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KING COUNTY DISTRICT COURT
EAST DIVISION, BELLEVUE
THE HONORABLE LINDA JACKE, JUDY EILER, ARTHUR CHAPMAN,
PRESIDING

STATE OF WASHINGTON,)
)
Plaintiff,)
)
vs.) NO. C439008
)
JAGLA,)
)
Defendant.)

[COPY]

TESTIMONY OF THE PROCEEDINGS
OF
ASHLEY EMERY, Ph.D.

9:00 a.m.
May 23, 2003
585 112th Avenue Southeast
Bellevue, Washington

Reported By:
JOHANNA CHAPIN
CSR NO. CH-AP-IJ-334MP

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I-N-D-E-X

<u>WITNESS:</u>	<u>DIRECT</u>	<u>CROSS</u>	<u>REDIRECT</u>	<u>RECROSS</u>	<u>VD</u>
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E	Supplementary Materials	45		
R	NIST Technical Note 1297	48		
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1 JUDGE EILER: Gentleman, I am going to be doing the
2 objections today, so we're going to give Judge Jacke a
3 little break. I'm going to be doing any of the responses on
4 the objections.

5 For the record, I suppose I should tell you that
6 I'm Judge Eiler.

7 Do we have our witness?

8 MR. STEIN: I would like to tell you I'm ready to
9 proceed, but for some reason Dr. Emery is not here. I spoke
10 to him as recently as last night. I've never known him to
11 be late for anything.

12 UNIDENTIFIED PERSON: Mr. Stein, I think I saw him
13 in the parking lot.

14 MR. STEIN: May I just --

15 MR. ROBBINS: I'll go.

16 JUDGE EILER: Well, go catch him if you can.

17 MR. STEIN: Otherwise, Defense is ready to proceed.

18 JUDGE JACKE: And I have a question for the court
19 reporter. When would we be getting the transcript of this,
20 today's hearing? When would we be getting it?

21 COURT REPORTER: Within a week and a half, two
22 weeks.

23 JUDGE JACKE: Two weeks?

24 COURT REPORTER: Yes.

25 MR. STEIN: May I have just have a moment to speak

1 to Dr. Emery, Your Honor?

2 JUDGE EILER: Yes.

3 Is the State ready to begin?

4 MR. SCHWARTZ: The State is ready, Your Honor.

5 JUDGE EILER: Is Defense ready to begin?

6 MR. STEIN: The defense is ready, Your Honor.

7 JUDGE EILER: Please call your witness.

8 MR. STEIN: Your Honor, if I may recall to the
9 stand Dr. Ashley Emery.

10 JUDGE EILER: Remember, you remain under oath.

11 THE WITNESS: Yes.

12 JUDGE EILER: Counsel, proceed.

13 MR. STEIN: Thank you, Your Honor.

14

15

16 D-I-R-E-C-T E-X-A-M-I-N-A-T-I-O-N (cont'd)

17 BY MR. STEIN:

18 Q. Dr. Emery, when we left off from the last of our
19 transcript, I asked you to describe -- when we left off, you
20 had described what NIST is, and you said, "The governmental
21 agency assigned by the United States to guarantee that when
22 people make a measurement of a length, volume, mass, force,
23 et cetera, that there are standards that can be appealed to
24 and say that you -- yes, my instrument is correct." Do you
25 recall that?

1 A. Yes.

2 Q. Let me ask you this. In addition to the specific
3 standards that you referred to, length, volume, mass and
4 force, any other standards offhand that you know of that
5 NIST maintains?

6 A. There are seven: length, mass, time, temperature,
7 radiant energy, luminosity, and a couple more there. There
8 are seven basic quantities defined by International Treaty.

9 Q. And what is a standard?

10 A. If it's mass, it's a kilogram which is maintained
11 in France and also at NIST. It's actually a block of
12 material. But if it's time, it's -- if it's distance, it's
13 defined to be the length that a ray of light will traverse
14 in some one three-hundred millionths of a second, for
15 instance.

16 Q. What length would that be?

17 A. That would be a meter.

18 Q. Thank you.

19 A. And if it's a temperature, it's defined to be one
20 two hundred and seventy-third point one five fraction of the
21 temperature of the triple point of water, and that would be
22 a degree kelvin.

23 Q. All right. And when we talk about the standard for
24 time, does NIST maintain a standard for time?

25 A. Yes, they do. They maintain an atomic clock, and

1 the standard for time is the time necessary for a cesium
2 atom -- for one electron of the cesium atom to change from
3 one energy state to another energy state a certain number of
4 times.

5 Q. With regard, then, to temperature, you have given
6 us the definition of a standard single temperature point.
7 Does NIST maintain any instrument or other standard with
8 which it verifies temperature readings?

9 A. Yes. It does it in two ways. There's what's known
10 as the direct way and the indirect way. They have listed
11 some 30 or 40 different materials. For instance, gold.
12 They say gold will melt at a certain temperature. And so
13 you can buy from them a piece of gold, and you can melt it
14 according to the way they prescribe, and you can stick your
15 thermometer in there and you must come up with the same
16 reading that they tell you that gold melts at. They also
17 have temperatures for water melting, for lead melting, a
18 whole variety of temperatures.

19 They then take a very precise device and compare it
20 to the melting temperature of gold and calibrate that
21 device, and that's called a standard platinum resistance
22 thermometer, and now all other thermometers are compared to
23 that one. And so that's the indirect comparison.

24 Q. And is there an abbreviation that's commonly used
25 with regard to the standard platinum resistance thermometer?

1 A. SPRT.

2 Q. And when we talk about traceability of the
3 standards maintained by NIST and the area of thermometry or
4 metrology with regard to temperature, what is it that people
5 trace their thermometers to when they have a thermometer
6 traceable to standards maintained by NIST?

7 MR. SCHWARTZ: Objection, foundation, and object to
8 the form of the question. What people?

9 JUDGE EILER: Sustained. Rephrase.

10 Q. In your experience, when we talk about traceable to
11 standards maintained by NIST, what is it that people are
12 establishing the traceability of their thermometers to?

13 MR. SCHWARTZ: Same objection.

14 MR. STEIN: It's in his experience. Now, we're
15 talking personal knowledge.

16 JUDGE EILER: Well, you're still talking about
17 they. You need to be specific. Counsel has made an
18 objection, so -- it's a technical objection, but it's his
19 objection.

20 Sustained. Rephrase.

21 MR. STEIN: Thank you, Your Honor.

22 Q. Dr. Emery, in the areas of thermometry, metrology
23 and engineering, are you familiar with how people establish
24 the traceability of their thermometers to standards
25 maintained by NIST?

1 A. Yes, I am.

2 Q. And what is it that they are tracing their
3 thermometers to?

4 A. They're determining how well their thermometer
5 agrees with NIST SPRT.

6 Q. Now, does NIST public scientific materials?

7 A. Yes, it does.

8 Q. Can you describe for the Court what kinds of --
9 type of materials they publish?

10 A. They publish reports, special publications, and in
11 conjunction with IEEE and ASTM, they publish procedures for
12 doing calibrations and certifications.

13 Q. All right. And in your opinion, are these type of
14 materials relied on by experts in the fields that that we
15 have been discussing?

16 MR. SCHWARTZ: Objection. The question is vague.
17 More importantly, we've also been discussing the field of
18 toxicology, which the witness has already repeatedly
19 indicated he has no experience in. So he's not qualified to
20 say whether or not they rely on articles from this or IEEE
21 or ASTM.

22 JUDGE EILER: Counsel?

23 MR. STEIN: Your Honor, perhaps I can approach this
24 a different way to the witness and have --

25 JUDGE EILER: I'll sustain his objection. I'll

1 allow you to rephrase.

2 MR. STEIN: Thank you.

3 Q. For the following questions, let's assume that when
4 I refer to the areas of science that we have been
5 discussing, that we've been talking about metrology,
6 thermometry and engineering, sir. Is that something that we
7 can work with, Dr. Emery?

8 A. I can.

9 Q. All right.

10 MR. SCHWARTZ: Then I'll object as to relevance to
11 any question that relates to what he has just outlined as a
12 hypothetical.

13 MR. STEIN: It's already been ruled on.

14 JUDGE EILER: He can ask a hypothetical question.
15 So you're a little premature. You can renew your objection
16 when he gets someplace with it, but at this point
17 he's setting up his hypothetical.

18 Proceed, Counsel. Ask your question.

19 MR. STEIN: Thank you, Your Honor.

20 Q. In these areas of science, thermometry, metrology,
21 engineering, are NIST publications the type of materials
22 that experts in those fields generally rely on to form their
23 opinions?

24 MR. SCHWARTZ: Objection; relevance.

25 JUDGE EILER: Well, this is foundation, and to get

1 to something, foundation materials are sometimes irrelevant.

2 I'm going to overrule at this point but you can
3 renew your objection --

4 MR. SCHWARTZ: Your Honor, rather than simply
5 objecting to every question, if I can simply have a standing
6 objection to this line of questioning. I understand it's
7 overruled.

8 JUDGE EILER: I don't think there's a standing
9 objection quality. If you want to make your objection each
10 time, you can do so, or you can just kind of tell us after a
11 while that you have objected to a whole bunch of stuff. But
12 I don't think you can, in advance, tell me that you have a
13 standing objection.

14 MR. SCHWARTZ: Okay.

15 MR. STEIN: Your Honor, I apologize for all of this
16 point of procedure. I just want to be clear that these
17 objections were made in the previous proceeding and that
18 they were ruled on and that the testimony of Dr. Emery in
19 these fields was allowed. So I would object to objection
20 that has already been ruled on being remade before Your
21 Honor, when Judge Jacke has previously ruled and allowed
22 these inquiries into these three fields as relevant and
23 material.

24 JUDGE EILER: I ruled on his objection, so move on.

25 MR. STEIN: Thank you.

1 JUDGE EILER: Ask your question on your
2 hypothetical.

3 Q. Let me go through some specifics, then. Does NIST
4 publish a scientific journal?

5 A. Yes, it does.

6 Q. And what's it called?

7 A. Journal for Research.

8 Q. Is that the type of material generally relied on by
9 experts in the fields that we have been discussing?

10 A. Yes.

11 Q. What other specific publications?

12 A. It also puts out special publications describing
13 how to -- describing certain processes that are recommended
14 by them.

15 Q. Is there certain titles for special publications?

16 A. Usually called Special Publications.

17 Q. Have you ever heard the term NIST Technical Note?

18 A. Yes, they're also Technical Notes. I believe the
19 one on uncertainty is a Technical Note. The one on units is
20 a special publication.

21 Q. Have you ever heard of NIST publishing a policy?

22 A. Yes.

23 Q. And how would you characterize that?

24 A. It's usually just entitled "NIST Policy On."

25 Q. Does it fit into the category of special

1 publication or general journal publication?

2 A. I don't think so.

3 Q. With regard to special publications in the fields
4 that we have been discussing, do those special publications
5 carry any particular weight in the scientific community?

6 A. Yes.

7 MR. SCHWARTZ: Objection. What scientific
8 community?

9 JUDGE EILER: Counsel, I think you need to be
10 specific.

11 MR. STEIN: Your Honor, I asked the witness at the
12 beginning of the line of inquiry if he would refer to the
13 areas of thermometry, metrology and engineering in all of
14 these questions. I can phrase every question with regard to
15 those three areas, or I can rely on his representation just
16 moments ago that he would --

17 JUDGE EILER: I think that you would at least have
18 to refer to the three that -- I mean, maybe not by name, but
19 that you are referring back to them, please. We want a good
20 record, and I think that you need to add that or at least
21 refer back to telling us that you are in fact using your
22 hypothetical --

23 MR. STEIN: Thank you, Your Honor.

24 JUDGE EILER: -- just as a technical matter.

25 Proceed.

1 MR. STEIN: Understood. And I've been trying to
2 refer back by saying "those areas that we have discussed" or
3 "those areas."

4 JUDGE EILER: Ask your question.

5 Q. With regard to NIST Special Publications in the
6 three areas of science that we've been discussing, do
7 Special Publications carry any particular weight?

8 MR. SCHWARTZ: Objection; relevance.

9 JUDGE EILER: Counsel, I think that we are at a
10 preliminary stage here. He's establishing a foundation, and
11 a lot of foundational stuff is not relevant until you get to
12 the end, so I think you're still premature.

13 MR. STEIN: Thank you, Your Honor.

14 JUDGE EILER: You can answer the question.

15 A. Yes.

16 Q. And can you describe what kind of special weight it
17 carries in those fields that we have been discussing?

18 A. In the field of thermometry, for instance, or the
19 field of temperature measurement, the NIST publications are
20 the basis for most -- for laboratories to calibrate their
21 instruments to make their measurements. They also publish,
22 for instance -- there is a sensor known as a thermocouple,
23 which is a very common device used to measure temperature.
24 And the thermocouple produces a voltage, and the voltage can
25 be related to temperature. And the equation which relates

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1 voltage to temperature is published by NIST. So it's used
2 by all commercial vendors. They include that equation or
3 that table with the thermocouples that they sell you. It's
4 included in their catalogs.

5 MR. SCHWARTZ: I'll object as nonresponsive and
6 move to strike. I don't know where we're going with this
7 answer, but...

8 JUDGE EILER: Counsel?

9 MR. STEIN: Your Honor, I'm trying to lay the
10 foundation for Dr. Emery's opinions, and we're going to be
11 very long and laborious this way. I can't, under ER104(a)
12 and (b), establish through him the way in which NIST works.
13 We can try and do this by means of supplying the Court with
14 Title 15 of the CFR and USCA, and the Court can take
15 judicial notice of the fact that NIST is --

16 JUDGE EILER: Well, you're going way beyond the
17 objection that's made here.

18 MR. STEIN: No, I don't believe I am, and I
19 appreciate the Court's tolerance for just a minute. We can
20 establish for the Court as a matter of law that NIST is a
21 federal agency, empowered by Congress, to establish uniform
22 weights and measurements through the United States, pursuant
23 to Article 1, Section 1, paragraph 8 of the United States
24 Constitution. That's its foundation.

25 What I am trying to establish through Dr. Emery is

1 that, in his experience, that scientists in various
2 fields -- and now he's gone a little astray of that saying
3 scientists and commerce in his experience --

4 JUDGE EILER: The objection was to strike some of
5 the testimony here, and you've just told me he's gone a
6 little far field. So I'm going to allow his testimony as
7 the basis for labs to calibrate instruments, but we're going
8 to strike the testimony as how it's used with commercial
9 venders because he's gone astray, in your words.

10 Ask a new question.

11 Q. With regard to the publications -- Special
12 Publications of NIST, then, does anyone other than -- in
13 your personal knowledge, anyone other than experts in the
14 field of thermometry, metrology and engineering rely upon
15 NIST Special Publications?

16 A. I use them. Other scientists use them. My
17 students use them. I don't know who is a non-expert.

18 Q. Let's return, then, to the term "traceable
19 standards maintained by NIST." I'm going to ask you first
20 if you're familiar with certain terms.

21 Are you familiar with the term calibration?

22 A. Yes, I am.

23 Q. Certification of calibration?

24 A. Yes.

25 Q. Report of calibration?

1 A. Yes.

2 Q. Traceable?

3 A. Yes.

4 Q. All right. In your opinion, do each of these terms
5 have a generally accepted scientific meaning amongst experts
6 in the fields that we have been discussing?

7 A. Yes.

8 Q. How would you characterize these terms in terms of
9 scientific complexity? Are they basic terms, are they
10 complex terms or something in between?

11 A. Basic.

12 Q. That's your opinion. Do you also believe that's
13 the opinion of experts in the fields that we've been
14 discussing?

15 MR. SCHWARTZ: And, again, just for the record, I
16 want to make it clear, are we only limiting the fields that
17 we're discussing --

18 JUDGE EILER: We certainly are. This is his
19 hypothetical. He's already limited it.

20 MR. SCHWARTZ: Okay. Thank you, Your Honor.

21 A. Yes.

22 Q. Can you give us what you believe to be the
23 generally accepted scientific definition of calibration in
24 the fields in which we have been discussing?

25 MR. SCHWARTZ: Objection; relevance.

1 MR. STEIN: Your Honor, we're talking about whether
2 the DRTs employed by the Washington State Patrol have been
3 traceable to standards maintained by NIST. The way in which
4 that is done is by an unbroken chain of comparisons. The
5 reports of those comparisons are called reports of
6 certifications of calibration. There's nothing more central
7 to Your Honor's review of these materials than to know what
8 a calibration, a report of calibration, a certificate of
9 calibration, and traceability means to the relevant
10 scientific communities.

11 JUDGE EILER: Well, at this point the objection is
12 only to the question of what is calibration. You've gone a
13 little further than what the question was in your answer.

14 Counsel, why isn't calibration relevant?

15 MR. SCHWARTZ: Well, aside from my standing
16 objection that the relevant communities aren't the ones in
17 this hypothetical, also, I believe that the term calibration
18 is defined in the Washington Administrative Code.

19 JUDGE EILER: I think this witness can tell us what
20 he believes the general scientific community's definition
21 is. And we may have a separate definition that's in the WAC
22 which you get to make argument on, but at this point I think
23 the question of calibration is within the ambit of this
24 hearing.

25 Answer the question. What's calibration?

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1 A. Calibration is a determination of the corrections
2 needed to be applied to the readings of an instrument to
3 make them correct.

4 Q. With regard to thermometers, is there a specific
5 definition of calibration in the relevant fields that we've
6 been discussing?

7 A. It's the general definition.

8 Q. Very good.

9 What is, in your opinion, the generally accepted
10 definition amongst scientists in the field that we have been
11 discussing of a certification or report of calibration?

12 JUDGE EILER: Counsel, are those two separate
13 things or are they one --

14 MR. STEIN: I can break it down.

15 JUDGE EILER: -- one document? You gave us four
16 things, and now you're asking about two.

17 MR. STEIN: Yes, it is a compound question, but
18 Your Honors assert the -- I believe the two phrases are
19 interchangeable. Some people call it a certification; some
20 people call it a report. Perhaps Dr. Emery's answer will
21 clarify that, or I can break it down into two if you wish.

22 JUDGE EILER: We're just looking at where you were
23 going with it. You told us that you think they're
24 interchangeable. Let's hear the answer.

25 MR. STEIN: Thank you, Your Honor.

1 A. A certificate is also called a report of
2 calibration.

3 Q. Okay. Does it have a generally accepted definition
4 or meaning within the relevant -- amongst the experts in the
5 fields that we have been discussing?

6 A. It's a report which describes the instrument which
7 was calibrated that lists the corrections which must --
8 well, describes the instrument that is being examined, the
9 conditions under which it was examined, the time it was
10 examined, lists the corrections which must be applied, and
11 lists the uncertainties that are associated with these
12 corrections.

13 Q. And in your opinion, must every certificate or
14 report of calibration contain those minimum qualities?

15 A. Yes.

16 Q. And do you believe that is also the opinion
17 generally accepted by experts in the fields that we have
18 been discussing?

19 A. Yes.

20 Q. We'll come back to that in a moment.

21 Do you have an opinion as to whether the term
22 "traceable" in the phrase "traceable of standards maintained
23 by NIST" has a specific scientific meaning?

24 A. It has an internationally agreed upon scientific
25 meaning.

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1 MR. SCHWARTZ: Your Honor, I'm going to object as
2 to the form of the question, and I realize that the answer
3 has already been given, but given previous testimony by
4 Dr. Emery, I don't think that the two terms are
5 interchangeable, and maybe I need to voir dire the witness
6 in terms of traceable and traceable to standards to NIST.

7 JUDGE EILER: Voir dire.

8
9 V-O-I-R D-I-R-E

10 BY MR. SCHWARTZ:

11 Q. Just a simple question based on that, Dr. Emery.

12 Are those two separate items, "traceable" and
13 "traceable to standards maintained by NIST"?

14 A. Traceability is defined independently of NIST.

15 MR. SCHWARTZ: So then I would object to the
16 question that was asked. Move to strike the answer.

17 MR. STEIN: I guess I don't know the basis of the
18 objection.

19 MR. SCHWARTZ: Well, the question that was asked,
20 as I heard it, was equating the terms "traceable" and
21 "traceable to standards by NIST."

22 JUDGE EILER: Well, the question asked about both
23 of them. The voir dire answer says that they are, in fact,
24 different. So you probably need to clarify. I'm not really
25 going to sustain your objection, but your point is well

1 taken.

2 Counsel, if they are, in fact, different and you've
3 asked both of them in the same question, you need to ask
4 another question.

5 MR. STEIN: Thank you, Your Honor. I appreciate
6 the clarification from counsel and from the Court.

7

8 D-I-R-E-C-T E-X-A-M-I-N-A-T-I-O-N (cont'd)

9 Q. (By Mr. Stein) Dr. Emery, as we have just begun
10 the discussion of the term "traceable" in the context of
11 "traceable to standards maintained by NIST," does
12 traceability, in and of itself, have a generally accepted
13 scientific meaning in the scientific communities that we
14 have been discussing?

15 A. Yes. It has an internationally agreed upon
16 definition.

17 Q. And does that term of traceability have the same
18 definition whether it is in phrase "traceable to standards
19 maintained by NIST" or traceability with reference to
20 something else?

21 A. In my mind -- let me rephrase myself. If you live
22 in the United States, you'll trace everything to NIST. If
23 you live in England, you'll trace everything to the National
24 Physics Laboratory.

25 Q. But regardless of whether an individual is tracing

1 to NIST, if tracing can be used in that manner, or tracing
2 to the Queen's Royal Standards, the term "traceability"
3 whether used in England or in the United States by
4 scientists in the relevant fields that we've been
5 discussing, is it the same?

6 A Yes.

7 Q. Is it a technical term?

8 A. It's used in all scientific and engineering
9 applications.

10 Q. Is it a term of art?

11 MR. SCHWARTZ: Actually, objection as to the
12 question and the answer. I don't -- we left the realm,
13 apparently, of the three areas that Mr. Stein was previously
14 talking about because now we're talking about all scientific
15 areas. I don't believe Dr. Emery, notwithstanding his
16 qualifications as a mechanical engineer, is qualified to
17 state to a scientific certainty anything about all science.

18 JUDGE EILER: Counsel, the point is well taken.
19 His answer said in the scientific community or all science
20 and in the area of engineering, and your hypothetical was
21 for three areas. So I think that we'll strike the answer.
22 Reask the question so that it is within the ambit of your
23 hypothetical that we're working on.

24 Q. Sir, have you ever been exposed to other scientific
25 areas besides trace -- besides thermometry, metrology and

1 engineering?

2 A. Have I been exposed to other areas?

3 Q. Yes.

4 A. Yes.

5 Q. What's the nature of your exposure to other fields
6 and can you describe them, please?

7 A. Either -- let me get the three areas down that I'm
8 supposed to. Thermometry, metrology --

9 Q. And engineering.

10 A. Well, engineering covers all applications of
11 science.

12 Q. How so?

13 A. Because, engineers, we have electrical engineers,
14 mechanical engineers, aeronautical engineers, biomedical
15 engineers.

16 Q. Are you familiar with some of those fields?

17 A. Yes, I am.

18 Q. And which fields and how are you familiar with
19 them?

20 A. I've worked in bioengineering. I've worked in
21 structural engineering. I've worked in fracture mechanics.
22 I've worked in acoustic tomography.

23 Q. What's the nature of your work in bioengineering?

24 A. Bioengineering? I was responsible for conducting
25 and analyzing tests to determine the possibility of getting

1 cataracts when you looked in a microwave oven.

2 Q. All right. And can you tell us what your training,
3 knowledge and experience in that field is?

4 A. The question there was the energy deposition and
5 its dissipation through the blood, and we were using
6 principles of heat transfer and thermodynamics and microwave
7 radiation, which is a subset of thermal radiation.

8 Q. Did you also study its effect upon human tissue?

9 A. Yes, I did.

10 Q. And what is your training, knowledge and experience
11 with regard to the analysis of human tissue?

12 A. Are you talking about the M & I or are you talking
13 about diathermy? I also worked in diathermy for patients.

14 Q. It is a general question, and I'm asking you, what
15 is your training, knowledge and experience with regard to
16 analysis of human tissue?

17 A. I sat in on courses on physiology. I talked to
18 experts in the field. I have done considerable literature
19 research in the biothermal area.

20 Q. Can you --

21 A. There is an organization of mechanical engineers
22 devoted exclusively to bioengineering -- biothermal
23 engineering.

24 Q. And what is that area?

25 A. That's all forms of the body with regard to

1 temperature elevations in the body due to exercise, injury,
2 sickness.

3 Q. And that's within your field of engineering; is
4 that correct?

5 A. It is.

6 Q. Now, can you characterize in any -- can you
7 quantify in any way for the Court how many hours, weeks,
8 months, years, in some fashion, how much time you have spent
9 educating yourself, researching and working in the fields of
10 bio?

11 A. For some ten years I probably spent 50 percent of
12 my time.

13 Q. Was that as a student? A professor?

14 A. That was as a researcher at the University.

15 Q. Which University?

16 A. University of Washington, in the medical school.

17 Q. What were the other areas of engineering besides
18 bioengineering that you've had experience in?

19 A. Fracture mechanics, viscoelasticity, acoustical
20 detection of flaws.

21 Q. I think we can leave those.

22 In any field in which you have worked have you seen
23 any different definition of traceability than the definition
24 with which you are familiar?

25 A. No, I have not.

1 Q. What is your definition of traceability?

2 A. An unbroken sequence of documentation describing
3 the comparisons and all of the uncertainties associated with
4 them. I don't remember word for word what the VIM or ISO
5 definition is, but that's the essence of it.

6 Q. And when we talk about an unbroken sequence, what
7 does that mean?

8 A. If I went to calibrate something, let's say
9 temperature, I can get from NIST the piece of gold, then I
10 can go through the procedure and I can calibrate my
11 instruments, or I can send my instrument back to NIST and
12 have them send me a report as to how accurate it is. In
13 fact, I will probably not do so; I will probably send it to
14 a local laboratory. They will tell me how my instrument
15 compares with theirs. They will tell me how their
16 instrument compares with NIST, and then I can figure out how
17 my instrument compares with NIST.

18 Q. And when it is done in this indirect fashion, is
19 that the chain or combination of comparisons that you're
20 referring to as a sequence?

21 A. Yes.

22 Q. And at each stage in this sequence, is there
23 something that must be accomplished to verify that the
24 individual instrument is accurate and precise?

25 A. They have -- at each stage you have to tell me the

1 uncertainty of the comparison.

2 Q. And so this chain or sequence of comparisons, could
3 it be more than just one?

4 A. Sure. Any number.

5 Q. And if it is more than one, do you have an opinion
6 as to how the -- what the documentation at each stage must
7 contain?

8 A. At each stage the document that I receive must
9 contain information about how their master instruments
10 compared with the next level up, and if I'm really
11 concerned, I will get a copy of the certificate or the
12 report of calibration for everybody involved, but, in
13 general, what will happen is that you will state how my
14 instrument compares with their standard, you'll state how
15 their instrument compared with NIST's standard or the next
16 standard up, and give me enough information that I could go
17 get the appropriate reports.

18 Q. And in each report, what are the things that must
19 be contained in that report to constitute --

20 A. They must tell me the ambient conditions under
21 which the report was generated, and they must tell me the
22 date and the time. They usually recommend the period over
23 which the calibration is to be accurate. They must tell me
24 something that I can describe statistically, either the
25 standard deviation or the expanded uncertainty or the

1 coverage factor.

2 Q. Standard deviation and standard uncertainty or
3 coverage factor, what are those things?

4 A. A measure of uncertainty.

5 Q. They're also known as confidence interval?

6 A. Yes.

7 Q. All of those things are the same essential item,
8 are they not?

9 A. They're a means of determining or specifying
10 uncertainty, yes.

11 Q. A report or certification of calibration that does
12 not state uncertainty, does that meet your definition of a
13 report or a certification of calibration?

14 A. No.

15 Q. May it be relied upon to establish traceability
16 back to NIST or any other international standards?

17 A. No.

18 MR. SCHWARTZ: Objection. It's in the form of the
19 question. Relied upon by whom?

20 MR. STEIN: Relied upon -- sorry.

21 JUDGE EILER: Counsel, I missed the question. We
22 were discussing something, so I missed the question. Let's
23 just rephrase.

24 MR. STEIN: Okay. And I apologize. I should have
25 been more sensitive of the Court. I didn't notice that the

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1 Court was conferencing, and that gives me an opportunity now
2 to expand.

3 JUDGE EILER: Well, let's not jump in and expand
4 too much the question. Just ask your question. The Court
5 might suggest cutting to the chase a little here.

6 MR. STEIN: Your Honor, if I could cut to the
7 chase, I would be unemployed most of the time.

8 Q. Dr. Emery, I'm going to ask you about four fields
9 of science: thermometry, metrology, general engineering and
10 bioengineering, and I want all of your answers to address
11 those four fields as we go through this line of inquiry
12 whenever I ask you about the fields that we have been
13 discussing. Is that an acceptable way to proceed, sir?

14 A. I understand.

15 Q. All right. Now, to go back, because I was not
16 paying attention earlier, in your opinion, is a statement of
17 uncertainty a required element of any report or
18 certification of calibration?

19 MR. SCHWARTZ: Objection; asked and answered.
20 Objection; relevance.

21 MR. STEIN: The Court's asked me to go back.

22 JUDGE EILER: I asked him to go back.

23 Overruled.

24 Answer the question.

25 A. Is a quantification of uncertainty a necessary part

1 of the report?

2 Q. Yes.

3 A. Yes.

4 Q. And is that also, in your opinion, the generally
5 accepted scientific opinion of those experts in the four
6 fields that we have been discussing?

7 A. Yes.

8 Q. In your opinion, may anyone make you rely upon a
9 report or certification of calibration not containing a
10 statement of uncertainty to establish traceability to NIST
11 or any other international standard?

12 A. No, you may not.

13 Q. And is that also the expert opinion -- is that, in
14 your opinion, also the generally accepted opinion of experts
15 in the four fields that we have been discussing today?

16 A. Yes, it is.

17 Q. And let me just do it as a tie-up. Previously I've
18 been asking you about the three fields that we have been
19 discussing. Do you recall your previous testimony to that?

20 A. Yes.

21 Q. Would any of your opinions have changed if I had
22 been asking you about the four fields that we are now
23 discussing?

24 A. No, they would not have.

25 Q. Now, I think before you is Court's Exhibit D.

1 Could you review that, please.

2 A. Yes.

3 Q. Have you seen that prior to today?

4 A. Yes, I have.

5 Q. What is it?

6 A. It's a description, a historical description of how
7 NIST was formed and a description of how NIST disseminates
8 measurements throughout the scientific community.

9 Q. Now, is it in the form of anything that you're used
10 to seeing?

11 A. This is a standard technical paper.

12 Q. When you say "standard technical paper," is it
13 published by any particular scientific or academic entity?

14 A. It's an article from the Journal of Research of the
15 National Institute of Standards and Technology.

16 Q. Thank you.

17 And have you seen it prior to today?

18 A. Yes, I have.

19 Q. Are you familiar with it?

20 A. Yes.

21 Q. In your opinion, is this type of document generally
22 relied upon by experts in the four fields of science that we
23 have been discussing in forming their expert opinions?

24 A. Yes.

25 Q. May I just ask you to please go to page 318.

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1 MR. STEIN: The Court doesn't have additional
2 copies, Your Honor? May I?

3 JUDGE EILER: No.

4 MR. STEIN: No.

5 JUDGE EILER: You have admitted an exhibit, period.

6 MR. STEIN: I'm just, as a convenience, suggesting
7 that I can provide additional copies to the Court to track
8 along with. But if Your Honor does not wish that, that's
9 fine.

10 JUDGE EILER: That's not what I said. I said that
11 all you've done is admit an exhibit.

12 MR. STEIN: I don't believe it's admitted yet.

13 JUDGE EILER: Okay. All you've done, then, is not
14 admitted the exhibit, just presented it, so we can't look at
15 it at all until it's admitted.

16 MR. STEIN: All right, Your Honor.

17 JUDGE EILER: Now, when you get to the point where
18 it's admitted, we'll take a peek.

19 MR. STEIN: Thank you, Your Honor.

20 Q. Let me ask you to please go to page 318 of the
21 Journal of Research of the National Institute of Standards
22 and Technology, Volume 106, Number 1, January 2001, "NIST
23 Mechanisms for Disseminating Measurements," T. E. Gills,
24 et al. Do you see Section 2.5?

25 A. Yes.

1 Q. Okay. The second paragraph of Section 2.5, does
2 that contain a definition of traceability, sir?

3 A. Yes, it does.

4 Q. Could you read that to us, please?

5 MR. SCHWARTZ: Objection. This isn't in evidence.

6 JUDGE EILER: You can't read it until it's in
7 evidence, so --

8 MR. STEIN: Your Honor --

9 JUDGE EILER: -- lay a foundation, get it into
10 evidence, then you can read a part of it.

11 MR. STEIN: Your Honor, once it's in evidence, it
12 speaks for itself.

13 JUDGE EILER: You can have him read sections of it
14 or it speaks for itself. You can point out places that we
15 ought to pay attention to. But we're not going to hear a
16 quotation from it until it's admitted because that's the
17 whole point.

18 MR. STEIN: I understand your ruling, but I'm just
19 trying to get the groundwork for it. I have a number of
20 things that I want to do. Now, I can admit it as a learned
21 treatise, or I can admit it -- or seek to admit it under
22 ER 703 --

23 JUDGE EILER: So move on and get it admitted.

24 MR. STEIN: All right.

25 Move to admit Exhibit D, Your Honor.

1 JUDGE EILER: Any objection by the State?

2 MR. SCHWARTZ: Objection; hearsay.

3 MR. STEIN: Well, Your Honor, it is a -- one, a
4 learned treatise which would be an exception to the hearsay
5 rule. And, two, it is a document relied on by this expert
6 and relied on by experts generally in the field to form
7 their opinions, and, therefore, under ER 703 and 704, it
8 comes in as basis of opinion outside the hearsay rule. If
9 experts rely even on hearsay, the Court may hear what it is
10 that experts rely upon.

11 JUDGE EILER: Anything else from the State?

12 MR. SCHWARTZ: Your Honor, I would dispute under
13 703 or 704 it comes in. Hearsay doesn't come in just
14 because it's relied upon. However, under 803, 818 I think
15 he probably does get it in as a learned treatise.

16 JUDGE EILER: Admitted.

17 MR. STEIN: Thank you, Your Honor.

18 (Exhibit D admitted into evidence.)

19 Q. Now, may we look at Section 2.5 of Exhibit D --

20 MR. ROBBINS: Your Honor, if I may approach?

21 MR. STEIN: Thank you, Counsel.

22 Q. -- page 318.

23 Dr. Emery, again returning to page 318 in
24 Exhibit D, paragraph 2.5 -- Section 2.5, does that section
25 contain a definition of traceability?

1 A. Yes, it does.

2 Q. May I ask you to read starting at the beginning of
3 paragraph 2 of Section 2.5 --

4 MR. SCHWARTZ: Objection, Your Honor. May I voir
5 dire the witness very briefly?

6 JUDGE EILER: You may.

7

8 V-O-I-R D-I-R-E

9 BY MR. SCHWARTZ:

10 Q. Dr. Emery, this article apparently was published in
11 the Journal of Research in the January through February 2001
12 edition. You previously -- well, it's been admitted -- your
13 CV has been admitted previously. You've been a professor at
14 the University of Washington, associate or otherwise, since
15 1961; is that --

16 A. That's correct.

17 Q. When did you first become aware of the definition
18 of traceability that you've been testifying to?

19 MR. STEIN: Relevance of voir dire.

20 JUDGE EILER: I think he gets at least a little
21 voir dire. We're going to allow him a little wiggle room
22 because this is, in fact, voir dire. It's not testimony.

23 MR. STEIN: Thank you, Your Honor.

24 A. The definition of traceability was promulgated in
25 1991. The concept of traceability I've been aware of for

1 probably 20 years. The precise definition, as listed here
2 or as taken out of the ISO, probably for four years.

3 Q. Okay. So certainly prior to January through
4 February of 2001?

5 A. Yes.

6 Q. And do you recall in 2001 if you actually read this
7 article, or did you just read this article in anticipation
8 of your testimony previously in this hearing and today?

9 MR. STEIN: Objection; relevance of voir dire.

10 JUDGE EILER: I think -- it's not testimonial. It
11 is voir dire. So it is in relation to his objection, not
12 testimonial, so we're going to allow him a little leeway.

13 Overruled.

14 MR. STEIN: I appreciate that, Your Honor. It just
15 appears to be more oriented towards cross-examination.

16 JUDGE EILER: Proceed, Counsel. Ask your question.

17 Q. I'm still waiting for --

18 A. Would you rephrase the question, please --

19 Q. Sure.

20 A. -- or restate it?

21 JUDGE EILER: The question was, did you read it in
22 2001 or did you read it in anticipation of your testimony
23 here today?

24 A. This specific one I read, not in anticipation of
25 today's testimony, but as background for work in this area.

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1 JUDGE EILER: So you don't have an idea of when you
2 read it?

3 THE WITNESS: Probably three months or so ago I
4 found this article during a literature search.

5 MR. SCHWARTZ: Okay. I have no further
6 questions.

7 JUDGE EILER: Counsel, proceed with your questions.
8

9 D-I-R-E-C-T E-X-A-M-I-N-A-T-I-O-N (cont'd)

10 BY MR. STEIN:

11 Q. Would you read to us, beginning with paragraph 2,
12 Section 2.5, the definition of traceability, please.

13 A. Definition of traceability: "The property or the
14 result of a measurement or the value of a standard whereby
15 it can be related to stated references, usually national or
16 international standards, through an unbroken chain of
17 comparisons, all having stated uncertainties."

18 Q. With regard to that definition, do you have an
19 opinion as to whether that is an accurate definition in the
20 four fields of science that we've been discussing?

21 A. Yes.

22 MR. SCHWARTZ: Objection. The document itself -- I
23 mean, we already discussed the fact that the document speaks
24 for itself, but I think the rule of completeness requires
25 that more of it be read than what -- the slight excerpt that

1 was read, and that leads to the objection, because the
2 document itself limits that definition in a way that that
3 question is improper.

4 MR. STEIN: If counsel wishes to admit or discuss
5 more of this document, it's admitted. He can do so on
6 cross-examination.

7 MR. SCHWARTZ: Then I'll object to the question.

8 JUDGE EILER: I think it is proper
9 cross-examination.

10 I'm going to overrule your objection.

11 MR. STEIN: Thank you.

12 JUDGE EILER: You're welcome.

13 Q. Do you have an opinion as to whether that's an
14 accurate statement of the definition of traceability, sir?

15 A. That is the definition given by ISO.

16 Q. I'm asking you whether it's your opinion.

17 A. Yes.

18 Q. And do you believe it is also the generally
19 accepted scientific definition of traceability in the
20 four -- amongst experts in the four fields that we've been
21 discussing?

22 A. Yes.

23 Q. Is there any dispute among scientists in the four
24 fields that we've been discussing about that definition of
25 traceability?

1 A. No.

2 Q. Would you read the sentence prior to the
3 definition.

4 A. The one beginning, "The definition"?

5 Q. Yes, sir.

6 A. "The definition of traceability that has achieved
7 global acceptance in the metrology community is as follows."

8 Q. Do you agree with that statement of global
9 acceptance in the metrology community?

10 A. Yes.

11 Q. And, again, just because it's been three weeks
12 since we last did it, what is metrology, sir?

13 A. Science of measurement.

14 Q. In your opinion, does that definition of
15 traceability have global acceptance in the four fields of
16 science that we've been discussing?

17 A. Yes.

18 Q. And is it also your opinion that all scientists in
19 the four fields of science that we have been discussing
20 agree and accept that definition of traceability?

21 MR. SCHWARTZ: Objection. There's no possible way
22 that the witness can know what all scientists, even in his
23 four fields, can know.

24 MR. STEIN: Your Honor, the Court can take that
25 into the weight and consideration, but if he has an opinion,

1 he can give it.

2 JUDGE EILER: Overruled.

3 A. Yes.

4 Q. And what is your opinion?

5 A. That all scientists believe -- follow this
6 definition.

7 Q. Thank you.

8 I'm going to hand you what's been marked previously
9 as defense Exhibit E.

10 JUDGE EILER: What letter would that be, Counsel?

11 MR. STEIN: E, Your Honor --

12 JUDGE EILER: Thank you.

13 MR. STEIN: -- as in Edward.

14 Q. Tell me when you've had an opportunity to review
15 this.

16 JUDGE EILER: Are you ready to answer that
17 question?

18 THE WITNESS: I didn't hear the question. I'm
19 sorry, Your Honor.

20 JUDGE EILER: Well, he asked when you had completed
21 reviewing it so he can --

22 A. Oh, I have read it before, yes.

23 Q. All right. Can you describe what this is, please?

24 A. It's entitled "Supplementary Materials." It's a
25 list of questions, frequently asked questions, and the

1 answers to those questions that NIST has disseminated.

2 MR. SCHWARTZ: Objection; foundation.

3 JUDGE EILER: Well, he's just telling us what it is
4 at this point.

5 MR. SCHWARTZ: But based on what I have in front of
6 me, I guess the foundation question still exists of how he
7 knows that it comes from NIST.

8 JUDGE EILER: If it's foundational at this point
9 and he's just asking for a title, you're premature.

10 Overruled.

11 Counsel, ask another question.

12 Q. Are you familiar with this document?

13 A. Yes, I am.

14 Q. Who published this document, if you know?

15 A. National Institute of Standards and Technology.

16 Q. How do you know they published it?

17 A. I took it off of their website.

18 Q. You did personally?

19 A. Yes, I did.

20 Q. Is the website for the National Institute of
21 Standards and Technology the kind of document generally
22 relied on by experts in the four fields of science that we
23 have been discussing to form their opinions?

24 A. Yes.

25 MR. STEIN: Move to admit.

1 MR. SCHWARTZ: Objection, Your Honor.
2 State v. Davis. It's improper to admit or to cite things
3 off of the Internet because there is no foundation.
4 Internet sites are hacked. There's no basis that this is
5 not pure hearsay.

6 MR. STEIN: Your Honor, Counsel cites to a case in
7 which it was moved to admit in case of chief before a jury
8 in which there was not this foundation under ER 703, 704 and
9 hearsay exceptions as essentially learned treatise, the
10 published documentation of the Federal Governmental,
11 Department of Commerce, National Institute of Standards and
12 Technology website generally relied upon by experts in the
13 four fields of science that we have been discussing in
14 forming their opinion. This is both relevant and material.
15 It is also admissible on those two bases, and it is also
16 admissible under ER 1101 as foundational for Your Honors'
17 formation of the opinion as to whether 448-13-035 has been
18 complied with. So it comes in under three separate bases.

19 JUDGE EILER: Anything else from the State?

20 MR. SCHWARTZ: Well, only to add that if we could
21 be assured of where it came from and who wrote it, those
22 things may be true, but we don't have any kind of foundation
23 other than a URL at the bottom of the page to suggest that
24 this comes from NIST.

25 JUDGE EILER: He makes the objection. He gets

1 first and last.

2 MR. STEIN: Absolutely.

3 JUDGE EILER: I'm going to allow the admission of
4 it. I think that it goes to weight. You can argue as to
5 whether or not we should pay little or no attention or a lot
6 of attention to this particular document, but I will allow
7 it to at least be admitted.

8 (Exhibit E admitted into evidence.)

9 MR. ROBBINS: Permit me to approach, Your Honor.

10 Q. Dr. Emery, does the exhibit have numbered pages?

11 A. Yes, it does.

12 MR. STEIN: Your Honors, I hope that the pages are
13 numbered for you, as well.

14 Q. May I ask you to refer to page 7 of the document.

15 A. Yes.

16 Q. Does page 7 have a question and answer from the
17 National Institute of Standards and Technology regarding
18 traceability?

19 A. Yes.

20 Q. Could you read the question and answer, please?

21 A. Well, there are two questions.

22 Q. Number 4, please.

23 A. Number 4. Okay.

24 MR. SCHWARTZ: Actually, I will object. I don't
25 believe this comes in as a learned treatise. I think at