?

MR. McRANIE: Oh, yeah.

MR. ZABEL: Thank you.

MR. BLOOMBERG: We have a few more follow-ups related to the EPRI document.

According to that document, again, related to the 2007 statement on the bottom of page 2, doesn't EPRI expect -- and this goes back to CEMS, away from sorbent trap -- that in 2007 work will be completed, quote, To ensure the commercially offered continuous emissions monitoring systems (CEMS) for

mercury are accurate and field-ready?

MR. McRANIE: Yeah, I think that's probably a wonderful global objection. I don't think it can be achieved.

MR. BLOOMBERG: But doesn't it say this project is "expected"; not an objective, this project is "expected"?

MR. McRANIE: Chuck's a little aggressive.

MR. BLOOMBERG: So it's your opinion that EPRI is wrong?

MR. McRANIE: Yes.

MR. BLOOMBERG: Okay. But EPRI believes --

HEARING OFFICER TIPSORD: You've read it three times. I think we all know exactly what it says.

MR. ZABEL: It says "expected." It doesn't say "believes." Don't put words into the document or the witness's mouth. Take it for what it is. It says what it says.

HEARING OFFICER TIPSORD: And as I said, he's read it three times. I think we all know what it says.

MR. BLOOMBERG: In your testimony, did

you state a belief that there are calibration issues with mercury CEMS?

MR. McRANIE: Yes.

MR. BLOOMBERG: According to this document, doesn't EPRI expect that in 2007, they will, quote, Complete the development of QA/QC procedures for Hg CEMS, end quote, and, quote, Obtain EPA approval of these procedures?

MR. McRANIE: That's what it says, but it's not going to happen.

MR. BLOOMBERG: Thank you for your opinion.

Again, according to the previously referenced document, doesn't the QA/QC objective include work on, quote, National Institute of Standards and Technology (NIST), traceable cylinders, and/or use of on-site gas generators as calibration gases as well as instrumental reference method for immediate readout of RATA test results?

MR. McRANIE: All of the projects or programs that you are describing from the EPRI document, we are the project manager for, RMB Consulting. And you can read what Chuck Dean wrote all you want to. I'm telling you that they're not going to

happen.

MR. BLOOMBERG: Okay. Just to -- For the record, given these 2007 expectations that are published here, isn't it true that the proposed Illinois rule will require compliance in monitoring after 2007?

MR. McRANIE: Yes.

MR. BLOOMBERG: Okay. That's if for that one.

HEARING OFFICER TIPSORD: All right. Are you ready for Question 19, then?

MR. MATOESIAN: Yes.

MR. McRANIE: Question 19: Your testimony is based, in large part, on your experience at the Trimble County plant. Is that plant equipped with a wet FGD?

Yes, it is.

HEARING OFFICER TIPSORD: Question.

MR. MATOESIAN: I'm sorry. Could you describe the type of stack conditions that exist?

HEARING OFFICER TIPSORD: That's the next question.

MR McRANIE: That's the next question.

HEARING OFFICER TIPSORD: Why don't we

ask Question Number 20.

MR. MATOESIAN: Oh, I'm sorry.

HEARING OFFICER TIPSORD: Question Number 20.

MR. McRANIE: Question 20: Could you describe the type of stack conditions that exist at Trimble County?

The stack gas constituents are typical for modern wet scrubber equipped units. The flue gas is saturated with water at approximately 135 degrees Fahrenheit. There are some small entrained water droplets in the stack gas. The particulate concentration is very low, below .03 pounds per million. The SO2 and NOx concentrations are also very low, normally 50 to 100 parts per million for SO2 and a 150 to 200 parts per million for NOx.

MR. MATOESIAN: Do those have -- those type of stacks have (inaudible)?

THE COURT REPORTER: I'm sorry. I couldn't hear you.

HEARING OFFICER TIPSORD: We can't hear you, Mr. Matoesian.

MR. McRANIE: I can't hear you.

MR. MATOESIAN: I'm sorry. I believe

you said they were wet stacks?

MR. McRANIE: Yes.

MR. MATOESIAN: Do those stacks -- wet stacks not have any new challenges compared to dry stacks?

MR. McRANIE: Wet stacks are harder to monitor with continuous monitoring equipment of all types, yes.

MR. MATOESIAN: And how many stacks in Illinois are wet stacks?

MR. McRANIE: I don't have a clue.

MR. MATOESIAN: Okay.

HEARING OFFICER TIPSORD: Question Number 21.

MR. McRANIE: Question 21: You focus heavily on continuous analyzer methods. Are there other methods for measurement of Hg from flue gas that comply with the proposed Illinois rule and CAMR? If so, what is your familiarity with these methods?

Yes. Carbon (sorbent) traps can be used under 40 CFR Part 75, Appendix K, to make flue gas mercury measurements. I am familiar with that technology, and I believe we've discussed it.

MR. MATOESIAN: On page 22 of your

testimony, you state that a good example of this problem is the need to conduct a NOx CEMs relative accuracy test audit (RATA) on a gas-fired combined cycle unit with emissions of two parts per million NOx. This measurement cannot be done at all with the wet chemistry EPA RM7 and is extraordinarily difficult to make using the instrumental RM7E.

If EPA already requires combustion turbines to control NOx to levels that you argue are below the RATA reference method accuracy levels, do you agree that under the same principle, RATA reference method accuracy shouldn't be an issue for mercury either?

MR. McRANIE: I've already answered that question. It was in the prefiled questions, and it is Question Number --

HEARING OFFICER TIPSORD: 10.

MR. McRANIE: -- 10.

MR. MATOESIAN: Thank you.

MR. KIM: I just have a few follow-up I'm sorry. I will go as quickly as I can while speaking slowly enough for the court reporter.

Mr. McRanie, first, I'm going to apologize. I've been ducking in and out this

afternoon, so if my -- some of questions have been asked and answered, then feel free to slap me on the wrist.

I believe you did do some -- get into some questions concerning Figure 12. Do you --

MR. McRANIE: Yes.

MR. KIM: -- recall that?

Do you have that handy, by any chance?

MR. McRANIE: We can get it handy.

HEARING OFFICER TIPSORD: It's page 24, isn't it? Yes, page 24.

MR. KIM: I have a few questions I just wanted to ask you concerning that table -- or that figure.

Do you believe that the high emissions rate periods that are shown in figure 12 are the result of control technology being turned off or being out of operation?

MR. McRANIE: That -- I'll reiterate that that is an example graph that I created. As a general rule, when we're looking at SO2 or NOx, the long tail to the right, the high values as you've characterized them, are generally a function of the

control device malfunctioning in some way, not being turned off but a pump breaking or a module going haywire.

In the case of mercury, I think they're going to be created by a combination of control device as well as these excursions that I had in the overhead presentation that I opened with, those very large excursions that seem to come out of no where from mercury.

MR. KIM: I'm thinking --

MR. McRANIE: Let me add one thing to that. That tail will also contain all your substituted data.

MR. KIM: And, again, that table, though, was prepared -- was something that you prepared based upon not so much empirical data but just --

MR. McRANIE: Experience of doing this on dozens of units, and they all look about the same.

MR. KIM: Okay. And I don't recall -- I'm not aware if you got into any discussions concerning commercial sorbent systems or what your level of familiarity is, but let me ask you this: Are you aware or are you not aware that commercial sorbent systems have redundant sorbent feeder systems that are

intended to ensure high reliability and avoid high emissions concentration periods?

MR. McRANIE: I'm aware that there are redundant systems. That's about all I know about the design of those things. Scrubbers, I should remind you, have as many as 20 recycle pumps, and we still see these kinds of excursions on scrubbers.

MR. KIM: Are you aware that other power plant pollution control technologies that are for more complex than sorbent ejection systems routinely achieve high removal rates, in excess of 90 percent, on a routine basis and that the removal rates are fairly reliable?

MR. McRANIE: I don't think you can compare removal rates between control technologies.

MR. KIM: On page 27 of your testimony, I'm looking at paragraph -- the second paragraph that begins "the Cape Fear unit."

MR. McRANIE: Yes.

MR. KIM: And specifically I'm looking at the last sentence of that paragraph that begins "in addition."

Could you read that sentence into the record, please?

MR. McRANIE: Certainly.

In addition, the absence of a SO2 scrubber results -- it should be "in." The word is "is" -- in higher mercury emissions and the combination of higher mercury emissions and the dry stack makes mercury monitoring much easier than on a wet stack with low mercury emissions.

MR. KIM: Given that statement in Illinois and given that in Illinois where most units fire PRB coal, aren't dry stacks more prevalent?

MR. McRANIE: Today, possibly so. What's going to be the situation after -- when the rule kicks in?

MR. KIM: Do you have any reason to the believe that the situation's going to change?

MR. McRANIE: I don't know what the control technology plans are for the utilities in the State of Illinois.

MR. KIM: To the best of your knowledge, though, isn't it possible that Illinois will continue to have mainly dry stacks?

MR. McRANIE: I don't know. If the question is, is the monitoring easier on dry stacks, the answer is yes.

MR. KIM: Okay. And then I just had a couple questions -- I know you provided some testimony to the data concerning the Trimble County program.

How long have you been involved in that program, I guess, you and your company?

MR. McRANIE: We have been involved in -- Well, let me back up and say that EPA had a project at Trimble County which did not go very well. We picked up that project after they stopped. We have been involved in all of the EPA, slash, EPRI mercury demonstration work from day one -- before day one.

MR. KIM: Do you have a time line for when day one is?

MR. McRANIE: Two years ago, approximately. I don't recall.

MR. KIM: Okay. Since that time, going back, say, roughly two years ago, have you seen progress -- significant progress in the advancement of mercury monitors?

MR. McRANIE: There has been significant progress on the reliability side.

MR. KIM: And it --

MR. McRANIE: I mean, we had -- we couldn't make them run three days in a row a year ago,

and now we can get ten or 12, 15 days in a row.

MR. KIM: And you would agree, wouldn't you, that given a -- if you have a situation where you have a rule-driven environment which creates, obviously, the bigger market and the bigger need for these monitors, that you would expect such improvements to continue, if nothing else, no less a pace than they have in that two-year period?

MR. McRANIE: That's the whole purpose of the Trimble County project, is to provide the vendors with a development site and for us to provide support for them to try new things to try to improve their performance. It was pretty obvious early on that that was going to have to be done; otherwise, we were never going to get there.

MR. KIM: At the Trimble County site, have there been any recent system calibrations that were performed that were not provided or not discussed in your written testimony?

MR. McRANIE: Oh, yeah.

MR. KIM: Have any of the systems performed any better with a relative accuracy under ten percent or even under five percent?

MR. McRANIE: There have been no

relative accuracy tests run at Trimble County since EPA ran one about a year ago. That's about 100,000-dollar test, and my focus -- our focus in the project has been to get them to run reliably. And we were worried about relative accuracy later.

MR. KIM: And just for the record -- Maybe you've already -- If you haven't already explained what a relative accuracy test or program is, could you explain that briefly?

MR. McRANIE: A relative accuracy test is a test that has been used for many, many years under EPA regulations to evaluate the performance of continuous emissions monitoring systems. And fundamentally, you have your system that is under test, your permanently mounted system on the stack. You then bring in a reference method, which is the EPA standard reference method. That may be wet chemistry, or it may be an instrumental type of method. And you run a series of at least nine tests, comparing the analyzer system under test with the reference method, and the reference method test is considered to be the gold standard. You take readings over various periods of time, depending on the specific analyzer system. You compare those readings up. You perform relative

standard deviation calculations, blah-blah-blah, go through a standard set of calculations that are in EPA regulations, and you come up with a calculation. And as a general rule, a 20 percent relative accuracy is considered acceptable.

MR. KIM: So given that and given the involvement that you had with the Trimble County program, do you think it's a fair statement to make that in the time that you've been involved, you had good progress and good results?

MR. McRANIE: We've had good results. I don't believe we could pass a 20 percent relative accuracy test. Only one analyzer has ever done that in all of EPA's testing, and it barely made it. They had to pass the alternative criteria, which was plus or minus one microgram.

MR. KIM: Isn't it true, though, that the current level of sophistication or product as far as mercury monitors go at this point is closer to meeting that test than what you would have found, say, two years ago?

MR. McRANIE: Oh, sure, much closer than two years ago.

MR. KIM: And, again, you would expect,

then, say, in another two years, advances would continue on; is that right?

MR. McRANIE: We will make further advances. The rate of progress is going to be much, much slower.

MR. KIM: And that brings me to the last series of questions I had.

You stated a couple times in your testimony the difficulty in working on certain pieces of CEMS -- mercury CEMS equipment and the complexity and so forth. And I think at one point, you might have been -- I think it's on page 17 -- you were comparing that to conventional SO2 and NOx CEMS from a hardware standpoint. Do you recall that?

MR. McRANIE: Yes.

MR. KIM: Well, do you think it's a fair or a better comparison -- and I guess my concern is, we don't want to go and compare apples and oranges because, obviously, SO2 and NOx emission monitors are intended to serve a different purpose -- if you establish -- Say, for example, going back to the time that you were involved in the Trimble County program, the mercury monitors there compared to the ones that you would find on the market now -- for example, the

brochure that I handed out -- do you think that using that comparison, mercury monitor to mercury monitor, that you're seeing advances in terms of better reliability, better accuracy?

MR. McRANIE: We are definitely seeing better reliability, but it hasn't been from fundamental design improvements or changes. It's been tinkering around the edges. These are big, bulky, expensive systems. I mean, these things cost 600 grand apiece, and the vendors are going to be hard-pressed to make monumental design improvements in the next two to three years. I think we can get the reliability up some more. I'm not sure whether we're going to get any better precision, maybe just slightly better precision.

MR. KIM: But certainly, as you stated, that's an ongoing process, and that's the subject of much of the focus of, I would assume as far as vendors, manufactures --

MR. McRANIE: Oh, absolutely.

MR. KIM: I think that's all I've got other than I noted that -- your statements concerning a lot of parts to malfunction and a lot of pieces, and I just keep thinking that, from my perspective, a toaster has a lot of parts in it. That's all question I have

on this.

MR. McRANIE: Well, I would encourage you to look at some of the pictures in my testimony of the inside guts of those boxes.

MR. KIM: I saw those, and my impression was it all looked like one big window-unit air conditioner, so -- which also to me has a lot of parts to malfunction.

We have no further questions.

HEARING OFFICER TIPSORD: In that case, Mr. McRanie, let's try and do the Prairie State questions so we don't have to bring you back tomorrow.

MR. McRANIE: That's fine with me.

HEARING OFFICER TIPSORD: These are from Prairie State Generating.

MR. McRANIE: All righty.

HEARING OFFICER TIPSORD: Question Number 1.

MR. McRANIE: Question Number 1: Are data substitution provisions needed or useful for command-and-control regulations like those proposed by Illinois, or is data substitution needed primarily for a trading program where every ounce of mercury has to be tracked? If data substitution is not as important,

what would you suggest be done with bad monitoring results?

Answer: Data substitution clearly has no place in a command-and-control, hard cap, or percent removal control program. The data are not real. They are simply made up, and they are always biased-high. As stated in my testimony, I also do not believe that data substitution in the format used by Part 75 has any place in a trading program because its use inflates the true emissions. However, in the specific case of the acid rain program, data substitution has not been much of an issue. The reason is the performance of the acid rain CEMS has been very high, 95 to 99 percent. So there has been little use of data substitution within the program.

For a command-and-control-type program that utilizes control equipment, it is just not necessary to obtain all of the mercury CEM data. Bad data should just be discarded. All that needs to be done is to collect control equipment operating parameters to show that the control equipment remained in operation. In fact, my reading of the new proposed Ameren alternative indicates that monitoring of the carbon feed is the only compliance-based mercury

monitoring that will be required by that alternative prior to 2015.

HEARING OFFICER TIPSORD: Question Number 2.

MR. BLOOMBERG: A follow-up on that.

You said that all you need to do is show that your control is still operating even if you lose the data.

But didn't your own charts show that sometimes the controls are still operating but there's a spike in emissions?

MR. McRANIE: Absolutely.

MR. BLOOMBERG: Okay. So then we should just suggest that companies throw out that data and don't accurately tell us -- tell the Agency what their true emissions are?

MR. McRANIE: I'm saying that under a command-and-control program, you do not need all of the data.

MR. BLOOMBERG: So from your perspective, the Illinois EPA doesn't need to know if people were in compliance all the time?

MR. McRANIE: You were making the argument earlier that a long-term average resolves all

those problems, weren't you?

MR. BLOOMBERG: Well, that's -- But if you're saying throw out the data, then we don't know -- then isn't it true that we don't know what that long-term average is?

MR. McRANIE: I would prefer, certainly, to throw it out rather than to substitute high-biased substitute data.

MR. BLOOMBERG: I think I can understand that industry would prefer that whereas the Agency --

HEARING OFFICER TIPSORD: Is there a question there?

MR. ZABEL: No. I think he's testifying, Madam Hearing Officer.

MR. BLOOMBERG: Isn't it true that industry would prefer to avoid a compliance issue like that?

MR. McRANIE: I don't know.

HEARING OFFICER TIPSORD: Question Number 2.

MR. McRANIE: Question 2: In your view, should the Illinois technical support document have addressed monitoring issues? Why? How significant is Illinois' omission?

Yes, I do believe the Illinois TSD should have addressed mercury-monitoring issues. Mercury monitoring is a very new and evolving technology. Illinois clearly should have evaluated the technology to determine if it could support reliable, accurate, and precise measurements at the contemplated compliance level. Consideration should have been given to adjusting the compliance level, if necessary, to accommodate the CEMS reliability and level-of-measurement uncertainty.

Illinois' omission is significant because selection of a compliance level, say .80 micrograms per cubic meter, without consideration of measurement reliability, accuracy, and precision forces the sources to absorb all of the unreliability, inaccuracy, and imprecision of the measurement. The end result is that the source will have to operate well below the actual mercury compliance cap level to achieve compliance.

MR. KIM: One quick follow-up.

What information should the technical support document have contained that wouldn't have been found within the confines of the federal CAMR documents on the subject of mercury monitors?

MR. McRANIE: I expect that -- No. The answer to that question is, I don't know.

HEARING OFFICER TIPSORD: Mr. Harley.

MR. HARLEY: A very quick follow-up.

Isn't it true that in order to comply with the federal CAMR, Illinois must include the mercury-monitoring requirements mandated in 40 CFR Part 75?

MR. McRANIE: For who to comply?

MR. HARLEY: Illinois.

MR. McRANIE: Oh, I don't know what the requirements are for the state.

MR. HARLEY: Thank you.

HEARING OFFICER TIPSORD: Question Number 3.

MR. McRANIE: Question 3: Has EPA ever conducted CEM monitoring in a plant where mercury emissions as low as those proposed by IEPA? If so, what were the results of that testing?

Answer: To my knowledge, Trimble County plant is the only site where EPA has conducted mercury CEMS monitoring where the mercury concentration approaches the emissions limit proposed by IEPA. However, the mercury concentration at Trimble County is

not as low as contemplated by the Illinois EPA. The mercury concentration at Trimble County with the SCR in service varies from about .8 micrograms up to about two micrograms per cubic meter. We do not know the results of the EPA Trimble County project since no report on that work has been prepared by EPA.

HEARING OFFICER TIPSORD: Question Number 4.

MR. McRANIE: Number 4: If, as your testimony suggests, that the error band (tolerance) of mercury CEMS is plus or minus one microgram per cubic meter, isn't it true that a plant with zero actual mercury emissions could still produce a mercury-monitoring result that showed it was out of compliance with Illinois' proposed standard of 0.8 micrograms per cubic meter?

Answer: Yes. If the mercury CEMS zero-calibration adjustment was at the Part 75 allowable limit of plus one microgram per cubic meter, the hypothetical situation posed by this question could be true.

HEARING OFFICER TIPSORD: (A).

MR. McRANIE: (A): Is this a measurement that is below the detection limit of the

method?

No. Based on recent observations with very carefully calibrated systems, the detection limit appears to be about 0.2 micrograms per cubic meter. This means that the measurement limit -- quantification limit is about 0.7 micrograms per cubic meter. The precision appears to be about 0.3 to 0.5. Given the tightest number, that means that the true -- if the CEM read 0.8 micrograms per cubic meter, the true value could be anywhere between 0.5 and 1.1 micrograms per cubic meter.

HEARING OFFICER TIPSORD: Go ahead to Question B.

MR. McRANIE: (B): Are you aware of any case where a regulatory agency has imposed a regulatory limit below the level that can be accurately measured?

Answer: There are numerous permits for gas turbines that have compliance limits of 2.0 parts per million, and this level is too low to accurately measure. There is at least one permit that has been issued for a coal-fired power plant at 0.182 pounds per million BTU SO2. While the absolute level is not too low to be measured, approximately 75 to 80 parts per million, the number of significant

digits in this permit suggest a measurement precision of 0.2 parts per million, and that is not possible.

HEARING OFFICER TIPSORD: Question Number 5.

MR. ROMAINE: Do you know the origin of that limit?

MR. McRANIE: Yes, I do.

MR. ROMAINE: And what is it?

MR. McRANIE: It's Prairie State.

MR. ROMAINE: Was that the limit that they proposed?

MR. McRANIE: I don't know.

MR. ROMAINE: Could it have been the limit they proposed?

HEARING OFFICER TIPSORD: He already said he doesn't know, Mr. Romaine. Anything's possible.

Question Number 5.

MR. McRANIE: Question 5: To provide a reliability measurement of 0.8 micrograms per cubic meter, what method detection limit would you like to see? Is it likely, given the state of science today, that mercury CEMS will have this low a detection limit by 2009?

I don't like to talk about detection limits because they are misleading. However, to make reasonable measurements at the 0.8 micrograms per cubic meter level, we will need to achieve a detection limit, precision, and accuracy of at least 0.1 microgram. Really good measurements, really good measurements will require precision and accuracy of at least 0.05 micrograms per cubic meter. These levels of precision and accuracy are, in my opinion, not likely to be achieved by 2009.

HEARING OFFICER TIPSORD: Anything else?

Mr. McRanie, thank you.

MR. ZABEL: I may have a follow-up question, but I'll do it in writing so that we can get out of here before they throw us out.

HEARING OFFICER TIPSORD: Mr. McRanie, thank you very, very much.

We are recessed for today.

(The hearing in the above-entitled cause was adjourned until Wednesday, August 23, 2006, at 9:00 a.m.)

STATE OF ILLINOIS)
) SS.
COUNTY OF COOK)

Martina Manzo, being first duly sworn, on oath says that she is a Certified Shorthand Reporter doing business in the City of Chicago, County of Cook and the State of Illinois;

That she reported in shorthand the proceedings had at the foregoing hearing;

And that the foregoing is a true and correct transcript of her shorthand notes so taken as aforesaid and contains all the proceedings had at the said hearing.

_____
MARTINA MANZO, CSR

CSR No. 084-004341

SUBSCRIBED AND SWORN TO
before me this 25th day of
August, A.D., 2006.

_____
NOTARY PUBLIC