

In The Matter Of:

*S. Fred Singer v.
Justin Lancaster*

*S. Fred Singer
September 24, 1993*

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COMMONWEALTH OF MASSACHUSETTS

[4] Middlesex, ss. Superior Court Department
[5] Middlesex, ss. Superior Court Department
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[8] S. FRED SINGER,
[9] Plaintiff,
[10] v. Civil Action
[11] No. 93-2219

[12] JUSTIN LANCASTER,
[13] Defendant.

[14] DEPOSITION of S. FRED SINGER, a witness
[15] called by counsel for the Defendant, taken pursuant
[16] to Rule 30 of the Massachusetts Rules of Civil
[17] Procedure, before Kimberly A. Edwards, Registered
[18] Professional Reporter, Certified Shorthand Reporter,
[19] and Notary Public in and for the Commonwealth of
[20] Massachusetts, at the offices of NUTTER, McCLENNEN &
[21] FISH, One International Place, Boston, Massachusetts,
[22] on Friday, the 24th day of September, 1993,
[23] commencing at 9:40 a.m.

[24] DORIS M. JONES & ASSOCIATES, INC.
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[1] I have informed Dr. Lancaster that

[2] we will permit him to — we will not press that

[3] objection today and that he will be permitted to

[4] inquire of Dr. Singer as to sources of funding of

[5] that organization.

[6] With respect to Dr. Singer's personal

[7] income, we objected to inquiry into his personal

[8] income. We reassert that objection. However, in the

[9] interest of trying to move this along without a

[10] fight, without a court battle, we've told Dr.

[11] Lancaster that he may inquire with very narrow

[12] directed questions to sources of income related to

[13] organizations that are at issue in this case, things

[14] such as the Western Fuel Alliance, and some other

[15] organizations and individuals that Dr. Lancaster has

[16] asserted are relevant to this case.

[17] To the extent they're limited and

[18] directed to that, I think we'll be able to avoid

[19] objections. However, if we do get an objection, I

[20] want to state that the way we'll handle it is I will

[21] inform you that I think it's beyond our agreement, we

[22] will reserve the right to go to court and to have the

[23] motion to compel ruled on, but we'll finish the

[24] deposition today, as much as we can today, so that we

[1] P_R_O_C_E_E_D_I_N_G_S

[2]

[3] Stipulation

[4] It is stipulated by and between counsel for the

[5] respective parties that the deposition is to be read

[6] and signed by the deponent before any notary; that

[7] the sealing and filing thereof are waived; and that

[8] all objections, except as to form, and motions to

[9] strike are reserved to the time of trial.

[10]

[11]

[12] MR. BLUTE: Before we begin, let me

[13] just make a statement on the record about our

[14] discussions on the motion to compel. There were some

[15] issues that came up in written discovery where we

[16] objected to certain inquiries made by Dr. Lancaster.

[17] We've had some discussions about those, those issues,

[18] and I think we worked out — at least we'll see if we

[19] can work out today those issues.

[20] And if I can summarize them, there

[21] was an interrogatory directed to the sources of

[22] funding of the Science and Environmental Policy

[23] Project, an organization formed by Dr. Singer. We

[24] will — we objected to giving that information.

[1] don't have to interrupt the deposition.

[2] MR. LANCASTER: I agree. We'll

[3] continue the deposition with the reservations and

[4] keep the deposition open till they're resolved.

[5] MR. BLUTE: Right.

[6] MR. LANCASTER: I think that there's

[7] a significant chance that we won't finish today. I

[8] had hoped we would. But as I — as you might

[9] imagine, you get into writing questions and it

[10] extends. But I'll try to.

[11] MR. BLUTE: We'll do our best. And

[12] we'll see where we are at the end of the day. It

[13] took us more than one day to finish yours. But I

[14] don't intend to interfere with your completion of the

[15] deposition, within reason.

[16] Another item I wanted to mention,

[17] given the situation where you're representing

[18] yourself, you're acting pro se, I've asked Dr.

[19] Singer, whenever he's referring to you, to refer to

[20] "Dr. Lancaster" rather than "you" or "your," so that

[21] the record is clear. If it has to be read at some

[22] time at trial, the record will be clear.

[23] MR. LANCASTER: I've also planned to

[24] refer to myself as "the defendant" in the questioning

[1] to try and keep that clear and also to help remind me
[2] that I'm going to try and conduct this part of the
[3] proceeding as an attorney representing myself rather
[4] than as a defendant with unrestrained passion.
[5] **MR. BLUTE:** All right. With that, I
[6] think that's all we should say at the outset. And go
[7] ahead.

[8]
[9] **S. FRED SINGER**

[10]
[11] a witness called for examination by counsel for the
[12] Defendant, being first duly sworn, was examined and
[13] testified as follows:

[14]
[15] **DIRECT EXAMINATION**
[16] **BY MR. LANCASTER:**

[17] **Q:** Just to start, could you please state your
[18] name for the record and your address?
[19] **A:** S. Fred Singer, 9812 Doulton Court,
[20] D-o-u-l-t-o-n, Fairfax, Virginia, 22032.
[21] **Q:** Dr. Singer, do you have a wife and
[22] children?
[23] **A:** I have a wife and she has children.
[24] **Q:** To your knowledge, you're not related to

[1] the family of Isaac Merritt Singer or his
[2] descendants, the founder of the Singer Corporation?
[3] **A:** To the best of my knowledge, I'm not
[4] related to him.
[5] **Q:** Are you any relation to Thomas Eric Singer
[6] of the company in Boston, Thomas Singer and
[7] Daughters, to your knowledge?
[8] **A:** To my knowledge, I'm not related to him.
[9] **Q:** You initiated this suit against defendant
[10] in April of this year, correct?
[11] **A:** I believe so.
[12] **Q:** And it's a suit for libel, four counts of
[13] libel, is that correct?
[14] **MR. BLUTE:** Well, the complaint —
[15] **Q:** And one count of violation of
[16] Massachusetts civil rights?
[17] **A:** I'm not familiar with the technicalities.
[18] **Q:** Okay. You're aware that defendant has
[19] responded with a counterclaim for abuse of process?
[20] **A:** I've been so informed.
[21] **Q:** And are you familiar with the grounds for
[22] abuse of process, what has to be proved?
[23] **A:** No, I'm not.
[24] **Q:** Okay. Are you a scientist?

[1] **A:** Yes.
[2] **Q:** Are you also a journalist?
[3] **A:** What precisely does that mean?
[4] **Q:** Well, are you a journalist in the sense
[5] that you would be a freelance journalist writing
[6] articles for publication in many newspapers more
[7] frequently than a scientist would be expected to?
[8] **MR. BLUTE:** I object to the form, but
[9] go ahead and answer.
[10] **A:** That's a very vague question. I've
[11] written articles for newspapers, but I don't know
[12] whether these are more frequent than any other
[13] scientist that I know of.
[14] **Q:** Do you know of any scientist, colleagues,
[15] or other, who has written more articles in newspapers
[16] than yourself?
[17] **A:** Yes.
[18] **Q:** Can you name that scientist?
[19] **A:** Dr. Carl Sagan.
[20] **Q:** Can you think of any other scientist other
[21] than Dr. Sagan?
[22] **A:** Not at the moment.
[23] **Q:** Would you agree that one of the
[24] differences between — strike that.

[1] Is not one of the areas of your expertise
[2] the relationship of science and policy making?
[3] **A:** Yes.
[4] **Q:** And would you agree that one of the
[5] differences between science and the legal profession
[6] is the fact that the legal profession has an ethical
[7] code?
[8] **MR. BLUTE:** Objection. You can
[9] answer, if you can.
[10] **Q:** I'll break it down. Are you aware that
[11] the legal profession has an ethical code —
[12] **MR. BLUTE:** Objection.
[13] **Q:** — called the Code of Professional
[14] Responsibility?
[15] **MR. BLUTE:** I object. Go ahead.
[16] **A:** I'm not familiar with such a code.
[17] **Q:** Does the profession of science have an
[18] ethical code?
[19] **MR. BLUTE:** Objection. Go ahead.
[20] **MR. LANCASTER:** Grounds for
[21] objection?
[22] **MR. BLUTE:** I think the question
[23] is — the form of the question, I think, is improper,
[24] because code — there's written codes, there's

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[1] customs, and there's —
 [2] **MR. LANCASTER:** Let me withdraw that
 [3] and make it more specific.
 [4] **BY MR. LANCASTER:**
 [5] **Q:** Are you aware, in the scientific
 [6] profession, of any requirement for scientists to be
 [7] licensed to practice science?
 [8] **A:** No, I'm not.
 [9] **Q:** Is there, to your knowledge, any
 [10] requirement that a scientist must state an adherence
 [11] to principles of ethics in order to practice science?
 [12] **A:** Could you rephrase that question?
 [13] **Q:** Are you aware of any requirement for a
 [14] professional scientist to adhere to any written
 [15] ethical principles?
 [16] **A:** No, I'm not.
 [17] **Q:** Would it surprise you, in the legal
 [18] profession, that practicing lawyers are required to
 [19] constrain their behavior to a set of stated ethical
 [20] principles?
 [21] **A:** I'm not surprised.
 [22] **Q:** Is it true that scientists and lawyers, in
 [23] their practice, approach the notion of truth
 [24] differently?

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[1] **MR. BLUTE:** I object.
 [2] **MR. LANCASTER:** Okay. I'll withdraw
 [3] it. Let me make it more specific.
 [4] **MR. BLUTE:** My grounds are that I
 [5] don't think Dr. Singer can testify as to what the
 [6] practices of a lawyer are. He's not an attorney.
 [7] But go ahead. I don't want to interrupt.
 [8] **BY MR. LANCASTER:**
 [9] **Q:** Okay. Let's back up. What is science?
 [10] **A:** There are many definitions. To me,
 [11] science is a search for evidence to develop the laws
 [12] of the behavior of nature.
 [13] **Q:** What is a scientist?
 [14] **A:** One who practices.
 [15] **Q:** Does a scientist search for truth in the
 [16] behavior of nature?
 [17] **A:** That's a very vague question. Truth can't
 [18] be discerned until it has been tested. Searches for
 [19] behavior and tests truth by further observations.
 [20] **Q:** Is it true that once one becomes a
 [21] professional scientist that one is always a
 [22] professional scientist? Can you become — I'll just
 [23] leave that.
 [24] **A:** (No response)

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[1] **Q:** Okay. I'll withdraw it, rephrase it.
 [2] If your career led you to the practice of
 [3] science, would there be, in your mind, anything that
 [4] would allow somebody to lose their qualification to
 [5] call themselves a scientist?
 [6] **A:** Yes.
 [7] **Q:** And how would that occur?
 [8] **A:** Falsification of data is an example.
 [9] **Q:** Would there be any difference between a
 [10] scientist who carried out multiple experiments and
 [11] observations and a scientist who practiced only
 [12] assembling other scientific information? Do you draw
 [13] a distinction between those types of scientists?
 [14] **A:** In one manner of speaking, yes. In
 [15] another manner, no.
 [16] **Q:** Can you explain?
 [17] **A:** One would be an experimental scientist and
 [18] the other would be a theoretical scientist.
 [19] **Q:** In your career, you have been both, have
 [20] you not?
 [21] **A:** Yes, I have.
 [22] **Q:** When did you carry out your experimental
 [23] science?
 [24] **A:** Starting approximately 1946 up to the

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[1] present time.
 [2] **Q:** What is the most recent experiment you've
 [3] carried out?
 [4] **A:** The most recent experiment relates to
 [5] measurements in a satellite of orbiting debris clouds
 [6] circling the earth.
 [7] **Q:** And you are carrying that experiment out
 [8] with whom?
 [9] **A:** With a group of collaborators.
 [10] **Q:** And their names are?
 [11] **A:** William Kinard, K-i-n-a-r-d, John Oliver,
 [12] Charles Simon, Jerry Weinberg.
 [13] **Q:** And where is Mr. Kinard, Dr. Kinard, his
 [14] professional location, affiliation?
 [15] **A:** Langley, Virginia.
 [16] **Q:** Is he with NASA?
 [17] **A:** Yes, sir.
 [18] **Q:** Dr. Oliver's affiliation?
 [19] **A:** University of Florida.
 [20] **Q:** Dr. Simon's affiliation?
 [21] **A:** Gainesville, Florida.
 [22] **Q:** Is Dr. Simon with the university?
 [23] **A:** I believe he has some kind of connection.
 [24] **Q:** And Dr. Weinberg?

[1] **A:** Gainesville, Florida.
 [2] **Q:** Is the funding for this satellite
 [3] experiment through NASA?
 [4] **A:** That is correct.
 [5] **Q:** And what is your role in this experimental
 [6] science?
 [7] **A:** I am a co-principal investigator.
 [8] **Q:** And that's under current grant?
 [9] **A:** Yes.
 [10] **Q:** And the title, again, of the grant?
 [11] **A:** The approximate title is something like
 [12] "Analysis of Satellite Experiments Relating to
 [13] Orbiting Debris Clouds."
 [14] **Q:** What is an orbiting debris cloud?
 [15] **A:** It is a group of particles circling the
 [16] earth of sufficient density to form a cloud.
 [17] **Q:** Is this experiment studying a certain set
 [18] of particles?
 [19] **A:** Yes.
 [20] **Q:** What set of particles is that?
 [21] **A:** The particles that are in the vicinity of
 [22] the earth, in orbit around the earth.
 [23] **Q:** At what elevation?
 [24] **A:** At 400 kilometers.

[1] **Q:** And you're using a NASA satellite or many
 [2] NASA satellites?
 [3] **A:** We have used a NASA satellite.
 [4] **Q:** And currently the satellite is not
 [5] gathering data?
 [6] **A:** Correct, the satellite has returned to the
 [7] earth.
 [8] **Q:** And what satellite is that?
 [9] **A:** LDEF, L-D-E-F. That stands for Long
 [10] Duration Exposure Facility.
 [11] **Q:** Prior to this experiment, were you working
 [12] on another experiment?
 [13] **A:** Yes.
 [14] **Q:** And what was that and what years?
 [15] **A:** In the middle '70s, I worked on a NASA
 [16] experiment relating to particles in the vicinity of
 [17] the earth.
 [18] **Q:** At what elevation?
 [19] **A:** Approximately 400 — low orbit, low earth
 [20] orbit.
 [21] **Q:** 100 to 200 kilometers?
 [22] **A:** No, higher.
 [23] **Q:** 200 to 400 kilometers?
 [24] **A:** Possibly.

[1] **Q:** Were you a principal investigator or a
 [2] co-principal investigator on that experiment?
 [3] **A:** I was principal investigator of the LDEF
 [4] experiment.
 [5] **Q:** On the current experiment, with Drs.
 [6] Kinard, Oliver, Simon, and Weinberg, the grant pays
 [7] you? Does the grant pay you?
 [8] **A:** The grant has paid me from time to time
 [9] whenever I did work.
 [10] **Q:** So you're a consulting investigator?
 [11] **MR. BLUTE:** Objection.
 [12] **Q:** Is your relationship to this NASA contract
 [13] on a pay-for-hours basis?
 [14] **A:** Roughly.
 [15] **Q:** And would Dr. Kinard, then, be the
 [16] co-principal investigator who would administer those
 [17] funds?
 [18] **A:** No, the funds are administered by Dr.
 [19] Weinberg.
 [20] **Q:** Dr. Weinberg. What's the size of that
 [21] grant; how many dollars?
 [22] **A:** I'm not familiar with the details of the
 [23] current grant, but it's of the order of 100,000. It
 [24] is certainly not a million and it is not 10,000.

[1] **Q:** And roughly, what percentage of that,
 [2] or how many dollars of that, come to you for your
 [3] work?
 [4] **A:** I am paid all of my expenses, travel
 [5] expenses. And I've received, to the best of my
 [6] recollection, no more than — or less than \$5,000.
 [7] **Q:** In theoretical science, what has been your
 [8] work in the last two or three years, say three years,
 [9] since 1990?
 [10] **A:** I've calculated the greenhouse effects of
 [11] high altitude cirrus clouds.
 [12] **Q:** And have you published that research?
 [13] **A:** Yes.
 [14] **Q:** And the citations for those? Do you
 [15] remember?
 [16] **A:** I don't carry them in my head.
 [17] **Q:** What journal?
 [18] **A:** Meteorology and Atmospheric Physics.
 [19] **Q:** How many articles?
 [20] **A:** One.
 [21] **Q:** And in what year?
 [22] **A:** Approximately 1990.
 [23] **Q:** Is that work that you are continuing now?
 [24] **A:** Not the specific — not the specific

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[1] investigation. It's completed.
[2] **Q:** Was that investigation under grant or
[3] contract?
[4] **A:** No.
[5] **Q:** So you were not paid for that work?
[6] **A:** No, I was not paid.
[7] **Q:** What were your major conclusions in that
[8] paper? Do you remember the title of the paper?
[9] **A:** My conclusions were that high altitude
[10] cirrus could produce very strong greenhouse effects.
[11] **Q:** At what elevation?
[12] **A:** In the stratosphere.
[13] **Q:** Would that be the lower stratosphere?
[14] **A:** The lower stratosphere.
[15] **Q:** Roughly 15 to 20 kilometers? Or which
[16] elevation?
[17] **A:** I'd say 10 to 15 kilometers.
[18] **Q:** 10 to 15 kilometers. Would this be an
[19] altitude that water vapor could reach if convection
[20] in the atmosphere increased?
[21] **A:** Does your question refer to water vapor
[22] originating at a lower altitude?
[23] **Q:** Yes.
[24] **A:** It is possible.

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[1] **Q:** Do you know if water vapor originates at a
[2] higher altitude, 10 to 15 kilometers?
[3] **A:** Yes.
[4] **Q:** And how does that occur?
[5] **A:** Through the photochemical conversion of
[6] methane.
[7] **Q:** In the region of 10 to 15 kilometers,
[8] roughly what percentage of water vapor would be
[9] created from methane photo-oxidation?
[10] **A:** That percentage is not known. At least I
[11] don't know that.
[12] **Q:** Do you have any sense of it?
[13] **MR. BLUTE:** Objection.
[14] **Q:** Do you have a scientific guess that it
[15] would be less than 50 percent?
[16] **MR. BLUTE:** Objection.
[17] **Q:** Do you have any information that would
[18] lead you to make a scientific estimate of that amount
[19] of water vapor created by methane photo-oxidation?
[20] **A:** I estimated that it would be an important
[21] source.
[22] **Q:** What percentage of the source, in your
[23] mind, would qualify as important?
[24] **A:** More than 10 percent.

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[1] **Q:** Where would that methane come from?
[2] **A:** That methane originates in the lower
[3] atmosphere.
[4] **Q:** Does some of that methane come from the
[5] surface, the earth's surface?
[6] **A:** Yes.
[7] **Q:** Is some of that methane sequestered in
[8] soils at high latitudes?
[9] **A:** Not that I'm aware of.
[10] **Q:** You're not aware that tundra soils hold
[11] methane?
[12] **A:** They may hold methane, but I'm not aware
[13] that they're an important source of methane into the
[14] atmosphere.
[15] **Q:** If tundra soils were to warm?
[16] **A:** That's a hypothetical question.
[17] **Q:** Let me pose the hypothetical question. If
[18] tundra soils were to warm, in your scientific
[19] opinion, is there any risk of increased methane
[20] release from the soils?
[21] **A:** Well, you're really asking if methane were
[22] to be released from these soils, would it be
[23] released?
[24] **Q:** No, I'm asking, if those soils were warm,

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[1] is there an increased risk that methane would be
[2] released?
[3] **A:** I'm not familiar with how the methane is
[4] held in the soil, so I can't really answer the
[5] question from any personal knowledge.
[6] **Q:** Are you telling me that you have no
[7] knowledge about how methane is held in soils?
[8] **MR. BLUTE:** Objection.
[9] **MR. LANCASTER:** Could we please read
[10] back Dr. Singer's response to my previous question?
[11] (Answer read.)
[12] **BY MR. LANCASTER:**
[13] **Q:** Are you saying that you are not familiar
[14] with how methane is held in soils?
[15] **A:** I'm not familiar with the literature on
[16] this particular subject.
[17] **Q:** Have you not, sir, held yourself out as an
[18] expert in the sources of methane —
[19] **A:** Yes.
[20] **Q:** — into the atmosphere?
[21] **A:** Yes.
[22] **Q:** And you're telling me now you're not
[23] familiar with the literature on how methane is held
[24] in soils?

[1] **MR. BLUTE:** Objection. There's a
 [2] question pending, unless you want to withdraw the
 [3] question.
 [4] **MR. LANCASTER:** What's the grounds
 [5] for the objection?
 [6] **MR. BLUTE:** I think it's not a
 [7] question at all. I think it's an argument.
 [8] **A:** Soil is not considered to be a current
 [9] source of methane.
 [10] **MR. BLUTE:** And let me just say for
 [11] the record, I don't want to interfere with your
 [12] examination. And I'm doing my best not to. And I
 [13] don't intend to. But if we're going to spend the day
 [14] debating scientific points, I don't think it's
 [15] relevant to the issues in the suit, either on our
 [16] claim or your counterclaim. And there is at some
 [17] point —
 [18] **MR. LANCASTER:** I'd like to move on.
 [19] **MR. BLUTE:** Let me just finish.
 [20] There is at some point an issue of how much time is
 [21] being spent on matters which are wholly unrelated to
 [22] the suit. It's expensive to do that. And at some
 [23] point I would ask you to stop and move on to issues
 [24] in the suit. And I would say it's being unreasonable

[1] **Q:** Would you say that the problem of global
 [2] warming is a fairly complex problem?
 [3] **A:** Yes.
 [4] **Q:** Would you agree that greenhouse gas
 [5] concentrations are imperceptible to the public?
 [6] **A:** What does that mean?
 [7] **Q:** Would you agree that the general public is
 [8] not able to perceive in the atmosphere around them
 [9] the changing levels of carbon dioxide, or methane, or
 [10] ozone, or nitrous oxide?
 [11] **A:** Do you mean by direct sense?
 [12] **Q:** Yes.
 [13] **A:** Correct.
 [14] **Q:** Would you agree that climate change, to
 [15] the extent that it occurs, or potential climate
 [16] change, would not be directly sensed by the public?
 [17] **A:** You'd have to specify to me over what time
 [18] interval you're referring. Certainly they would
 [19] probably sense the climate change from summer to
 [20] winter.
 [21] **Q:** Right. If I specify, then, climate change
 [22] over a decade, in your scientific estimate, is that a
 [23] change that can be perceived or sensed?
 [24] **A:** You have to distinguish — your question

[1] to put us to this expense on those issues. So I
 [2] just — let's move on.
 [3] **MR. LANCASTER:** Let me respond to
 [4] that. I understand that concern. The issues in this
 [5] suit concern Dr. Singer's expertise in global warming
 [6] science; would you agree?
 [7] **MR. BLUTE:** I think the issues in the
 [8] suit concern claims of libel and counterclaims for
 [9] abuse of process and matters relating to those
 [10] claims.
 [11] And I don't see how methane gas
 [12] leaking from the tundra, if it's heated, has anything
 [13] to do with the issues in this case.
 [14] **MR. LANCASTER:** I believe you. I
 [15] believe you don't see that.
 [16] **MR. BLUTE:** I don't see that. And I
 [17] don't —
 [18] **MR. LANCASTER:** I do. But I will try
 [19] and move on.
 [20] **MR. BLUTE:** Continue on.
 [21] **MR. LANCASTER:** I will try and move
 [22] on, because I don't want to get deeply into this.
 [23] There are many other topics to reach.
 [24] **BY MR. LANCASTER:**

[1] is unclear to me. First you asked me about whether
 [2] the public could detect such a climate change. And
 [3] now you seem to be asking me a different question.
 [4] **Q:** I'm sorry. The same second question,
 [5] whether that climate change over a decade could be
 [6] sensed by the general public.
 [7] **A:** This is not a question that can be
 [8] addressed to me, as a scientist. I must answer it by
 [9] saying that the public seems to think that the
 [10] climate is changing, in the sense that they say the
 [11] climate used to be better or worse 10 years ago.
 [12] Whether they have any foundation for this, I don't
 [13] know.
 [14] **Q:** Is it fair to say that the chemical
 [15] changes in the atmosphere are too slow and too
 [16] invisible for the public to be conscious of them
 [17] without communication from attentive scientists?
 [18] **A:** Yes.
 [19] **Q:** Would you agree that the science is fairly
 [20] complex in the sense that many disciplines of science
 [21] must be comprehended to grasp the relationships
 [22] between biology, chemistry, oceanography,
 [23] meteorology, and climatology?
 [24] **A:** Again, it depends on the time frame. And

[1] unless you specify the time frame, I cannot answer
 [2] this question.
 [3] **Q:** For example, to detect climate change or
 [4] to have the ability to make a scientific judgment
 [5] about the likelihood that there will be a significant
 [6] climate change over 50 years, is it fair to
 [7] characterize this science as very complex, because it
 [8] involves biology, atmospheric chemistry,
 [9] oceanography, meteorology, and sciences of
 [10] climatology?
 [11] **MR. BLUTE:** I object to the form.
 [12] But you can answer, if you can.
 [13] **A:** Yes.
 [14] **Q:** It's fair to say that it's very complex?
 [15] **A:** Yes.
 [16] **Q:** As a scientific question?
 [17] **A:** (Nodding)
 [18] **Q:** Is it fair —
 [19] **A:** Over 50 years, yes.
 [20] **Q:** Is it fair to say that there are not many
 [21] scientists practicing who have sufficient expertise
 [22] in all of the related disciplines that bear on this
 [23] problem to be able to make valid scientific judgments
 [24] about the entire problem alone as single scientists?

[1] **Q:** Can we keep going, then? Could you list
 [2] other branches of science where you've worked?
 [3] **A:** If you were to ask me a direct question, I
 [4] could say yes or no.
 [5] **Q:** Have you conducted research and published
 [6] in oceanography?
 [7] **A:** Yes.
 [8] **Q:** And what was that research?
 [9] **A:** I published a paper on composition of
 [10] deep-sea sediments.
 [11] **Q:** Was that sole author, or jointly authored?
 [12] **A:** Sole, sole author.
 [13] **Q:** In ecology?
 [14] **A:** Ecology is a broad subject. I would
 [15] prefer if you were to ask me a specific question.
 [16] **Q:** In —
 [17] **A:** In a sense, everything is ecology.
 [18] **Q:** In biology?
 [19] **A:** No.
 [20] **Q:** Forestry?
 [21] **A:** Yes, I've written a paper on forestry.
 [22] **Q:** And that topic?
 [23] **A:** On forest fires.
 [24] **Q:** Agricultural ecology?

[1] **MR. BLUTE:** I object to the form. Go
 [2] ahead.
 [3] **A:** Yes.
 [4] **Q:** Is it not true that you are a scientist
 [5] with unusual expertise in multiple disciplines?
 [6] **A:** I have worked in several scientific areas.
 [7] **Q:** Can you list these?
 [8] **A:** Yes, principally atmospheric physics,
 [9] space physics, planetary physics.
 [10] **Q:** When you list planetary physics, what
 [11] branches of planetary physics do you have expertise?
 [12] **A:** My publications involve such subjects as
 [13] meteorites, planetary satellites, the moon, and
 [14] interplanetary dust, among others.
 [15] **Q:** Can you list others?
 [16] **A:** Zodiacal light.
 [17] **Q:** In atmospheric physics, what branches do
 [18] you consider yourself expert?
 [19] **A:** I've published on such topics as the
 [20] growth of atmospheric methane, stratosphere ozone,
 [21] ionospheric currents, exosphere, magnetosphere.
 [22] **Q:** Of all of these disciplines that you've
 [23] mentioned, is it fair to say —
 [24] **A:** This is not exhaustive.

[1] **A:** Indirectly, yes. I've written about the
 [2] ecology of fisheries.
 [3] **Q:** Anything about land plants?
 [4] **A:** Not that I recall.
 [5] **Q:** Have you studied the chemistry of carbon
 [6] dioxide, the transport of carbon dioxide between
 [7] oceans, atmosphere, and land plants?
 [8] **A:** I have not published any original papers
 [9] on the subjects.
 [10] **Q:** In topics relating to the chemistry
 [11] involved, greenhouse gases and potential global
 [12] warming, would you say that yourself or Dr. Roger
 [13] Revelle had more expertise?
 [14] **A:** Please repeat the question.
 [15] **Q:** In scientific topics, chemistry
 [16] particularly, transport of chemicals between the
 [17] ocean, atmosphere, and land plants, would you say
 [18] that yourself or Dr. Roger Revelle had more
 [19] scientific expertise?
 [20] **MR. BLUTE:** Object to the form. You
 [21] can answer.
 [22] **A:** It depends on the specific topic. I'm not
 [23] familiar with all of his publications, of course.
 [24] But I would judge that I have more expertise on the

[1] issue of methane coming from natural sources.
 [2] **Q:** Okay. Would you agree that the general
 [3] public, including — the nonscientist, including
 [4] legislators, politicians, lawyers, and economists,
 [5] are unable to develop and carry out their own
 [6] analysis of the scientific evidence related to global
 [7] warming?
 [8] **A:** I would agree with that.
 [9] **MR. BLUTE:** Object to the form. Go
 [10] ahead. That's fine. You've got it.
 [11] **A:** I would agree to that.
 [12] **Q:** This is because of the complexity of the
 [13] science?
 [14] **A:** Partly.
 [15] **Q:** And because of the lack of training in
 [16] science?
 [17] **A:** Yes, yes.
 [18] **Q:** Would you agree that the public relies,
 [19] then, on the responsible transfer of scientific
 [20] information about environmental change from the realm
 [21] of the scientist to the realm of the policy maker?
 [22] **A:** Is this question a normative question or a
 [23] factual question?
 [24] **Q:** Both.

[1] **A:** I would agree that the public should rely
 [2] on the scientists for the scientific — for forming a
 [3] scientific base for policy making.
 [4] **Q:** Would you agree that the public does rely
 [5] on the responsible transfer of scientific information
 [6] from scientists to policy makers?
 [7] **MR. BLUTE:** Object to the form. Go
 [8] ahead.
 [9] **A:** It depends on the specific case. I think
 [10] you'd have to ask me. And I will tell you yes or no.
 [11] Your question is too broad.
 [12] **Q:** Well, let's talk, then, about the global
 [13] warming case. In the case of global warming,
 [14] potential global warming, because of the scientific
 [15] complexity we discussed, would you agree that the
 [16] public relies on the responsible transfer of
 [17] scientific results, scientific assessments to the
 [18] legislative process, that they rely upon scientists
 [19] and those who assess the scientific information to
 [20] make that transfer responsibly?
 [21] **MR. BLUTE:** Object to form.
 [22] **A:** This is a complicated question. And I
 [23] think I'd like you to rephrase it in a simple way.
 [24] **Q:** How does the public —

[1] **A:** Who —
 [2] **Q:** How does the general public — and let me
 [3] say here the legislative body in Congress —
 [4] **A:** Well, that's not the general public.
 [5] **Q:** — I'm going to list, the legislative body
 [6] in Congress, the man on the street, the teachers in
 [7] elementary schools — how do these people, who are
 [8] not practicing scientists in the global warming
 [9] topic — how do they learn about whether or not
 [10] global warming is a risk?
 [11] **A:** I think I can answer that question. They
 [12] learn about it from television and newspapers.
 [13] **Q:** How do televisions and newspapers gather
 [14] this information?
 [15] **A:** I'm not in the television and newspaper
 [16] business. But my impression is that they interview
 [17] or listen to the people who want to get a message to
 [18] them.
 [19] **Q:** Is it customary for practicing scientists
 [20] to try and pass their conclusions to the general
 [21] public, as I described the general public in the
 [22] previous question, through newspaper articles? Is
 [23] this the general custom of practicing scientists?
 [24] **A:** I would say many practicing scientists

[1] these days do write newspaper articles —
 [2] **Q:** Can you —
 [3] **A:** — in addition to scientific articles.
 [4] **Q:** As director of the Science and
 [5] Environmental Policy Project and an expert in the
 [6] passage of science to the policy making process, what
 [7] is your estimate of the percentage of practicing
 [8] scientists that regularly write newspaper articles to
 [9] convey their scientific results?
 [10] **MR. BLUTE:** Objection.
 [11] **MR. LANCASTER:** On what grounds?
 [12] **MR. BLUTE:** Several. I think, first
 [13] of all, your question includes a statement as to an
 [14] area of expertise which is an assumption on your
 [15] part. And there's no foundation for it.
 [16] **MR. LANCASTER:** Okay. Let's lay that
 [17] foundation.
 [18] **MR. BLUTE:** And secondly, you asked
 [19] for an estimate about a percentage. I just don't
 [20] think there's any — I think it calls for — let me
 [21] just state my objection.
 [22] I think the question calls for just
 [23] speculation, a guess.
 [24] I also think, again — and I'm not

[1] going to — I'll let you go on with it, but I think
[2] at this point — I do think this area of questioning
[3] is just beyond the scope of what's at issue in this
[4] case.

[5] Global warming is not a dispute in
[6] this case. It's not an issue to be decided by the
[7] court. The issue is the authorship or not of Roger
[8] Revelle, and what you said, and your abuse of process
[9] counterclaim. Having said that, go ahead. And you
[10] may answer, if you can.

[11] **BY MR. LANCASTER:**

[12] **Q:** Would you care to answer?

[13] **A:** Would you read the question?

[14] **Q:** Let's lay the foundation. As one who has
[15] been a professor of environmental sciences, as one
[16] who is a director, and has been for at least three
[17] years, of the Science and Environmental Policy
[18] Project, do you have expertise in how scientific
[19] information is conveyed to the governmental process?

[20] **A:** It is conveyed in a number of different
[21] ways.

[22] **Q:** We're just laying the foundation here.
[23] Yes or no; do you see yourself as someone who has
[24] expertise in this topic?

[1] **A:** I don't think I have any unusual expertise
[2] that is different from the expertise of any other
[3] scientist.

[4] **Q:** You answered previously that, in your
[5] estimation, the only scientist you could think of was
[6] Dr. Carl Sagan who has written more newspaper
[7] articles about science and his scientific work as a
[8] practicing scientist than you.

[9] **A:** I think you're putting words in my mouth.
[10] I didn't say that.

[11] **MR. LANCASTER:** Can we read back the
[12] answer to the second question, please? I think it
[13] was the second question I asked.

[14] **MR. BLUTE:** In the deposition? Let
[15] me just state this is — I'm not trying to fight with
[16] you about this.

[17] **MR. LANCASTER:** It's quicker to ask
[18] the question again, isn't it?

[19] **MR. BLUTE:** Yes.

[20] **A:** I did not say that Carl Sagan was the only
[21] other scientist.

[22] **Q:** I asked you if you could think of any
[23] other scientist, the name of any other scientist,
[24] publishing as many or more newspaper articles than

[1] yourself. And your response was? Could you think of
[2] any other name?

[3] **A:** Not at this time. But I cannot say that
[4] Sagan is the only other scientist.

[5] **Q:** I understand that. Is it fair to say that
[6] you have a knowledge about the transmission of
[7] science to the policy process that is at a higher
[8] level of expertise about that knowledge, about that
[9] process, the transfer of information, than most
[10] practicing scientists?

[11] **MR. BLUTE:** Objection.

[12] **A:** I have no basis for judgment.

[13] **Q:** Okay. For a scientist writing about
[14] scientific conclusions of their own work and the work
[15] of other scientists, would you agree that there is
[16] any ethical burden upon those publishing this work to
[17] the public?

[18] **A:** Yes.

[19] **Q:** Would you agree that for those scientists
[20] who regularly make this their role in science, to
[21] assess the science of the many practitioners around
[22] them, publish newspaper articles about it, in the way
[23] that reaches the public more effectively than through
[24] the scientific journals, is there any unique or

[1] greater ethical burden upon this group of scientists
[2] than other practicing scientists?

[3] **MR. BLUTE:** Objection. You can
[4] answer.

[5] **A:** No, I think the burden is the same, which
[6] is to tell the truth. You tell the truth in
[7] scientific articles and you tell the truth when you
[8] speak to the public.

[9] **Q:** Okay. Would you agree, if one assumed —
[10] we can make this a hypothetical, if you'd like — if
[11] we assume that global warming is an issue of public
[12] concern, and if we assume the public relies on those
[13] persons communicating results and assessments of
[14] science to the public, that the question of whether
[15] this communication of science and assessment of
[16] science, the question of whether that communication
[17] is accurate and balanced and truthful, that this
[18] question itself is an issue of public concern?

[19] **MR. BLUTE:** Objection.

[20] **MR. LANCASTER:** On what grounds?

[21] **MR. BLUTE:** Well, first of all, it's
[22] about three or four different questions. It's a
[23] compound question.

[24] **MR. LANCASTER:** It's a question based

[1] on two assumptions.
 [2] **MR. BLUTE:** Right. He can answer it,
 [3] if he can.
 [4] **MR. LANCASTER:** Is it too complicated
 [5] for him to answer?
 [6] **MR. BLUTE:** No, I'm stating an
 [7] objection for the record. I'm preserving my
 [8] objection at the time of trial. You can choose to
 [9] either rephrase it, or Dr. Singer can attempt to
 [10] answer it as best he can. But I'm entitled to state
 [11] my objection on the record to preserve it; otherwise,
 [12] I lose it.
 [13] **MR. LANCASTER:** And the objection is
 [14] it's too complicated a question?
 [15] **MR. BLUTE:** I think it's a compound
 [16] question, so that it incorporates more than one
 [17] question. And therefore, to the extent you want a
 [18] yes or no answer, it would be unclear on the record
 [19] as to what he's answering, first of all.
 [20] **MR. LANCASTER:** Okay.
 [21] **MR. BLUTE:** Secondly, I think it just
 [22] calls for an argument, an opinion. It's completely
 [23] irrelevant to anything in this case. I'm not going
 [24] to tell him not to answer on that ground. I don't

[1] think that's appropriate. But again, I hope at some
 [2] point we move on to the issues in this case and not
 [3] the science —
 [4] **MR. LANCASTER:** Me too. I'm on page
 [5] one of 40 pages. But I'm having a hard time getting
 [6] through one page. The answers are very slow and the
 [7] objections are many.
 [8] **MR. BLUTE:** Well, let me state this:
 [9] I don't want to interfere with you. I want you to
 [10] move forward. I do feel I have an obligation to my
 [11] client to preserve objections for the record.
 [12] **MR. LANCASTER:** I understand.
 [13] **MR. BLUTE:** And it's not to interfere
 [14] with you. I'll stop making these little speeches. I
 [15] do think, though, that some of the areas of
 [16] questioning are beyond what's in dispute. That's all
 [17] I'm saying. If you want to ask it again or rephrase
 [18] it...
 [19] **BY MR. LANCASTER:**
 [20] **Q:** Do you, Dr. Singer, feel an ethical
 [21] obligation to convey truthful information in your
 [22] newspaper articles?
 [23] **A:** Yes.
 [24] **Q:** Do you feel an obligation to convey

[1] information that is accurate and balanced? Let me
 [2] define "balanced."
 [3] **MR. BLUTE:** Objection, as compound.
 [4] There's two questions there.
 [5] **Q:** Okay. Do you feel an obligation to
 [6] publish information that is accurate?
 [7] **A:** Yes.
 [8] **Q:** Do you feel an obligation to publish
 [9] information that is as scientifically precise as
 [10] possible?
 [11] **A:** To the extent that it will not confuse the
 [12] average reader.
 [13] **Q:** So in your communications through
 [14] newspapers, you anticipate the perceptions of an
 [15] average reader?
 [16] **A:** I have to make the subject understandable.
 [17] **Q:** In making the subject understandable, do
 [18] you feel that gives you latitude to stray away from
 [19] the truth?
 [20] **A:** No.
 [21] **Q:** Or to stray away from accuracy?
 [22] **A:** No.
 [23] **Q:** Does it give you the latitude to stray
 [24] away from objectivity?

[1] **A:** Is that a different question than the one
 [2] you just asked me?
 [3] **Q:** Is scientific objectivity different, in
 [4] your mind, from expressing scientific truth?
 [5] **A:** I see them as closely related.
 [6] **Q:** Do you see any differences in the two
 [7] concepts?
 [8] **A:** Could you suggest a difference?
 [9] **Q:** One could imagine a scientist publishing a
 [10] newspaper article that was accurate about six
 [11] relevant facts out of 10 on global warming, but
 [12] omitted four other facts, that would lead the public
 [13] to draw a different conclusion about the risks of the
 [14] environmental change, or the risks of the toxin,
 [15] et cetera. One could be accurate in reporting the
 [16] six facts, but one might not be objective by omitting
 [17] the other four facts. Do you agree that there's a
 [18] distinction?
 [19] **A:** Yes, I do. You've explained it very well.
 [20] **Q:** As a practicing scientist, communicating
 [21] to the general public through newspapers, do you feel
 [22] a burden to be objective?
 [23] **A:** I do in all of my publications.
 [24] **Q:** Are you objective in all of your

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[1] publications?
 [2] **A:** I believe that I am.
 [3] **Q:** As a practitioner in the area of science
 [4] policy, the transmission of how science is used in
 [5] the policy making process — I'll make this a
 [6] normative question — do you believe that the public
 [7] has a justifiable concern, or that this is an issue
 [8] of public concern, whether or not these
 [9] communications are truthful, objective, and accurate?
 [10] **A:** I think you've asked me this question
 [11] before in a number of ways. Is this a different
 [12] question?
 [13] **Q:** Well, I'd like to have your answer again,
 [14] if I did ask it before.
 [15] **MR. BLUTE:** Answer, if you can. I
 [16] object to the extent it's been asked and answered.
 [17] But go ahead.
 [18] **A:** Please repeat it.
 [19] **Q:** Well, I'll make it very simple.
 [20] **A:** Yes.
 [21] **Q:** Is it an issue of public concern that the
 [22] communications from practicing scientists be
 [23] objective, accurate, and truthful?
 [24] **A:** Yes.

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[1] truth.
 [2] **A:** So I don't know what truth you're
 [3] referring to, unless you're referring to absolute
 [4] truth. And if you refer to absolute truth, I wish
 [5] you could define it for me.
 [6] **Q:** Okay. I'll move on. What is the stated
 [7] mission of the Science and Environmental Policy
 [8] Project?
 [9] **A:** The mission of the SEPP was to write books
 [10] on science and environmental policy. That is the
 [11] reason it was formed.
 [12] **Q:** Was it formed to influence the direction
 [13] of federal environmental policy?
 [14] **A:** Not specifically. It was hoped, of
 [15] course, that the book or any other publications would
 [16] have a beneficial influence on the policy making
 [17] process.
 [18] **Q:** Now, when you say "a beneficial
 [19] influence," what do you mean?
 [20] **A:** By this, I mean that the policy making
 [21] process would pay more attention, greater attention,
 [22] than it does now to the underlying science.
 [23] **Q:** Would it be fair to say, then, that the
 [24] mission of your organization is to increase the

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[1] **Q:** If the public were intentionally misled or
 [2] even accidentally misled — well, I don't want to ask
 [3] multiple questions.
 [4] If the public is intentionally misled by
 [5] inaccurate and unobjective reporting of the science,
 [6] would this be an issue of public concern? And let's
 [7] make it more specific; in the global warming issue.
 [8] **A:** It should be.
 [9] **Q:** If the public were accidentally
 [10] misled — that's even without intent on the part of
 [11] the scientist — by inaccurate and unbalanced
 [12] reporting of the science, would this also be an issue
 [13] of public concern in the global warming issue?
 [14] **A:** Much less so.
 [15] **Q:** Why much less so?
 [16] **A:** Because there was no intent.
 [17] **Q:** Isn't part of the concern on the part of
 [18] the public that they get accurate information and
 [19] truthful information, whether they receive — let's
 [20] just leave it that way.
 [21] **A:** Yes, but there's a difference in opinion
 [22] as to what is accuracy and what is truthful. In
 [23] other words, there's a scientific controversy. And
 [24] in a controversy, both sides believe to have the

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[1] conveyance of objective scientific information to the
 [2] policy making process?
 [3] **A:** That is certainly one of the objectives.
 [4] **Q:** Included in — have you not stated that
 [5] the mission of your organization — have you not
 [6] stated previously in writing that the mission of your
 [7] organization is merely to study how government uses
 [8] science?
 [9] **MR. BLUTE:** I object. I think it's
 [10] an unfair question. If there's a specific writing
 [11] you want to direct his attention to, ask him if he
 [12] remembers writing that.
 [13] **Q:** Okay. Do you remember writing such a
 [14] description of the mission of your organization?
 [15] **A:** I think this is an incomplete statement.
 [16] Obviously studying by itself does little good. I
 [17] think the mission statement was to study and
 [18] document.
 [19] **Q:** So you do remember the phrase and you
 [20] remember that it was "and document"?
 [21] **A:** I don't know if I used that specific
 [22] phrase, but that's what I would say now.
 [23] **Q:** Okay. And would you include, then, in the
 [24] mission to study and document how science is used by

[1] government, or the policy making process, to convey
 [2] specific scientific information to government in an
 [3] effort to influence environmental policy?
 [4] **A:** No, the intention was to use specific
 [5] information, where available, as examples.
 [6] **Q:** Okay. Isn't it true that the Science and
 [7] Environmental Policy Project regularly communicates a
 [8] specific viewpoint about global warming?
 [9] **A:** I don't understand that question.
 [10] **Q:** Is it fair to say that the Science and
 [11] Environmental Policy Project publishes documents that
 [12] espouse a specific viewpoint about global warming,
 [13] about the risks of global warming? Let me back up.
 [14] I'll withdraw that.
 [15] **MR. BLUTE:** Okay.
 [16] **Q:** Is it fair to say that the Science and
 [17] Environmental Policy Project publishes documents
 [18] often that contend there is not a risk of global
 [19] warming?
 [20] **A:** No.
 [21] **Q:** Is it fair to say that the Science and
 [22] Environmental Policy Project publishes information
 [23] criticizing the use of the Intergovernmental Panel on
 [24] Climate Change assessment of science?

[1] **A:** You've used lawyer language in your
 [2] question by referring to risk of global warming.
 [3] **Q:** That was the previous question. I'm
 [4] talking about this question.
 [5] **A:** We have done an analysis of the IPCC
 [6] report and of the summary and published that, yes.
 [7] **Q:** Do your communications from the Science
 [8] and Environmental Policy Project go at all beyond
 [9] publishing the results of this single study you've
 [10] mentioned concerning the risks of global warming?
 [11] **A:** Yes, we write op-ed articles. We write
 [12] updates on the scientific information underlying
 [13] potential global warming.
 [14] **Q:** Is this communication objective?
 [15] **A:** To the best of my knowledge and to the
 [16] best of my ability, it is objective, truthful,
 [17] accurate, and complete.
 [18] **Q:** Can a scientist responsibly advocate
 [19] policy action or inaction and maintain scientific
 [20] objectivity?
 [21] **A:** Yes.
 [22] **MR. LANCASTER:** I'd like to start
 [23] with the first exhibit as the document you produced
 [24] to me. I don't believe you put a document number on

[1] it. But I'll call it the galley proof. We've
 [2] referred to it many times. And I'd ask that to be
 [3] marked as Exhibit 1, it being the —
 [4] **MR. BLUTE:** Why don't we call it the
 [5] galley proof.
 [6] **MR. LANCASTER:** Should we call it the
 [7] galley proof? I think we'll be all set with that.
 [8] **MR. BLUTE:** Let me just state for
 [9] the record it is a document with both typed and
 [10] handwritten notations. And it bears the statement at
 [11] the top, "This file has been output on a laser
 [12] proof. The type quality, including kerning and
 [13] character outline, may be slightly distorted."
 [14] **MR. LANCASTER:** And it bears a date,
 [15] I think, 31 January '91.
 [16] **MR. BLUTE:** Why don't we mark that.
 [17] (Exhibit 1 marked
 [18] for identification.)
 [19] (Recess taken.)
 [20] **BY MR. LANCASTER:**
 [21] **Q:** Back on. Just for this document, do you
 [22] recognize this document, Dr. Singer?
 [23] **A:** Yes.
 [24] **Q:** Can you tell me what that document is?

[1] **A:** This is a laser proof of the Cosmos
 [2] Journal article by Revelle, Starr, and myself.
 [3] **Q:** Dr. Singer, I'd like to give you — I have
 [4] to do something else first, sorry — strike that.
 [5] Looking at this galley proof, at the top
 [6] of the second page, you speak of global warming,
 [7] fourth line down, is that correct?
 [8] **A:** Yes.
 [9] **Q:** And then under — at the bottom of the
 [10] page, the caption, "The Climate Record," you speak of
 [11] a temperature increase — we're actually onto the top
 [12] of the third page now — the temperature increase of
 [13] about 1.6 degrees Celsius.
 [14] **A:** Yes.
 [15] **Q:** Is that correct?
 [16] **A:** Yes.
 [17] **MR. BLUTE:** Hold on. Let me just
 [18] state for the record, I object, because it's both in
 [19] type — "1.5" in type and there's a "6" delineated in
 [20] there in pencil.
 [21] **Q:** Good. 1.5, in the original, degrees
 [22] Celsius, with a marking, and a 6 marked above the 5
 [23] in handwritten script, is that correct?
 [24] **A:** Yes.

[1] Q: What temperature would this be, an
 [2] increase in what?
 [3] A: You're referring to the 1.6 now?
 [4] Q: Yes, and to the — well, let's just stick
 [5] with the 1.6. Would this be global — I'll leave the
 [6] first question.
 [7] A: This would be the increase calculated by
 [8] the prevailing theory for global average temperature.
 [9] Q: And for what time period would this
 [10] average be made?
 [11] A: You have to be more precise. Do you mean
 [12] time interval, or time period?
 [13] Q: Time interval.
 [14] A: From about 1880 to the present.
 [15] Q: Now, when you talk about a temperature
 [16] increase, how does the scientific community generally
 [17] measure that temperature increase?
 [18] A: Up until about 15 years ago, this was done
 [19] by thermometers located at various surface locations.
 [20] Q: And how would they publish those results?
 [21] How would they assemble those measurements into a
 [22] published result?
 [23] And what I'm after here is, are these
 [24] numbers — do they publish a temperature for every

[1] record of Jones and Wigley?
 [2] A: I recall it, but I'm less familiar with
 [3] it.
 [4] Q: Is that temperature of Jones and Wigley
 [5] typically considered global average temperature?
 [6] A: Yes, I believe so.
 [7] Q: And that's conveyed as global annually
 [8] averaged temperature, is it not?
 [9] A: I don't recall whether that's annual —
 [10] whether it's a rolling average that is averaged over
 [11] a number of years.
 [12] Q: Okay. Below this last point we were in
 [13] your document —
 [14] A: Which page?
 [15] Q: On the third page. Actually, it's marked
 [16] at the top "Galley: 002." In the first full
 [17] paragraph, there's the —
 [18] MR. BLUTE: Read the first three
 [19] words of the paragraph so we know.
 [20] Q: "But has there been a climate effect..."
 [21] MR. BLUTE: Thank you.
 [22] Q: And the second sentence, "The data are
 [23] ambiguous to say the least. Advocates for immediate
 [24] action profess to see a global warming of about 0.5

[1] five-minute interval of the day? Do they typically
 [2] publish a temperature for every hour of the day?
 [3] Generally, how are those averages created in the
 [4] published work?
 [5] A: This is a very specialized job for people
 [6] who assemble such data from various stations.
 [7] Stations have different procedures. Some stations
 [8] will record temperature every four hours, some twice
 [9] a day, some continuously.
 [10] Q: In 1988, Dr. James Hansen presented his
 [11] scientific results concerning temperature increase to
 [12] Congress. Are you familiar with that proceeding?
 [13] A: Yes, I am.
 [14] Q: And I trust you're familiar with the
 [15] temperature record that he presented?
 [16] A: Yes, I am.
 [17] Q: The results that he presented were
 [18] displayed how?
 [19] A: They were displayed as a northern
 [20] hemisphere temperature averaged over — a rolling
 [21] average over a several-year period — and I don't
 [22] recall the details — starting around 1880 up to
 [23] 1988.
 [24] Q: And are you familiar with the temperature

[1] degrees C since 1980, and point to record global
 [2] temperatures in the 1980s and the warmest year on
 [3] record in 1990."
 [4] A: Yes.
 [5] Q: Now, how would one characterize the
 [6] warmest year on record?
 [7] MR. BLUTE: Objection.
 [8] Q: How would one determine if 1990 were a
 [9] warmer year than any other year?
 [10] A: The one way to do this is to take the
 [11] average over the year and compare it with other
 [12] averages over preceding years.
 [13] Q: And that's typically done, is it not, in
 [14] the publication of —
 [15] A: I have not seen that publication. I think
 [16] this was a claim made in newspapers.
 [17] Q: Is it common practice to report global
 [18] temperature change as annually averaged data?
 [19] A: That — it would be the most common
 [20] practice, yes.
 [21] Q: Okay. Thank you. In the sentence just
 [22] above where we are, "Advocates for immediate action
 [23] profess to see a global warming of about 0.5
 [24] degrees C...", again, this is global average

[1] temperature, is that correct?
 [2] **A:** Yes.
 [3] **Q:** And it would be reasonable, if a reader
 [4] interpreted that as global annually averaged
 [5] temperature, a nonscientific reader?
 [6] **A:** I assume.
 [7] **Q:** At the end of the paragraph, speaking
 [8] about — the same paragraph, "...global atmospheric
 [9] (rather than surface) temperatures measured by Tiros
 [10] weather satellites...", would it be a reasonable
 [11] assumption for a reader that you're talking about
 [12] global annually averaged temperatures?
 [13] **MR. BLUTE:** I object. You can
 [14] answer, if you can.
 [15] **A:** Yes.
 [16] **MR. LANCASTER:** Objection on what
 [17] ground?
 [18] **MR. BLUTE:** I think your asking
 [19] Dr. Singer to put himself in the mind of a reader is
 [20] an inappropriate question. But if he can answer it,
 [21] let him answer it. I think it's an inappropriate
 [22] question. You're asking him what someone reading
 [23] this —
 [24] **BY MR. LANCASTER:**

[1] **Q:** Did we not discuss before that when you
 [2] write an article you anticipate what a reader — how
 [3] a reader will interpret it?
 [4] **A:** Yes.
 [5] **Q:** When you wrote this article, did you
 [6] anticipate how a reader would interpret your words?
 [7] **A:** The specific question as you raised it
 [8] did not occur to me. Since we're talking about
 [9] temperature change over long periods, the question
 [10] about whether you average over one year or two years
 [11] is not particularly relevant.
 [12] **Q:** When you wrote this sentence, you were
 [13] referring to global average temperature, correct?
 [14] **A:** I think throughout we refer to global
 [15] average temperatures.
 [16] **Q:** So two paragraphs down, where you say,
 [17] "Fair to say," let's find that paragraph — "It is
 [18] therefore fair to say" — small paragraph, fourth
 [19] paragraph down —
 [20] **A:** Yes.
 [21] **Q:** — "It is therefore fair to say that we
 [22] haven't seen the huge greenhouse warming, of between
 [23] 0.7 and 2.5 degrees C..." Again, a reader would
 [24] understand this to mean global average temperature?

[1] **MR. BLUTE:** Objection.
 [2] **Q:** Again, you meant, as you wrote this —
 [3] you're referring to global average temperature,
 [4] correct?
 [5] **A:** Let's be precise. I referred to
 [6] temperatures averaged over the globe.
 [7] **Q:** Yes.
 [8] **A:** And averaged over the season — over the
 [9] seasons. Is that what you're referring to?
 [10] **Q:** I'm talking about —
 [11] **A:** What average are you speaking about? Are
 [12] you speaking about a geographic average? Are you
 [13] speaking about a temporal average?
 [14] **Q:** Well, I'm talking about a global
 [15] geographic average, is that correct?
 [16] **A:** Yes.
 [17] **Q:** Okay. And if you were to try and
 [18] demonstrate this warming between 0.7 and 2.5 degrees
 [19] C, would you normally do so using annually averaged
 [20] data?
 [21] **A:** Yes.
 [22] **Q:** Under the section "Mathematical Models,"
 [23] you referred to the calculated average global
 [24] increase. Let's find this. Halfway down the

[1] paragraph, "There is general agreement..." begins the
 [2] sentence.
 [3] **A:** Yep.
 [4] **Q:** And you refer to global increase ranges
 [5] from 1.5 and 4.5 degrees C.
 [6] **A:** Yes.
 [7] **Q:** Again, this is global average temperature?
 [8] **A:** Average global increase, which is a change
 [9] in temperature.
 [10] **Q:** Yes. Would it be fair for a reader to
 [11] assume that you mean global annually averaged
 [12] temperature?
 [13] **A:** As opposed to what?
 [14] **Q:** As opposed to any other way of producing
 [15] these results or assessing or measuring these
 [16] results.
 [17] **A:** Well, you would normally eliminate the sea
 [18] stone variation. So in that sense you would at least
 [19] average over the year.
 [20] **Q:** Okay. Thank you. Okay, moving down to
 [21] "Impacts of Climate Change," you refer to a modest
 [22] average warming —
 [23] **A:** Yes.
 [24] **Q:** — in the next century of less than one

[1] degree Celsius.
 [2] **A:** Yes.
 [3] **Q:** Again, this would refer to global average
 [4] temperature, wouldn't it?
 [5] **A:** Yes.
 [6] **Q:** So it's true that throughout this article,
 [7] up through and including this paragraph, that every
 [8] time you speak about global temperature rise you're
 [9] speaking about global average temperature?
 [10] **A:** Averaging, again, over what? Over —
 [11] geographically?
 [12] **Q:** Geographically, yes.
 [13] **A:** Yes.
 [14] **Q:** The second half of this sentence,
 [15] "...normal year-to-year variation," is there any
 [16] reason for a reader to expect that phrase to mean
 [17] anything other than the variation in global annually
 [18] averaged temperature from one year to the next?
 [19] **A:** Correct.
 [20] **MR. BLUTE:** Objection.
 [21] **MR. LANCASTER:** Objection on what
 [22] ground?
 [23] **MR. BLUTE:** Again, I just don't
 [24] think — when you say is there any reason why a

[1] global annually averaged temperature?
 [2] **A:** Yes.
 [3] **Q:** Thank you. Can you think of any reason up
 [4] to this point in the article why a reader would be
 [5] led to believe that the meaning in this sentence
 [6] would refer to any different way of averaging the
 [7] temperature, any different?
 [8] **A:** I'm puzzled by your question. What other
 [9] interpretation do you have in mind?
 [10] **Q:** A variation in some — something other
 [11] than global average temperature.
 [12] **A:** Such as?
 [13] **Q:** A variation in temperature at one
 [14] location.
 [15] **A:** Oh. Let me think about this. We don't
 [16] refer to specific locations. I think I refer to
 [17] global temperatures.
 [18] **Q:** Thank you.
 [19] **A:** Except where I specifically refer to
 [20] elevation, such as in the end of that sentence, it
 [21] refers to "high latitudes."
 [22] **Q:** Yes.
 [23] **A:** That is not global.
 [24] **Q:** Understood.

[1] reader would expect it to mean something else, do you
 [2] mean in this article? Or do you mean if someone is
 [3] reading this may take whatever — I think you're
 [4] asking him to put himself in the mind of a reader. I
 [5] don't think that's an appropriate question.
 [6] **Q:** Okay. When you wrote that particular
 [7] sentence, —
 [8] **MR. BLUTE:** He can tell you what he
 [9] meant.
 [10] **Q:** — what did you mean? Did you mean
 [11] year-to-year variation global annually averaged
 [12] temperature?
 [13] **A:** In the first place, I don't recall now
 [14] whether I wrote this sentence or not. There were, as
 [15] you know, two other co-authors. But this is the
 [16] final or next to final version. So you may ask me
 [17] about this without suggesting that I actually wrote
 [18] the sentence.
 [19] **Q:** As you read that sentence, —
 [20] **A:** Yes.
 [21] **Q:** — of which you are an author, —
 [22] **A:** Yes.
 [23] **Q:** — is it fair to take that sentence to
 [24] mean normal year-to-year variation in the context of

[1] **A:** And it refers to winter. That is not
 [2] averaged over the year, over the annual cycle.
 [3] **Q:** So just to get this clear, the warming in
 [4] the next century will be well below the normal
 [5] difference in global average temperature from one
 [6] year to the next; is that the meaning of that?
 [7] **A:** That is what we regarded as the most
 [8] likely outcome.
 [9] **Q:** Okay. So you allow a reader here to take
 [10] your meaning to be that year-to-year variations in
 [11] global average temperature are greater than the
 [12] modest increase in global annually averaged
 [13] temperature that you expect as the most likely
 [14] outcome?
 [15] **MR. BLUTE:** Objection. You can
 [16] answer, if you can.
 [17] **A:** I think you can read the sentence. It's
 [18] perfectly clear.
 [19] **MR. LANCASTER:** Grounds for the
 [20] objection?
 [21] **MR. BLUTE:** Again, I think the words
 [22] say what they say. It speaks for itself. I don't
 [23] know how an individual reader takes it. It seems to
 [24] me Dr. Singer can't talk about that. Also, I think

[1] the question is just an argument.
 [2] **MR. LANCASTER:** I'm just trying to
 [3] get very clear what is meant here.
 [4] **MR. BLUTE:** I'm just making an
 [5] objection for the record. There's no need to argue
 [6] about this. I'm just preserving it for later on. We
 [7] can argue later on if they're raised.
 [8] **BY MR. LANCASTER:**
 [9] **Q:** How should a reader interpret your use of
 [10] the word "normal"? What do you mean by the use of
 [11] the word "normal"?
 [12] **A:** Where does it occur?
 [13] **Q:** "Normal year-to-year variation."
 [14] **A:** This means to us, or meant to us, since
 [15] one of the co-authors is now deceased, that there
 [16] could be year-to-year variations caused by unusual
 [17] events, such as volcanoes. And that would be
 [18] abnormal.
 [19] **Q:** Given that this is an article written by
 [20] three scientists, would it be a reasonable
 [21] interpretation to take it as the range defined by the
 [22] normal statistical distribution?
 [23] **A:** The word "normal" is not used here in a
 [24] technical sense.

[1] **A:** I don't recall.
 [2] **Q:** Would you think that you would have
 [3] authored a sentence talking about normal year-to-year
 [4] variation in global average temperature without
 [5] having made yourself familiar with what the normal
 [6] variation in global average temperature was?
 [7] **MR. BLUTE:** Objection.
 [8] **MR. LANCASTER:** On what ground?
 [9] **MR. BLUTE:** Again, I think, first of
 [10] all, there are three authors. Your question
 [11] assumes — I don't know who wrote this, but your
 [12] question assumes that Dr. Singer did. He's told you
 [13] that there are three authors to this article. So I
 [14] think you have to be precise in that question. I
 [15] think your question assumes something which may or
 [16] may not be true.
 [17] Secondly, I think it's — again, if
 [18] you want to ask him did you or didn't you, he can
 [19] give you his best memory. But I think the way you
 [20] phrased it is really just an argument.
 [21] **A:** Are you familiar with the work of Solow on
 [22] this particular issue?
 [23] **MR. BLUTE:** Let him ask the
 [24] questions, Dr. Singer.

[1] **Q:** This is a technical article, is it not?
 [2] **A:** Yeah, this is an article in a popular
 [3] journal to be read by nonscientists. "Normal,"
 [4] therefore, means usual.
 [5] **Q:** Usual, okay. Would it be fair to say that
 [6] you are familiar with the historical global
 [7] temperature record?
 [8] **A:** I've done no original work in this, so I'm
 [9] generally familiar with what I've seen in the
 [10] literature.
 [11] **Q:** Would it be fair to say that you're
 [12] familiar with the temperature record, or are you not
 [13] familiar with it?
 [14] **A:** I don't understand what you mean by
 [15] "familiar."
 [16] **Q:** Have you looked at year-to-year variation
 [17] in the global average temperature record?
 [18] **A:** I have seen a paper dealing with the
 [19] subject.
 [20] **Q:** What paper is that?
 [21] **A:** A paper by Andrew Solow, S-o-l-o-w, of the
 [22] Woods Hole Oceanographic Institution.
 [23] **Q:** Had you seen that paper before authoring
 [24] this paragraph?

[1] **BY MR. LANCASTER:**
 [2] **Q:** Do you maintain that you do not remember
 [3] writing — drafting that sentence?
 [4] **A:** I did the initial draft. There were many
 [5] changes made based on inputs I received. So I cannot
 [6] be sure that I wrote this particular sentence or this
 [7] particular word.
 [8] **Q:** Did either of the other authors, Starr or
 [9] Revelle, do the actual editing of the manuscript?
 [10] **A:** Yes.
 [11] **Q:** Which of those authors did the actual
 [12] editing of the manuscript?
 [13] **A:** Certainly Starr, possibly Revelle, I don't
 [14] recall, plus a number of other people to whom I sent
 [15] the manuscript for comment.
 [16] **Q:** Who are those persons?
 [17] **A:** Hugh Ellsaesser, as I recall, possibly,
 [18] although I'm not absolutely sure, possibly Richard
 [19] Lindzen, L-i-n-d-z-e-n.
 [20] **Q:** Is it possible you sent it to Dr.
 [21] Michaels?
 [22] **A:** It is possible.
 [23] **Q:** Is it possible you sent it to Dr. Balling?
 [24] **A:** Yes, it is possible.

[1] Q: Would you have any way of determining
 [2] whether or not you did?
 [3] A: Not at this stage.
 [4] Q: Is it possible that one of those four
 [5] scientists wrote that sentence, specifically the
 [6] sentence — the phrase "well below the normal
 [7] year-to-year variation"?
 [8] A: It is possible they suggested it.
 [9] Q: Do you know which of them might have
 [10] suggested it?
 [11] A: No, I do not recall.
 [12] Q: But you don't remember writing that
 [13] phrase?
 [14] A: Not specifically.
 [15] Q: Do you remember at what draft it appeared,
 [16] what version?
 [17] A: No, I do not.
 [18] Q: Was this manuscript created in a computer,
 [19] word processor?
 [20] A: Yes.
 [21] Q: Whose computer?
 [22] A: The computer was — belonged to an
 [23] institute that I was using on a courtesy basis. I
 [24] did not have a computer of my own.

[1] Q: Whose computer?
 [2] A: It belonged to The Washington Institute.
 [3] Q: Did you store this document on their hard
 [4] disk?
 [5] A: I don't recall.
 [6] Q: Do you recall saving a copy on a floppy
 [7] disk?
 [8] A: I must have saved a copy, but I don't
 [9] recall how I saved it. In any case, my practice was
 [10] to incorporate changes as they were suggested. So
 [11] the copy I saved would be identical with this copy.
 [12] If I saved a copy, it would be identical with this
 [13] copy, except for changes made by the editor.
 [14] Q: The editor being?
 [15] A: The editor of the journal.
 [16] Q: Being Mr. Tanzer?
 [17] A: Mr. Tanzer, yes.
 [18] Q: Would your backup copy, if it existed on
 [19] the floppy disk — would that floppy disk have saved
 [20] any other drafts?
 [21] A: No.
 [22] Q: Previous drafts?
 [23] A: No, I would simply write over it.
 [24] Q: Was this your general practice in creating

[1] a manuscript to each version write over the previous
 [2] version so that the old language was not saved?
 [3] A: Yes.
 [4] Q: Was this your general practice with other
 [5] articles you were working on?
 [6] A: Except when there was some special reason
 [7] to save an earlier draft because of some paragraphs
 [8] that I wanted to keep but might use later in some
 [9] other connection.
 [10] Q: Would that have applied to any of the
 [11] paragraphs in the Cosmos article?
 [12] A: I don't believe so.
 [13] Q: You didn't use these paragraphs in other
 [14] publications?
 [15] A: Yes, I did, and I had the final version on
 [16] a disk. I don't recall whether it was a floppy disk
 [17] or a hard disk.
 [18] Q: Is there a reason why that computer disk
 [19] wasn't provided in the answer to the request for
 [20] documents that specifically asked for computer disks?
 [21] A: I have to consult my attorney here.
 [22] MR. BLUTE: Well, we'll go back and
 [23] check and see what's there. There was no conscious
 [24] decision not to produce something if it was

[1] requested.
 [2] I'll have to go back and look at the
 [3] request. And if it falls under the scope of the
 [4] request, we'll certainly turn it over.
 [5] MR. LANCASTER: Okay. Thank you.
 [6] MR. BLUTE: But my understanding is
 [7] you have the final — the final. It's my
 [8] understanding it won't show anything different.
 [9] MR. LANCASTER: We're interested in
 [10] every nuance of drafting.
 [11] MR. BLUTE: Okay. Let's deal with
 [12] that off the record. We'll check.
 [13] BY MR. LANCASTER:
 [14] Q: Okay. To get back on —
 [15] MR. BLUTE: Excuse me one second.
 [16] Let me just —
 [17] (Witness conferring with counsel.)
 [18] BY MR. LANCASTER:
 [19] Q: I'd like to come back to the meaning of
 [20] "normal year-to-year variation." What, in your mind,
 [21] would be the normal year-to-year variation in global
 [22] average temperature?
 [23] A: You want a quantitative answer?
 [24] Q: Yes.

[1] A: I would have to consult Solow's paper.
 [2] Q: I'd like to show you exhibit —
 [3] MR. LANCASTER: We have three pages.
 [4] Can we staple them and mark them as one exhibit?
 [5] MR. BLUTE: Yes. Are they related?
 [6] MR. LANCASTER: All three are
 [7] related.
 [8] MR. BLUTE: Yeah.
 [9] (Exhibit 2 marked
 [10] for identification.)
 [11] Q: To describe Exhibit 2, there's the words,
 [12] in bold, "Global and Hemispheric" on the first page;
 [13] "glob temp, J&W" on the second page, which is marked
 [14] at the bottom "page 1"; the third page, "Jones abs
 [15] difs," also marked "page 1" at the bottom.
 [16] Dr. Singer, the first page, does this
 [17] appear to be a record of temperatures?
 [18] A: I'm trying to find my way around this.
 [19] These are annual temperature anomalies, mm-hmm.
 [20] MR. BLUTE: Let me just object.
 [21] Dr. Singer — I don't know whether he's seen this
 [22] document before.
 [23] MR. LANCASTER: I don't know either.
 [24] MR. BLUTE: If he hasn't, perhaps you

[1] should state what it is and then go on from there.
 [2] MR. LANCASTER: Oh, okay. I didn't
 [3] know if I was allowed to do that.
 [4] MR. BLUTE: Yeah.
 [5] BY MR. LANCASTER:
 [6] Q: This is a record of temperatures from a
 [7] document called Trends '90, published by the CDIC,
 [8] the Carbon Dioxide Information Center of the
 [9] Department of Energy. Are you familiar with that
 [10] organization, CDIC?
 [11] A: Not by that name.
 [12] Q: Have you heard of the Trends '90
 [13] publication?
 [14] A: (No response)
 [15] Q: Have you ever seen this publication,
 [16] Trends '90?
 [17] A: Published by whom?
 [18] Q: Published by the Department of Energy,
 [19] CDIC.
 [20] A: Oh, I think I may have seen such a book.
 [21] I don't recall, though.
 [22] Q: This page is the Jones and Wigley
 [23] temperature record from that publication. Does this
 [24] record look to you to be what you remember to be the

[1] temperature record from 1861 to 1988 from your
 [2] looking at it in other publications?
 [3] A: It's presented in quite a different way;
 [4] and therefore, not easily recognizable. I have a
 [5] graph in mind, a picture, of annual temperatures
 [6] showing a rather wide black band of considerable
 [7] width.
 [8] Q: Mm-hmm. If we look at the second page of
 [9] this exhibit —
 [10] A: Yes.
 [11] Q: — there are plotted the third column of
 [12] data, global temperature data.
 [13] A: Mm-hmm.
 [14] Q: Does that curve look familiar to you?
 [15] A: Yes, although it looks quite different
 [16] from what Solow presented.
 [17] Q: I see. Does this — do you doubt that the
 [18] data plotted on this curve conformed to the third
 [19] column listed in the Trends '90 page, or the Jones
 [20] and Wigley record?
 [21] MR. BLUTE: I object to that.
 [22] Q: Do you have any reason, as you look at it,
 [23] to dispute or doubt that it is?
 [24] MR. BLUTE: I object.

[1] Q: Well, should we go point by point, then?
 [2] A: I assume —
 [3] Q: I mean, we can construct it, if you want.
 [4] MR. BLUTE: No, why don't we just
 [5] state, if you want, that it's your understanding that
 [6] this chart matches up with the information on the
 [7] first page.
 [8] MR. LANCASTER: Okay.
 [9] MR. BLUTE: I'm not fighting you on
 [10] it. I don't know it to be true. If you want to
 [11] state that that's your understanding, then we can go
 [12] from there, without acknowledging it, that's all.
 [13] BY MR. LANCASTER:
 [14] Q: Okay. It's my understanding that these
 [15] points plotted on the second page are the third
 [16] column.
 [17] A: I would prefer to consult with an expert
 [18] that I know personally regarding this analysis,
 [19] because it is well known that data can be used
 [20] selectively. I'm not accusing of these people of
 [21] doing so.
 [22] Q: Sure. I'm willing to go through these
 [23] points and check them. We could check the first
 [24] point. And I would be patient to let you do so to

[1] give you some measure of confidence that these are
[2] related.

[3] **MR. BLUTE:** Let me say this: Is it
[4] your — are you representing to us that you've
[5] reviewed the documents —

[6] **MR. LANCASTER:** Yes.

[7] **MR. BLUTE:** — and that the graph on
[8] the second page depicts in graphic form the
[9] information that's on the first page?

[10] **MR. LANCASTER:** Yes.

[11] **MR. BLUTE:** All right. Subject to
[12] our reviewing it and disagreeing with you, we'll
[13] accept that representation for the purposes of your
[14] questioning.

[15] **MR. LANCASTER:** Okay. Thank you.

[16] **BY MR. LANCASTER:**

[17] **Q:** Then let's move on to the third page —
[18] thank you, Joe — to the third page, where are
[19] plotted the differences.

[20] And the first tall black line on this
[21] chart would refer to the year 1862 temperature
[22] anomaly minus the 1861 temperature anomaly; in other
[23] words, the absolute difference between those two
[24] average annual temperatures.

[1] **MR. BLUTE:** All right. Now, that I
[2] don't see.

[3] **Q:** All right. Let's look at it carefully.
[4] We've got essentially 0.53 less 0.38 equaling 0.15,
[5] which is the first column.

[6] **MR. BLUTE:** Yeah, I guess what I
[7] don't understand, without any — if you want to make
[8] a representation as to what this is, why don't you do
[9] that. But there's nothing on this document which
[10] tells me what it depicts.

[11] **MR. LANCASTER:** Well, it's the Jones
[12] absolute differences.

[13] **MR. BLUTE:** I see at the top, okay.

[14] **MR. LANCASTER:** That's cryptic. And
[15] I'm sorry I didn't have time to lay out a detailed
[16] description on the page.

[17] **MR. BLUTE:** I take it that this
[18] document is part of a larger document which has some
[19] text that describes that; is that fair to say?

[20] **MR. LANCASTER:** No, it isn't. These
[21] two documents are a rendering of this global
[22] temperature and a showing of the interannual
[23] variation.

[24] **MR. BLUTE:** Why don't you make a

[1] representation on the record as to what you
[2] understand this graph to be and then we will accept
[3] that representation and answer your questions,
[4] subject to our disagreeing, should we upon further
[5] review misrepresent it.

[6] **BY MR. LANCASTER:**

[7] **Q:** Let me represent to you that this third
[8] plot on the third page is a plot of the absolute
[9] differences between neighboring years, with the
[10] previous year value being subtracted from the
[11] subsequent year value.

[12] **A:** May I ask who prepared this plot?

[13] **Q:** Sure. I did, okay?

[14] **MR. BLUTE:** All right. So in other
[15] words — let me just — this plot of Jones absolute
[16] differences is a document that you prepared?

[17] **MR. LANCASTER:** Yes.

[18] **MR. BLUTE:** Based on the data in the
[19] previous two pages?

[20] **MR. LANCASTER:** Based on the cover
[21] sheet.

[22] **MR. BLUTE:** Based on the cover sheet.

[23] **MR. LANCASTER:** The second page is a
[24] representation of the third column, global

[1] temperatures.

[2] **MR. BLUTE:** Is that also a document
[3] that you prepared?

[4] **MR. LANCASTER:** Yes.

[5] **MR. BLUTE:** All right. What I would
[6] like to do, that being the case, is separate out the
[7] Jones — the Trends '90 graph as a separate exhibit
[8] so it is clear on the record that they are not
[9] related in the sense that — I thought this all came
[10] as one document. I just want to make that clear on
[11] the record.

[12] **MR. LANCASTER:** We can do that, break
[13] them into two exhibits?

[14] **MR. BLUTE:** Yeah. For the record,
[15] Singer Exhibit 2 is a document entitled "Global and
[16] Hemispheric Temperature Anomalies" from Trends '90.

[17] Then we'll make Exhibit 3 and Exhibit
[18] 4 two — Exhibits 3 and 4 are charts prepared by
[19] Dr. Lancaster, which he represents to us were drawn
[20] from Exhibit 1. Is that fair?

[21] **MR. LANCASTER:** From Exhibit 2.

[22] **MR. BLUTE:** I apologize, Exhibit 2.

[23] (Exhibits 3 and 4 marked

[24] for identification.)

[1] **MR. BLUTE:** Again, for the record, in
[2] order to move forward in the deposition, we will
[3] accept Dr. Lancaster's representation that these
[4] graphs accurately reflect the information on Singer
[5] Exhibit 2, —

[6] **MR. LANCASTER:** Understood.

[7] **MR. BLUTE:** — subject to our
[8] reviewing them, and also subject to the statement
[9] that we do not — we're not stipulating that the
[10] numbers in Exhibit 2 are accurate or correct.

[11] **MR. LANCASTER:** Understood.

[12] **A:** From which publication were these numbers
[13] taken? There are a number of publications listed
[14] here.

[15] **Q:** These are the CDIC version of the Jones
[16] and Wigley record. I don't know —

[17] **A:** There's no reference given.

[18] **Q:** No, I agree. I don't know from which
[19] publication they derived those numbers or whether
[20] they are assembled from a number of publications.

[21] I just would like to go to Exhibit 4,
[22] then.

[23] **MR. BLUTE:** Let me — can I just take
[24] a short break and discuss something with him outside?

[1] **Q:** Of these numbers. Let me put it this
[2] way: If you were looking at these data from a
[3] scientific point of view, trying to characterize the
[4] normal value, how would you determine that value?

[5] **MR. BLUTE:** Object to that question.

[6] Go ahead, if you understand it.

[7] **A:** Well, this is a misleading question.

[8] Based on misleading knowledge of what this
[9] represents, it is well known that there's something
[10] called persistence in climate.

[11] And what we're seeing here is the effect
[12] of year-to-year persistence which would, in the view
[13] of statisticians — I'm not expert on this — reduce
[14] the year-to-year variability, but not the variability
[15] over a number of years.

[16] In other words, this is a question that
[17] you should address to someone who's properly
[18] qualified in climate statistics, which you're not, as
[19] an attorney, and I'm not as an atmospheric physicist.

[20] **Q:** If you write a sentence where you refer
[21] to the normal year-to-year variation, would it be
[22] reasonable for a reader to investigate normal
[23] year-to-year variation?

[24] **A:** (Nodding)

[1] **MR. LANCASTER:** Sure.
[2] (Witness conferring with counsel.)

[3] **MR. BLUTE:** Okay. Just for the
[4] record, it's unclear on Exhibit 2 where these numbers
[5] came from; in other words, which of the references we
[6] can go to to see whether these numbers are reported.
[7] And that's the reason for Dr. Singer's discomfort in
[8] accepting them.

[9] **MR. LANCASTER:** I understand.

[10] **MR. BLUTE:** That being said, let's go
[11] on with the questioning. We are not conceding that
[12] these are or are not accurate numbers. We're not
[13] disputing them with you now. And we'll accept your
[14] representation for the purposes of questioning —

[15] **MR. LANCASTER:** Okay.

[16] **MR. BLUTE:** — that you've accurately
[17] portrayed graphically the information that appears on
[18] Singer Exhibit 2.

[19] **MR. LANCASTER:** Understood.

[20] **MR. BLUTE:** Okay.

[21] **BY MR. LANCASTER:**

[22] **Q:** Looking at Exhibit 4, what would you take
[23] to be the usual value?

[24] **A:** Of?

[1] **Q:** Can you answer verbally?

[2] **MR. BLUTE:** You have to answer
[3] verbally if you have an answer to that.

[4] **A:** Is your question finished?

[5] **Q:** The first one, would it be reasonable for
[6] a reader to investigate year-to-year variation in
[7] global average temperature?

[8] **MR. BLUTE:** I object to the question,
[9] but you can answer.

[10] **A:** No.

[11] **Q:** It wouldn't be reasonable for a reader to
[12] try and investigate year-to-year variation?

[13] **A:** I don't think so. I don't think they
[14] would make an effort to do so.

[15] **Q:** Normally a reader would not make an effort
[16] to do so?

[17] **A:** Correct.

[18] **Q:** Okay. If I, as a scientist, not as an
[19] attorney, read the Cosmos article, normal
[20] year-to-year variation, and take the word "normal" to
[21] mean the mean variation plus or minus the standard
[22] deviation, would I be acting unreasonably?

[23] **A:** Well, as we discussed earlier, the word
[24] "normal" here is not used in the scientific sense.

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[1] It's not — we don't have what's called a normal
[2] distribution, a Gaussian distribution, nor is there
[3] any reason to expect one.
[4] **Q:** Understood. Looking at this record of
[5] year-to-year variations, —
[6] **A:** Which one?
[7] **Q:** — on the third page, Exhibit 4, —
[8] **MR. BLUTE:** Exhibit 4.
[9] **A:** Exhibit 4, okay.
[10] **Q:** — would it be fair to say that the
[11] normal, meaning usual in the sense that you applied,
[12] variation in global annually averaged temperature is
[13] less than 0.2 degrees Celsius?
[14] **A:** No, it would be misleading.
[15] **Q:** Would it be fair to say that the normal
[16] year-to-year variation is less than 0.3 degrees
[17] Celsius?
[18] **A:** That would also be misleading.
[19] **Q:** Would it be fair to say that the normal
[20] year-to-year variation in global annually averaged
[21] temperature is less than 0.4 degrees Celsius?
[22] **A:** In my view, one should not look at
[23] Exhibit 4. One should look at Exhibit 3 in order to
[24] answer your question.

[1] we deleted the words on the laser proof which said
[2] "less than one degree Celsius."
[3] **Q:** Could you please answer my question?
[4] **MR. BLUTE:** I'm a little confused
[5] now. Is your question directed to this graph?
[6] **MR. LANCASTER:** Yes.
[7] **MR. BLUTE:** Or is your question
[8] directed to the article? What is it directed to?
[9] Why don't you rephrase it, please.
[10] **MR. LANCASTER:** It's directed to the
[11] graph. Could you read it back for me, please?
[12] (Question read.)
[13] **A:** Looking at the graph, Exhibit 3, that
[14] you've presented us with, which was drawn by you,
[15] based on data that you have not yet completely
[16] identified to us, the approximate number will be half
[17] a degree centigrade.
[18] **Q:** Thank you. Looking at Exhibit 2, as
[19] graphically depicted in Exhibit 3 and Exhibit 4, what
[20] is shown to be the largest difference in global
[21] average temperature from one year to the next?
[22] **A:** Using Exhibit 4, which depicts only
[23] successive years, the largest is .4 degrees.
[24] **Q:** Now, using Exhibit 4, where the successive

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[1] **Q:** Then let's look at Exhibit 3. And I'll
[2] ask the same question.
[3] As you look at Exhibit 3, what do you
[4] determine to be the normal year-to-year variation in
[5] global annually averaged temperature?
[6] **A:** I would guess that the average reader
[7] presented with this curve would estimate the
[8] year-to-year variation by the spread of the points
[9] that you have drawn there.
[10] **Q:** Can you give me an estimate of what that
[11] number would be or the range that it would be or a
[12] number that with some confidence you can estimate
[13] that number would be less than?
[14] **A:** I'm trying to put myself in the place of
[15] an average reader.
[16] **Q:** Let me — let me ask you, as a scientist,
[17] who published that sentence. Can you turn the words
[18] "normal year-to-year variation" for me into a number
[19] in degrees Celsius or into a range less than a
[20] certain number degrees Celsius?
[21] **A:** Well, as you're well aware, this is an
[22] issue that Roger Revelle and I discussed in the
[23] editing of the article. And we jointly decided to
[24] take out any reference to a number. And therefore,

[1] year differences are shown in global average
[2] temperature, can you estimate how many times from one
[3] year to the next global average temperature changed
[4] by more than 0.25 degrees?
[5] **A:** I can't estimate it, but I can count it.
[6] **Q:** Can you count it?
[7] **A:** Eight.
[8] **Q:** Out of 127 years, temperature differences
[9] between each year, with eight of those differences
[10] exceeding 0.25 degrees Celsius, and the greatest
[11] difference being 0.4, you are comfortable in saying
[12] that the normal year-to-year variation in global
[13] average temperature is about 0.5 degrees Celsius, is
[14] that correct?
[15] **A:** Looking at your Exhibit 3, yes.
[16] **Q:** Now looking at Exhibit 3 and 4 together,
[17] would you still stand by that assessment?
[18] **A:** Exhibit 3 and 4 should not be looked at
[19] together. They're not comparable.
[20] **Q:** Looking only at Exhibit 4, if a reader of
[21] your Cosmos Journal article obtained the temperature
[22] record that is before us as Exhibit 2, and looked at
[23] the year-to-year variations in the way they have been
[24] displayed in Exhibit 4, what normal year-to-year

[1] variation from Exhibit 4 would a reader reasonably
 [2] conclude?
 [3] **MR. BLUTE:** I object for the same
 [4] reasons we discussed earlier.
 [5] **MR. LANCASTER:** Understood.
 [6] **A:** As I explained earlier, Exhibit 4 is a
 [7] misrepresentation of the data and therefore should
 [8] not be presented to an unsophisticated nonscientific
 [9] reader.
 [10] **Q:** Okay. So you stand by 0.5 degrees Celsius
 [11] as being the usual qua normal year-to-year variation?
 [12] **MR. BLUTE:** I object.
 [13] **Q:** You stand by your meaning in the Cosmos
 [14] article in the phrase "the normal year-to-year
 [15] variation" as being about 0.5 degrees centigrade,
 [16] assuming that Exhibit 3 before you is an accurate and
 [17] objective display of the global temperature record?
 [18] **MR. BLUTE:** I object to that
 [19] question.
 [20] **A:** I think you've misrepresented.
 [21] **MR. LANCASTER:** Grounds?
 [22] **MR. BLUTE:** Let me state my grounds
 [23] for the reasons Dr. Singer just said. I think you're
 [24] misrepresenting both what's stated in the article and

[1] what he's stated in his testimony today. You're
 [2] mixing his article with Exhibit 2 and Exhibit 3. So
 [3] I object.
 [4] I also object generally, Dr.
 [5] Lancaster, on the whole issue of the accuracy or not
 [6] of anything in this article. This case is not about
 [7] whether this is a good article, a bad article, an
 [8] accurate article, or any of those items that you
 [9] might wish to discuss.
 [10] This case is about who authored it,
 [11] who signed their name to it, and the statements that
 [12] you made about it. And I'm not going to litigate and
 [13] have Dr. Singer litigate the issues of global
 [14] warming.
 [15] **MR. LANCASTER:** No, this issue goes
 [16] directly to whether or not Roger Revelle authored
 [17] this article and whether this article represents his
 [18] views.
 [19] **MR. BLUTE:** I don't see how it does.
 [20] I don't believe it does. I ask you to move on.
 [21] **MR. LANCASTER:** We will move on.
 [22] That's fine, because we've covered this ground.
 [23] There's one final question. I don't think so. I
 [24] think that — well, this last question I think I'm

[1] entitled to ask.
 [2] **BY MR. LANCASTER:**
 [3] **Q:** Your meaning, in the phrase "the normal
 [4] year-to-year variation," could reasonably be taken to
 [5] mean about 0.5 degrees Celsius, is that correct?
 [6] **A:** No, it says here "less than one degree
 [7] Celsius."
 [8] **Q:** I am talking about what you mean by — you
 [9] say "below the normal year-to-year variation." That
 [10] sets up the normal year-to-year variation as a number
 [11] or as a range. What is that number? What is that
 [12] range in your mind?
 [13] **MR. BLUTE:** When you say "in your
 [14] mind," are you referring to Dr. Singer's mind, Dr.
 [15] Revelle's mind, Dr. Starr's mind?
 [16] **MR. LANCASTER:** Yes, Dr. Singer's
 [17] mind.
 [18] **MR. BLUTE:** They all authored it.
 [19] **MR. LANCASTER:** Dr. Singer's mind.
 [20] **MR. BLUTE:** You may answer, if you
 [21] can.
 [22] **A:** Less than one degree Celsius.
 [23] **Q:** Well, I'll take that for now.
 [24] I would like now to ask you to mark the

[1] galley proof with a highlighter for anything that can
 [2] indicate to me and to you those sentences that Roger
 [3] Revelle co-authored, starting right at the beginning
 [4] of the article, please, and going all the way
 [5] through.
 [6] We can talk about it sentence by sentence,
 [7] but I think it would be faster if you would look at
 [8] sentences and paragraphs and determine from your
 [9] memory whether or not Dr. Revelle had any
 [10] participation in the actual writing of those
 [11] sentences.
 [12] **MR. BLUTE:** I object. Dr. Revelle
 [13] was a co-author of the article. So to — maybe I'm
 [14] misunderstanding you.
 [15] **MR. LANCASTER:** I want to know where
 [16] each of these sentences and paragraphs came from, who
 [17] wrote them.
 [18] **BY MR. LANCASTER:**
 [19] **Q:** We were just at the previous page where
 [20] you said you weren't sure that you wrote "well below
 [21] normal year-to-year variation."
 [22] And you say that it may have been, in
 [23] fact, Dr. Ellsaesser, Dr. Lindzen, Dr. Michaels, or
 [24] Dr. Balling, possibly. I would like to know, from

[1] your memory, sentences in this document that you
 [2] remember clearly were written or suggested, specific
 [3] language, by Dr. Roger Revelle.
 [4] **MR. BLUTE:** I object to the question.
 [5] You can answer.
 [6] **MR. LANCASTER:** Object on what
 [7] grounds?
 [8] **MR. BLUTE:** Again, I think it's a
 [9] trick question. This was a collaborative effort.
 [10] And if the question is who is the drafter of the
 [11] sentences, then, fine. If that's the question, then
 [12] Dr. Singer can do his best to tell you who was the
 [13] initial drafter, since one person, by definition, has
 [14] to be the drafter.
 [15] But if the question is who wrote them
 [16] and who authored them, I think it's a trick question,
 [17] because Dr. Revelle is a co-author of the entire
 [18] article. If you want to discuss the process by which
 [19] the article came out, that's fine.
 [20] **MR. LANCASTER:** That's what I'm
 [21] getting at.
 [22] **MR. BLUTE:** I think the question as
 [23] you phrased it is a trick question. I think it's
 [24] meant to be a trick question. It's misleading.

[1] If the question is who does Dr.
 [2] Singer remember who was the drafter of each sentence
 [3] in the article, then you can ask him that question,
 [4] and I'd ask him to answer as best he can. But to ask
 [5] him who was the author of sentences or who wrote the
 [6] sentences is a misleading, trick question.
 [7] **MR. LANCASTER:** I don't think it's a
 [8] trick question. I think it goes to the core of the
 [9] issue here.
 [10] **MR. BLUTE:** Let's not argue it.
 [11] There's no judge here to resolve it. I stated my
 [12] objection.
 [13] Dr. Singer, as best you can, try and
 [14] answer that question.
 [15] **BY MR. LANCASTER:**
 [16] **Q:** Well, let's go paragraph by paragraph.
 [17] The first paragraph.
 [18] **A:** I think the —
 [19] **Q:** Did those words come from Dr. Revelle?
 [20] **A:** In the initial draft, I incorporated
 [21] Revelle's New Orleans paper in this article.
 [22] **Q:** In the first paragraph, did that sentence
 [23] that comprises the first paragraph exist in Dr.
 [24] Revelle's AAAS talk, his paper?

[1] **A:** I'd have to check that.
 [2] (Pause.)
 [3] (Exhibit 5 marked
 [4] for identification.)
 [5] **Q:** Dr. Singer, Exhibit 5 has been marked.
 [6] **A:** Yes.
 [7] **Q:** And I present it to you as the text of the
 [8] AAAS talk presented in New Orleans. Do you recognize
 [9] this document?
 [10] **A:** Yes.
 [11] **Q:** Where did you first see this document?
 [12] **A:** It was given to me by Roger Revelle.
 [13] **Q:** When?
 [14] **A:** In February 1990 in New Orleans.
 [15] **Q:** In New Orleans. Having this document to
 [16] refer to, the first paragraph in the Cosmos Club
 [17] galley proof, Exhibit 2 —
 [18] **A:** One.
 [19] **Q:** — Exhibit 1, I'm sorry, did Roger Revelle
 [20] author that first paragraph with you?
 [21] **A:** Not that I recall.
 [22] **MR. BLUTE:** Objection.
 [23] **Q:** I'm sorry, did you draft that paragraph?
 [24] **A:** I think so.

[1] **Q:** Does that paragraph exist in the AAAS
 [2] talk?
 [3] **A:** No.
 [4] **Q:** Do you remember specific input from Dr.
 [5] Roger Revelle as to the wording of that paragraph?
 [6] **A:** In general discussion with him, it was
 [7] agreed that it was a complex and controversial issue.
 [8] So I think it accurately reflects his view.
 [9] **Q:** The question is whether he's an author of
 [10] that by way of participation in the drafting, not by
 [11] way of endorsement in February of 1991, but by way of
 [12] participation in the creation of the language.
 [13] **A:** The answer is I did the initial draft at
 [14] his request.
 [15] **Q:** These words, "complex and controversial
 [16] environmental and foreign policy issues," then, were
 [17] his words to you that you wrote down, mixed with your
 [18] own views? So he's truly a — let's just leave that
 [19] question.
 [20] **A:** Yes.
 [21] **Q:** Yes?
 [22] **A:** Yes, we had a long discussion. And many
 [23] of the ideas that emerged in the first part of it,
 [24] which do not occur in this paper, are reflected in

[1] the first part of the draft.
 [2] **Q:** Could we please mark that first paragraph
 [3] yellow, then, with the highlighter, to show that
 [4] Dr. Revelle did co-author with you that paragraph?
 [5] That's what you're saying now? Is that true?
 [6] **A:** Would you define the word "co-author"?
 [7] **MR. BLUTE:** I object.
 [8] **Q:** He actively participated in the drafting
 [9] of that paragraph?
 [10] **A:** No, that is not correct.
 [11] **MR. BLUTE:** Let me just state — I'm
 [12] not going to argue about it. But you know, let's not
 [13] play games. Be precise what you mean.
 [14] **MR. LANCASTER:** I want to be precise.
 [15] **MR. BLUTE:** Only one person can put a
 [16] pen to paper initially.
 [17] **MR. LANCASTER:** Yes.
 [18] **MR. BLUTE:** Okay. So there's that
 [19] person. Dr. Singer has talked about discussions that
 [20] he's had. He's talked about initial drafting. And
 [21] the words you're throwing around, "co-authorship" —
 [22] I don't think the question is clear what you want
 [23] from him.
 [24] **BY MR. LANCASTER:**

[1] **Q:** I want from you testimony as to whether or
 [2] not Roger Revelle contributed, when this statement
 [3] was written, to the language of that statement.
 [4] **A:** The word "contributed" is vague. We
 [5] didn't sit around a table and write it together. But
 [6] the words are the ones that he expressed in
 [7] conversation with me.
 [8] **Q:** By virtue of that, then, —
 [9] **A:** I felt comfortable —
 [10] **Q:** — you grant him authorship of that
 [11] paragraph?
 [12] **A:** I would grant him — yes, because he
 [13] believed that this was a complex and controversial
 [14] issue.
 [15] **Q:** I don't mean to ask whether you grant him
 [16] authorship because you recognize that this statement
 [17] that you drafted reflects his view derived after the
 [18] fact.
 [19] I mean, when you wrote this statement,
 [20] when you drafted this statement, had Dr. Revelle
 [21] participated in the creation of this language,
 [22] through contribution, conversation, notes, whatever,
 [23] so that the writing of this sentence Dr. Revelle was
 [24] an author, shared rights of authorship in this

[1] sentence? Did he or did he not?
 [2] **MR. BLUTE:** Objection. Go ahead.
 [3] **MR. LANCASTER:** On what ground?
 [4] **MR. BLUTE:** I just think — he's a
 [5] co-author of the article. He signed the article.
 [6] It's ridiculous to go back and separate — if you're
 [7] going to separate it out, do that, but don't mix the
 [8] words. I mean —
 [9] **MR. LANCASTER:** That's what I'm
 [10] trying to do with these two issues. I'm trying to
 [11] separate it out.
 [12] **MR. BLUTE:** Dr. Singer has explained
 [13] already his answer twice, that he had conversations
 [14] with Dr. Revelle, but that Dr. Singer was the person
 [15] who put the pen to paper. All right? He's already
 [16] explained that.
 [17] **MR. LANCASTER:** Mm-hmm. I'm trying
 [18] to find out paragraph by paragraph here to what
 [19] extent Dr. Revelle participated in the drafting of
 [20] the language.
 [21] **MR. BLUTE:** All right. And what I'm
 [22] saying is by definition he participated — strike
 [23] that.
 [24] Go ahead. Ask the question. Answer

[1] the question as best you can.
 [2] **A:** I don't know what you mean by
 [3] "participation." If "participation" you mean that he
 [4] sat around a table with me and we jointly drafted
 [5] these words, the answer is no.
 [6] **Q:** Okay.
 [7] **A:** If that's your meaning of "participation."
 [8] **Q:** So in this first paragraph —
 [9] **A:** But his instructions to me were to prepare
 [10] a first draft.
 [11] **Q:** He instructed you?
 [12] **A:** He instructed me to do it.
 [13] **Q:** You were doing this at his bidding, —
 [14] **A:** Yes.
 [15] **Q:** — preparing these words. So these words
 [16] were all created subsequent to your meeting with Dr.
 [17] Revelle February 16, 1990?
 [18] **A:** We had a discussion. And when he agreed
 [19] to be a co-author, he instructed me to prepare a
 [20] first draft.
 [21] **Q:** Did you write this first paragraph at Dr.
 [22] Revelle's bidding subsequent to your meeting?
 [23] **A:** In the sense in which I just explained it,
 [24] yes, I wrote it after the meeting, and I wrote this

[1] first draft at his bidding.
 [2] **Q:** This first paragraph, then, —
 [3] **A:** Not just the first paragraph. The first
 [4] draft.
 [5] **Q:** I'm talking about the first paragraph.
 [6] We're going to go paragraph by paragraph.
 [7] **A:** Okay.
 [8] **Q:** This first paragraph represented your
 [9] assessment of conversation previous to the writing of
 [10] this paragraph with Dr. Revelle?
 [11] **A:** Yes.
 [12] **Q:** So that this first paragraph contains some
 [13] of Dr. Revelle's ideas in formulating the draft?
 [14] **A:** When you use the word "ideas," the fact
 [15] that greenhouse warming is a complex and
 [16] controversial issue is hardly original. I think
 [17] everyone agrees.
 [18] So I incorporated not only his ideas but
 [19] everyone else's in the whole world. There's no one
 [20] who disagrees.
 [21] **Q:** So everyone else in the whole world is an
 [22] author of this?
 [23] **MR. BLUTE:** Objection.
 [24] **A:** In this first paragraph, yes.

[1] **BY MR. LANCASTER:**
 [2] **Q:** Is it fair to say that any person who
 [3] believes that greenhouse warming is complex and
 [4] controversial is an author of that statement?
 [5] **MR. BLUTE:** Objection.
 [6] **A:** I think we're playing with words.
 [7] **MR. BLUTE:** Right.
 [8] **Q:** Well, we will be playing — we could go
 [9] off the record here.
 [10] **MR. BLUTE:** Let's go off the record
 [11] for a second.
 [12] (Discussion off the record.)
 [13] **BY MR. LANCASTER:**
 [14] **Q:** Let's try it this way. Dr. Singer, do you
 [15] maintain that Dr. Revelle is a co-author of this
 [16] first paragraph?
 [17] **MR. BLUTE:** Go ahead.
 [18] **A:** It depends on how you — what you mean by
 [19] this question. We didn't sit around the table and do
 [20] it line by line. He asked me to draft the article.
 [21] And he had several chances to review it. And he
 [22] evidently agreed with it. Besides, this first
 [23] paragraph is a preamble. There's nothing
 [24] controversial in it. This paragraph could have been

[1] **Q:** Every other person in the whole world
 [2] thinks that greenhouse warming is complex and
 [3] controversial?
 [4] **A:** Yes.
 [5] **MR. BLUTE:** You're arguing with the
 [6] witness.
 [7] **MR. LANCASTER:** No, I am not. I'm
 [8] asking who is an author of this paragraph. Am I
 [9] allowed to ask that?
 [10] **MR. BLUTE:** That's not the question
 [11] to ask, first of all.
 [12] **MR. LANCASTER:** Okay.
 [13] **MR. BLUTE:** Secondly, you're arguing
 [14] with the witness. You're badgering the witness.
 [15] **MR. LANCASTER:** I am not.
 [16] **MR. BLUTE:** You are. And you're
 [17] asking him to restate things that he's already said.
 [18] All right?
 [19] Now, just for the record, you ask the
 [20] question, you wait, Dr. Singer, let me object, and
 [21] then you answer. Let's proceed that way. Go ahead.
 [22] **MR. LANCASTER:** Well, I think we have
 [23] the answer on record there with your objection.
 [24] (Discussion off the record.)

[1] written by anyone and contains no original
 [2] information.
 [3] **Q:** So it does not contain any specific ideas
 [4] that you would attribute to Roger Revelle uniquely?
 [5] **A:** Or to me.
 [6] **Q:** Or to yourself uniquely.
 [7] **A:** It's a general preamble.
 [8] **Q:** Can you say anything different for any of
 [9] the other paragraphs in this paper, or is your
 [10] response the same for every paragraph in the paper?
 [11] **MR. BLUTE:** I object.
 [12] **Q:** Okay. Let's go paragraph —
 [13] **MR. BLUTE:** Same as what? I don't
 [14] understand.
 [15] **Q:** Do you maintain that Dr. Revelle, because
 [16] he asked you to write — because he asked you to
 [17] draft a paper, and because you had a sense of his
 [18] ideas, co-authored each and every paragraph through
 [19] the Cosmos Club article — galley proof?
 [20] **A:** In that sense, yes. In the sense that I
 [21] think I represented here what I thought were ideas
 [22] that he had and would agree to.
 [23] In other words, I did not think that
 [24] this — any of this material would strike him as

[1] strange, odd, or in conflict with his own views.

[2] **Q:** Any of the material in this galley proof,
[3] or in the first draft?

[4] **A:** Well, certainly the galley proof.

[5] **Q:** On this first page, in the text that
[6] existed 31 January 1991, ignoring, then, the
[7] annotations, did Roger Revelle specifically, to your
[8] memory, contribute any specific words and text
[9] occurring on this page?

[10] **A:** Well, yes, I have here a number of marked
[11] changes which came out of our conversation in his
[12] office in February 1991.

[13] **Q:** I'm asking you prior to 31 January 1991.
[14] I'm asking you to ignore all of the annotations. I'm
[15] talking about what went into the galley proof.

[16] **A:** Oh. I don't recall now what changes had
[17] taken place between the initial draft and this galley
[18] proof, except I know many changes were made as a
[19] result of inputs from co-authors and others.

[20] **Q:** And do you maintain that some of those
[21] inputs were from Roger Revelle?

[22] **A:** I don't recall specific inputs from him.

[23] **Q:** Do you remember that there were not any
[24] specific inputs, or do you remember — or do you just

[1] **BY MR. LANCASTER:**

[2] **Q:** Yeah. I'm reading page two, top of page
[3] two, in response to Interrogatory 1. And you affirm,
[4] under penalty of perjury: "Between February 1990 and
[5] February 1991, I prepared a first draft, much of
[6] which derived from Revelle's presentation at the AAAS
[7] meeting in New Orleans, and sent it to Revelle and
[8] Starr for their review and comments. Revelle and
[9] Starr reviewed the draft and returned copies to me
[10] with suggested changes and/or comments."

[11] Do you stand by that statement, or do you
[12] correct it now?

[13] **MR. BLUTE:** I object.

[14] **MR. LANCASTER:** What ground?

[15] **MR. BLUTE:** It's just an argument.

[16] Are you asking him does he want to change an
[17] interrogatory answer?

[18] **BY MR. LANCASTER:**

[19] **Q:** What I want to know is, your answer, right
[20] five minutes ago, was that you don't remember whether
[21] or not Roger Revelle sent you any comments back on
[22] any drafts, is that correct?

[23] **A:** That is correct.

[24] **Q:** Is that statement consistent with the

[1] not remember whether there were?

[2] **A:** It's the second. I got so many inputs, so
[3] many comments, that I don't recall whether —
[4] specifically whether he made any changes on the
[5] drafts — several drafts that I sent him.

[6] **Q:** So as far as you remember, Dr. Revelle may
[7] have sent you, but you don't remember that he did?

[8] **A:** Correct.

[9] **Q:** Now, if you testified previously that Dr.
[10] Revelle did send you annotations on drafts —

[11] **A:** I don't recall that testimony.

[12] **MR. BLUTE:** Let him ask the question
[13] first. Go ahead.

[14] **Q:** Then would you correct that testimony now?

[15] **MR. BLUTE:** I object.

[16] (Pause.)

[17] **MR. LANCASTER:** The next exhibit
[18] would be Plaintiff's Answers to Defendant's First Set
[19] of Interrogatories. I don't know if these need to be
[20] entered as an exhibit. I suppose they do.

[21] **MR. BLUTE:** Just refer to them as
[22] they are. It's the Plaintiff's Answers to
[23] Defendant's Interrogatories. Is there a particular
[24] one that you want to address his attention to?

[1] statement in response to interrogatories that Revelle
[2] reviewed the draft, returned copies to me with
[3] suggested changes?

[4] **A:** All I can say is that I didn't recall
[5] Starr's reviewing drafts until he sent me copies
[6] recently. There were so many copies going back and
[7] forth from so many different people who commented
[8] that I didn't keep track of it. I simply
[9] incorporated whatever changes were appropriate.

[10] **Q:** There were many comments coming to you,
[11] then?

[12] **A:** Yes.

[13] **Q:** And so until — strike that.

[14] When did you receive the copies from Dr.
[15] Starr of your drafts and his comments?

[16] **A:** In the spring of 1990.

[17] **Q:** They were in your possession —

[18] **A:** No.

[19] **Q:** — I mean the copies we have here.

[20] **A:** Oh, those. Those arrived only after your
[21] deposition.

[22] **Q:** In the last 10 days?

[23] **A:** Well, no, after your first deposition.

[24] **Q:** After the first deposition.

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[1] A: Yes.
 [2] Q: So this summer of 1993?
 [3] A: Yes.
 [4] Q: Until those arrived, you didn't recall
 [5] Dr. Starr's comments?
 [6] A: No, not in detail. I knew that he sent me
 [7] comments back.
 [8] Q: You knew that he sent you comments back?
 [9] A: That's right.
 [10] Q: I want to reask the question, because I
 [11] didn't get an answer.
 [12] Is your statement that you don't remember
 [13] Revelle sending you comments consistent with your
 [14] statement in the answer to the interrogatories that
 [15] Revelle returned copies to me with suggested changes?
 [16] MR. BLUTE: It says Revelle and
 [17] Starr, first of all. So — the records speak for
 [18] themselves. As to whether they're consistent or
 [19] inconsistent, you can argue that to whoever you want.
 [20] Q: I want to give you a chance to make them
 [21] consistent.
 [22] MR. BLUTE: If we feel they're
 [23] inconsistent, we can supplement the answer to
 [24] interrogatories.

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[1] Q: Thank you.
 [2] MR. BLUTE: For the record, it's
 [3] Plaintiff's Answers to Interrogatories and was the
 [4] answer to Interrogatory No. 1.
 [5] Q: Coming back to Exhibit 1, the galley
 [6] proof, you have said here that you don't remember
 [7] specific wording contributed by Revelle's comments to
 [8] this document before it was produced in January of
 [9] '91.
 [10] Can you find anywhere in these paragraphs
 [11] on page one language from the AAAS talk upon which
 [12] you claim this is based?
 [13] (Witness reviewing document.)
 [14] A: Yes, Revelle's second paragraph in his New
 [15] Orleans paper is reflected, I think, in — on page
 [16] one.
 [17] Q: Can you show me where on page one it's
 [18] reflected?
 [19] A: Yes.
 [20] Q: The specific language.
 [21] A: The second paragraph says that we shall
 [22] have a better idea over the next 10, 20 years of the
 [23] likely magnitude of warming.
 [24] And then says in the meantime — and this

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[1] MR. LANCASTER: I'd like you to do
 [2] that, considering your present testimony.
 [3] MR. BLUTE: Dr. Singer has testified
 [4] that his present memory is that he can't remember
 [5] specific changes from Revelle.
 [6] MR. LANCASTER: No, he's testified
 [7] right now that he doesn't remember ever getting
 [8] comments from Revelle, isn't that correct?
 [9] A: That is correct, I don't remember whether
 [10] Revelle sent comments back to me or not.
 [11] MR. BLUTE: To the extent the
 [12] interrogatory answer is inconsistent with that
 [13] testimony, then he has corrected it.
 [14] BY MR. LANCASTER:
 [15] Q: That interrogatory answer also reads,
 [16] "This process was repeated until we arrived at a
 [17] final draft."
 [18] I take that to mean that Revelle and Starr
 [19] reviewed the draft and returned copies, not just to
 [20] the first draft, but to subsequent drafts as well?
 [21] A: That's what it says, yes.
 [22] Q: But your testimony today is that you don't
 [23] remember that Revelle ever sent you comments back?
 [24] A: Correct.

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[1] means that — means to me and means to him — that we
 [2] should not take drastic action, but learn to
 [3] mitigate, adapt to, and better understand.
 [4] Q: Can you show me the specific language on
 [5] the first page of the galley proof that derives from
 [6] this second paragraph?
 [7] Are you telling me that the word "The
 [8] scientific" — the words "The scientific base for a
 [9] greenhouse warming is too uncertain to justify
 [10] drastic action at this time," that you wrote those
 [11] words based upon your reading of Revelle's AAAS talk?
 [12] A: Yes, the second paragraph would be in
 [13] consonance with this.
 [14] Q: I'm not asking whether it's in consonance.
 [15] I'm asking whether, when you drafted the words in the
 [16] Cosmos article, in the galley proof, were they
 [17] drafted based on the AAAS talk? Were they drafted
 [18] after the AAAS talk?
 [19] A: After the AAAS talk.
 [20] Q: So clearly, this sentence here was drafted
 [21] after the AAAS talk.
 [22] A: (No response)
 [23] MR. BLUTE: You have to give a verbal
 [24] response, if you have one.

[1] **A:** That wasn't a question, was it?
 [2] **Q:** Well, I'm asking, you are telling me that
 [3] the fifth paragraph of the Cosmos article, "We can
 [4] sum up our conclusion in a simple message: The
 [5] scientific base for a greenhouse warming is too
 [6] uncertain to justify drastic action at this time,"
 [7] was written — drafted by you based upon the second
 [8] paragraph of the AAAS talk? Is that what you're
 [9] telling me?
 [10] **A:** Well, no. First of all, this is a message
 [11] that I have had for some time and may have used, I
 [12] don't recall now, in other publications prior to my
 [13] meeting with Roger Revelle I thought —
 [14] **Q:** So these words may have been written —
 [15] **MR. BLUTE:** Let him answer the
 [16] question.
 [17] **A:** That's it.
 [18] **MR. BLUTE:** Thank you.
 [19] **Q:** Are you saying you don't remember if those
 [20] words were written prior to February 16, 1990?
 [21] **A:** What I'm saying is I may have used such
 [22] words before and decided that they would be
 [23] appropriate in this co-authored article.
 [24] **Q:** If you had used that phrase before, "The

[1] scientific base for a greenhouse warming is too
 [2] uncertain to justify drastic action at this time,"
 [3] and you had authored those words before, then you
 [4] feel justified in saying that their existence here —
 [5] they were drafted based on Roger Revelle's AAAS talk?
 [6] **A:** I said they were in consonance with the
 [7] second paragraph of his AAAS talk.
 [8] **Q:** I asked you earlier if anything on this
 [9] first page was specific wording based upon Roger
 [10] Revelle's language in the AAAS talk.
 [11] **A:** Well, this is a tendentious question,
 [12] because this information can be obtained by a word
 [13] processor in a document comparison. And I don't
 [14] think you need to ask this question in order to gain
 [15] information, which is the purpose of today's
 [16] exercise.
 [17] **MR. BLUTE:** If — if the question is,
 [18] do the words in Roger Revelle's paragraph get carried
 [19] over into these, that can be looked at by a
 [20] comparison of the records. If your question is, does
 [21] the —
 [22] **MR. LANCASTER:** I think that will be
 [23] good.
 [24] **BY MR. LANCASTER:**

[1] **Q:** You admit that these words may have been
 [2] written by you prior to your meeting with Revelle in
 [3] February 1990?
 [4] **A:** They may have. I don't recall. Or they
 [5] may have been written after the meeting.
 [6] **Q:** So you're not swearing here under oath
 [7] that those words were written after Revelle's AAAS
 [8] talk based on his talk?
 [9] **MR. BLUTE:** I object.
 [10] **MR. LANCASTER:** I just want this
 [11] clear. This is very important.
 [12] **MR. BLUTE:** He's answered it three
 [13] times. And it's leading. He told you that he may
 [14] have written the words and used them before, but that
 [15] he published them here in consonance with the AAAS
 [16] paper. That's the answer that he gave.
 [17] **MR. LANCASTER:** We started talking
 [18] about these words, because the answer was — do we
 [19] need to read it back what the answer was? —
 [20] **MR. BLUTE:** No.
 [21] **MR. LANCASTER:** — that this specific
 [22] wording derived from the AAAS talk. That's what I'm
 [23] trying to track down. I'm looking for these
 [24] connections, Joe.

[1] **MR. BLUTE:** Fine. You can ask the
 [2] question. But I think you're playing a game with the
 [3] witness.
 [4] **MR. LANCASTER:** No, you know clearly
 [5] what I'm trying to do. I think that clearly I am
 [6] trying to nail down where and when these sentences
 [7] were drafted and to what extent Dr. Revelle
 [8] contributed to their drafting.
 [9] And if they all existed prior to the
 [10] meeting with Dr. Revelle, then this is very relevant
 [11] information for somebody trying to determine to what
 [12] extent Revelle was an author of these words, simply
 [13] that. Let's move to the second page, please.
 [14] **MR. BLUTE:** Fine. Ask your
 [15] questions.
 [16] **BY MR. LANCASTER:**
 [17] **Q:** The second page of the galley proof, at
 [18] the top, it's marked "001," Dr. Singer, looking down
 [19] through these paragraphs, can you find any sentences
 [20] on this page that exist in the AAAS talk?
 [21] **MR. BLUTE:** I object to that. If
 [22] you're asking —
 [23] **MR. LANCASTER:** That's a simple
 [24] factual question.

[1] **MR. BLUTE:** No, but come on. Do you
 [2] want to sit here and spend an hour reading both?
 [3] **MR. LANCASTER:** Yeah, I will spend
 [4] all day getting these answers.
 [5] **MR. BLUTE:** And I will tell you I
 [6] will not permit you to force us to have him read
 [7] through documents to tell you something that the
 [8] documents say for themselves. You can read — you
 [9] can look at this document, a jury can look at this
 [10] document, and compare them.
 [11] **MR. LANCASTER:** Okay.
 [12] **MR. BLUTE:** It costs money to sit
 [13] here, both for the stenographer's time and my
 [14] time, —
 [15] **MR. LANCASTER:** I understand.
 [16] **MR. BLUTE:** — to to go through a
 [17] useless exercise.
 [18] **MR. LANCASTER:** I'm paying the
 [19] stenographer, Joe.
 [20] **MR. BLUTE:** If you have a question.
 [21] **BY MR. LANCASTER:**
 [22] **Q:** The question, then, is, did Roger Revelle
 [23] contribute specific words to you or advice to you or
 [24] comments to you regarding any of the language in the

[1] galley proof prior to January 31, 1991?
 [2] **A:** Most of what is on page two, the chapter
 [3] called "Greenhouse Gases," is an expansion and is
 [4] unacceptable — is an expansion of material that's in
 [5] Roger Revelle's first paragraph of his New Orleans
 [6] paper.
 [7] **Q:** So there's no specific language in there
 [8] that you remember came from a conversation or a
 [9] comment of Dr. Revelle other than an expansion of the
 [10] sentence in the first paragraph?
 [11] **A:** Yes. Nor is it necessary, because there's
 [12] nothing controversial about this. But we owe it to
 [13] the reader to tell him what methane is.
 [14] **Q:** Understood. Now, you drafted this, as the
 [15] first drafter, then?
 [16] **A:** Yes.
 [17] **Q:** Let's move to the third page marked "002"
 [18] at the top, "Galley: 002." Same question for this
 [19] page: Is there any specific language given to you by
 [20] Dr. Revelle that went into your drafting of this page
 [21] prior to February 1, 1991?
 [22] **A:** I believe that the material relating to
 [23] the Munk experiment may have come from Revelle's
 [24] paper.

[1] **Q:** Now, you say that —
 [2] **A:** But I don't see it now.
 [3] **Q:** Do you believe you could have obtained the
 [4] information about Walter Munk's experiment otherwise?
 [5] **A:** Yes.
 [6] **Q:** Okay. Only three pages to go. Moving to
 [7] the next page, "Galley: 003," is there any material
 [8] on this page, any language, specific language, in
 [9] sentences, in words and sentences, that you recall
 [10] was specifically given to you in conversation or
 [11] comments from Dr. Roger Revelle?
 [12] **A:** Revelle expressed to me his skepticism
 [13] about the validity of mathematical models. And that
 [14] skepticism is reflected partly in the chapter titled
 [15] "Mathematical Models."
 [16] **Q:** Did you draft this chapter subsequent to
 [17] February 16, 1990?
 [18] **A:** That, I don't recall.
 [19] **Q:** Is it possible that you wrote this chapter
 [20] on mathematical models prior to February 16, 1991?
 [21] **A:** It is possible, yes.
 [22] **Q:** Is it possible that this language was
 [23] contributed by some of the other commentators to whom
 [24] you sent the article while it was being drafted? Is

[1] that possible?
 [2] **A:** Yes, it is possible.
 [3] **Q:** Do you have any idea now which of those
 [4] commentators may have contributed some of these
 [5] specific ideas?
 [6] **A:** I can identify one.
 [7] **Q:** Please do.
 [8] **A:** The business in the second paragraph,
 [9] about the models being tuned, the word "tuned" in
 [10] quotes, was conveyed to me, perhaps in a publication
 [11] that he sent me, by Professor Lindzen, L-i-n-d-z-e-n.
 [12] And the material in the third paragraph was conveyed
 [13] to me by Dr. Ellsaesser, as stated here.
 [14] **Q:** Yeah. Now, in the second paragraph, "The
 [15] 'models' are tuned..." you remember that Dr. Lindzen
 [16] contributed that, but it's not stated here?
 [17] **A:** That's correct.
 [18] **Q:** Any other memory regarding the statements
 [19] on this page, specific attribution to commentators?
 [20] **A:** Not that I can recall.
 [21] **Q:** One last question on this, on this section
 [22] on mathematical models: If it is possible that this
 [23] was drafted prior to February 16, 1990, is it
 [24] possible that comments from Drs. Lindzen and

[1] Ellsaesser reached you on this topic before February
[2] 16, 1991?

[3] **A:** Yes, because they had been writing about
[4] these topics, and they may have sent me preprints or
[5] reprints from which I gained the information.

[6] **Q:** You testified today that you believe you
[7] sent copies of your drafts of the Cosmos article to
[8] Drs. Lindzen and Ellsaesser to receive their comments
[9] back.

[10] **A:** (Nodding)

[11] **Q:** Is it possible that this section was
[12] written prior to February 16, 1991?

[13] **A:** 1990.

[14] **Q:** 1990. Thank you for correcting me. And
[15] you received comments back prior to that date as
[16] well?

[17] **A:** I don't believe so. I believe I sent out
[18] drafts, successive drafts, not only to my co-authors,
[19] but to other people whose scientific judgment I
[20] valued.

[21] **Q:** Okay. Thank you.

[22] (Discussion off the record.)

[23] (Lunch recess taken at 1:00 p.m.)

[24] (Deposition resumed at 1:38 p.m.)

[1] A_F_T_E_R_N_O_O_N__S_E_S_S_I_O_N

[2]
[3] **MR. LANCASTER:** Okay. Show we're
[4] resuming the deposition of Dr. Fred Singer.

[5] **BY MR. LANCASTER:**

[6] **Q:** And understanding that you're still under
[7] oath. Okay?

[8] **A:** Okay.

[9] **Q:** Picking up where we left off, we were
[10] going through the galley proof.

[11] And my question was asking for specific
[12] contribution in the form of ideas and language given
[13] to you in conversations or comments or annotations on
[14] drafts that you can remember coming from Dr. Roger
[15] Revelle or from other commentators. And I think we
[16] finished page Galley: 003.

[17] And turning now to Galley: 004. On this
[18] page, Dr. Singer, can you remember clearly any of
[19] these sentences being attributed to language given to
[20] you by Dr. Revelle prior to February 1, 1991?

[21] **A:** Okay, the second paragraph on the bottom,
[22] starting with the words "In view...", then turning to
[23] Galley: 005, under the chapter heading "Energy
[24] Policies," all of that.

[1] **Q:** Let's stop on four with this paragraph,
[2] "In view of the uncertainties..."

[3] **A:** Yes.

[4] **Q:** Can you explain to me in detail how
[5] Dr. Revelle's views and comments helped you draft
[6] that language?

[7] **A:** Yes. You understand that I was the
[8] drafter of this first draft and incorporated comments
[9] and ideas from many sources, and specifically from
[10] Revelle's New Orleans paper, and other places or
[11] other conversations that I had had with him in the
[12] past, and drafted a draft that I felt would be in
[13] consonance with his views, that he would be happy
[14] with as a co-author. Obviously, we cannot be —
[15] we're not completely substitutive.

[16] So this paragraph you're referring to
[17] reflects his views that we should try to better
[18] understand future global change, his feeling that
[19] more research was needed to not only understand the
[20] science, but also its effects on our society and on
[21] our environment.

[22] **Q:** This "In view of the uncertainties..."
[23] paragraph, the last paragraph before the section on
[24] "Energy Policies," —

[1] **A:** There's "an expanded research program."

[2] **Q:** — there's "an expanded research program"
[3] that derives from the AAAS talk.

[4] **A:** Yes, but also from my own views and from
[5] Chauncey Starr's views.

[6] **Q:** Would it be fair to say that the language
[7] in that paragraph is similar to the language in the
[8] first paragraph, that expanding the research program
[9] is something that very many people believe?

[10] **A:** Can you refer me to the paragraph?

[11] **Q:** Well, what I'm asking is, as you're
[12] telling me that other commentators also —

[13] **A:** Yes.

[14] **Q:** — believe in an expanded research
[15] program, are you telling me that this specific
[16] paragraph derived from something specific that Dr.
[17] Revelle gave you, such as the AAAS talk? Is it
[18] specifically relating to that, or is it a general
[19] statement that could have come from many places?

[20] **A:** Well, it's not unique to Revelle.

[21] **Q:** Okay, but consistent with the AAAS talk?

[22] **A:** Yes. I would say there's nothing in the
[23] draft that is in conflict with Revelle's AAAS talk.

[24] **Q:** Okay, let's move, then, to the fifth page,

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- [1] or the page marked "Galley: 005."
[2] **A:** Yes.
[3] **Q:** And you had comments there?
[4] **A:** Yes, yes. Energy policy and direct
[5] interventions are largely modeled on the triple — on
[6] Revelle's AAAS paper, with inputs, of course, from
[7] Chauncy Starr and others.
[8] **Q:** Can you show me any specific language?
[9] **A:** Yes, the specific language would be the
[10] new idea by John Martin to fertilize the Antarctic.
[11] **Q:** At the bottom of the page, first paragraph
[12] under "Direct Interventions"?
[13] **A:** Yes.
[14] **Q:** Okay. The reference to John Martin, then,
[15] is traceable to the AAAS talk?
[16] **A:** Uniquely so, because I had not heard of it
[17] before.
[18] **Q:** Okay. I apologize. If I could back up to
[19] Galley: 004, can you remember any of the material
[20] that went into your draft of this text attributable
[21] to other commentators, either Dr. Starr, or Dr.
[22] Lindzen, or Ellsaesser, or Michaels, or Balling, or
[23] others?
[24] **A:** Starr made many detailed comments.

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- [1] **Q:** Can you remember any of them?
[2] **A:** No, I don't remember them. The first
[3] matter there, the matter of soil adjustment, is
[4] something that I had published in the past. I
[5] received from Sherwood Idso's book and other
[6] publications and Reifsnnyder's publication the
[7] material there.
[8] Patrick Michaels suggested to me the
[9] feature of the warmer nighttime temperatures which he
[10] discovered in the data of Thomas Karl and I had not
[11] been aware of until he drew my attention to it.
[12] **Q:** Can you tell me when he drew your
[13] attention to it? Was it after February 16, '91? Was
[14] it after you wrote the first draft?
[15] **A:** No, I don't know when he drew my attention
[16] to it.
[17] **Q:** Okay.
[18] **A:** Balling communicated to me the material
[19] about property cycles which appears in the second
[20] paragraph on Galley: 004.
[21] **Q:** Again, do you remember when he
[22] communicated that to you? Was it, perhaps, in
[23] response to a review of this draft article?
[24] **A:** It might have been.

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- [1] **Q:** Okay.
[2] **A:** Or I might have just picked it up in
[3] something that he sent me.
[4] **Q:** Is there anything else specific on this
[5] page you remember?
[6] **A:** No.
[7] **Q:** Acknowledging that the specific reference
[8] is to Revelle's contribution of expanded research
[9] program.
[10] Okay, then, turning to Galley: 005, other
[11] than the unique contribution by Revelle referring to
[12] John Martin in the AAAS talk, do you recognize or
[13] remember any of the text drafted here being
[14] attributable to comments from Chauncy Starr or
[15] others?
[16] **A:** In his AAAS paper, Revelle lists six
[17] different kinds of action. And what I've done is to
[18] take these, use them, and expand on them to make them
[19] more intelligible to the average reader in the
[20] process of working in ideas I received from Chauncey
[21] Starr and also some of my own ideas.
[22] **Q:** Okay. Let's move on to the short last
[23] piece, the "Conclusion," on Galley: 006 and the
[24] partial paragraph above.

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- [1] **A:** Yes, this came from a paper communicated
[2] to me by Yale economist William Nordhaus, who
[3] actually gave this paper at the AAAS meeting in New
[4] Orleans. And I was very impressed with that. And so
[5] was Roger Revelle.
[6] **Q:** Did Dr. Revelle contribute to the drafting
[7] of this paragraph to the extent that when it was
[8] written you would say he was a co-author?
[9] **A:** Well, we're back again at this impasse.
[10] **Q:** Let me rephrase that. To the extent that
[11] your choice of language in drafting these — this
[12] last paragraph, is any of that choice of language
[13] directly attributable to Dr. Revelle, specific
[14] comments from him, prior to February 1st, 1991?
[15] **A:** Yes. Again, the words "It would be
[16] prudent to complete the ongoing and recently expanded
[17] research so that we will know what we are doing
[18] before we act" is a rephrasing of the second
[19] paragraph of Revelle's AAAS paper.
[20] **Q:** Okay. So that sentence was written after
[21] February 16th?
[22] **A:** To the best of my recollection, yes.
[23] **Q:** Just the best of your recollection. Are
[24] you certain of that?

[1] A: No; to the best of my recollection.
 [2] Q: Okay. Other language in the conclusion,
 [3] to the best of your recollection, was written after
 [4] February 16th, 1991?
 [5] A: To the best of my recollection, yes.
 [6] Q: Is it possible that this text was written
 [7] by you before February 16th, 1990?
 [8] A: It's possible, if I managed to get a
 [9] preprint of Nordhaus's paper. And, of course, I
 [10] don't know right now whether I saw that before
 [11] February or not. Since I quote Nordhaus,
 [12] N-o-r-d-h-a-u-s, directly, I had access to his paper
 [13] and I was quoting directly from it.
 [14] Q: Thank you. Referring to the AAAS talk,
 [15] which we've marked, I believe, as Exhibit —
 [16] A: 5.
 [17] Q: — Exhibit 5, the very first sentence of
 [18] that, "There is a good but by no means certain chance
 [19] that the world's average climate will become
 [20] significantly warmer during the next century...",
 [21] et cetera, is that sentence or any of that language
 [22] that I just read — can it be found in the galley
 [23] proof?
 [24] A: The answer is I don't know. I have to

[1] next century?
 [2] A: You left off —
 [3] MR. BLUTE: Let me state my
 [4] objection. I think there are two separate questions
 [5] here. Your first question was, are they consistent?
 [6] His answer to that was yes. Now you've asked
 [7] something entirely different.
 [8] MR. LANCASTER: I'm trying to explore
 [9] the consistency. Is that allowed? Well, let me try
 [10] to approach it in more detail.
 [11] BY MR. LANCASTER:
 [12] Q: In your view, would a warming of less
 [13] than one degree Celsius, well below the normal
 [14] year-to-year variation — that would be a warming in
 [15] what range?
 [16] A: Well, below one degree centigrade.
 [17] Q: Did you not say today that, in your view,
 [18] the normal year-to-year variation would be a
 [19] threshold of less than one degree centigrade?
 [20] A: (Nodding)
 [21] Q: So what would be a range well below that?
 [22] A: It's hard to quantify this, since the
 [23] empirical evidence that we have could even be
 [24] interpreted as zero. Therefore, Roger and I agreed

[1] look for it.
 [2] Q: Well, let me ask you a more specifically
 [3] related question. As a scientist, is that first
 [4] sentence that I just read the first half of,
 [5] "There is a good chance the climate will become
 [6] significantly" — "There is a good but by no means
 [7] certain chance that the world's average climate will
 [8] become significantly warmer during the next
 [9] century...", is that consistent, in your view, with
 [10] the statement under the heading "Impacts of Climate
 [11] Change"; "Assume what we regard as the most likely
 [12] outcome: A modest average warming in the next
 [13] century of less than one degree Celsius; well below
 [14] the normal year-to-year variation — and mostly at
 [15] high latitudes and in the winter"? Are those two
 [16] statements consistent?
 [17] (Witness reviewing documents.)
 [18] A: Yes, after rereading both statements, I
 [19] think that they are consistent.
 [20] Q: It is your view, then, that the statement,
 [21] "A modest average warming in the next century of less
 [22] than one degree Celsius; well below the normal
 [23] year-to-year variation," refers to a change in
 [24] climate that would be significantly warmer during the

[1] in the discussion to eliminate any reference to
 [2] numbers.
 [3] Q: I am not talking about the discussion in
 [4] February of 1991. I'm talking about the drafting of
 [5] the galley proof and the consistency with the AAAS
 [6] talk upon which you've claimed this galley proof is
 [7] based.
 [8] A: Well, I —
 [9] Q: Is it your contention that a warming well
 [10] below one degree centigrade is significantly warmer?
 [11] Is that what you believe Roger Revelle meant by
 [12] "significantly warmer"?
 [13] MR. BLUTE: Objection.
 [14] Q: Two different questions.
 [15] A: I'd like to answer that. You have misread
 [16] the material in a very significant way. They are
 [17] consistent, as I've testified.
 [18] I'm testifying here that this statement is
 [19] the most likely outcome. That means if you take a
 [20] distribution of views of people that I've talked to,
 [21] we believe, we as co-authors, believe that this is
 [22] the most likely outcome. Roger, what he says here,
 [23] there's a certain chance, —
 [24] Q: A good chance.

[1] **A:** — a probability. No, he doesn't say a
[2] good chance.
[3] **Q:** It says "good but by no means certain
[4] chance."
[5] **A:** Yes, chance. This could be 10 percent, 20
[6] percent. He doesn't specify what the chance is. I
[7] think you're sophisticated. You understand that
[8] we're dealing with probabilities.
[9] He only says that there's a chance it will
[10] be significantly warmer. He doesn't define what the
[11] chance is. He doesn't define what he means by
[12] significantly. In the final version, we agreed on
[13] the wording.
[14] **Q:** Isn't it true in 1990, when you drafted
[15] the first draft of this article, that you knew what
[16] Roger Revelle believed when he said there's a good
[17] chance significantly warmer? Isn't it true that you
[18] knew what he believed to be the most likely outcome
[19] in the next century?
[20] **MR. BLUTE:** Objection. Go ahead.
[21] **A:** Well —
[22] **Q:** Okay. Let me lay the foundation for that.
[23] You knew Dr. Revelle for many years previous to 1990,
[24] is this true?

[1] **A:** Yes.
[2] **Q:** Do you maintain that a collaboration on a
[3] joint paper between you and Dr. Revelle would not be
[4] unusual?
[5] **A:** I do.
[6] **Q:** You're an expert in the field of global
[7] warming, are you not?
[8] **A:** I know something about the subject.
[9] **Q:** You had communicated with Dr. Revelle at
[10] various meetings over years previous to 1990?
[11] **A:** That is correct.
[12] **Q:** Would you say you were well acquainted
[13] with Dr. Revelle's views?
[14] **A:** Yes.
[15] **MR. LANCASTER:** If we could mark a
[16] document produced by plaintiff, No. 14, I believe,
[17] which I think bears Attorney Blute's control number
[18] S00034, being two pages, a letter from Dr. Singer to
[19] the Washington Post dated September 15, 1992 as the
[20] next exhibit.
[21] (Exhibit 6 marked
[22] for identification.)
[23] **Q:** Dr. Singer, do you recognize this letter?
[24] **A:** Yes.

[1] **Q:** Referring to page two, you write, "Revelle
[2] had a balanced view of the consequences of increased
[3] carbon dioxide...", et cetera.
[4] **Second sentence:** "In an article published
[5] in The Resourceful Earth in 1984, he indicated (on
[6] page 198) that average temperatures near the earth's
[7] surface might rise between two and three degrees with
[8] a doubling of atmospheric CO2 (after another
[9] century)..."
[10] **A:** That is correct.
[11] **Q:** Is that correct?
[12] **A:** Yes.
[13] **Q:** Do you draw any understanding of Dr.
[14] Revelle's view from that statement of his?
[15] **A:** Not particularly.
[16] **Q:** Okay. Thank you.
[17] **A:** He —
[18] **Q:** Go ahead and answer.
[19] **MR. BLUTE:** Go ahead and answer the
[20] question.
[21] **A:** He was simply echoing a view prevalent
[22] among mathematical models. I don't think he believed
[23] in this number.
[24] **Q:** And what basis do you have for concluding

[1] that he didn't believe in that number?
[2] **A:** Our discussion.
[3] **Q:** Your discussions when, sir?
[4] **A:** With him.
[5] **Q:** With him on what date?
[6] **A:** February 1991.
[7] **Q:** How about previous to February 1991, in
[8] the spring of 1990, when you drafted this language?
[9] **A:** We didn't get into numbers.
[10] **Q:** At that point in the spring of 1990, did
[11] you have any reason to believe that Roger Revelle
[12] believed that global warming in the next century —
[13] the most likely outcome would be less than one degree
[14] centigrade?
[15] **A:** We didn't discuss any numbers. This was
[16] in February 1990, not in the spring. Our
[17] conversation at breakfast revolved around some of the
[18] recommendations he made in his paper and his
[19] agreement to become a co-author.
[20] **MR. LANCASTER:** I'd like to mark the
[21] next exhibit, a document that defendant produced,
[22] document No. 1, titled "Is the Climate Changing?"
[23] marked in the upper right and in handwriting, "Roger
[24] Revelle abstract for 'Is the Climate Changing?'"

*He says
"it tells me"*

[1] Irvine - 2-28-9."
 [2] (Exhibit 7 marked
 [3] for identification.)
 [4] Q: Let me represent to you that this is a
 [5] text of a talk that Roger Revelle had planned to
 [6] deliver in Irvine February 28th, 1990. The "'90"
 [7] appears on this copy and I guess got Xeroxed off the
 [8] edge of that one.
 [9] The language I'd like to draw your
 [10] attention to, "During the next hundred years there is
 [11] likely to be an equal change in the opposite
 [12] direction, i.e., the climate in the United States is
 [13] likely to be about five degrees warmer than now."
 [14] Would you draw any understanding of
 [15] Dr. Revelle's view about the likelihood of global
 [16] warming based on that statement?
 [17] A: Well, he told me that he was careless with
 [18] numbers.
 [19] Q: Okay. Thank you.
 [20] MR. BLUTE: And — no, go ahead.
 [21] Q: Now, sir, I'd like to draw your attention
 [22] to the next exhibit which I would offer, being your
 [23] first draft sent to Dr. Revelle with cover letter
 [24] March 2nd, 1990. If we could mark that as the next

[1] A: Yes, that's what it seems to be.
 [2] Q: Maybe in a file named "Greenhouse," or
 [3] subdirectory, a directory, "Greenhouse"?
 [4] A: No, I think it's a file.
 [5] Q: Actually a file, okay. Dr. Singer, is
 [6] this the draft — the first draft that you wrote of
 [7] the Cosmos article?
 [8] A: I believe so.
 [9] Q: Referring to page seven of the text, there
 [10] exists there a heading, "Impacts of Climate Change."
 [11] A: Yes. Mm-hmm.
 [12] Q: Reading the first sentence, "But assume
 [13] the most likely outcome - a modest general warming of
 [14] perhaps one to two Celsius in the next century," do
 [15] you see that language?
 [16] A: Yes. Mm-hmm.
 [17] Q: You wrote that language?
 [18] A: Yes.
 [19] Q: Would you argue you wrote that language
 [20] based on your understanding of the AAAS talk and
 [21] Roger Revelle's views?
 [22] A: No, I think this was — may have been my
 [23] own understanding at the times.
 [24] Q: Haven't you told us that the first draft

[1] exhibit.
 [2] (Exhibit 8 marked
 [3] for identification.)
 [4] Q: Do you recognize this document?
 [5] A: Let me look at it.
 [6] Q: It's marked Exhibit — what are we on now,
 [7] 8?
 [8] (Witness reviewing document.)
 [9] A: Yes, I recognize it.
 [10] Q: Do you recognize the draft article
 [11] attached marked at the top of the second page of this
 [12] exhibit "3-1-2-27-90" —
 [13] A: Yes. Mm-hmm.
 [14] Q: — "SFS-A: Greenhouse"?
 [15] A: Mm-hmm.
 [16] Q: Would the "2-27-90" indicate that this was
 [17] a draft written February 27th, 1990, or at least this
 [18] version existed or was printed that day?
 [19] A: Yes.
 [20] Q: "SF," do I take that to mean your
 [21] initials?
 [22] A: Yes.
 [23] Q: And the "A: Greenhouse" indicating a file
 [24] no doubt located on an A drive?

[1] you wrote was based on Roger Revelle's direction to
 [2] you to write a draft? And haven't you told us — let
 [3] me just leave that.
 [4] Wasn't this first draft created following
 [5] Roger Revelle's direction to you to write a draft
 [6] based on what you and he and Dr. Starr believed?
 [7] A: Yes.
 [8] Q: And haven't you told us that in the
 [9] writing of the draft, the first draft you wrote, you
 [10] were attentive to put down words that you believe
 [11] encompassed what Dr. Revelle believed?
 [12] MR. BLUTE: Objection. Go ahead.
 [13] A: In general, yes.
 [14] Q: In March of 1990, when you sent this draft
 [15] that you created at the direction of Roger Revelle
 [16] you claim to Dr. Revelle and Dr. Starr, did you
 [17] believe then that this first sentence under "Impacts
 [18] of Climate Change," would be inconsistent with Dr.
 [19] Revelle's view?
 [20] A: I thought it would be consistent with his
 [21] view.
 [22] Q: Would you say that a modest general
 [23] warming of perhaps one to two degrees Celsius in the
 [24] next century would be a significant warming?

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[1] **A:** Significant, yes, in the sense that one
[2] could discern it, but not significant in the sense
[3] that it would cause serious problems.
[4] **Q:** If there were a warming in the next
[5] century of .5 degrees Celsius, would that be
[6] significant in the sense that it could be discerned?
[7] **A:** It might not be. It might get lost in the
[8] noise.
[9] **Q:** Yet, you maintain that Dr. Revelle's
[10] statement that there would be a significant
[11] warming — let me get it exactly right.
[12] Let me refer to Exhibit 7, Dr. Revelle's
[13] statement that, "...the climate in the United States
[14] is likely to be about five degrees warmer than now,"
[15] you maintain that this was merely his being careless
[16] with numbers?
[17] **MR. BLUTE:** Let me say one thing. I
[18] think what you're reading is from Exhibit No. 7,
[19] which, as I understand it, —
[20] **MR. LANCASTER:** I've just referred to
[21] it, yes.
[22] **MR. BLUTE:** — which I understand was
[23] not something that was ever published by Roger
[24] Revelle or indeed has Roger Revelle's name on it. So

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[1] I just want to make that clear. We don't concede
[2] that Roger Revelle ever wrote that statement.
[3] **MR. LANCASTER:** Fine.
[4] **MR. BLUTE:** It's not published
[5] anywhere. I don't know where that document came from
[6] or who prepared it.
[7] **A:** It is — this number is inconsistent with
[8] what Roger Revelle published in The Resourceful
[9] Earth. And it is quite inconsistent with his actual
[10] handwritten notes on the galley, on the Cosmos — the
[11] galley. So this is why I said that this five degree
[12] number — this doesn't make sense to me.
[13] **Q:** Okay.
[14] **A:** And since it's just been discussed, we
[15] don't know who wrote this. Maybe if he did write it,
[16] he may have been very careless.
[17] **Q:** Do you still maintain that Dr. Revelle's
[18] statement, leading off the AAAS talk, there is a —
[19] quote, "There is a good but by no means certain
[20] chance that the world's average climate will become
[21] significantly warmer during the next century," was
[22] not captured by you in your drafting the language in
[23] the draft of Exhibit 8 under "Impacts of Climate
[24] Change"?

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[1] **A:** I think these two are entirely consistent.
[2] I see no conflict at all between them.
[3] **Q:** Okay. And you would agree, then, —
[4] strike that.
[5] Yet, you also maintain that Dr. Revelle's
[6] first sentence in the AAAS talk is consistent with
[7] the language that appears in the galley proof January
[8] 31st, 1991, is that correct?
[9] **A:** Yes, it depends on how you quantify the
[10] word "chance" and the word "significant."
[11] **Q:** In your view, is the statement in your
[12] March 2nd draft, "...a modest general warming of
[13] perhaps one to two Celsius in the next century,"
[14] consistent with the statement January 31st, "A modest
[15] average warming in the next century of less than one
[16] degree Celsius; well below the normal year-to-year
[17] variation"? Are they saying the same thing?
[18] **A:** The answer to that question is that
[19] they're not consistent. And the reason for it is
[20] that I have received during this intervening year
[21] sufficient inputs, either from publications that I
[22] saw or from comments that I received, to bring about
[23] this change. In other words, the draft evolved
[24] over — during the year based on comments received.

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[1] **Q:** By people other than Dr. Revelle and Dr.
[2] Starr?
[3] **A:** Possibly, yes. Mm-hmm.
[4] **MR. LANCASTER:** Taking as the next
[5] exhibit the draft conveyed by letter from Dr. Singer
[6] to Dr. Revelle dated March 6th, 1990, I'd like to
[7] mark that as the next exhibit.
[8] (Exhibit 9 marked
[9] for identification.)
[10] **Q:** Dr. Singer, do you recognize Exhibit 9?
[11] **A:** Yes.
[12] **Q:** Is this the letter you sent to Dr. Revelle
[13] March 6th, 1990 with attached draft?
[14] **A:** Yes.
[15] **Q:** This — on the second page of this
[16] exhibit, the first page of the draft is marked
[17] "Doc 2 GRNH2 3/5/90/SFS." May I take "3/5/90" to
[18] refer to March 5th, 1990?
[19] **A:** Yes.
[20] **Q:** You created this draft as well?
[21] **A:** Yes, I printed it.
[22] **Q:** And the second draft came — strike that.
[23] The second draft was mailed to Dr. Revelle
[24] four days after the first draft?

[1] **A:** I don't recall. But one can check the
 [2] dates.
 [3] **Q:** Does it appear that from the date, if one
 [4] is March 6th, 1990, the other is March 2, 1990?
 [5] **A:** Yes, it does.
 [6] **Q:** Dr. Singer, do you know where Dr. Revelle
 [7] was during this first week of March 1990?
 [8] **A:** Yes, I believe he was recovering from an
 [9] operation.
 [10] **Q:** Do you know his condition during that
 [11] week?
 [12] **A:** No, I do not.
 [13] **Q:** Would you be surprised to learn that he
 [14] was in the hospital or in a hospital bed at his home?
 [15] **A:** No, not surprised. I've since learned
 [16] that he was quite ill. I did not know this at this
 [17] time.
 [18] **Q:** In all likelihood, Dr. Singer, did you
 [19] receive comments from Dr. Revelle between the sending
 [20] of your first draft and the sending of your second
 [21] draft?
 [22] **A:** Very likely not.
 [23] **Q:** Yet, you remember — in your
 [24] interrogatories you said that you received comments

[1] from Dr. Revelle after your first draft was sent to
 [2] him.
 [3] **MR. BLUTE:** He said on the record
 [4] today he does not have memory of Revelle, so —
 [5] **Q:** Now we're at a different point. Now we're
 [6] at a point where you're realizing that it's very
 [7] unlikely that you did?
 [8] **MR. BLUTE:** No, he told you in
 [9] response to a direct question that he didn't remember
 [10] one way or the other. It's correct in all the
 [11] respects. But I don't see the point in arguing that.
 [12] **A:** If you say and you're correct that he was
 [13] in the hospital, then I would say it's very unlikely
 [14] that I received anything from him.
 [15] **Q:** Just based on the four-day interval, your
 [16] comment, "Please ignore the first draft," —
 [17] **A:** Yes.
 [18] **Q:** — it's likely that there weren't comments
 [19] coming back, is that true?
 [20] **A:** No. My purpose here was to tell him that
 [21] I had made changes and I didn't want him to waste his
 [22] time looking at the first draft.
 [23] **Q:** Okay. I understand. Looking at the text,
 [24] I think we can use the fax number in the corner,

[1] number 28 in the top right corner, to identify the
 [2] page bearing the subsection "Impacts of Climate
 [3] Change."
 [4] In this draft the language is, "But assume
 [5] the most likely outcome - a modest general warming of
 [6] perhaps one degree Celsius in the next century."
 [7] Do you have any memory, Dr. Singer, of why
 [8] you made the change between Draft 1 and Draft 2 on
 [9] this point?
 [10] **A:** Not in detail. Likely because of inputs
 [11] that I received or information that I received
 [12] bearing on this issue.
 [13] **Q:** It's likely that you received information
 [14] from Dr. Starr, then, or other commentators on that
 [15] issue?
 [16] **A:** I know that Starr sent information. I
 [17] don't have the information at hand. And I'm not sure
 [18] whether he commented on this point. But I may have
 [19] received information from other sources. We can
 [20] easily check that.
 [21] **MR. LANCASTER:** Well, I guess we
 [22] should mark this as Exhibit 10, unless there's a more
 [23] efficient way to check it. Is there a way to refresh
 [24] memory without marking as exhibits, or would you

[1] prefer to mark it?
 [2] **MR. BLUTE:** We ought to mark it as an
 [3] exhibit. The reason for marking it is just so that
 [4] when you read the transcript you know exactly what
 [5] you were referring to. That's the only purpose it
 [6] serves at this point.
 [7] **MR. LANCASTER:** Well, maybe we don't
 [8] need to mark this as an exhibit if I show you the
 [9] documents you gave me when I walked in the room
 [10] today, which include —
 [11] **MR. BLUTE:** You better mark it just
 [12] so it's clear on the record what you're showing him.
 [13] That's the only purpose this serves.
 [14] **MR. LANCASTER:** Okay. Well then,
 [15] we'll mark this as the next exhibit, what appears to
 [16] be Dr. Starr's comments on Draft 1.
 [17] (Exhibit 10 marked
 [18] for identification.)
 [19] **BY MR. LANCASTER:**
 [20] **Q:** Dr. Singer, Exhibit 10, do these appear to
 [21] be Dr. Starr's comments returned to you on Draft 1
 [22] sent to him on March 2, 1990?
 [23] (Witness reviewing document.)
 [24] **A:** Yes, I see comments by him in this draft.

[1] Q: On page seven, I believe, is the text
 [2] we're talking about, under "Impacts of Climate
 [3] Change."
 [4] A: Yes.
 [5] Q: Do you see any comment registered at the
 [6] line "...a modest general warming of perhaps one to
 [7] two degrees Celsius in the next century?"
 [8] A: No, I do not.
 [9] Q: Is it unlikely, then, that your change
 [10] between Draft 2 — I mean Draft 1 and Draft 2 of this
 [11] article was based on Dr. Starr's comments to you?
 [12] A: That is correct.
 [13] Q: Does that make it even more likely that
 [14] that change was based on someone else's comments to
 [15] you?
 [16] A: It does.
 [17] MR. LANCASTER: Let's mark up Draft
 [18] 3. I'd like to mark as an exhibit a letter from
 [19] Dr. Singer to Dr. Revelle dated March 20th with
 [20] attached text. I guess that's Exhibit 11.
 [21] (Exhibit 11 marked
 [22] for identification.)
 [23] Q: Dr. Singer, does this appear to be
 [24] Draft 3?

[1] A: It does.
 [2] Q: That you sent to Dr. Revelle apparently
 [3] March 20th, 1990?
 [4] A: Yes.
 [5] Q: And at the top of the first page of the
 [6] text, it says, "Doc 3 GRNH2 3/19/90"?
 [7] A: Yes.
 [8] Q: Apparently written two weeks after
 [9] Draft 2?
 [10] A: Yes.
 [11] Q: Turning to the heading "Impacts of Climate
 [12] Change," I guess it's the fifth page of the draft
 [13] text —
 [14] MR. BLUTE: I'm sorry, say it again.
 [15] Fifth page of the text?
 [16] MR. LANCASTER: The fifth page of the
 [17] draft text.
 [18] MR. BLUTE: Mm-hmm.
 [19] Q: I read, quoting, "But assume the most
 [20] likely outcome - a modest general warming of perhaps
 [21] one degree Celsius in the next century, mostly at
 [22] high latitudes and in the winter."
 [23] Would you agree that this sentence has
 [24] changed again from Draft 2 to Draft 3?

[1] A: I'd have to compare it.
 [2] Q: Please do. I think Exhibit 9 would be
 [3] Draft 2.
 [4] (Witness reviewing document.)
 [5] A: Yes. Mm-hmm.
 [6] Q: Would you agree that the language that has
 [7] now been added is "mostly at high latitudes and in
 [8] the winter"?
 [9] A: Yes. Mm-hmm.
 [10] Q: And do you remember the reason why you
 [11] added those words?
 [12] A: Yes, because the climate models, insofar
 [13] as one can believe them, predict warming — when you
 [14] decompose the average warming — predict the warming
 [15] will be primarily at high latitudes.
 [16] Q: Does that mean that the warming in the
 [17] United States would be greater than the global
 [18] average warming?
 [19] A: No, I don't know that.
 [20] Q: Does the United States sit at a higher
 [21] latitude than the equatorial region?
 [22] A: Yes, but at a lower latitude than the
 [23] polar regions.
 [24] Q: Is it possible that Dr. Revelle — he

[1] earlier stated that he thought that — strike that.
 [2] If Dr. Revelle in 1990 stated that he
 [3] believed the warming in the United States would be
 [4] five degrees in the next century — strike that.
 [5] Do you know when Dr. Revelle said that the
 [6] warming in the next century — if indeed that is his
 [7] statement — the warming in the next century in the
 [8] United States would be five degrees, do you know that
 [9] he was referring to Celsius or Fahrenheit?
 [10] A: I don't know that.
 [11] Q: Would it be not unusual if he were
 [12] speaking to a nonscientific argument — I mean
 [13] nonscientific audience to put his prediction of
 [14] likely warming in Fahrenheit for a United States
 [15] audience?
 [16] A: That's pure speculation. I have no way of
 [17] telling. And I don't know what the audience was. It
 [18] might have been scientific.
 [19] Q: Okay. That's not impossible, though?
 [20] It's possible that he was talking Fahrenheit?
 [21] A: Yes, since he didn't specify.
 [22] Q: If he were talking Fahrenheit, what would
 [23] be the converted value in Celsius?
 [24] MR. BLUTE: Just so it's clear on the

[1] record, are we talking about the exhibit that you
 [2] marked that was the so-called abstract?
 [3] **MR. LANCASTER:** Yes.
 [4] **MR. BLUTE:** Okay. And again, that's
 [5] assuming that Roger Revelle wrote this.
 [6] **MR. LANCASTER:** Right.
 [7] **A:** And that it was to be given at the
 [8] University of California, Irvine?
 [9] **Q:** Yes.
 [10] **MR. BLUTE:** How's he going to know?
 [11] I object.
 [12] **MR. LANCASTER:** How is Dr. Singer
 [13] going to know what the conversion between Fahrenheit
 [14] and Celsius would be? I think he knows.
 [15] **MR. BLUTE:** No, I just think — well,
 [16] you can answer that. Go ahead.
 [17] **A:** Okay. It would be five-eighth of that
 [18] number; about three degrees, about three degrees
 [19] centigrade.
 [20] **Q:** Now, your addition of the words "mostly at
 [21] high latitudes and in the winter," did those words —
 [22] were those suggested by Dr. Starr?
 [23] **A:** No.
 [24] **Q:** You added those from your own information

[1] gathered elsewhere?
 [2] **A:** It may have been suggested by one of my
 [3] other commentators.
 [4] **Q:** Do you believe that this Draft 3 was the
 [5] last draft that you sent to Dr. Revelle and Dr.
 [6] Starr?
 [7] **A:** I don't know that.
 [8] **Q:** Would it surprise you that Dr. Revelle
 [9] kept practically every piece of paper ever sent to
 [10] him for archives?
 [11] **A:** It does surprise me.
 [12] **Q:** Would it surprise you that the archives
 [13] show communications between Dr. Starr and Dr. Revelle
 [14] and between you and Dr. Revelle in 1990 and 1991?
 [15] **A:** No, it wouldn't surprise me. We were
 [16] co-authors of a paper.
 [17] **Q:** Would you — let me —
 [18] **A:** I don't recollect what those
 [19] communications might have been.
 [20] **Q:** If these three drafts sent in March of
 [21] 1990 appear in the archives, and no other drafts sent
 [22] to Dr. Revelle appear in the archives, does that —
 [23] is that any evidence to you about whether or not
 [24] another draft was sent to Dr. Revelle?

[1] **MR. BLUTE:** I object to that. It's
 [2] an unanswerable question. That would assume
 [3] knowledge about Revelle's habits of keeping records.
 [4] **MR. LANCASTER:** Fine.
 [5] **MR. BLUTE:** It would assume how many
 [6] records go to the archives. It would assume the
 [7] voracity of your understanding of what's in the
 [8] archives.
 [9] **MR. LANCASTER:** I'll withdraw it.
 [10] Withdrawn.
 [11] **BY MR. LANCASTER:**
 [12] **Q:** You have no record of any other draft
 [13] being sent?
 [14] **A:** No, I do not.
 [15] **Q:** Dr. Starr hasn't —
 [16] **A:** My letters, as you can see, were
 [17] handwritten. And I have kept no copies.
 [18] **Q:** Dr. Starr shows the same three drafts sent
 [19] to him?
 [20] **A:** At first glance, they appear to be the
 [21] same. I have not had a chance to check them, since I
 [22] just saw the Revelle drafts here for the first time
 [23] today.
 [24] **Q:** You've had Dr. Starr's documents for many

[1] weeks now?
 [2] **A:** I'd say about three or four weeks.
 [3] **Q:** Do those documents contain any other
 [4] drafts — do those documents contain more than three
 [5] drafts?
 [6] **A:** No, they do not. I believe I've given you
 [7] everything that I've received from Dr. Starr.
 [8] **Q:** When did you discard or misplace your
 [9] copies of the drafts? Why do you have no records?
 [10] I'm sorry, just the first question.
 [11] **A:** Well, I'm not good at collecting and
 [12] archiving. I didn't attach any great importance to
 [13] preserving the successive improvements in this draft.
 [14] **Q:** Dr. Starr has all three drafts, Dr.
 [15] Revelle kept all three drafts, you were the primary
 [16] author, and Dr. Starr's drafts came to you, and yet
 [17] you have none of that record?
 [18] **A:** I don't have an office like Starr or
 [19] Revelle. I don't have a secretary. I do my own
 [20] writing and my own filing. And I'm not organized the
 [21] way they are.
 [22] **Q:** So you might have them, but you couldn't
 [23] find them?
 [24] **A:** I don't think I would have kept them.

[1] Q: Okay.
 [2] A: And I have not conducted a major search.
 [3] Q: Okay.
 [4] MR. BLUTE: Beyond gathering whatever
 [5] documents were available to respond to your document
 [6] request, obviously.
 [7] MR. LANCASTER: I understand.
 [8] BY MR. LANCASTER:
 [9] Q: Given that all three drafts were written
 [10] in March — strike that.
 [11] Did you send draft copies of draft — of
 [12] each of the drafts to Drs. Ellsaesser and Lindzen?
 [13] A: I would say probably not. I would have
 [14] sent them either number one, number two, and number
 [15] three. And I don't recall which. Possibly number
 [16] one.
 [17] Q: Did Richard Geyer see a draft of this
 [18] article before it was published?
 [19] A: Certainly not from me.
 [20] Q: I'd like to return to Exhibit 1, if we
 [21] could, and have you circle in green comments written
 [22] in your hand, all annotations and comments.
 [23] MR. BLUTE: Green would be all —
 [24] just so I understand, the green is all Dr. Singer's

[1] "one to three." I can't make it out. The discussion
 [2] revolved around whether warming would be below the
 [3] year-to-year variation.
 [4] And I explained to Roger that my wording
 [5] was much more certain, that if the average warming
 [6] was below one degree, it would be below the normal
 [7] year-to-year variation, whereas his numbers would
 [8] certainly not be below the normal year-to-year
 [9] variation.
 [10] He didn't argue about the normal
 [11] year-to-year variation, but he argued about the
 [12] number. I was able to convince him.
 [13] But we compromised finally by leaving out
 [14] all references to any number. And note that his
 [15] position was much more conservative than mine. He
 [16] was willing to allow that a much larger temperature
 [17] increase would still be below the normal year-to-year
 [18] variation. And I told him that that is not so.
 [19] Q: Let me see if I have this right. The "one
 [20] to three" indicates what?
 [21] A: The "one to three" indicates degrees
 [22] Celsius.
 [23] MR. BLUTE: Just for the record, or
 [24] "one or three." It's not clear at this point what it

[1] comments?
 [2] MR. LANCASTER: Yes. And maybe we
 [3] could use the highlighter, if that works, whichever
 [4] you two prefer.
 [5] MR. BLUTE: Anything in your
 [6] handwriting.
 [7] A: (Indicating)
 [8] Q: And to be complete, can we mark in orange
 [9] what you recognize to be Dr. Revelle's handwriting?
 [10] A: (Indicating)
 [11] Q: Thank you.
 [12] (Recess taken.)
 [13] BY MR. LANCASTER:
 [14] Q: Turning back to this marked up manuscript,
 [15] now the galley proof, moving to the impact — the
 [16] climate change section again, Galley: 003, can you
 [17] explain to me the discussion in February of 1991
 [18] concerning the first sentence under this section?
 [19] And explain the notations.
 [20] A: The printed text represents, of course, my
 [21] final draft submitted to the Cosmos Journal sometime
 [22] in 1990. The handwritten note on the side is Roger
 [23] Revelle's.
 [24] And it reads either "one or three" or

[1] was.
 [2] MR. LANCASTER: It's clear to me that
 [3] it's "to." I can read it as a "t" written by Dr.
 [4] Singer.
 [5] BY MR. LANCASTER:
 [6] Q: The "one to three" is in Dr. Singer's
 [7] handwriting, is it not, Dr. Singer?
 [8] MR. BLUTE: He's got that listed as
 [9] Dr. Revelle's handwriting.
 [10] Q: That's a mistake. Isn't it true that if
 [11] you look closely at the word "one," "one to three" —
 [12] A: Oh, you mean that whole thing is my
 [13] handwriting?
 [14] Q: I believe the "one to three" is written in
 [15] the lighter pen. The "o's" and the "t's" are the
 [16] same as yours. The "t" —
 [17] A: No.
 [18] Q: The "t-o" clearly shows under the
 [19] cross-out.
 [20] A: No, I disagree with you.
 [21] Q: I won't argue. Okay.
 [22] MR. BLUTE: The testimony is that
 [23] that was Dr. Revelle's handwriting. He so testified.
 [24] He was there. You're not a handwriting expert.

[1] Let's move on.
 [2] (Discussion off the record.)
 [3] **BY MR. LANCASTER:**
 [4] **Q:** Taking what you've told us to be the "one
 [5] or three" or the "one to three" written by Roger, may
 [6] I take the "RR" with the circle around it to indicate
 [7] your expression that this was one of Roger's
 [8] comments?
 [9] **A:** Yes.
 [10] **Q:** Fine.
 [11] **A:** The "RR" is in my handwriting.
 [12] **Q:** Clearly. Would you agree that it doesn't
 [13] matter whether Roger wrote "one or three" or "one to
 [14] three," or whether you wrote "one to three" or "one
 [15] or three," that in either case we're talking about
 [16] Revelle's comment?
 [17] **A:** Well, I would never have written this.
 [18] **Q:** Okay.
 [19] **A:** You know, this is my final draft. And so
 [20] these comments were written on here by Revelle to
 [21] discuss with me before we turned the draft — the
 [22] final draft, the laser proofs back to the publisher.
 [23] **Q:** Okay. Let let me back up and ask
 [24] generally. The comments on this draft in your

[1] gave me no additional comments.
 [2] **Q:** So none of your handwriting on this draft
 [3] reflects Dr. Starr's comments?
 [4] **A:** I believe that's correct.
 [5] **Q:** Would it be fair to say that this draft
 [6] during your meeting with Dr. Revelle changed hands,
 [7] that at times he held it and marked on it, and that
 [8] other times you held it and marked on it?
 [9] **A:** I don't think we held it. I think it was
 [10] on a table and we were sitting on either side of the
 [11] manuscript.
 [12] **Q:** I see. So at any point that you are
 [13] talking about either you or Dr. Revelle could have
 [14] made a notation?
 [15] **A:** Yes.
 [16] **Q:** Would you have ever made a notation based
 [17] on something he said?
 [18] **A:** Yes.
 [19] **Q:** So he might have spoken a word and you
 [20] could have written it down?
 [21] **A:** Yes. That, in fact, is how it happened.
 [22] **MR. BLUTE:** Let's go off the record
 [23] for a second.
 [24] (Discussion off the record.)

[1] handwriting, —
 [2] **A:** Yes.
 [3] **Q:** — were these made prior to your meeting
 [4] with Dr. Revelle?
 [5] **A:** No.
 [6] **Q:** Were they made subsequent to your meeting
 [7] with Dr. Revelle?
 [8] **A:** All the substantive comments were made at
 [9] the meeting with Dr. Revelle. The comment that it
 [10] was reviewed by Revelle was made after the meeting,
 [11] just after the meeting.
 [12] **Q:** Did you have this galley proof, this
 [13] document, in your possession when you traveled to
 [14] La Jolla?
 [15] **A:** Yes.
 [16] **Q:** Did you send a draft copy to Dr. Starr
 [17] prior to leaving for La Jolla?
 [18] **A:** I took it with me. He was at La Jolla.
 [19] **Q:** So you carried this document expecting to
 [20] have contact with Dr. Starr and Dr. Revelle?
 [21] **A:** That is correct.
 [22] **Q:** Did you and Dr. Starr review this draft
 [23] together at La Jolla?
 [24] **A:** Yes, he had a copy of the draft. And he

[1] (Witness conferring with counsel.)
 [2] **BY MR. LANCASTER:**
 [3] **Q:** Well, just again on this point, under the
 [4] "Impacts of Climate Change" in the first sentence, is
 [5] it reasonable to understand the "one or three" or the
 [6] "one to three" comment to indicate Dr. Revelle's
 [7] belief that a modest average warming, a likely
 [8] outcome, would be one to three degrees — in the
 [9] range of one or three degrees Celsius, in that range?
 [10] **A:** That is one interpretation.
 [11] **Q:** Is that an incorrect interpretation? And
 [12] if so, what is the correct interpretation? Why are
 [13] those words written there?
 [14] **A:** He was under the impression that this
 [15] would still be below the normal year-to-year
 [16] variation. And we discussed it and thought the best
 [17] way to adjust it is to take out reference to any kind
 [18] of number. So we deleted my sentence — my part of
 [19] the sentence and we deleted his comment.
 [20] **Q:** Doesn't it show that he actually struck
 [21] the word "well" in that third line of that paragraph?
 [22] **A:** It does show that, yes.
 [23] **Q:** Isn't it true in the published version
 [24] that the word "well" isn't struck, that it exists in

[1] the document?
 [2] **A:** I'd have to check that.
 [3] **MR. BLUTE:** It speaks for itself.
 [4] **Q:** Would you agree, based on what you've just
 [5] said, that it was understood between you and Dr.
 [6] Revelle that the words "of less than one degree
 [7] Celsius: well" would be struck from the document?
 [8] **A:** I don't recall that. But I'm quite
 [9] willing, as it were, to strike the word "well." So
 [10] if it does appear in the final version, it might well
 [11] have been a mistake.
 [12] **Q:** Might it not have been a mistake if
 [13] Dr. Revelle believed that one to three degrees was
 [14] the most likely average warming in the next century,
 [15] to have the words "below the normal year-to-year
 [16] variation"?
 [17] **A:** Well, I don't think that's correct.
 [18] That's just my point, that if you accept the fact
 [19] that the average warming is below the normal
 [20] year-to-year variation, which he did, then you cannot
 [21] specify a warming of one to three degrees. It has to
 [22] be less than one degree.
 [23] **Q:** Did you and Dr. Revelle discuss at that
 [24] point what the number was for the normal year-to-year

[1] **A:** I think we did.
 [2] **Q:** You remember that clearly?
 [3] **A:** Yes, I think I said to him that a
 [4] three-degree increase would certainly stick out about
 [5] the normal year-to-year variation. And he accepted
 [6] that.
 [7] **Q:** If Dr. Revelle's closest colleagues
 [8] believe that Roger Revelle — Roger Revelle's view
 [9] was that the most likely warming in the next century
 [10] would be one to three degrees, then you're saying
 [11] they're mistaken?
 [12] **MR. BLUTE:** Objection. You can
 [13] answer.
 [14] **A:** Either that, either they're mistaken, or
 [15] they misinformed you, or I was able to convince him
 [16] otherwise. Revelle is not an expert on mathematical
 [17] models. And these numbers are derived from
 [18] mathematical models.
 [19] **Q:** Is it fair to say that it was your belief
 [20] in March of 1990 that a modest average warming in the
 [21] next century would be one to two degrees Celsius?
 [22] **A:** Yes, at that time that was my belief.
 [23] **Q:** And what influenced your belief between
 [24] that time and the writing of this draft?

[1] variation?
 [2] **A:** I think we tried to estimate it.
 [3] **Q:** What number did you come up with?
 [4] **A:** I told him it would have to be less than
 [5] one degree. And he agreed but suggested that we also
 [6] take out my wording, which is "of less than one
 [7] degree." So we left it kind of open. This is quite
 [8] usual when people collaborate and try to achieve a
 [9] compromise.
 [10] **Q:** Is it possible that you got to this point
 [11] and you understood Dr. Revelle's belief was that a
 [12] likely warming would be one to three degrees
 [13] indicated by this comment written in the margin, and
 [14] that then you were able to move on by you striking
 [15] the language "of less than one degree Celsius," your
 [16] agreeing to strike that language?
 [17] **A:** Well, I certainly agreed to it, yes.
 [18] **Q:** Is it possible that at that time you
 [19] didn't discuss and didn't estimate the normal
 [20] year-to-year variation?
 [21] **MR. BLUTE:** He just testified that he
 [22] did.
 [23] **MR. LANCASTER:** Yeah, I just want to
 [24] know if it's possible that he didn't.

[1] **A:** I would say a closer look at the data on
 [2] temperature changes and a realization that the models
 [3] are really much worse than I had thought. This was
 [4] based on discussions with a number of experts whose
 [5] names I've already mentioned.
 [6] **Q:** Okay. Would you agree that the following
 [7] eight scientists were cited by Dr. Revelle in his
 [8] AAAS talk: Dr. Starr, Dr. Searl, Dr. John Martin,
 [9] Dr. Wallace Broecker, Dr. Paul Waggoner, Dr. Walter
 [10] Munk, Dr. Taro Takahashi, and Dr. Inez Fung?
 [11] **A:** Yes.
 [12] **Q:** Do you have that exhibit in front of you?
 [13] **A:** Yes.
 [14] **MR. BLUTE:** If you represent those
 [15] are the people.
 [16] **MR. LANCASTER:** That sounds right.
 [17] **A:** I couldn't find Munk's name before. But
 [18] if it's there, then I'm glad to know that.
 [19] **Q:** Of these eight scientists, would you agree
 [20] that the Cosmos article you drafted only referred to
 [21] two, namely Dr. Munk and Dr. Martin?
 [22] **A:** Yes.
 [23] **Q:** Yet, you had the AAAS talk before you?
 [24] **A:** Yes. Mm-hmm.

[1] Q: Is there any reason why the work of Starr
 [2] and Searl cited by Dr. Revelle in the AAAS talk
 [3] wasn't carried into the Cosmos article?
 [4] A: It was, through the co-authorship of
 [5] Starr.
 [6] Q: But no mention of Dr. Searl?
 [7] A: No mention of Dr. Searl, that's correct.
 [8] Q: Isn't it true that, in fact, the topic,
 [9] the whole discussion in the AAAS talk regarding
 [10] Drs. Starr and Searl's work, is not in the Cosmos
 [11] article?
 [12] A: Starr had, of course, a choice of what he
 [13] wanted to put in. And had he wanted to put that in,
 [14] he would have. The article, as you know, had become
 [15] too long. And one of the first things we did between
 [16] Draft 1 and 2 was to cut severely.
 [17] Q: Isn't it true that — or do you remember
 [18] writing in a letter that you and Dr. Starr
 [19] co-authored this article based on Dr. Revelle's AAAS
 [20] talk because Revelle cited Starr and Searl's work in
 [21] his talk? — I'll withdraw that.
 [22] Did you not use as justification in
 [23] defense for Revelle's co-authorship Revelle's
 [24] citation of Starr and Searl's work in the AAAS talk?

[1] MR. BLUTE: Is there a particular
 [2] place you want to direct him to?
 [3] Q: Do you remember writing that?
 [4] A: I object to the use of the word "defense."
 [5] Q: I withdraw the word "defense." Predicate.
 [6] Let's replace it with predicate. Do you remember
 [7] predicating an explanation —
 [8] A: Yes, I thought that Revelle's referring to
 [9] Starr in his paper, in this very prominent way, would
 [10] make our triple collaboration a very natural one.
 [11] Q: But it's true that the work of Starr and
 [12] Searl isn't referred to in the Cosmos article at all,
 [13] isn't that true?
 [14] A: Not by name.
 [15] Q: Can you show me how it does come through,
 [16] with Exhibit 5, the AAAS talk, paragraphs two and
 [17] three on page two?
 [18] A: Yes.
 [19] (Witness reviewing document.)
 [20] A: He refers here to a specific scenario that
 [21] Starr and Searl have constructed. It's very
 [22] detailed. It uses lots of numbers.
 [23] When I wrote the draft, I judged that it
 [24] would not be wise to include in a general article

[1] this kind of detail.
 [2] Q: Okay. Did not Dr. Revelle say in his AAAS
 [3] talk, "It may be more difficult to help forest trees
 [4] and other ecological components to adapt, because the
 [5] expected climate change will happen 50 to 100 times
 [6] more rapidly than the changes at the end of the last
 [7] ice age"?
 [8] MR. BLUTE: Just point out where it
 [9] is.
 [10] Q: I believe it's page four, the end of the
 [11] second paragraph.
 [12] (Witness reviewing document.)
 [13] A: Yes, he said that.
 [14] Q: Is this consistent, in your view, with the
 [15] Cosmos article saying, "Keep in mind also that
 [16] year-to-year changes at any location are far greater
 [17] and more rapid than what might be expected from
 [18] greenhouse warming; and nature, crops, and people are
 [19] already adapted to such changes"? That's — you can
 [20] find it under "Impacts," Galley: 004, second
 [21] paragraph down.
 [22] A: That is — that is partly correct. But I
 [23] also say —
 [24] Q: I asked if it was consistent or not. Are

[1] these statements consistent?
 [2] A: It is consistent, yes.
 [3] Q: How is it consistent that Dr. Revelle says
 [4] in his AAAS talk that it may be more difficult to
 [5] help forest trees and other ecological components to
 [6] adapt, when the Cosmos draft says, keep in mind that
 [7] nature is already adapted?
 [8] A: It depends on which biota you're referring
 [9] to. If you're referring to biota that had a lifetime
 [10] of a few years, then clearly there's no problem.
 [11] If you're referring to biota that had a
 [12] lifetime, let's say, of 100 years, then there could
 [13] be an adaptation problem. And I refer to it in the
 [14] Cosmos article, in my first draft, in order to give a
 [15] balanced picture, because not all the impact —
 [16] there's a variety of impacts over a climate change,
 [17] some good, some bad.
 [18] Q: Why did that balance picture get taken
 [19] out?
 [20] A: It didn't.
 [21] Q: Where is it in the Cosmos article?
 [22] A: I'll refer you to it. I published a
 [23] research paper in the late '70s pointing out the fact
 [24] that rapid changes in climate that is more rapid than

[1] changes of the soil can lead to adaptation problems.
 [2] And that's referred to at the end of Galley: 003 and
 [3] beginning of Galley: 004. I didn't reference the
 [4] fact that this is my work.
 [5] **Q:** Are you referring to the sentence, "Even
 [6] though crop varieties are available that can benefit
 [7] from higher temperatures with either more or less
 [8] moisture, the soils themselves may not be able to
 [9] adjust that quickly?"
 [10] **A:** Yes.
 [11] **Q:** Does that refer at all to forest trees?
 [12] **A:** Yes.
 [13] **Q:** Although you talk about crop varieties in
 [14] the beginning of the sentence, a reader, to get your
 [15] meaning correctly, would understand that the second
 [16] half of the sentence, talking about soils adjusting,
 [17] would be soils under forest trees?
 [18] **A:** Yes. Mm-hmm.
 [19] **Q:** So you maintain that the statement nature
 [20] has already adapted to such changes is consistent
 [21] with Revelle's warning it may be difficult to help
 [22] forest trees to adapt?
 [23] **A:** Yes, that's right.
 [24] **Q:** Referring again to the AAAS text,

[1] planting aren't based on Revelle's view expressed in
 [2] the AAAS talk?
 [3] **A:** Revelle didn't discuss the economics
 [4] anywhere. He was discussing about the theoretical
 [5] possibility of sequestering carbon.
 [6] **Q:** Okay.
 [7] **A:** And I agree with him.
 [8] **MR. LANCASTER:** Referring to the
 [9] published Cosmos article, I think this may require
 [10] another exhibit, if we could mark that as Exhibit
 [11] whatever we're on.
 [12] (Exhibit 12 marked
 [13] for identification.)
 [14] **Q:** Do you recognize this as the final version
 [15] published in the Cosmos Journal?
 [16] **A:** I do.
 [17] **Q:** And do you know the date of publication?
 [18] **A:** Approximately April 1991.
 [19] **Q:** Sometime in April. It was not published
 [20] in February?
 [21] **A:** No. It could have been as early as March.
 [22] **Q:** To revisit the "Impacts" sentence one more
 [23] time on — I guess it's shown here as page 31 of
 [24] Cosmos — just to verify what the quotation is,

[1] Exhibit 7, —
 [2] **A:** 5.
 [3] **Q:** — 5, thank you, Dr. Revelle states,
 [4] "Planting trees in the United States would be
 [5] worthwhile." Did that point get carried through to
 [6] the Cosmos article?
 [7] **A:** That is his point five on page one, which
 [8] reads, "Sequestration of carbon in trees and other
 [9] long-lived land plants."
 [10] **Q:** Right, which he explains in the text at
 [11] page three, last paragraph.
 [12] (Witness reviewing document.)
 [13] **A:** Yes, under "Direct Interventions,"
 [14] **Galley:** 005 of Exhibit 1, I say, "Rebuilding forests
 [15] is widely talked about, but may not be
 [16] cost-effective..."
 [17] By this, I mean it is possible to do this.
 [18] It will do exactly as Revelle has suggested, of
 [19] course, but it may cost a great deal of money.
 [20] **Q:** Isn't it true elsewhere in the Cosmos
 [21] article you say, "Tree planting would have to cover
 [22] Australia and is uneconomic"?
 [23] **A:** Yes.
 [24] **Q:** So certainly, those statements about tree

[1] "Assume what we regard as the most likely outcome: A
 [2] modest average warming in the next century - well
 [3] below the normal year-to-year variation - and mostly
 [4] at high latitudes and in the winter."
 [5] Now, you're aware, are you not, that the
 [6] Intergovernmental Panel on Climate Change has stated
 [7] its estimate of the most likely warming would be
 [8] between 1.5 degrees Celsius and 4.5 degrees Celsius
 [9] in the next century?
 [10] **A:** I'm aware of that. Excuse me, that's
 [11] incorrect.
 [12] **Q:** Please correct me.
 [13] **A:** Before doubling of CO2, whenever that
 [14] takes place.
 [15] **Q:** Would that be for a doubling of CO2 or for
 [16] an equivalent doubling of CO2?
 [17] **A:** Equivalent doubling.
 [18] **Q:** Would that be for an equivalent doubling
 [19] of CO2 at equilibrium conditions or transient
 [20] conditions?
 [21] **A:** Equilibrium conditions.
 [22] **Q:** Would you accept that it is the contention
 [23] of the Intergovernmental Panel on Climate Change that
 [24] it's most likely that this condition will exist

[1] before the end of the next century?
 [2] **A:** Intergovernmental Panel on Climate Change
 [3] has produced a variety of scenarios. Its basic
 [4] scenario has proved to be unreliable and quite
 [5] unacceptable. They've modified it at least once
 [6] since then. And I believe it is still very doubtful
 [7] whether their scenario will hold up. But be this as
 [8] it may, the temperature numbers that you've mentioned
 [9] are the ones that they have published.
 [10] **Q:** Do you know — strike that.
 [11] Do you think that Roger Revelle was aware
 [12] of the IPCC report?
 [13] **MR. BLUTE:** Objection. If you know.
 [14] **MR. LANCASTER:** Do you want me to
 [15] rephrase that?
 [16] **Q:** Do you have any knowledge —
 [17] **MR. BLUTE:** If he has knowledge. I
 [18] don't want him guessing as to what Roger Revelle
 [19] might have read somewhere sometime.
 [20] **MR. LANCASTER:** That's fine.
 [21] **BY MR. LANCASTER:**
 [22] **Q:** Let's ask it this way: Did you and
 [23] Dr. Revelle ever discuss the IPCC report?
 [24] **A:** No.

[1] **Q:** Do you have any knowledge — is there any
 [2] reason for you to believe that Dr. Revelle disputed
 [3] the IPCC report?
 [4] **A:** I don't think he could have. It wasn't
 [5] published.
 [6] **Q:** Previous to the publication of the IPCC
 [7] report, were copies distributed to numerous
 [8] scientists?
 [9] **A:** Perhaps they were to those people who
 [10] worked on it. Speaking for myself, I did not get a
 [11] copy until it was published.
 [12] **Q:** Do you think it is possible that Dr.
 [13] Revelle saw a copy before it was published?
 [14] **A:** I have no basis for speculating on that.
 [15] **Q:** Would it surprise you if you learned that
 [16] he had reviewed a copy of the IPCC report before it
 [17] was published?
 [18] **A:** No, it would not surprise me.
 [19] **Q:** All right. Would you agree with me that
 [20] the modest average warming in the next century that
 [21] you and your co-authors considered to be the most
 [22] likely outcome in the Cosmos article would have to be
 [23] well below 0.5 degrees Celsius in order to be well
 [24] below the normal year-to-year variation?

[1] **A:** We decided not to put a number on it. But
 [2] it certainly would be a lower figure than what the
 [3] IPCC had published.
 [4] **Q:** It would be a very dramatically different
 [5] figure, would it not?
 [6] **A:** If — yes.
 [7] **Q:** Yet, you believe that that statement would
 [8] be accurate and truthful and objective?
 [9] **A:** Yes, I do. And I believe my co-authors
 [10] would subscribe to it.
 [11] **Q:** Referring to the comment in the galley
 [12] proof in Dr. Revelle's handwriting, bottom of the
 [13] first page, Exhibit 1, under the section "The
 [14] Scientific Base," can you say what that comment says?
 [15] **A:** Yes.
 [16] **Q:** Can you read that?
 [17] **A:** Yes, I can.
 [18] **Q:** Read it, please.
 [19] **A:** The complete sentence says, "The models
 [20] used to calculate future climate" — and those are
 [21] the ones, I'd interject now, on which the IPCC
 [22] estimates of 1.5 to 4.5 are based, which we do not
 [23] accept — "are not yet good enough because the
 [24] climate-balancing processes are not sufficiently

[1] understood," to which Roger added in his own
 [2] handwriting, "Nor would they ever be good enough
 [3] until we gain more understanding of climate processes
 [4] through observations and experiments."
 [5] **Q:** Did you leave a word out there that's
 [6] difficult to read?
 [7] **A:** Yes.
 [8] **Q:** Could that word be "careful," "through
 [9] careful observations and experiments"?
 [10] **A:** Yes, thank you.
 [11] **Q:** Referring to the Cosmos article, is that
 [12] comment by Revelle written?
 [13] **A:** Yes, after we had a discussion on it, and
 [14] I had to persuade him, persuade Roger Revelle, to
 [15] modify his language and to soften it from his
 [16] position that the models would never be good enough
 [17] to make valid predictions, to the words "nor are they
 [18] likely to be good enough," which is a much softer way
 [19] of putting it to explain.
 [20] In this discussion with Roger, I
 [21] discovered, again, as I knew, of course, from past
 [22] discussions, that he had no faith whatsoever in these
 [23] mathematical models. And this is why I believe that
 [24] he would never have accepted, nor would he accept any

[1] of the numbers that the IPCC produced, nor would he
 [2] give any weight to any of the numbers that
 [3] mathematical models came up with. And he said so in
 [4] his own words and his own handwriting, not only here,
 [5] but also on other occasions.
 [6] **Q:** Do you know if Dr. Revelle placed any
 [7] credence in the forecast of Dr. Arrhenius in the
 [8] 1900s?
 [9] **A:** I don't know of anyone who does.
 [10] **Q:** Referring to the "Nitrous Oxide"
 [11] subheading under "Greenhouse Gases" on the second
 [12] page of the text, Dr. Revelle's comment, "And
 [13] denitrifying process in the ocean," —
 [14] **A:** Yes.
 [15] **Q:** — did that comment make it into the
 [16] Cosmos article?
 [17] **A:** No, it did not.
 [18] **Q:** Can you say why not?
 [19] **A:** Partly because he didn't feel it was
 [20] necessary after we talked about it. And as you can
 [21] see, he had added a question mark originally when he
 [22] made the comment — when he wrote the comment and
 [23] added another question mark afterwards. It doesn't
 [24] add — in other words, it doesn't add to the

[1] substance of the discussion.
 [2] **Q:** Can you remember if Dr. Revelle made any
 [3] subsequent comments to you after this day on that
 [4] topic?
 [5] **A:** No, he did not.
 [6] **Q:** Are you certain of that?
 [7] **A:** I think after we finished our discussion
 [8] on this draft and he essentially signed off, I don't
 [9] think we had any more detailed discussions.
 [10] **Q:** And when you say he signed off, what do
 [11] you mean by that? Is his name signed somewhere here?
 [12] **A:** No, when I said he signed off, I mean by
 [13] that we got up and said, "Okay, we've gone through
 [14] the draft." The reason it doesn't make any
 [15] difference is that this bacteria that produced the
 [16] N2O, and while the text here talks about soil, and
 [17] there may also be processes in the ocean, it — it's
 [18] immaterial to the rest of the discussion.
 [19] **Q:** Isn't this whole section under "Greenhouse
 [20] Gases" attempting to inform the reader about sources
 [21] of those gases and uncertainty?
 [22] **A:** Yes. There's always a question as to how
 [23] complete do you want the discussion to be.
 [24] **Q:** Understood. Is it — following up that,

[1] is it fair to say you would always want the
 [2] discussion to be as complete as space permitted?
 [3] **MR. BLUTE:** I object. Go ahead.
 [4] **A:** No, I would want the discussion to be as
 [5] complete as is necessary for the purpose.
 [6] The purpose here is to inform the reader
 [7] sufficiently about the science so he can make some
 [8] judgments about what to do. It doesn't make any
 [9] difference about denitrifying processes in the ocean,
 [10] because there's nothing that can be done about it.
 [11] So while this is interesting information,
 [12] from a scientific point of view, to the average
 [13] reader who reads this article it's of useless
 [14] baggage.
 [15] On the other hand, when we talk about
 [16] methane, in the previous paragraph, preceding
 [17] paragraph, we do talk about the various sources, like
 [18] coal mines, oil field operations, where actions,
 [19] policy actions, can have some effect on sources.
 [20] **Q:** By that argumentation, wouldn't you have
 [21] left out any discussion about water vapor? — I
 [22] withdraw it. It's argumentative.
 [23] Let's move on to page Galley: 004, Dr.
 [24] Revelle's notation next to the fourth paragraph down,

[1] I'll try and read it: "Warming of Antarctic Ocean
 [2] will take a long time because of deep convection."
 [3] **A:** Yes.
 [4] **Q:** Does that match the way you read that?
 [5] **A:** Yes.
 [6] **Q:** Isn't it true that you incorporated that
 [7] remark in the Cosmos article through the words,
 [8] "Modeling results suggest little warming of the
 [9] Antarctic Ocean because the heat is convected to
 [10] deeper levels"?
 [11] **A:** Yes.
 [12] **Q:** Does that convey the same message to the
 [13] reader, do you believe?
 [14] **A:** Yes.
 [15] **Q:** Those are equivalent statements?
 [16] **A:** Yes, I believe so.
 [17] **Q:** In terms of scientific accuracy and
 [18] precision, those are equivalent statements?
 [19] **A:** Well, I think it has to be primarily
 [20] understandable. It has to be to the average reader
 [21] something that he can comprehend.
 [22] **Q:** And an average reader would have trouble
 [23] understanding the warming of the Antarctic Ocean
 [24] would take a long time because of deep convection?

[1] You've made it easier — I'll leave that question.
 [2] **A:** Yes.
 [3] **Q:** You've made it easier to understand this
 [4] concept by saying, "Modeling results suggest little
 [5] warming of the Atlantic Ocean because the heat is
 [6] convected to deeper levels." I'm sorry, there must
 [7] be a typo in what I'm reading. I think "Antarctic."
 [8] Let me check that.
 [9] (Pause.)
 [10] **A:** My copy says "Antarctic."
 [11] **Q:** "Modeling results suggest little warming
 [12] of the Antarctic Ocean because the heat is convected
 [13] to deeper levels."
 [14] **A:** I feel they're equivalent.
 [15] **Q:** Okay. Do you remember, in your letter to
 [16] defendant in 1992, telling defendant that you engaged
 [17] in a spirited rewrite of the Cosmos article in
 [18] Dr. Revelle's office?
 [19] **A:** I remember the word "spirited." I don't
 [20] remember the rest.
 [21] **MR. BLUTE:** Are you representing that
 [22] that's what he said in the letter?
 [23] **MR. LANCASTER:** I'm representing
 [24] that. I believe the language is "culminating in a

[1] spirited exchange."
 [2] **MR. BLUTE:** Let's not play a game,
 [3] not to suggest that you are. But so everything is
 [4] clear, why don't we actually get the letter. I
 [5] didn't mean to suggest you were playing a game.
 [6] Sorry.
 [7] (Discussion off the record.)
 [8] (Exhibit 13 marked
 [9] for identification.)
 [10] **A:** He can change, yes. Yes, absolutely
 [11] correct.
 [12] **Q:** "Roger and I" — I'm quoting — "had
 [13] spirited exchanges about our Cosmos paper culminating
 [14] in a detailed rewrite for the final draft in February
 [15] 1991 when I was in his office."
 [16] **A:** Yes.
 [17] **Q:** Were your spirited exchanges previous to
 [18] this detailed rewrite, or did they occur on that day?
 [19] **A:** On that day.
 [20] **Q:** 6 February.
 [21] **A:** On that day, yes. They were simultaneous.
 [22] **Q:** And is it your position that the
 [23] modifications between the galley proof and the Cosmos
 [24] Journal article constitute a detailed rewrite?

[1] **A:** Yes, that's what I had in mind.
 [2] **Q:** Would you say that this rewrite was any
 [3] substantial change in the article?
 [4] **A:** No, I don't think so. But it did evoke a
 [5] spirited discussion.
 [6] **Q:** I understand. If I represent to you that
 [7] the amount of text altered owing to Dr. Revelle's
 [8] review on 6 February comprised less than one
 [9] hundredth of the Cosmos text, you would still contend
 [10] that this was a rewrite?
 [11] **A:** Yes, we rewrote some parts of it.
 [12] **Q:** Okay. Moving along rapidly, let me ask
 [13] you, coming back to the "Impacts of Climate Change"
 [14] and the comment regarding what the authors expected
 [15] as global warming in the next century, why, if
 [16] Dr. Revelle believed in your conversation with him
 [17] that global warming in the next century would be less
 [18] than one degree Celsius, well below the normal
 [19] year-to-year variation — why would he have objected
 [20] to leaving that phrase in, "less than one degree
 [21] Celsius"? Why cross that out, if he believes that
 [22] the expected warming in the next century would be
 [23] below one degree Celsius?
 [24] **MR. BLUTE:** I object. Go ahead.

[1] **A:** We had no access to data in his office. I
 [2] believe that he thought that the year-to-year
 [3] variation was larger, much larger, than it really is.
 [4] He seemed to be under the impression, as
 [5] best I recall now, that the year-to-year variation is
 [6] really quite large. I mentioned to him that I didn't
 [7] think so, and that it was smaller, but it was less
 [8] than one degree. And so we compromised by leaving
 [9] out any reference to any number.
 [10] **Q:** Why was a compromise necessary if he
 [11] believed less than one degree Celsius? Why would any
 [12] compromise be necessary?
 [13] **A:** Well, he didn't have the time nor
 [14] inclination apparently to verify my statements. He
 [15] seemed to think that the year-to-year variation was
 [16] large, much larger, and we couldn't settle the matter
 [17] in sitting next to each other at the table.
 [18] **Q:** Do you think he was tired at this point?
 [19] **A:** He didn't seem to be tired.
 [20] **Q:** How many minutes into your meeting were
 [21] you at that point?
 [22] **A:** Well, it's hard to say. I can't answer
 [23] this question after two and a half years.
 [24] **Q:** Do you remember as you approached this

[1] article with Dr. Revelle —
 [2] **A:** Halfway through, perhaps.
 [3] **Q:** Would he have sat down —
 [4] **A:** We didn't jump around. We went through
 [5] these.
 [6] **Q:** You started at the beginning?
 [7] **A:** Yeah, we started at the beginning.
 [8] **Q:** And do you remember that it was Dr.
 [9] Revelle's pattern to work carefully and slowly from
 [10] the beginning?
 [11] **A:** Yes.
 [12] **Q:** Is it likely that to cover this first page
 [13] here it could easily have taken half an hour?
 [14] **A:** No, I don't think it was that long.
 [15] Although, we did spend a good bit of time on his
 [16] additions, his last sentence, in which I tried to
 [17] persuade him to tone down his skepticism about the
 [18] mathematical models and about the predictions of
 [19] future warming.
 [20] **Q:** Would it surprise you to know that
 [21] Dr. Revelle taught seminars in which he discussed the
 [22] global temperature record?
 [23] **A:** No, it doesn't surprise me.
 [24] **Q:** Yet, you represent here that he had an

[1] **Q:** What did he choose?
 [2] **A:** If you're correct, then he would have
 [3] asked that we abolish the statement that the expected
 [4] temperature increase is less than the year-to-year
 [5] variation. That's what he should have done. He
 [6] didn't. He accepted that.
 [7] **Q:** Is it fair for me to say that you were
 [8] quite happy to let him accept that?
 [9] **A:** My feeling was the fewer changes the
 [10] better. I was at this point glad to turn the article
 [11] back to the editor and let him take care of it.
 [12] **Q:** Didn't you realize, Dr. Singer, that
 [13] leaving that statement stand the way it was would
 [14] essentially send the message to the reader that
 [15] Dr. Revelle and Dr. Starr and Dr. Singer believed the
 [16] likely warming in the next century would be well
 [17] below 0.5 degrees centigrade?
 [18] **A:** We believe that the warming will be very
 [19] small, much smaller than the IPCC, even the lowest
 [20] IPCC number. This belief is firmly based on
 [21] observations that we had.
 [22] **Q:** Did Dr. Revelle believe that the warming
 [23] in the next century, the most likely global average
 [24] warming in the next century, would be well below 0.5

[1] inaccurate knowledge, at least at this time
 [2] discussing with you, what the normal year-to-year
 [3] variation was.
 [4] **A:** That was my impression, yes.
 [5] **Q:** Is it possible that you allowed him to
 [6] believe that — withdraw that.
 [7] Is it possible that your description to
 [8] Dr. Revelle of normal year-to-year variation was
 [9] significantly higher than the true normal
 [10] year-to-year variation?
 [11] **MR. BLUTE:** Objection.
 [12] **A:** That doesn't make sense. This could not
 [13] have happened.
 [14] **Q:** Take the hypothetical that the true
 [15] year-to-year variation, the normal year-to-year
 [16] variation, is less than .2 degrees Celsius.
 [17] If that were true, then would a
 [18] representation to Dr. Revelle that the normal
 [19] year-to-year variation is just less than one degree
 [20] Celsius — that would be an inaccurate
 [21] representation, wouldn't it?
 [22] **A:** The reason I said it doesn't make sense is
 [23] that he chose a much higher value for year-to-year
 [24] variation. You see —

[1] degrees Celsius; yes or no?
 [2] **MR. BLUTE:** I object to that. You
 [3] can answer.
 [4] **A:** We had a discussion on this matter. I
 [5] tried to persuade him that the warming would be less
 [6] than one degree. He wasn't sure what it would be.
 [7] We then decided to leave out any reference to the
 [8] expected warming, any numerical reference.
 [9] **Q:** Was it not clear to you that leaving the
 [10] sentence the way it was would allow the meaning to be
 [11] carried that the expected warming, the most likely
 [12] outcome, would be less — would be well below 0.5
 [13] degrees centigrade? Wasn't it clear to you then as
 [14] it is now that that's what the meaning was?
 [15] **MR. BLUTE:** I object to that, because
 [16] I think the testimony has been that both Dr. Revelle
 [17] and Dr. Singer had a disagreement over what the
 [18] year-to-year global warming increase would be.
 [19] So when you say "Wasn't that what it
 [20] meant?" it was left out. I don't understand. It
 [21] wasn't —
 [22] **MR. LANCASTER:** I think — let's go
 [23] off the record.
 [24] (Discussion off the record.)

[1] **MR. BLUTE:** I'll withdraw my
 [2] objection. Ask another question.
 [3] **MR. LANCASTER:** I'd like to go, I
 [4] believe, two questions back and reask that question
 [5] to get a yes or a no.
 [6] (Question read.)
 [7] **BY MR. LANCASTER:**
 [8] **Q:** Okay. Let's ask that.
 [9] **A:** Well, your question is premised on the
 [10] supposition that your analysis and your
 [11] representation of Jones' data is correct. We argued
 [12] about it this morning.
 [13] I have no basis of judging whether your
 [14] presentation is sound. I would be happy to submit it
 [15] to someone whom I consider an expert. So I'm not
 [16] willing to commit myself here, nor do I have the
 [17] data, on the magnitude of the year-to-year variation.
 [18] I simply can't answer your question in the way in
 [19] which you've phrased it.
 [20] **Q:** Do you think this disagreement about
 [21] whether the expected warming in the next century is
 [22] less than or greater than one degree Celsius is an
 [23] important issue?
 [24] **A:** Only if you will spell out by how much.

[1] Certainly it is immaterial whether it is .9 degrees
 [2] or 1.1 degrees. It is very material whether it is
 [3] less than one, that is to say, .8, .9 degrees, even a
 [4] little bit less than one, or whether it is between
 [5] three and five degrees. Then it would be a very
 [6] material difference.
 [7] **Q:** Is it an important issue between well
 [8] below 0.5 degrees versus one to three degrees?
 [9] **A:** In my view, estimating impacts of climate
 [10] change on various human activities, as best as I can
 [11] estimate those, the difference between .5 degrees and
 [12] one degree is not material.
 [13] **Q:** What expertise, Dr. Singer, do you have
 [14] for estimating impacts on human society from global
 [15] warming?
 [16] **A:** We have historical data, which I have
 [17] read. And we have publications by people who have
 [18] devoted time to the subject, which I have also looked
 [19] at.
 [20] **Q:** Which people?
 [21] **A:** To mention a specific person, John Eddy,
 [22] an expert on solar influences on climate, has written
 [23] about historical climate changes and their effects.
 [24] **Q:** Has John Eddy analyzed impacts on human

[1] society with potential climate change scenarios? Has
 [2] he conducted an impact assessment?
 [3] **A:** You mean for the future?
 [4] **Q:** For any potential global change scenario.
 [5] **A:** Not that I'm aware of.
 [6] **Q:** Have you conducted research that leads you
 [7] to draw a conclusion about potential impacts? Have
 [8] you conducted any impact assessment research
 [9] yourself?
 [10] **A:** If you mean have I been funded to carry on
 [11] such a project, the answer is no.
 [12] **Q:** Isn't it true, Dr. Singer, that there has
 [13] yet to be carried out impact assessment research for
 [14] global warming?
 [15] **A:** The answer is yes and no. Let me say that
 [16] a lot of money has been spent by people who have
 [17] claimed to have carried out such impact research.
 [18] **Q:** Which people?
 [19] **A:** I cannot give you their names. But —
 [20] **Q:** Do you know of these people?
 [21] **A:** The reports are available from the
 [22] Environmental Protection Agency and from the
 [23] Department of Energy. I regard such studies as
 [24] rather speculative, because the assumptions that have

[1] gone into these studies are immense.
 [2] **Q:** So you would agree that there are no
 [3] conclusive reliable data for what the impacts of a
 [4] global warming in the next century could be?
 [5] **A:** No.
 [6] **Q:** Then how can you conclude —
 [7] **MR. BLUTE:** Let him finish.
 [8] **A:** I think you phrased it improperly. I have
 [9] concluded that the impacts would be minor, of little
 [10] consequence, in our society, in our society, which is
 [11] an industrial society.
 [12] **Q:** What evidence do you have to form a
 [13] conclusion? You've admitted that you haven't done
 [14] this research.
 [15] **A:** Well, other people have and have published
 [16] it.
 [17] **Q:** You just told me that you don't believe
 [18] any complete or reliable studies have been done.
 [19] **A:** I cannot say that they are complete. I
 [20] cannot say that they're reliable. I can only say
 [21] that they have been published. Many people will
 [22] believe them.
 [23] **Q:** So you maintain that impact studies have
 [24] been published that are not comprehensive or