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# Transcript of Philip Botham, Ph.D., Corporate Designee

**Date:** September 17, 2024
**Case:** Paraquat Products Liability Litigation, In Re:

**Planet Depos**
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PHILADELPHIA COUNTY COURT OF COMMON PLEAS

TRIAL DIVISION

IN RE: PARAQUAT PRODUCTS LIABILITY LITIGATION,
This Document Relates to All Actions
Case No. 220500559

**CONFIDENTIAL**

Videotaped deposition of

DEFENDANT SYNGENTA

by and through its corporate representative

DR. PHILIP BOTHAM

Volume I
(pages 1 - 338)

London, England
United Kingdom

Tuesday, September 17, 2024

Job No. 553162

Reported stenographically by:
LEAH M. WILLERSDORF, RMR, CRR, FBIVR, ACR, QRR2, CLR

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Tuesday, September 17, 2024

09:24 a.m. to 5:59 p.m.
(British Summer Time)

VOLUME I of the videotaped deposition of SYNGENTA, by and through its corporate representative DR. PHILIP BOTHAM, held at the offices of Kirkland & Ellis LLP, 30 St. Mary Axe, London EC3A 8AF, England, United Kingdom, before Leah M. Willersdorf, Registered Merit Reporter and Certified Realtime Reporter, both with the US National Court Reporters Association, and Fellow of the British Institute of Verbatim Reporters, Accredited Court Reporter, Qualified Realtime Reporter (Level 2), and Certified LiveNote Reporter.

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| Jeremy Dineen | - | Videographer |
| Linda Fleet | - | Remote technician |

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(On the record at 09:24 a.m.)

THE VIDEOGRAPHER: Here begins media number 1 in the videotaped deposition of Philip Botham, In Re: Paraquat Products Liability Litigation, in the Philadelphia County Court of Common Pleas.

Today's date is September 17, 2024. The time on the video monitor is 09:25 a.m.

The videographer today is Jeremy Dineen, representing Planet Depos.

Would counsel please voice-identify themselves and state whom they represent.

MR. DICKENS: David Dickens on behalf of the plaintiffs.

MR. TRAVERS: Jeffrey Travers on behalf of the plaintiffs.

MR. NARESH: Ragan Naresh on behalf of Syngenta.

MR. SMITH: Mark Smith, Syngenta.

MS. LAHASZOW: Kristin Lahaszow of Jones Day on behalf of defendant Chevron.

MS. BOSTON: Christina Boston from Troutman Pepper on behalf of FMC Corporation.

THE VIDEOGRAPHER: The court reporter today is Leah Willersdorf representing Planet Depos. Would the reporter please swear in the witness.

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THE STENOGRAPHER: Dr. Botham -- oh, sorry, before I do that.

Good morning. My name is Leah Willersdorf. I am a Registered Merit Reporter and a Certified Realtime Reporter.

Will counsel please stipulate that, in lieu of formally swearing in the witness, the reporter will instead ask the witness to acknowledge that their testimony will be true under the penalties of perjury, that counsel will not object to the admissibility of the transcript based on proceeding in this way, and that the witness has verified that he is, in fact, Dr. Botham.

MR. DICKENS: So stipulate.

MR. NARESH: Agreed.

THE STENOGRAPHER: Thank you.

Dr. Botham, do you hereby acknowledge that your testimony will be true under the penalties of perjury?

THE WITNESS: I do.

THE STENOGRAPHER: Thank you. Thank you, Counsel.

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DR. PHILIP BOTHAM,
having first agreed to tell the truth
under penalty of perjury, was examined
and testified as follows:

EXAMINATION ON BEHALF OF PLAINTIFFS

BY MR. DICKENS:

Q. Good morning, Dr. Botham.

**A. Good morning.**

Q. Can you please state your name for the record.

**A. Philip Botham.**

Q. And who is your current employer?

**A. Syngenta.**

Q. And I understand you've been put forward today as a witness to testify on behalf of Syngenta; is that your understanding?

**A. That's correct.**

Q. And to testify with respect to specific topics?

**A. Yes.**

Q. Have you had an opportunity to review those topics prior to today's deposition?

**A. Yes, I have.**

Q. And do you understand that in testifying for Syngenta on the designated topics, you're required

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to answer not based on information known to you personally, but also based on information known or reasonably available to Syngenta as a corporation?

**A. That's my understanding, yes.**

Q. And you understand that the matters you'll be testifying to for Syngenta includes actions and knowledge of Syngenta corporation as well as its predecessors, including AstraZeneca, Zeneca, Ciba-Geigy, Imperial Chemical Industries and its predecessors?

**A. Yes, I do understand.**

Q. And did you take that into account when preparing to testify today?

**A. Yes, I did.**

Q. What did you do to prepare for today's deposition?

**A. Well, starting back in July, I've had a number of discussions with external counsel, Mr. Naresh and his colleagues, with also Mr. Smith, and looked at a large range of documents, which I think have provided the topics that are of interest to yourselves in this case, and I've also had some conversations with some other internal colleagues to help with making sure that I understand some of that information.**

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Q. Do you have an understanding of what these lawsuits are about?

**A. I think I do.**

Q. Okay. What's your understanding?

**A. Well, the -- my understanding is that these lawsuits are to represent individuals who have unfortunately developed Parkinson's disease and where it is believed that that disease may have been caused by their prior exposure to paraquat.**

Q. Do you believe that your preparation has given you sufficient information to testify on behalf of Syngenta here today?

**A. As much as I possibly can.**

Q. You mentioned a review of documents. Were those documents that were specifically identified in the Notice of Deposition?

**A. Yes.**

Q. Did you review any additional documents outside of what was specified in that notice?

**A. A few, but the majority were those that were provided in the notice.**

Q. Now, you mentioned, other than counsel, you spoke to some colleagues. Which colleagues did you speak with?

**A. I spoke to my colleague in the United**

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**States, Monty Dixon; a colleague in Basel, Ian Wheals; and another colleague in Basel, Clive Campbell.**
**That's the list.**
Q. And what was the purpose of reaching out to Monty Dixon?
**A. There were some specific questions about the company's interactions in the past with the US Environmental Protection Agency and I needed to understand, because he's been involved in those interactions, a little more about that. There were some issues around the formulations of paraquat that were marketed in the United States; I needed to know a little bit more about that.**
**With regard to -- yes, and I think that was the majority of what I spoke to Monty about.**
Q. With respect to the regulations or regulatory matters with respect to the Environmental Protection Agency, what specifically did you discuss with Monty Dixon?
**A. Well, we had a broad discussion about our, I guess you would say our philosophy of the way in which we've interacted with the US EPA over the years, and one or two specific discussions. But it was mostly so that I could be reassured, if you like, about the way in which we had had that relationship**

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**with the regulatory agencies.**
Q. And what was the purpose of reaching out to Ian Wheals?
**A. Ian Wheals was, 20 years ago or more now, the global regulatory manager and also the European regulatory manager for paraquat, and so there were, again, a few very specific documents where his name was on -- and I didn't really know as much about those as I needed to; so I think there were only two or three documents where we just needed to check the detail.**
Q. And those were specific documents Ian Wheals was mentioned in or --
**A. Yes.**
Q. Is Ian Wheals still an employee at Syngenta?
**A. He is.**
Q. What was the purpose of reaching out to Clive Campbell?
**A. Clive Campbell is the chief medical officer for Syngenta and has been for a number of years. So I wanted to discuss with him some detail about one or two documents with respect to the manufacture of paraquat and issues around the safety of the people involved in that manufacture. So that**

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**was the main thing. There were, again, one or two other smaller items.**
Q. And those were the only three colleagues you spoke with for preparation for today's deposition?
**A. Yes, I believe that's right.**
Q. Now, you mentioned you reviewed some other documents other than what was included in the deposition notice. What documents in particular did you review?
**A. Mainly for my own memory, I went back and looked at a few publications on paraquat and Parkinson's disease. I wouldn't be able to name all of them, but, as an example, I looked at a report from an organization called Exponent, and -- because I needed to recall the detail of that. So it was mainly scientific documents and publications.**
Q. What document in particular related to Exponent did you review?
**A. It was their report of a contract that they were involved in, sponsored by the UK government.**
Q. Defra?
**A. Yes, Defra.**
Q. Now, I understand you've been deposed multiple times, correct?
**A. I have.**

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Q. And deposed multiple times as a representative for Syngenta, correct?
**A. That's correct.**
Q. Did you review your prior deposition testimony in preparation for today's deposition?
**A. No, I did not.**
Q. No deposition transcripts from previous depositions at all?
**A. Not of my own. I believe on one occasion I was reminded of one or two little sections of my deposition, but I did not systematically review my own depositions.**
Q. Did you review deposition transcripts of any other Syngenta employees or any other witnesses in this litigation?
**A. I was given access to the depositions of two former Syngenta employees: Dr. Lewis Smith and Dr. Bob Scott.**
Q. Any other depositions?
**A. No, I don't believe so.**
Q. And you reviewed those depositions specifically for preparation for today's deposition?
**A. That's correct.**
Q. Now, I see you brought something here with you today. What did you bring?

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**A. These are some documents which we have put together as, essentially, aide-memoire information that relates to some of the topics that you were interested in. So it's just as an enabler of some of the detailed information that we may require.**

Q. And are those notes that you specifically put together?

**A. I've contributed to some of these. Others have been prepared, for example, by my colleague, Monty Dixon. So subject-matter experts have been involved.**

Q. Okay.

MR. DICKENS: And we'll ask for a copy to mark those as an exhibit to today's deposition.

You're one step ahead of us. We'll go ahead and mark your notes as exhibit --

MR. TRAVERS: Is there another copy or is that it?

MR. NARESH: We just have that one.

MR. DICKENS: Exhibit 1 to today's deposition, and we'll just do the whole compendium.

(Exhibit 1 marked for identification.)

BY MR. DICKENS:

Q. In total, how long -- oh, I'm sorry.

THE STENOGRAPHER: It's okay.

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BY MR. DICKENS:

Q. In total, how long did you prepare for today's deposition?

**A. I started around July 10 and have had regular meetings since then, so two months.**

Q. Do you know roughly how many hours?

**A. I would have to do a mental calculation. I would say 25, 30 hours.**

Q. Now, is your current role at Syngenta still principal science advisor?

**A. It is, yes.**

Q. And you started in that position in 2017, correct?

**A. That's right.**

Q. Has there been any change in your role or job responsibilities as principal science advisor since your last deposition?

**A. No.**

Q. Now, paraquat's herbicidal properties were discovered in 1954; is that right?

**A. Yes.**

Q. And the discovery was made by scientists at ICI, or Imperial Chemical Industries?

**A. That's correct.**

Q. And I will just ask, as we go forward, if I ask a question you don't understand, please let me know and I'll rephrase; is that fair?

**A. Mmm-hmm. Sorry.**

Q. That's a yes?

**A. Yes.**

Q. Okay. And, therefore, if you go ahead and answer, I'll understand that you understood the question and answered fully and truthfully; is that fair?

**A. That's fine.**

Q. Now, scientists at ICI carried out a program of field testing on paraquat in the 1950s before putting paraquat on the market, right?

MR. NARESH: Objection to scope.

What topic?

MR. DICKENS: Topic 4.

MR. NARESH: Do you have the document?

MR. DICKENS: We do.

MR. NARESH: Oh, and can we have the stipulation I think we've done previously, that we don't have to go off the record to resolve objections in order to preserve them?

MR. DICKENS: That's correct, yes.

MR. NARESH: Okay.

MR. DICKENS: I'll go ahead and mark Exhibit 2 for the record.

(Exhibit 2 marked for identification.)

BY MR. DICKENS:

Q. Dr. Botham, I've handed you Exhibit 2 for the record. Is this a document you've seen before?

**A. Yes, I have seen this document.**

Q. And a document you reviewed in preparation for today's deposition?

**A. This is one of the documents that I reviewed, yes.**

Q. And the title of this document is "The Story of Gramoxone from 1947 to 1992," right?

**A. That's correct.**

Q. If you can turn to page 5 of this document -- it actually might be 4 but it looks like a 5 on the bottom there, but it's "History of Paraquat - Part 2 - Recognition" on the top.

Do you see that?

**A. Ah, okay, right. Yeah, I'm there.**

Q. Okay.

Now, this document discusses the history of paraquat, including prior to its coming onto the market, right?

**A. It does.**

Q. Okay. Now, it refers to field testing

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undertaken on paraquat before introducing paraquat to the market, not only in the United States but worldwide, right?

**A. It does, yes.**

Q. Okay. Now, you'd agree that during the time of the initial field tests on paraquat, very little was known about the properties of paraquat, including its toxicity and irritant effects, right?

**A. The majority of the safety tests were certainly conducted shortly after that period.**

Q. During the field tests in the 1950s, the earlier researchers experienced nosebleeds, lost fingernails, irritation to the eyes, right?

**A. That's what the document says, certainly.**

Q. Do you have any reason to dispute that that is correct?

**A. No. It seems plausible.**

Q. Did you do anything to confirm whether or not that was the case?

**A. I did not.**

Q. Do you have any reason to doubt the information mentioned here in this particular document?

**A. I have no reason to doubt it.**

Q. This document states:

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"The full extent of its toxicity and irritant effects were not known."

Do you see that?

**A. Yes.**

Q. "The early researchers had nosebleeds, lost fingernails, suffered conjunctivitis in their eyes before they learned to take the proper precautions."

Right?

**A. That's what it says, yes.**

Q. Now, in the early researching and testing of paraquat, the researchers also found the wings of airplanes used to spray paraquat in the field test being conducted on paraquat in Africa started to crumble away, right?

MR. NARESH: Objection to form.

THE WITNESS: Yes.

BY MR. DICKENS:

Q. And the airplane wings were crumbling because of the corrosive properties of paraquat, right?

**A. That would be my assumption.**

Q. Well, you have an understanding, right, that paraquat is corrosive to airplane wings, right?

**A. I had no understanding of that, that that was the case, until I read this document.**

Q. Do you know of other documents or experience where Syngenta researchers have found that paraquat is corrosive to metal airplane wings?

**A. I have no other background on that subject at all.**

Q. As you said, it doesn't surprise you that that is the case, correct?

**A. Because paraquat does have corrosive properties, so, yes, it is plausible.**

Q. You can put that document aside.

Syngenta's always known that paraquat is an acutely toxic compound, right?

**A. Since the early 1960s, certainly, yes.**

Q. Syngenta knew paraquat was acutely toxic, both from the findings in the field as well as animal studies that the company conducted?

**A. Yes.**

Q. Paraquat's capable of causing toxicity through the generation of reactive oxygen species?

MR. NARESH: Objection; scope.

What's the topic?

THE WITNESS: That is its mode of action --

MR. NARESH: Just wait.

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THE WITNESS: I'm sorry.

MR. NARESH: What's the topic?

I'll also note the last three questions are identical in substance to questions that Dr. Botham has previously been asked at depositions, to which plaintiffs' counsel have access to, which I don't think is consistent with our understanding of this deposition, which was that this deposition would be limited to new questions, not questions previously asked and answered by this witness on the same topics.

MR. DICKENS: Topic 17, I will state for the record, which is stating a foundation or laying a foundation for the questions I will be asking, but I can move on from there.

BY MR. DICKENS:

Q. We can agree that investigation field studies of paraquat began in the 1950s but wasn't sold for commercial use in the United States until 1965, correct?

**A. That's right.**

Q. Early animal studies showed paraquat could have an effect on the central nervous system, right?

**A. There were some documents which suggested that, but I think the interpretation of those studies**

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**is not clear when you look at the actual wording of the documents.**

Q. Are you aware of any early research showing paraquat having an effect on the central nervous system?

MR. NARESH: Objection; scope.

What's the topic?

MR. DICKENS: Topic 5.

I'll go ahead and mark Exhibit 3 for the record.

(Exhibit 3 marked for identification.)

MR. NARESH: This is 5B?

MR. DICKENS: 5B.

BY MR. DICKENS:

Q. I've handed you Exhibit 3. For the record, this is a study produced in Syngenta's production of documents in this litigation.

It's a study that you've seen before, correct, Doctor?

**A. I don't recall having seen this one before.**

Q. It's not a document you recall seeing in preparation for today's deposition?

**A. It certainly, as far as I remember, is not part of the documentation that I was -- have been**

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**looking at over the last two months.**

Q. Okay. Did you review all documents that were cited in the Notice of Deposition in preparation for today's deposition?

**A. I believed I did.**

Q. But this document, you don't recall seeing?

**A. I don't think it was actually part of that, unless I have forgotten that. But I -- no, I don't think I've seen this.**

Q. This study, titled "The effect of Gramoxone on the activity of the nervous system of laboratory animals."

Do you see that?

**A. I do.**

Q. A study from 1971?

**A. Yes.**

Q. Now, you mentioned earlier the studies or early studies with respect to paraquat and the central nervous system. Are the studies that you did review internal Syngenta studies?

**A. No, not always. Some of them are external publications.**

Q. And you're aware that those studies, or early studies in animals, did show signs of possible

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central nervous system effects, right?

**A. "Possible" is the right word, but these were studies done at very high doses, and so it's possible that the interpretation of effects on the central nervous system was incorrect.**

Q. Now, in this particular study -- and do you understand this to be a study conducted by outside researchers?

**A. I assume so. I don't recognize the authors.**

Q. And it's a document that appears to have been published in a journal, right?

**A. Yes.**

MR. NARESH: And, Dr. Botham, if you need a minute with the document, if you don't remember having looked at it, obviously take a minute to look at it, if you'd like to.

THE WITNESS: Okay.

BY MR. DICKENS:

Q. Now, the first paragraph in this study states that:

"The toxic influence of Gramoxone on the activity of the central nervous system is investigated in this work."

Correct?

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**A. That's correct.**

Q. If we can turn to page ending 7815 on the bottom right-hand corner, there's a "Discussion of results."

In the second paragraph, it states:

"It follows from the above results that Gramoxone acts on the central nervous system in two phases."

Do you see that?

**A. I do.**

Q. And it reports:

"In small doses, it amplifies processes of stimulation and inhibition in the central nervous system. In larger doses, it acts in the opposite way, weakening these processes."

Right?

**A. That's what it says, yes.**

Q. And it's specifically reporting that Gramoxone, in this study, according to the authors, does have an effect on the central nervous system, right?

**A. As assessed with the methodology here, which I'm certainly not familiar with.**

Q. Is the methodology any different than the methodology conducted by Syngenta in their early

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studies on the central nervous system effects?
MR. NARESH: Objection to form.
THE WITNESS: It looks different to me. It talks about methods which I have never really come across and I am, therefore, not sure about the suitability of these methods, even, for assessing the effects on the central nervous system. I'm not qualified to comment on that.
But certainly ICI, as far as I remember, didn't ever use this kind of methodology.
BY MR. DICKENS:
Q. Does Syngenta believe that the methodology used by the authors or researchers in this study is inappropriate to test the central nervous system effects on animals?
**A. I would say that that would need to be reviewed by someone who is more expert in these matters than me.**
Q. But I have you here today. Do you know whether or not Syngenta believes it's inappropriate, the methodology or research undertaken to test the central nervous effects in these animals?
**A. I really have not been able to make a comment on that. I have never seen any other study using this methodology. So it's unusual.**

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Q. Now, your familiarity with methodology in animal testing, is that from your experience with Syngenta?
**A. It is.**
Q. You're not a toxicologist?
**A. I am a toxicologist.**
Q. Okay. By your role with Syngenta, though, correct?
**A. Yes.**
Q. Is all of your experience with respect to toxicology involving animal studies based on your time and experience with Syngenta?
**A. And its legacy companies, yes.**
(Stenographer clarification.)
THE WITNESS: And its legacy companies.
THE STENOGRAPHER: "Legacy," thank you.
BY MR. DICKENS:
Q. The very last section of this page goes on:
"... it can be assumed that the observed changes in the activity of the nervous system can be ascribed to the dipyridyl component of Gramoxone."
Correct?
**A. That's what it says, yes.**
Q. And those were the findings of these

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particular authors, right?
**A. That's right.**
Q. And is it your understanding that Syngenta would have received a copy of this document if it was in its records and produced in this litigation?
**A. Yes.**
Q. Now, Syngenta knew, by the time of this study in 1971, that paraquat could get into the brain of humans, right?
**A. There was certainly evidence that paraquat can get into the brain, yes, and there were some studies, postmortem studies, I believe, where -- from humans, where paraquat was measured.**
Q. Okay. Postmortem studies being autopsies of individuals who died after ingestion --
**A. Yes.**
Q. -- of paraquat, right?
**A. Yes.**
Q. And Syngenta knew from the autopsies of those individuals who died after paraquat ingestion that paraquat could bypass the blood-brain barrier?
**A. I don't -- they certainly didn't know that because of the evidence from the autopsies. I think the weight of evidence generally suggested that paraquat can get into the brain and that might include**

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**across the blood-brain barrier, but there were many other studies which addressed that point in more detail.**
Q. Many other animal studies?
**A. Mostly animal studies.**
Q. And when you say many other animal studies that address that point, what animal studies are you referring to specifically?
**A. Just as an example, some studies that were done in the 1990s by ICI as it was, Zeneca, were looking specifically at the ability of paraquat to be transported into the brain.**
Q. Were those the Widdowson and Naylor studies?
**A. That's correct.**
Q. And those were undertaken in the 1990s, you said?
**A. Those were in the 1990s, yes.**
Q. Roughly 30 years after paraquat was in the market in the United States?
**A. That would be right, yes.**
Q. Were there any other studies prior to that time that was investigating the issue of whether or not paraquat could get into the brain?
**A. I'm sure there were, yes. I'm afraid**

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**I don't have an encyclopedic knowledge of every study, but, yes, Widdowson was not the first -- the very first observation of that.**

Q. And the other studies prior to Widdowson and Naylor, those were studies undertaken by Syngenta?

**A. Some. Not all.**

Q. Can you recall any studies undertaken by Syngenta prior to Widdowson and Naylor investigating whether or not paraquat could get into the brain of animals?

**A. No, I don't recall specific examples right now.**

Q. And we'll note for the record, Exhibit 3, "The effect of Gramoxone on the activity of the nervous system of laboratory animals," was identified in the Notice of Deposition at 5B.

Do you have any reason to dispute that?

MR. NARESH: I'll also note for the record that Dr. Botham answered all your questions on 5B.

MR. DICKENS: I'll go ahead and hand you Exhibit 4 for the record.

(Exhibit 4 marked for identification.)

BY MR. DICKENS:

Q. I've handed you Exhibit 4 for the record, which is a document identified in the Notice of

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Deposition, topic 5.

Is this a document you reviewed previously, Dr. Botham?

**A. Yes, it is.**

Q. And this is an autopsy of a poisoning victim; is that right?

**A. That's correct.**

Q. This is one of the postmortem studies that you were referring to in your earlier testimony, correct?

**A. That's correct.**

Q. This is an autopsy of an individual who was a farm worker, correct?

**A. Yes, that's correct.**

Q. And the autopsy took place in October of 1976, right?

**A. That's right.**

Q. Turn to page 2. The bottom of the page, there's an opinion on the cause of death.

Do you see that?

**A. I do.**

Q. The cause of death is related to paraquat ingestion.

Do you see that?

**A. I do.**

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Q. And then the next page, there's some histology listed, correct?

**A. That's correct.**

Q. And in this particular individual, there were effects on the brain that were listed, right?

**A. There were.**

Q. And those effects included degenerative changes in the cells in the substantia nigra, the Purkinje cells of the cerebellum, right?

**A. That's correct.**

Q. Substantia nigra, that's a structure of the brain that plays a role in controlling movement, mood, and other brain functions?

**A. That's correct.**

Q. Substantia nigra is a critical brain region for the production of dopamine?

MR. NARESH: Objection to the extent it calls for expert testimony.

THE WITNESS: It is correct, yes.

BY MR. DICKENS:

Q. Parkinson's disease is a progressive disorder caused by degeneration of nerve cells in the brain called the substantia nigra?

MR. NARESH: Same objection. Also, these are questions that Dr. Botham has been asked and

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answered previously as a corporate representative in prior deposition as to which plaintiffs' counsel have access.

(Stenographer clarification.)

MR. NARESH: ...previously as a corporate representative of Syngenta and that plaintiffs' counsel have access to.

THE STENOGRAPHER: Thanks.

BY MR. DICKENS:

Q. Is that correct?

**A. Yes, correct.**

Q. Now, "degenerative" means a continuous process where cells are damaged over time, correct?

**A. That would normally be assumed from that phrase, yes.**

Q. Do you know whether the findings of this autopsy were ever published in a scientific or medical journal?

**A. I don't know.**

Q. Did you do anything to determine whether or not the results of this autopsy were published in any way?

**A. I don't recall looking for that.**

Q. Do you know whether or not this autopsy or the other postmortem studies that you referred to were

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ever submitted to the United States Environmental Protection Agency?
MR. NARESH: Objection; scope.
THE WITNESS: I have no knowledge of that.
BY MR. DICKENS:
Q. There were findings of autopsies of paraquat poisoning cases that were published, though, weren't there?
**A. Yes, there were.**
Q. And almost all of them showed effects of paraquat on the brain, didn't they?
**A. Certainly some did, yes.**
Q. And when you say "some," the majority, right?
**A. I take your word for it. I've not added them up.**
(Exhibit 5 marked for identification.)
MR. DICKENS: I'll go ahead and hand you Exhibit 5 for the record.
Exhibit 5 is another document identifying topic 5 in the Notice of Deposition.
BY MR. DICKENS:
Q. Is this a document you've seen before, Doctor?
**A. Yes, I believe so.**

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Q. And this is a document that was prepared by Syngenta, correct?
**A. Yes, I understand so.**
Q. It's titled "Effects of Paraquat on the Brain - an annotated bibliography in three parts."
Right?
**A. Correct.**
Q. Now, this particular document identifies references in published literature where brain and the CNS were examined.
Is that your understanding?
**A. That's correct.**
Q. And there's a section here on the first page "Bibliography of references where the brain/CNS was examined and no effects were seen."
Right?
**A. Yes.**
Q. And there are three particular references in that section, right?
**A. There are.**
Q. Then there's, on the same page, a "Bibliography of references where the brain/CNS were examined and effects were seen."
Do you see that?
**A. I do.**

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Q. Okay. It goes on to list 14 particular publications where effects on the brain and CNS were seen, right?
**A. Well, again, I haven't added them up, but, yes, I'm sure that looks like approximately the right number.**
Q. And some of these, as on page 3, the Russell publication involves multiple cases where CNS and brain effects were seen, right?
**A. Yes.**
Q. Then on the page ending 9336, there's a section "Bibliography of references where details of postmortem paraquat brain concentrations were given."
Do you see that?
**A. Yes, I do.**
Q. And it goes on to list 14 more publications where brain concentrations of paraquat were given.
**A. Yes, indeed, consistent with the answer I gave earlier.**
Q. And those -- when it says "paraquat brain concentrations were given," these are instances, in fact, where paraquat was found in the brain of the individuals who died after ingesting paraquat?
**A. Yes, that's correct.**

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Q. Now, Syngenta would have known from at least the 1990s that a farmer spraying crops with paraquat was going to end up with paraquat in their brain, right?
MR. NARESH: Objection to form, foundation, scope.
THE WITNESS: What Syngenta knew is that -- as this report actually does also say, is that the paraquat poisoning results in a lot of different pathologies, and paraquat does enter a number of tissues. But it does include the brain, certainly.
BY MR. DICKENS:
Q. You mentioned other pathologies, but I think, as you just said, that does include effects on the brain as well, right?
MR. NARESH: Same objections as before.
THE WITNESS: Yeah, and the focus of this is on the brain, but certainly in many of these cases, other pathology was seen.
BY MR. DICKENS:
Q. Turn back to that page we had you on, the 9336, the "Bibliography of references where details of postmortem brain concentrations were given."
And specifically refer to the last publication on the document, by Cravey, "Poisoning by

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paraquat."
Do you see that?
**A. Yes.**
Q. That's a publication from 1978, right?
**A. Yes.**
Q. And it's referring to three human cases of fatal post-paraquat ingestion, right?
**A. Correct.**
Q. And these were deaths 22, 21 days, and 8 hours post ingestion, correct?
**A. Correct.**
Q. Now, it gives the actual postmortem paraquat concentrations for those three individuals, correct?
**A. Correct.**
Q. And they include 0.09, 6.3, 1.5, ug/grams respectively.
Can you tell us what that means in your understanding?
**A. These are the concentrations expressed as micrograms per gram of brain tissue. So the brain would have been weighed, it would then have been analyzed for paraquat, and then the concentration of paraquat is expressed, as I've just indicated, micrograms of the pesticide per gram of brain tissue.**

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Q. So these brain tissues, then, were reviewed, analyzed for paraquat post death, right?
**A. That's right.**
Q. And in these cases, it shows that paraquat remained in the brain 22 days and 21 days after ingestion, correct?
**A. Yes.**
Q. So paraquat remained in the brain 22 to 21 days after any exposure to paraquat in those particular cases?
MR. NARESH: Object to the form.
THE WITNESS: It did.
BY MR. DICKENS:
Q. And you understand that paraquat can accumulate in the brain, right?
**A. We --**
MR. NARESH: Objection to form, scope.
THE WITNESS: Yes, we do understand a little more now about, if you like, the kinetics of brain, of paraquat entry into the brain, yes.
BY MR. DICKENS:
Q. You say we know now. You would have known that back in 1978, right?
**A. Well, I think we knewless then. I think we nowhave done more experiments to try to understand that in a little bit more detail; so, work that we've done in the last 10, 20 years has tried to understand exactly how much and how long paraquat may get into the brain.**
Q. Well, you knew from this particular study published in 1978 that paraquat could stay in the brain at least 22 days after exposure, didn't you?
**A. Yes, yes.**
Q. And that was known back in 1978 that paraquat could stay in the brain for weeks after exposure to paraquat?
**A. Yes.**
MR. NARESH: Objection; asked and answered.
THE WITNESS: Sorry.
MR. DICKENS: I'll have marked Exhibit 6 for the record.
(Exhibit 6 marked for identification.)
MR. NARESH: Do you have a topic number handy?
MR. DICKENS: Exhibit -- sorry. Topic 42.
I've handed you Exhibit 6, which is from topic 42 in the Notice of Deposition, a document titled "Xenobiotics linked to paraquat disease," dated January 18, 2000, by a Ms. E.R.A. Ralph.

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BY MR. DICKENS:
Q. Do you see that?
**A. I do.**
Q. And this is a internal report from Central Toxicology Laboratory, right?
**A. It is.**
Q. And what is Central Toxicology Laboratory?
**A. It is the toxicology laboratory which was owned by ICI and then Zeneca, and which closed in 2007 to 2010.**
Q. At this time in 2000, it was the main research arm of what is now Syngenta, right?
**A. It was the main toxicology safety assessment lab of Syngenta.**
Q. And at this point in 2000, that lab undertook a report specific to xenobiotics and whether or not it's linked to Parkinson's disease, right?
**A. Correct.**
Q. And what's your understanding of what xenobiotics means?
**A. Xenobiotics are -- they are external agents, such as chemicals, which can interact with the body, with the biology of a human being or with an animal.**
Q. And this is Elizabeth Ralph. Do you know

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Elizabeth Ralph?
**A. I don't know who Elizabeth Ralph was. I would be -- I've looked at this document before and I would be -- I would speculate that she may have been a temporary student at the Central Toxicology Laboratory.**
MR. DICKENS: Okay. I'll move to strike everything after "I don't know who Elizabeth Ralph [is]."
MR. NARESH: I'll object to that motion as frivolous as part of the answer to the question.
BY MR. DICKENS:
Q. This was approved for issue by an A.R. Soames.
Do you see that?
**A. I do.**
Q. Do you know who that is?
**A. Yes. Tony Soames was a pathology technician.**
Q. And a circulation list here; do you see that?
**A. I do.**
Q. With individuals from the pathology department?
**A. They were all from pathology, yes.**

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Q. Okay. Now, there's a report number listed here, right?
**A. That's correct.**
Q. And report numbers show up on various Syngenta documents. What do the report numbers mean?
**A. Well, the notation R, the R stands for "research" and the numbering is just the numbering which started at 1; so by the time it gets to 1463, that's the 1,463rd document under the research category.**
Q. Okay. So these are officially commissioned reports or research for individuals at Syngenta to undertake, right?
**A. They are reports of the research activities, which were very broad, conducted by many people at Central Toxicology Laboratory.**
Q. Turn to page 8 of this document.
In the second paragraph, under "2.5 Epidemiology," it states:
"Soon after, epidemiological studies showed there to be a link between an increased incidence of Parkinson's disease and an agricultural lifestyle. Some reports directly link the increase in Parkinson's disease to herbicides and pesticides, and in particular paraquat."

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Right?
**A. That's right.**
Q. And it specifically cites to a reference of a study by Barbeau, "Ecogenetics of Parkinson's disease: prevalence and environmental aspects in rural cases."
Right?
**A. It does, that's correct.**
Q. You're certainly aware of that particular study?
**A. I am.**
Q. From 1987?
**A. I am.**
Q. Based on that study, Syngenta was aware that epidemiologists had linked paraquat to Parkinson's disease, right?
**A. Yes. 1985 was the first epidemiological study which suggested that that -- there could be a link.**
Q. Now, prior to that time, Syngenta itself did not undertake any epidemiological studies on paraquat and neurotoxicity, did they?
MR. NARESH: Objection to form. Can you define "epidemiological"?
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BY MR. DICKENS:
Q. Did Syngenta undertake any human studies to test whether or not paraquat was linked to neurotoxicity in humans?
**A. I think the answer to that is yes. They were, strictly, not epidemiological studies, but there were certainly investigations of, as we've been discussing earlier, individuals exposed to paraquat, in some cases high concentrations of paraquat, and clinical observations were made on those individuals to see -- and that would include looking at the effects on the central nervous system.**
**So some of that work was published.**
Q. What studies are you referring to?
**A. Some of the worker -- so-called "worker exposure studies" from people using paraquat in the field, in parts of the Far East.**
Q. So biomonitoring studies?
**A. You could describe them as "biomonitoring," yes. I call -- I think they're better called "worker monitoring."**
Q. Do you have an understanding -- in this document, for example, it references a category "epidemiology." Do you have an understanding what "epidemiology" means?

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**A. I do, yes.**
Q. And what is your definition of "epidemiology"?
**A. It's the study of -- in human populations, generally in human populations, of the potential for a relationship between an exposure to, for example, an environmental agent or an agent in the diet to the development of a disease state.**
Q. And there's different type of epidemiology studies, right?
**A. There are.**
Q. Cohort, case control studies, as examples?
**A. That's correct.**
Q. What category did those biomonitoring or worker exposure studies fall into from an epidemiological standpoint?
**A. I'm not an epidemiologist, but I think that they would probably be described as observational studies.**
Q. Now, you mentioned those studies taken in the Far East, those are studies that took place in Malaysia?
**A. That's one of the countries, yes.**
Q. And some other countries as well, right?
**A. Yes.**

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Q. What specifically did Syngenta do in those studies to figure out whether or not there were any central nervous system effects?
MR. NARESH: Object to scope.
What's the topic?
THE WITNESS: We --
MR. NARESH: Wait. Sorry.
THE WITNESS: Sorry.
MR. NARESH: What's the topic? I do believe these --
MR. DICKENS: It's topic 17.
MR. NARESH: -- questions have been asked previously of Dr. Botham, including in depos- -- well, in depositions that you have access to.
And which part of 17? There's --
MR. DICKENS: The actual subject of 17, which is "paraquat exposure studies and assessments including findings and information."
MR. NARESH: Well, that's not -- no, no, that's -- you've identified something like 60 or 70 different subparts to 17 and so, surely, it's one of those; so just tell me which one and then we can -- because there's a number of --
MR. DICKENS: It's not a requirement to tell you exactly which one.

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MR. NARESH: Well --
MR. DICKENS: The topic is --
MR. NARESH: -- hang on.
MR. DICKENS: -- exposure studies and assessments.
MR. NARESH: I'm sorry, I don't want to speak over you. We have had extensive back-and-forth on a subpart-by-subpart basis and reached a number of agreements on what is and what is not at issue. And so it does matter because half of the ones in 17 are, by agreement of counsel, not at issue in this deposition, so please tell me which one.
MR. DICKENS: So we could say -- once again, I don't believe it's necessary. We can ask whatever we want, but I don't have the numbers here. There are studies of Dunlop estate worker exposure to paraquat in Malaysia --
MR. NARESH: Okay. If you have specific questions, then you can ask those questions, but some of these -- you know, for example, we have an agreement that 17D, which is the Swan study from 1969, per a July 30 email from you-all, is not at issue in this deposition, right.
And so that's what I'm talking about, that a number of these you have said are not at issue in

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this deposition, and so if you have specific questions about studies that you've -- that, by agreement, are at issue here, I'm more than happy to let it go forward.
But, for example, a number of the ones on Malaysia you have said are not going to be questioned here, and I'm happy to show you the email if you'd like. It's from July 30 from Mr. Travers.
MR. DICKENS: Well, I don't think anything in our agreements prevents follow-up questions to answers given by the witness in this particular case, and so we're going to continue to ask follow-up questions as deemed appropriate. If he mentions his reliance on particular studies for his answers to any of the questions that we ask, nothing that we've talked about would preclude us from following up on those.
I'll continue to do so, unless I'm prevented by the Special Master or the Court. If you want to jump off and contact Randi Ellis, I'm happy to do so.
MR. NARESH: Look, let's see where this goes, but this is exactly the concern that I raised with you multiple times, that you're going to retread ground that has been asked and answered over the

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course of seven days of depositions with Dr. Botham.
(Stenographer interjection.)
MR. NARESH: This is exactly the concern that I've raised multiple times, that the subjects that you're asking about are exactly what was asked and answered of Dr. Botham in his seven prior days of deposition. This line of questioning has been asked of Dr. Botham repeatedly by multiple previous lawyers, as a corporate representative.
Let's see where it goes, but this is precisely what the point of incorporating prior depositions was intended to avoid, was answering these questions for a second or a third time just because you didn't like the prior answers, okay.
So let's see where this goes, but we will probably have to get Ms. Ellis on the phone once it is daylight in the Central Time Zone, and I need to make my record on this, so let's go for a while and then we'll call her at a break.
MS. ELLIS: You guys, I'm here.
MR. DICKENS: Hey, Randi.
MR. NARESH: I'm sorry.
MS. ELLIS: I'm listening.
MR. DICKENS: It's bright and early.
MS. ELLIS: I'm here. Yes, it is. Keep

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going.
MR. DICKENS: Okay.
BY MR. DICKENS:
Q. Doctor, what specifically did Syngenta do in the worker exposure studies to figure out whether or not there were any central nervous system effects?
MR. NARESH: Which studies are you talking about?
MR. DICKENS: I am talking about...
BY MR. DICKENS:
Q. You mentioned the biomonitoring exposure studies in the Far East, I believe you said, right?
**A. Yes, yes.**
Q. Okay. And so were you -- when you mentioned those studies in the Far East, were there any particular studies that you were referring to in your previous answer?
**A. Yes. And, if I might, this is where, for example, I'm referring to my document folder that we mentioned at the beginning. So studies such as those authored by Howard and others. They indicate that there were clinical observations of those individuals which looked at a number of -- the health generally of those individuals, and that did include an assessment of any potential effects on the central nervous**

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**system.**
Q. Was there any long-term follow-up of those individuals?
**A. There was some follow-up. So it wasn't just a one-off in some cases. There were -- there was follow-up. It depends on your definition of "long-term."**
Q. Well, tell me how long the follow-up, to your understanding, was in the studies that you're specifically relying on?
**A. I don't recall exactly what that length of follow-up was. I seem to remember that it was certainly more than a year in one or two cases, but certainly not a decade; so it was -- it depends what your definition of "long-term" is.**
Q. So not ten years, right?
**A. No.**
Q. Not five years, correct?
**A. I don't think so, no.**
Q. Dr. Botham, based on your understanding, you'd agree it would take far longer than a year for Parkinson's disease to develop, right?
MR. NARESH: Objection to form, vague.
THE WITNESS: Yes.
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BY MR. DICKENS:
Q. Last sentence of that paragraph:
"These conflicting reports suggest that a gene/environment interaction may well be very important in the etiology of Parkinson's disease. Purely genetic factors seem to be significant only in juvenile onset PD..."
Do you see that?
**A. I do.**
Q. And do you agree with that statement?
**A. It's still generally true. Certainly, genetic factors are more prevalent in early onset Parkinson's disease. I wouldn't, today, describe it as "juvenile."**
**The gene/environment interaction is still very much an open book. It's not clear yet what -- how genes and environment may interact.**
Q. And on the next page, under "Genetic factors," it states:
"Current understanding of the etiology of Parkinson's disease indicates purely genetic Parkinson's is rare, and causes early onset of the disease (before the age of 50)."
And that's what you were just referencing, right?

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**A. That's correct.**
Q. Under "Non-genetic factors":
"Oxidative damage caused by free radicals is currently held to be the main pathogenic factor in idiopathic Parkinson's disease."
For non-genetic factors. Right?
**A. That's what it says. I wouldn't necessarily agree with that statement.**
Q. Okay. What don't you agree with?
**A. I don't think there's any evidence to say that in idiopathic Parkinson's disease that that is caused by the mechanism of oxidative damage. Idiopathic Parkinson's disease, by definition, means the mechanism, the origin of that Parkinson's disease is unknown.**
Q. Will you agree that oxidative damage caused by free radicals is held to be the main pathogenic factor in environmental-caused Parkinson's disease?
MR. NARESH: Object to the form.
THE WITNESS: Even that, I would disagree with. It is one possible mode of action, but I would not agree with the view that it is the only one.
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BY MR. DICKENS:
Q. Now, this report in 2000 I think you mentioned was, to your understanding, by a research student with the pathology department?
**A. I'm afraid that is speculation because I don't -- I'm not able to find any direct evidence for that.**
Q. Was there ever any officially commissioned reports from Syngenta that was conducted by a neurologist on xenobiotics and the link to Parkinson's disease, to your understanding?
**A. Not by a neurologist, no. We certainly employed external experts on epidemiology, for example, to look at the effect of -- the influence of xenobiotics and other factors that could be involved in Parkinson's disease.**
Q. Turn to page 17. Section "Mechanisms of paraquat-induced cytotoxicity."
Do you see that?
**A. I do.**
Q. Do you know what "cytotoxicity" means?
**A. It's the death of cells.**
Q. It starts off:
"Once within a cell, paraquat cyclically reduced and reoxidized."

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That's something you agree with, right?
**A. I do.**
Q. And you've testified to that in prior depositions, correct?
**A. Correct.**
Q. It states later:
"... paraquat produces reactive oxygen species which [is] the classical theory of the etiology of Parkinson's disease..."
You agree with that statement, don't you?
**A. Sorry, could you just repeat that?**
Q. Yes.
"... paraquat produces reactive oxygen species which [is] the classical theory of the etiology of Parkinson's disease..."
MR. NARESH: I'm sorry, where? I'm not seeing it.
BY MR. DICKENS:
Q. It is the bottom section "4.2.3 Mechanisms of paraquat-induced cytotoxicity." Halfway in that paragraph.
MR. NARESH: Oh, do you see it?
THE WITNESS: Yes, I see it. But I don't agree -- I think as I explained, I don't agree with that. I think it is one possible mechanism but it

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certainly is not the classical theory of the etiology of Parkinson's disease. I think that is a misrepresentation.
BY MR. DICKENS:
Q. Now, you do agree paraquat produces reactive oxygen species, though, right?
**A. Yes, I do.**
Q. Okay. So it's the second part of that paragraph you don't agree with?
**A. I agree, yes.**
Q. Okay.
Turn to page 18. In the paragraph right before "The blood/brain barrier and paraquat," it begins:
"Paraquat can localize to neurones where neuromelanin is produced..."
Do you see that?
**A. I do.**
Q. And you agree with that?
**A. Yes, it can.**
Q. Turn to page 22 now.
At the top of that page, and this is referring to the Brooks study, which is discussed in the page earlier, but it states:
"The data seemed quite compelling;

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however, a few questions remain unanswered."
Right?
**A. Yes.**
MR. NARESH: Object on completeness.
BY MR. DICKENS:
Q. And then later on in "The future for paraquat research," the last sentence:
"Further studies must be done in different species to investigate the permeability of the blood/brain barrier to paraquat, and the role of genetics in determining susceptibility."
Right?
MR. NARESH: Object on completeness again --
THE WITNESS: Yes --
THE STENOGRAPHER: I'm sorry, I didn't hear that.
MR. NARESH: I'm objecting on completeness. It's missing the surrounding context.
THE WITNESS: Yes, some of these statements are actually what led me to speculate that this was written by a student because there are some very broad statements which I think -- you would expect a student who has perhaps not been an expert in this area for some time to write.

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So I think that some of these statements are too general and are not necessarily completely accurate.
MR. DICKENS: I move to strike.
BY MR. DICKENS:
Q. Doctor, my question specifically was all it does is state:
"Further studies must be done in different species to investigate the permeability of the blood/brain barrier to paraquat, and the role of genetics in determining susceptibility."
That's what it states, right?
**A. Yes. That's an opinion, yes.**
Q. Now, this report, this was commissioned by Syngenta specifically, right?
**A. I really don't know how it was commissioned.**
Q. It was given a report number, right?
**A. It was certainly written up and issued as a report, yes.**
Q. A report from Syngenta?
**A. It was a report from the author as a -- I'm assuming, as the product of this lady's time in Central Toxicology Laboratory and the work that she clearly seemed to do mainly with reviewing the literature.**

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Q. And specifically approved by a Syngenta employee, right?
**A. Yes.**
Q. Did you see anything in your review of documents to suggest that anyone at the time in 2000 within Syngenta disagreed with any of the statements in this document?
**A. I don't have direct evidence that they were criticizing any of the content of this report. I think, like I've been doing, in 2000 I'm sure that if other people had read this, they may have had some questions about whether everything was actually fully accurate.**
Q. Is it your understanding that individuals within Syngenta did not read this particular report?
**A. I suspect it was read by a small number of people and maybe only the people who are on the circulation list.**
Q. What did Syngenta do after 2000? What different studies in different species did Syngenta conduct to investigate the permeability of the blood-brain barrier?
**A. Well, by then we had already done studies in rodents -- rats and mice -- and we didn't directly**

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**address the question of the permeability of the blood-brain barrier, but, subsequently, there were certainly studies done, for example, in the nonhuman primate, and now we're talking much later, where we were looking at the distribution of paraquat in the body of the nonhuman primate, including the brain.**
Q. When were those nonhuman primate studies undertaken?
**A. They were done in the time period of around 2016 to 2019, so published in 2019.**
Q. So 19 years after this particular report?
**A. That's correct.**
Q. That was the Stevens study?
**A. That's correct.**
Q. You didn't measure paraquat in the brain in the Stevens study, right?
**A. We did model the amount of paraquat that we expected to be in the brain, yes.**
Q. Now, the earlier studies that were taken prior to this time, Widdowson and Naylor, those were in rats?
**A. Yes.**
Q. Rats lack neuromelanin?
**A. I believe that's true, yes.**
Q. Nonhuman primates possess neuromelanin?

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**A. Yes, that's right.**
Q. Humans do as well?
**A. Yes.**
Q. Now, with respect to Stevens, you mentioned there was modeling done. Modeling is not the same as directly measuring the amount of paraquat in the brain, right?
**A. It's not, but today, in today's science, mathematical modeling is often as accurate as actually directly measuring substances, and we were using very modern modeling techniques.**
Q. What are you relying on for your statement that mathematical modeling is often as accurate as actually measuring the amount of paraquat in the brain?
**A. Well, we collaborated with people in the United States who were experts in this field, so it wasn't just Syngenta scientists that would be saying that. So we were working with a state-of-the-art research organization in mathematical modeling.**
Q. So those individuals working in mathematical modeling told you that mathematical modeling is as accurate as actually measuring how much is in the brain?
**A. It can be. You have to calibrate your**

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**mathematical model against actual data, so we -- and that is part of coming to the conclusion about the relative accuracy, and that's exactly what we did do.**
Q. You could have directly measured the amount of paraquat in the brain in the Stevens study, right?
**A. Yeah. In theory, yes. In practice, that would have been a very difficult experiment to do. Nonhuman primates are, of course, a highly protected species in laboratory animal experiments, and in order to do the ideal experiment, to answer your question, we would have had to have used significantly more nonhuman primates than we did and it would have not been possible -- we know it would not have been possible to get ethical approval to do those studies.**
MR. DICKENS: I'll move to strike.
BY MR. DICKENS:
Q. Doctor, I didn't ask you whether or not it would be difficult to do so. I just simply asked, you could have directly measured the amount of paraquat in the brain in the Stevens study, right?
MR. NARESH: I'll object to that.
Go ahead.
THE WITNESS: I stick by my answer. We could have looked for paraquat in the brain, but it

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would have been meaningless without actually doing a proper, what I call a kinetic study and that would have required more animals.
BY MR. DICKENS:
Q. Now, do you understand that all the monkeys in the Stevens study were killed?
**A. They were, yes.**
MR. NARESH: Are you moving to a new document?
MR. DICKENS: I am, yeah. We can put that away.
MR. NARESH: We've been going for about an hour and 15.
MR. DICKENS: Yeah.
MR. NARESH: Take five, ten?
MR. DICKENS: Perfect. Whatever you need.
THE VIDEOGRAPHER: We are going off the record at 10:39.
(Break taken.)
THE VIDEOGRAPHER: We are back on the record at 10:52.
MR. DICKENS: Welcome back, Doctor. I'm going to hand you Exhibit 7 for the record.
(Exhibit 7 marked for identification.)
MR. NARESH: Which topic?

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MR. DICKENS: Topic No. 6.
MR. NARESH: Oh, it's 6GG?
MR. DICKENS: Yeah, I should have had those numbered -- or lettered.
BY MR. DICKENS:
Q. Doctor, I've handed you --
MR. NARESH: Wait, not GG. I'm still looking for it. Let me withdraw that for the record.
BY MR. DICKENS:
Q. -- Exhibit 7, which is a document identified in topic 6 of the Notice of Deposition, dated February 1, 1976.
Do you see that?
**A. I do.**
MR. NARESH: I'm sorry if I'm being dense, but where is this in topic 6?
MR. DICKENS: Q.
MR. NARESH: I have Q as a Syngenta Bates-numbered document, not a CUSA document.
MR. DICKENS: I don't know. It's the last one.
MR. NARESH: Let's go off the record for a second.
MR. DICKENS: We can go off the record.
THE VIDEOGRAPHER: We are going off the

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record at 10:54.
(Off the record.)
THE VIDEOGRAPHER: We are back on the record at 10:56.
BY MR. DICKENS:
Q. Okay. Doctor, I handed you a document dated February 1, two thousand -- sorry, 1976, relating to a paraquat toxicology meeting.
Do you see that?
**A. I do.**
Q. And this is a document you've reviewed before?
**A. I've certainly looked at this in the last couple of months, yes.**
Q. Okay. And this is actually a letter which was signed off by a Dr. Cavalli.
Do you see that?
**A. That's correct.**
Q. And do you understand Dr. Cavalli to be with Chevron?
**A. Yes, he was.**
Q. And Syngenta and Chevron had a contract or agreement with respect to the sale of paraquat in the United States?
**A. Yes, that's correct.**

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Q. And this states:
"The following is a summary of meetings between [himself]," Dr Cavalli, "and Ken Fletcher of CTL..."
Right?
**A. Yes, that's right.**
Q. And do you know who Ken Fletcher at CTL is?
**A. He left before I joined CTL, but, yes, he was -- I can't remember whether he was medically qualified but he was certainly in the toxicology organization.**
Q. If we can look at number 3 within this letter, it states:
"We discussed at some length the gaps in our knowledge of the chronic effects of paraquat exposure."
Do you see that?
**A. Yes.**
Q. "The animal studies available are old and do not meet the current standards. [...] Some are poorly done."
That's what's stated here, right?
**A. That's what it says, yes.**
Q. As a summary of a conversation held with

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Ken Fletcher of CTL, right?
**A. Correct.**
Q. "In fact, the cause of death from chronic exposure to paraquat could not be determined from these studies."
Right?
**A. That's what it says.**
Q. And that's an example of the studies being poorly done with respect to Dr. Cavalli, as he reports on this date, right?
MR. NARESH: Objection to form.
THE WITNESS: Yes. I don't know specifically which studies Dr. Cavalli is referring to, but that's what the record shows.
BY MR. DICKENS:
Q. Now, the documents -- or, sorry, the studies were old and poorly done, in part -- strike that.
The studies that were old and poorly done are referring to studies that were initially submitted by Syngenta and Chevron to the EPA in order to obtain registration, right?
MR. NARESH: Objection; foundation.
THE WITNESS: That's my assumption.
///

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BY MR. DICKENS:
Q. Before we move on from this document, if we can turn to number 10. It states:
"Dr. Fletcher described an unpublished case of paraquat poisoning by dermal absorption. An individual in Yugoslavia sprayed waist-high weeds and soaked his clothing."
Do you see that?
**A. I do.**
Q. And this is being reported by Dr. Fletcher, correct?
**A. That's right.**
Q. At the end of that paragraph:
"This individual died an unknown time later from what sounds like a typical paraquat death."
MR. NARESH: Object on the rule of completeness.
BY MR. DICKENS:
Q. "The case has not been published and no more details are available at present."
Do you see that?
MR. NARESH: Sorry, I didn't mean to cut you off. I'll object on completeness; it leaves out the middle sentences.
(Stenographer clarification.)

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MR. NARESH: I'm sorry, okay. I'll object on completeness; it leaves out the middle sentences.
THE STENOGRAPHER: Thanks.
THE WITNESS: So do you have a question?
BY MR. DICKENS:
Q. Yeah. That's what it says, correct?
**A. Yes, it does.**
Q. Now, at this time in 1976, Syngenta was aware of paraquat poisoning by dermal absorption, right?
**A. Yes, it was.**
Q. And death could occur by dermal absorption of paraquat, and that was known by Syngenta by 1976?
**A. Yes. It would require a very extensive exposure by the dermal route, but it was certainly known.**
Q. Okay. Now, this individual soaked his clothing while spraying. The clothes were not changed for two days, right?
**A. That's right. That's what it says.**
Q. "At this time, he was seen at the hospital for a skin rash. The following day he sprayed again, [...] resulting in severe chemical burns."
Correct?
**A. Correct.**

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Q. And is that an instance that you would say or consider as extreme exposure enough to cause death by dermal absorption?
**A. Exactly. I think this is an example of what I've just been saying. You would not normally expect somebody to have such exposure as is described here.**
Q. It appears he sprayed on two days, right?
**A. Yes.**
Q. Now, the case was not published and no more details were available.
Do you know whether or not this instance or death was reported to the United States Environmental Protection Agency?
**A. I don't know that.**
Q. Now, going back to the first page and the animal studies that are referenced as "old," "do not meet current standards" and "are poorly done," for those early animal studies, Syngenta contracted with a company Industrial Bio-Test Laboratories to conduct paraquat toxicity studies for the purposes of EPA registration, correct?
**A. I understand that to be true, yes.**
Q. And the EPA found that IBT tests to support the registration of pesticides were deficient and invalid.
Correct?
MR. NARESH: What's the topic?
MR. DICKENS: Topic 8. Sorry, not topic 8. 86.
MR. TRAVERS: And 85.
MR. DICKENS: And 85.
BY MR. DICKENS:
Q. I'll ask again. Doctor, the EPA found that IBT tests to support the registration of pesticides were deficient and invalid, right?
**A. I believe that was the case, yes.**
Q. Those tests relied on fraudulent data, right?
**A. I've seen that phrase "fraudulent data." I've never actually understood or looked at, in detail, what the basis for that accusation of fraud is.**
Q. Did you look at that issue in detail for preparation for today's deposition?
**A. No, I did not.**
Q. Did you look at any document specific to IBT in preparation for today's deposition?
**A. No. Again, only through sort of tangential mention of the IBT studies. We did not go into that in any detail.**
Q. Were you aware that IBT's president and founder, Joseph Calandra, along with other IBT employees, were found criminally responsible for their fraud in the role in falsifying scientific data?
**A. I don't remember the name, but I do remember the incident being described to me in the past.**
Q. The past; while you were working for Syngenta?
**A. Yes. I'm not talking about in the last two months. I remember it being said in the more distant past.**
MR. DICKENS: I'm going to hand you what we'll mark as Exhibit 8 for the record.
(Exhibit 8 marked for identification.)
BY MR. DICKENS:
Q. Doctor, I've handed you Exhibit 8, which is a document from the United States Environmental Protection Agency, "Summary of the IBT review program, from the office of pesticide programs," dated July 1983.
Right?
**A. Correct.**
Q. And this was -- report was approximately

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seven years after the last document we looked at where Syngenta and Chevron were discussing the fact that Syngenta studies were old and poorly done, right?

**A. Yes.**

Q. If you can turn to the first page. "The IBT Review Process" states:

"This report summarizes the findings of the joint program conducted by Environmental Protection Agency and the Health Protection Branch of Health and Welfare Canada to re-examine the health effects studies on pesticides tested by Industrial Bio-Test Laboratories (IBT)."

Right?

**A. Yes.**

Q. And that review:

"... revealed serious deficiencies in IBT tests [...] to support the registration of numerous pesticides."

Right?

**A. Yes.**

Q. Then it states:

"Exhibit A shows how many IBT and non-IBT tests are available to EPA in each testing category for the pesticide chemicals having some IBT-conducted studies in their database."

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Right?

**A. Right.**

Q. Now, if we can turn to Exhibit A, which begins on page 10. Page 10, it just states "Exhibit A - The Data Base for Industrial Bio-Test Chemicals" and then the very next page kind of gives a summary of Exhibit A. It states:

"The IBT studies are designated by the letter O. Studies in the EPA data base done by labs other than IBT are designated by the letter X."

Do you see that?

**A. I do.**

Q. Now, if we can find paraquat, it's alphabetical --

**A. Yes.**

Q. -- but there are no page numbers.

**A. Yes.**

Q. Let me know when you're there.

**A. I'm there.**

Q. Okay.

So there's paraquat listed and then there's various categories of studies, correct?

**A. Yes, that's right.**

Q. And if you can look in the column for neurotoxicity, there's one study presented, right?

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**A. Yes, that's right.**

Q. And that's an O, correct?

**A. That's right.**

Q. So that means that the neurotoxicity study submitted by Syngenta was conducted by IBT, right?

**A. That's what that suggests, yes.**

Q. And there were no other studies in EPA's database on neurotoxicity as of the date of this document in 1983, right?

**A. I don't know that. This document doesn't show me that, so I can't comment.**

Q. Well, we just looked, Doctor, at the part for section A, that describes what letter O and letter X mean, right?

**A. Yes.**

Q. It says:

"The IBT studies are designated by the letter O."

And:

"Studies in the EPA data base done by [other] labs [...] are designated by the letter X."

**A. Okay, sorry. I misunderstood the question. Yes, that's true, I agree.**

Q. So, for example, the other chronic effects for paraquat, there's an IBT study but some --

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**A. Yes.**

Q. -- other studies, right?

**A. Now I understand. Yes, I agree.**

Q. For neurotoxicity, however, there are no other studies other than the IBT, right?

**A. That's what that suggests, yes.**

Q. So the EPA's approval of paraquat in the 1960s was done with respect to one neurotoxicity study that was submitted in support of registration, right?

MR. NARESH: Object to the foundation and the form.

THE WITNESS: That's what that suggests, I agree.

BY MR. DICKENS:

Q. And that one study was conducted by IBT?

**A. Right.**

Q. The laboratory whose studies were found to be invalidated and relied on by fraudulent data by the EPA, right?

MR. NARESH: Objection; form, foundation.

THE WITNESS: That's what I understand, yes.

BY MR. DICKENS:

Q. So as of 1983, there were no valid neurotoxicity studies in the EPA's database supporting

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paraquat?
MR. NARESH: Objection to form and foundation.
THE WITNESS: That's what this would indicate.
BY MR. DICKENS:
Q. Now, Syngenta knew, even before the EPA's report, that there were issues in IBT's tests being conducted on behalf of Syngenta, right?
**A. I don't -- I'm not familiar with the detail of that history. I'm sorry.**
MR. DICKENS: I'll go ahead and hand you what we'll mark as Exhibit 9.
(Exhibit 9 marked for identification.)
BY MR. DICKENS:
Q. Exhibit 9 is a letter from an A.A.B. Swan to a J.C. Calandra, director of Industrial Bio-Test Labs, dated February 12, 1964.
Do you see that?
**A. Yes.**
Q. And it's regarding urinary estimation in dogs, right?
**A. Yes.**
Q. Now, was paraquat on the market in the United States in February 1964?

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**A. I think -- isn't that shortly before?**
Q. To the best of your knowledge.
**A. Yeah, I think it was shortly before.**
Q. And do you know who A.A.B. Swan is?
**A. Yes. He was the director of the Central Toxicology Laboratory at that time.**
Q. So the director of the Central Toxicology Laboratory is writing to the director of IBT, right?
**A. Yes.**
Q. And he's writing with respect to a dog study where they're testing urinary excretion of paraquat?
**A. Yes.**
Q. In the very last couple sentences in the third paragraph, the sentence beginning, "It is difficult to understand..."
Do you see that?
**A. Yes.**
Q. And so the director of Central Toxicology Laboratory writes:
"It is difficult to understand why dogs on such widely varying paraquat intakes (up to tenfold) should show no difference in the levels of urinary excretion, and I think it would be wise to defer killing the animals until we are satisfied that all

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doubts on the method of paraquat estimation have been resolved."
That's what is being reported to the director of IBT, right?
**A. Yes.**
Q. And you'd agree that it would be unusual for the paraquat intakes -- or, sorry, for the levels of urinary excretion to be the same for paraquat intakes that are tenfold different, right?
**A. I would -- yes, I would agree.**
Q. Do you know whether or not IBT did defer on killing the animals until they resolved or satisfied all doubts on the methods of paraquat estimation?
**A. I don't immediately recall having seen any evidence for that, but perhaps you've got some documents which would substantiate that.**
Q. You can put that to the side.
MR. DICKENS: I'll go ahead and hand you Exhibit 10 for the record.
(Exhibit 10 marked for identification.)
BY MR. DICKENS:
Q. I've handed you the exhibit dated May 11, 1966, correspondence from, once again, the director of CTL, A.A.B. Swan, to an R.A. Hamilton, and W.

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Johnston, or Johnstone, of Plant Protection Limited.
Do you see that?
**A. Yes, I do.**
Q. And what was Plant Protection Limited?
**A. That was the division of ICI that was involved in crop protection chemicals.**
Q. So both CTL and ICI, those are now what is known as Syngenta, right?
**A. Yes.**
Q. And so there's internal correspondence here specific to Chevron and the paraquat petition, right?
**A. Yes.**
Q. And in your understanding, this would be the petition to the United States to register paraquat?
**A. That's correct.**
Q. I direct your attention the third paragraph, beginning "In the petition..."
In this paragraph, the director of CTL notes that:
"In the petition for temporary tolerances presented in January 1965..."
Do you know what temporary tolerances he's referring to?

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**A. I think it's a kind of interim step in the registration.**
Q. Registration in the United States?
**A. Yes, yes.**
Q. In order to sell paraquat?
**A. Yes.**
Q. And it mentions work being done on inhalation toxicity by IBT.
Right?
**A. That's right.**
Q. And those were inhalation studies that were submitted to the United States for the registration in the United States to sell paraquat?
**A. Right.**
Q. He goes on at a subsequent "examination at IHRL..."
And what is that referring to?
**A. That was the Industrial Hygiene Research Laboratory, which is what Central Toxicology used to be called.**
Q. So that is kind of the predecessor of CTL?
**A. That's correct.**
Q. Is it in the same location in the UK?
**A. It actually was in the south of England and then it moved to the north of England.**

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Q. And so there was an examination of the IBT studies at IHRL -- sorry.
Examination of a sample of equipment that was used by IBT, and that led the scientists at Syngenta to believe that the work actually "underestimated the inhalation toxicity" of paraquat.
Right?
**A. Yes, that's what it says.**
Q. And that was actually confirmed by results of experimental work at IHRL in 1965, right?
**A. Yes, I believe so. Yes.**
Q. So Syngenta actually re-examined work by IBT and found that the studies they ran underestimated the amount of inhalation toxicity from paraquat?
**A. That would appear to be the case, yes.**
Q. And if we can turn the page --
MR. NARESH: I'll object on completeness; you left out the last sentence.
BY MR. DICKENS:
Q. Okay. It says:
"[IBT] were informed and agreed to do further work, in the light of which they issued revised reports..."
Right?
**A. Yes.**

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Q. So it was IBT, then, that did the additional work, correct?
**A. This is what this suggests, yes.**
Q. Okay. And they apparently issued revised reports in 1966, correct?
**A. Right.**
Q. Now turn the page. Now, at the bottom of that first paragraph, "In the event..."
Do you see that?
**A. Yes.**
Q. "In the event the old, unrevised Bio-Test work [was] submitted in the petition, together with the first half of the paper I presented at the Development Conference, as evidence for the proposed threshold limit value for respirable aerosol concentration. Thus, the greatest apparent discrepancy in results has been presented, and this could so easily have been avoided."
Right?
**A. Yes.**
Q. So what this is saying, from the director of Central -- or IHRL at the time, Dr. Swan, is the actual old IBT work that underestimated inhalation toxicity was actually submitted to the EPA, right?
**A. Yes.**

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Q. Instead of the new revised reports that were done at the request of Syngenta?
**A. That would appear to be the case, yes.**
Q. You can put that aside.
MR. DICKENS: I'll hand you Exhibit 11.
(Exhibit 11 marked for identification.)
BY MR. DICKENS:
Q. I'm actually going to direct your attention to what is the fifth page, ending 6541.
**A. Yes.**
Q. These are minutes from a Chevron/ICI meeting on October -- sorry, on August 31, 1977, right?
**A. That's right.**
Q. It includes various individuals from CTL and ICI, and then Chevron, right?
**A. Yes.**
Q. And it begins with a discussion of Industrial Bio-Test Laboratory, two-year rat and dog studies, correct?
**A. Correct.**
Q. "Dr. Cavalli..."
He's with Chevron, right?
**A. Yes, he was at that time.**
Q. And he told the meeting:

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"... IBT had severe problems at all levels within the organization apart from right at the top, during the '60s until mid '70s."
Right?
**A. Yes.**
Q. That was the very time that IBT was conducting testing and research for Syngenta in order to submit paraquat for registration in the United States?
**A. Yes.**
Q. And as we looked at before, this was the time that the only neurotoxicity study submitted with paraquat for registration in the United States would have been conducted by IBT?
(Stenographer clarification.)
MR. DICKENS: Yes.
BY MR. DICKENS:
Q. And as we looked at before, this was the time that the only neurotoxicity study that was submitted for registration in the United States for paraquat was conducted by IBT?
**A. Yes.**
Q. It goes on:
"This [has] led to a loss in faith in IBT by the FDA/EPA."

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Right?
**A. Yes.**
Q. Now, at the time paraquat was submitted for registration in the United States, the EPA did not exist, right?
**A. I don't have that detailed history, so I can't comment on that.**
Q. Anyway, FDA/EPA was asking, "a complete review of all IBT studies which supported petitions."
Right?
**A. Yes.**
Q. And Chevron actually conducted a review of those IBT studies?
**A. Correct.**
Q. And they reported at this meeting some of their findings, correct?
**A. That's written down here, yes.**
Q. And some of those findings from the two-year rat and dog studies were that the IBT study had no concept of recording of data?
**A. Yes.**
Q. It reported, based on Chevron's review, that no dates were recorded in the IBT studies, only month numbers.
Right?

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**A. Yes.**
Q. There was a poor identification of animals in the IBT studies, right?
**A. Yes.**
Q. One animal actually died four times in their study, correct?
**A. Yes.**
Q. And:
"Two-thirds of the experiment were individually housed and one-third had 5 per cage - no explanation and all data handled in the same manner..."
Right?
**A. Yes.**
Q. These are serious concerns that would invalidate the toxicology studies conducted by IBT, right?
**A. They would certainly seriously question the quality of the study, yes.**
Q. Well, one animal dying four times, I mean, that goes beyond questioning the study; it invalidates it, doesn't it?
**A. I think certainly in terms of good laboratory practice and so on, yes, it would.**
Q. I mean, just common sense says that an

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animal can't die four times?
**A. Of course.**
Q. And these two-year rat and dog studies, these were studies that would have been submitted to the EPA for registration of paraquat?
MR. NARESH: Objection; asked and answered.
THE WITNESS: Yes, I believe so.
BY MR. DICKENS:
Q. If we can turn to the next page. The second paragraph:
"As far as Chevron could ascertain, the raw data for both the rat and dog paraquat studies had been destroyed."
Right?
**A. Yes.**
Q. No longer existed?
**A. Correct.**
Q. All right. We can put that aside.
MR. DICKENS: I'll hand you Exhibit 12.
(Exhibit 12 marked for identification.)
MR. DICKENS: I've handed you Exhibit 12, which, for the record, is topic 109 of the Notice of Deposition.
///

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BY MR. DICKENS:
Q. These are notes on another ICI/Chevron meeting; this time in July 16, 1979, correct?
**A. That's correct.**
Q. Is this a document you reviewed in preparation for today's deposition?
**A. It is.**
Q. And this includes, once again, individuals from ICI as well as Chevron, right?
**A. Yes, it does.**
Q. Now, starting off on page 1, there's a discussion on "Toxicology - Dermal Trigger."
Do you see that?
**A. Yes, I do.**
Q. And the second sentence begins, "Dr. Rose," and that's a Dr. Michael Rose?
**A. That's right, yes.**
Q. He was with Syngenta?
**A. He was at the Central Toxicology Laboratory, yes.**
Q. And what was his role with the Central Toxicology Laboratory?
**A. He was a biochemical toxicologist. He was a section head of that -- of biochemical toxicology in CLT.**

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Q. It says:
"Dr. Rose drew attention to the ten known incidents of death arising from dermal exposure to paraquat."
Do you see that?
**A. Yes.**
Q. And we looked at the one case from Yugoslavia earlier that we discussed, right?
**A. Yes.**
Q. Dr. Rose is reporting here there was at least ten known incidents at this point in 1979 of deaths from dermal exposure, correct?
**A. Yes, that's right.**
Q. Several of those were accidents with the concentrate followed by inadequate remedial measures, right?
**A. Yes.**
Q. Then he goes on that:
"... three published incidents relate to spraying paraquat low volume at strengths, or with equipment, not recommended."
Right?
**A. Yes.**
Q. Do you know what strengths or equipment were being used in those particular cases?

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**A. No, I don't.**
Q. Do you know whether or not those strengths or equipment were contraindicated by Syngenta in any way?
MR. NARESH: I'll object to that. You just used a different word then, "contraindicated."
THE WITNESS: This suggests --
MR. NARESH: Let him rephrase.
MR. DICKENS: Let me ask it again.
BY MR. DICKENS:
Q. Were the strengths or equipment -- strike that.
Did Syngenta -- do you know whether or not these deaths were at strengths, or equipment, that Syngenta had warned should not be used in the spraying of paraquat?
**A. Well, I think that is -- this suggests that the equipment and strengths that were used were not those recommended by Syngenta.**
Q. There's a difference between recommended and telling someone not to use something, right?
**A. Yes, but it is assumed that in saying "You should use paraquat in this way, this strength, this equipment," that is effectively an instruction for safe use.**

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Q. That you should use something is directing them, while a recommendation is different; you'd agree with that?
**A. The purpose of a product label is to give instruction as to how to best use a product, yes.**
Q. And so that's a fair point. Do you know whether or not the strengths or equipment being used was specified on the label that it should not be used?
**A. I can't comment on that. It will be unusual to say, "Don't do it this way." Normally, it's a positive statement saying to do it this way.**
Q. All right. One worker, it mentions:
"... died following a leaking connection from a backpack container to a herbicide applicator and subsequent poor hygiene."
Do you see that?
**A. Yes.**
Q. A leaking backpack container would not be against recommendations on the label, correct?
**A. It would -- the label would probably say that you should avoid that and what to do in the event that it happens.**
Q. Syngenta certainly was aware by this point in 1979 of individuals wearing backpack containers having leaking incidents, right?

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**A. Yes.**
Q. Do you know what poor hygiene is being referred to here in this document?
**A. I don't know specifically. You would -- it would suggest that, for example, the individual did not take action to decontaminate, to wash his clothing or himself.**
Q. If you go down to the bottom of that page, under (ii) it says:
"Chevron have had up to a dozen cases in their packaging plants of accidents where workers have had quite severe dermal exposure and shown significant paraquat levels in blood and urine."
Do you see that?
**A. Yes.**
Q. "Four or five [of them] were hospitalized."
Right?
**A. Yes.**
Q. Were the Chevron workers, to your knowledge, exposed to paraquat in ways that were not recommended?
**A. I can't comment on the working practices in Chevron packing plants, I'm afraid. I've no evidence to understand that.**

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Q. Nonetheless, those individuals did have paraquat in their blood and their urine, right?
**A. Yes. I mean, the assumption must be that there was some bad practice going on.**
Q. And the assumption being the fact that there was paraquat in their blood and urine?
**A. The fact that they were exposed at all to paraquat would be something you wouldn't expect in a packaging plant.**
Q. Syngenta, by this point in 1979, had individuals working within their packaging plants who experienced adverse health effects from exposure to paraquat, such as severe nosebleeds, right?
**A. Yes.**
Q. Including dermal incidents as well, right?
**A. I can't give you chapter and verse on that as regards packaging, but there were certainly incidents of dermal toxicity, yes.**
Q. Including incidents of keratosis or skin issues?
**A. That's different. So the keratosis was not in packaging plants; that was in manufacture.**
Q. That's fair. So do you know whether or not there were any issues of dermal incidents in the actual packaging plants?

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**A. I understand that there -- as you referred earlier, that there were some incidents, for example occasional nosebleeds. That's something that I've been told about, yes.**
Q. But there were other incidents you are aware of of skin issues, such as keratosis, in the manufacturing plants of paraquat?
**A. Where there was significant exposure in the early days of paraquat manufacture.**
Q. Turn the page. It begins on top:
"[Syngenta] agreed to send details of these cases to Dr. Rose."
Do you see that?
**A. Yes.**
Q. Do you know whether that was done?
**A. I do not.**
MR. NARESH: Did you say "Syngenta agreed to..."?
MR. DICKENS: Oh, I might have. Let me ask again.
BY MR. DICKENS:
Q. It says:
"Chevron agreed to send details of these cases to Dr. Rose."
**A. Yes. I'm sorry, I misheard you as well.**

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**Yes, correct.**
Q. Do you know whether or not Chevron did send those to Dr. Rose?
**A. No, I don't.**
Q. Do you know whether or not Dr. Rose reviewed those cases and drafted a report in any way?
**A. I don't recall that.**
Q. Do you know whether or not Syngenta ever notified the United States EPA that Chevron workers in packaging plants had quite severe dermal exposure and ended up with paraquat in their blood and urine?
**A. I don't know, but, in any case, that would be the responsibility of Chevron.**
Q. In the next section, "Inhalation," there's a section here that's bracketed. It says:
"Irritation to mucus membrane and nosebleed has always been associated with exposure of workers to spray mist as a clear warning of exposure."
Right?
**A. Yes.**
Q. And you'd agree with that statement?
**A. Yes.**
Q. Turn two more pages to a section towards the bottom, "Other Paraquat Studies."
Do you see that?

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**A. Yes.**
Q. It mentions:
"According to Chevron, IBT dog studies tended to be well done and the only IBT study they have so far succeeded in validating is a dog study."
Right?
**A. Yes.**
Q. Now, we looked at earlier that the IBT dog studies were included in the group that was criticized in the Chevron/ICI meeting, right?
**A. Right.**
Q. So not all the dog studies were well done; we can agree on that?
**A. Okay.**
Q. Is that --
**A. Yeah, I don't -- sorry, I would need to go back to just double-check that in that report, but yes.**
**Right. So this -- well, the report that we talked about earlier from the US EPA doesn't appear to specify dog studies.**
Q. I was actually referring to Exhibit 11, and I'll put that back up here. It's hard to keep track of all these.
**A. Yes, okay.**

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Q. This is the one of the minutes of a meeting held August 31, 1977.
**A. Yes.**
Q. It's at page ending 6541.
**A. Right.**
Q. And the section we were looking at is "IBT two-year rat and dog studies."
Right?
**A. Ah, right, okay. Yes. Mmm-hmm.**
Q. So the issues they were reporting here relate to the two-year rat and the dog studies, correct?
**A. Okay, yes.**
Q. So we can turn back now and turn to the second-to-last page, page 6 of this document. There's a section "Proposed Label Changes" a little more than halfway down the page.
Do you see that?
**A. Yes, I do.**
Q. Now, at the time of the IBT scandal and the invalidation of those studies, paraquat was undergoing something known as a RPAR, or Rebuttable Presumption Against Registration in the United States, right?
**A. Yes.**

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Q. What's your understanding of what the Rebuttable Presumption Against Registration in the United States meant?
**A. So this is one of the questions I had of Mr. -- of Monty Dixon because I wasn't sure myself, so how he described that was that the EPA would start from a position that a registration was not possible until -- essentially until there was a rebuttal to that and that rebuttal should be based on data, on studies, in order for them to allow registration.**
Q. And that's a review that was initiated by EPA itself, right?
**A. Yes.**
Q. And it was initiated -- or they initiated the review of paraquat under this process because of concerns that paraquat may cause unreasonable adverse effects on people and the environment?
**A. Yes.**
Q. And that review was ongoing at this particular time, right, in 1979?
**A. That's correct.**
Q. And as discussed at this meeting between Chevron and ICI:
"... no attempt to discuss label changes should be made unless it became apparent that the

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technical case to rebut any particular trigger was failing to influence EPA and that otherwise the Agency was likely to issue an RPAR of paraquat."
Right?
**A. Right.**
Q. So, "We won't be discussing any labeling changes with the EPA until we know whether or not they're going to actually issue a Rebuttable Presumption Against Registration of paraquat in the United States"?
**A. That would be my understanding of what was said here, yes.**
Q. Okay. So at this time, then, based on meeting notes in 1979, ICI and Chevron knew that dermal exposure could result in significant paraquat levels in the blood and urine of humans, right?
**A. Yes, when, essentially, there was a misuse of the product.**
Q. Okay. It knew that once in the blood, paraquat could pass through the blood-brain barrier?
MR. NARESH: Objection; form.
THE WITNESS: Yes.
BY MR. DICKENS:
Q. It could accumulate in the brain?
**A. Yes.**

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Q. And there were death in users from exposure on the skin, as well as inhalation of paraquat?
**A. Correct.**
Q. You can put that aside.
MR. DICKENS: I'll hand you Exhibit 13 for the record.
(Exhibit 13 marked for identification.)
BY MR. DICKENS:
Q. I've handed you Exhibit 13, which is a statement read by Michael Rose to the US House of Representatives on June 28, 1979, right?
**A. Yes.**
Q. Michael Rose, once again, as you mentioned, was, it says here, a toxicology -- or a paraquat toxicology research manager in the Central Toxicology Laboratory of ICI, right?
**A. Yes.**
Q. And this is a statement Dr. Rose made to the US government?
**A. To the House of Representatives, yes; a select committee thereof.**
Q. Shortly after the meeting minutes that we just looked at between ICI and Chevron, right?
**A. That's just before, yes.**

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Q. Michael Rose tells the US Congress that ICI:
"... is one of the largest," I believe that should be, "companies in the world, with 145,000 employees and sales (in 1978) of around $9 billion in petrochemicals, plastics, fibers, dyes [...] as well as agricultural chemicals."
Right?
**A. Correct.**
Q. CTL at the time was staffed by 300 trained scientists; is that correct?
**A. At the time, it was correct.**
Q. How many trained scientists are in the Syngenta research laboratories currently?
**A. Well, we don't do laboratory toxicology in-house anymore; that is outsourced. But the internal teams of what we now call product safety are around about 200 or so.**
Q. And those scientists' job was to provide the ICI group with safety evaluation of all chemicals used by the company to ensure that both their employees and customers are not exposed to hazards.
Right?
**A. Yes.**
Q. And that's an accurate description of CTL

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in 1979?
**A. Yes. It's not a complete description but it's a reasonable one.**
Q. And it's what was reported to US Congress, right?
**A. I'm sorry?**
Q. It is what was reported to the US Government?
**A. Yes, yes.**
Q. Michael Rose goes on:
"All of this data, both experimental and epidemiological, confirm our view that there are no significant health hazards associated with the normal use of the product."
And that product being paraquat, right?
**A. Yes.**
Q. And that was the message, or public message, by ICI, or Syngenta, at this point, in June 1979, right?
**A. Yes.**
Q. That there were no significant health hazards associated with use of paraquat?
MR. NARESH: No, no. I'll object; misstates the document.
THE WITNESS: The keyword there is

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"normal use," by which we mean when it's used according to the label instructions. So that -- in other words, if you avoid the kind of exposures that we've been talking about, if you breathe in an aerosol, if you get it on your skin, of course there can be health effects.
But if used normally -- what it means by here is "normally" means as according to the instructions, there should be no health hazards. That was his intent, I think, in making this statement.
BY MR. DICKENS:
Q. You can put that aside.
Now, we talked about the Rebuttable Presumption Against Registration earlier. The EPA ultimately decided -- or ultimately issued its decision in 1982 that the data did not support a Rebuttable Presumption Against Registration for paraquat, didn't it?
**A. I'm sorry, I don't have that date to hand so I'll take that as accurate.**
Q. Do you understand whether or not, an RPAR, as they say, was -- ended up being issued by the EPA?
**A. I don't know whether that happened.**
MR. NARESH: I'll do a belated scope objection on that.

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(Exhibit 14 marked for identification.)
MR. DICKENS: I'm going to go ahead and hand you Exhibit 14 for the record.
MR. NARESH: Can you give me the topic number on this one?
MR. DICKENS: 105.
MR. NARESH: 105.
BY MR. DICKENS:
Q. I've handed you a document which is identified in topic 105 of the Notice of Deposition, a letter from a Maurice Green to a Dr. Braunholtz at ICI/Plant Protection Division dated June 3, 1980.
Do you see that?
**A. I do.**
Q. And is this a document you reviewed prior to this deposition?
**A. Yes.**
Q. And do you understand that Maurice Green was a former employee of ICI?
**A. Yes. I've confirmed that that is the case.**
Q. At this point in 1980, or June 3, 1980, he was no longer an employee with ICI, right?
**A. That's correct.**
Q. But he is writing to a former colleague of

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his, a Dr. Braunholtz, right?
**A. Yes.**
Q. Do you know who Dr. John Braunholtz is?
**A. At that time, he would probably have been the director of research -- of R&D, research and development.**
Q. Do you know what Maurice Green's role at Syngenta was while he was working there?
**A. I don't know what his role was. I know that he was working in a part of ICI that was not the pesticide, the agriculture business. I think he was working in the chemicals business.**
Q. He writes to John:
"I hope that you are well and that PPD is flourishing."
That's Plant Protection Division, right?
**A. Correct.**
Q. Last paragraph:
"I greatly enjoy my new job in Washington."
Right?
**A. Yes.**
Q. "My company exists to help any firms which have problems with the government authorities such as EPA, FDA, OSHA [...] over registration of products,

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[...] [including] toxic substances, hazards to consumers..."
Right?
**A. Yes.**
Q. Now, at this time in June 1980, Syngenta was having problems with government authorities as they were undergoing a Rebuttable Presumption Against Registration, right?
**A. Yes; so you indicated.**
Q. He goes on:
"We independently assess the size of the problem and make recommendations on what should be done about it, and we also handle all the negotiations with the government departments for our clients as we know all the protocol and the right form in which to present evidence and we also have an inside track to EPA."
Right?
**A. That's what it says.**
Q. So he's reporting to an old colleague at ICI that his new company assists chemical and pesticide manufacturers in issues they're having with the EPA, right?
**A. Yes. And it says elsewhere that he also works directly for the EPA as well, so he had a -- his**

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**consultancy was -- had a number of different clients.**
Q. And his inside track with the EPA, and which he had from actual working with them as well, and can be used to assist those manufacturers or registrants with the problems that they were having; that's what he's reporting, right?
**A. My interpretation of this is that it would help a company like ICI/Syngenta to understand how to make representations and -- to the EPA in situations that we're describing now.**
Q. Representations to deal with situations for the benefit of the registrants of pesticides such as ICI with paraquat, right?
**A. At the end of the day, in order to make sure, I guess, that the EPA has the right information in the right form at the right time.**
Q. It goes on:
"EPA also use us to assess the risks of products, effluents [...] from firms they suspect because they have neither the money nor the staff to do all the work themselves."
Right? So he's reporting the EPA doesn't have the work or staff to do the assessment of risks of pesticides?
**A. Yes.**

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Q. And that's why they call in his new company to assist in that process?
**A. Yes.**
Q. Another field Maurice Green is getting into is re-registration of pesticides, right?
**A. Indeed.**
Q. And he reports:
"They therefore settled," they being the EPA, "for reconsideration of the active ingredients only and issue of generalized registrations for these."
Right?
**A. Yes, and this is part of that other role I was describing where the EPA are asking his agency to do some work.**
Q. And it's your understanding that the EPA, in consideration of pesticides, considers the active ingredient and the registration of the active ingredient in the product, right?
**A. They do, yes.**
Q. So their concern for paraquat, for example, is -- or for Gramoxone, would be looking at the active ingredient being paraquat?
**A. Yes, but regulatory authorities, including US EPA, also look at the formulated product as well as**

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**part of their registration process.**
Q. Okay. And so the formulated product being what's actually in the container --
**A. Yes.**
Q. -- that's being sold to consumers?
**A. Yes.**
Q. And any of the ingredients within the actual container itself, right?
**A. That would be part of their assessment of the formulated product, yes.**
Q. Now, the reconsideration of the active ingredients, that proved to be beyond the scope of the present staff at EPA, according to Maurice Green, right?
**A. That's what it says.**
Q. So they handed the whole job over to Clement Associates, right?
MR. NARESH: Objection to foundation.
THE WITNESS: That's what it says.
BY MR. DICKENS:
Q. And do you have any reason to dispute that that was the case?
**A. No.**
Q. Clement Associates:
"... have a $5 million contract to develop

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the risk assessments for 78 existing pesticides. [...] the first one that EPA sent us was paraquat."
Right?
**A. Yes.**
Q. And so Maurice Green, then, would be handling the analysis and re-review of paraquat at Clement & Associates.
**A. That seems to be the case, yes.**
Q. So the former employee of ICI is reviewing whether or not paraquat should be re-registered based on the scientific information presented to the EPA?
**A. Yes.**
Q. And the last sentence on the last page says:
"We have already had the toxicological expertise in Clement to deal with the risk assessment..."
Correct?
**A. Yes.**
Q. And that's being Clement Associates have the toxicological expertise?
**A. Yes.**
Q. And he says:
"... I shall build up the facilities here to do the benefit assessment and the risk-benefit

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analysis."
Right?
**A. Yes.**
Q. So Maurice Green, the former employee of ICI, was going to do the risk-benefit analysis on paraquat for the EPA?
**A. Yes. And, through today's lens, this all looks a little strange, that you would describe this, perhaps, today as a conflict of interest. But I can assume that, at the time, this was recognized by the EPA to be appropriate.**
Q. Do you know whether or not the EPA knew that Maurice Green was a former employee of ICI?
**A. I don't know, no.**
Q. Did you see any evidence in your review or preparation for today's deposition that the EPA knew that a former employee of ICI would be doing the risk-benefit analysis for paraquat?
**A. No, I've not seen that.**
Q. And this risk-benefit analysis, this was specific to the Rebuttal Presumption Against Registration for the EPA, right?
**A. Yes, and that, again, still now is normal practice. It's -- there always is a balance between what the benefit of a product is versus the potential**

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**risks.**
MR. DICKENS: I'll hand you Exhibit 15.
(Exhibit 15 marked for identification.)
BY MR. DICKENS:
Q. I've handed you Exhibit 15 which, for the record, is topic 105 of the Notice of Deposition, which are minutes from a meeting of Chevron and ICI, June 30 to July 2 of 1980.
Do you see that?
**A. I do.**
Q. And there's a Summary section beginning with "Chevron," and this is less than 30 days from the initial correspondence from Maurice Green on June 3, 1980, right?
**A. Yes, that's right.**
Q. So within a month's time:
"Chevron now confidently learned that an RPAR will not issue on paraquat before early 1981 (latest date published by EPA is October 1980), and the chances of an RPAR being issued at all seems to be declining."
That's what they're discussing at this meeting, right?
**A. Yes.**
Q. "As we already know, Clement Associates

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have been assigned the job of reviewing the database on paraquat for EPA."
Right?
**A. Correct.**
Q. So at this point in June -- or June 30 or July 2 of 1980, less than 30 months after Maurice Green reaches out, Chevron/ICI now don't expect that a Rebuttable Presumption Against Registration will not issue for paraquat, correct?
**A. Yes. Sorry, just to correct you. I think you said "months" there; I think you meant to say "days." But, yes, that is correct.**
Q. And Chevron and ICI, within these minutes, specify the fact that Clement & Associates have been assigned to the job, right?
**A. Yes.**
Q. Now, one of the issues the EPA initially started the process of the RPAR for was concerns of the chronic toxicity of paraquat, right?
**A. I believe so.**
Q. If you can turn to page 6, the second paragraph:
"Messages received from Don Dye (Chevron's representative in Washington) are that pressures on paraquat seem to have relaxed somewhat."

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Right?
**A. Yes.**
Q. Once again, they reference the fact that the review of paraquat data has been turned over to Clement Associates.
Right?
**A. Yes, correct.**
Q. And it was discussed between ICI and Chevron that they learned of this independently through contact of one of their former employees, Maurice Green.
Right?
**A. Yes.**
Q. If we can go down underneath the Roman numerals:
"Reports received from Chevron, and independently through contacts at the Downing town Conference, are that Clement Associates are making a poor job of the reviews undertaken under contract from EPA."
Right?
**A. Yeah. Sorry, where are you reading that? I'm just --**
Q. It's that same page, under Roman numeral -- for paragraph (iv).

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**A. Oh, yes. Yes, I see it. Yes, indeed.**
Q. So what's being discussed with ICI and Chevron is not only does -- Clement & Associates reviewing the paraquat data, but they're not doing a very good job of it, right?
**A. That's what that suggests.**
Q. And it's your understanding that Clement Associates continued to undertake the paraquat review for the RPAR until the final decision was issued by the EPA, right?
**A. I am not sure that I do know that.**
Q. You're not sure you know that or you do?
**A. No, I don't know for how long the company Clement actually did continue with that work. I can't remember seeing any dates.**
Q. The next paragraph:
"It was agreed that neither ICI nor Chevron would supply Clement Associates with the data which had not been first sent to EPA. There seemed little value to be gained from discussions with the EPA paraquat RPAR manager until after Clement Associates had completed its reviews."
Right?
**A. Okay.**
Q. That's what it says?

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**A. That's what it says.**
Q. So ICI and Chevron wouldn't discuss with the actual EPA employee responsible for the Rebuttable Presumption Against Registration until Clement Associates completed its review of the risk-benefit analysis for paraquat, right?
**A. Which seems very reasonable, until the EPA were able to be given full and complete information.**
Q. Until -- EPA giving full and complete information as presented from Clement Associates, right, that's what you mean?
**A. That's what that suggests, yes.**
Q. So there would be no discussions with EPA related to paraquat until they knew how Clement Associates were going to come out on the side of paraquat?
MR. NARESH: Objection; form, foundation.
THE WITNESS: That's certainly an interpretation of what's said here.
BY MR. DICKENS:
Q. And as we saw on the first page:
"The chances of the RPAR being issued seems to be declining."
That was the understanding of ICI and Chevron at this point in 1980, right?

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**A. Yes.**
MR. NARESH: Objection; asked and answered.
THE WITNESS: And it gave some reasons for that further up on this same page, on page 6.
BY MR. DICKENS:
Q. And, indeed, an RPAR was not issued, right?
**A. I believe that was true, yes.**
Q. And it was not issued based on the review and risk-benefit analysis undertaken by Clement?
**A. Indeed, and with a more complete and up to date set of studies and assessments.**
MR. DICKENS: Do you want to take a quick break?
MR. NARESH: Sure.
THE VIDEOGRAPHER: We are going off the record at 12:06.
(Lunch break taken.)
THE VIDEOGRAPHER: We are back on the record at 12:46.
BY MR. DICKENS:
Q. Welcome back, Dr. Botham.
**A. Thank you.**
Q. We talked a little earlier in the

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deposition with respect to dermal absorption of paraquat. Now, absorption of paraquat through the skin is greatly increased in the presence of damaged or irritated skin, right?
**A. That's correct.**
Q. And that includes skin with cuts, rashes, sores or other irritation?
**A. Yes, mmm-hmm.**
Q. And skin absorption's also greatly increased if the user wears the same clothing or PPE on multiple days, right?
**A. Yes, and I think that we touched on some of the cases earlier which may have been -- where the toxicity may have been caused by that, so yes.**
Q. Now, paraquat is a moderately strong irritant of the skin, is it not?
**A. It is.**
Q. Meaning that exposure to paraquat itself will irritate the skin, right?
**A. Yes.**
MR. DICKENS: I'll hand you what we'll mark as Exhibit 16.
(Exhibit 16 marked for identification.)
BY MR. DICKENS:
Q. I've handed you Exhibit 16, for the

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record, which is topic 17 in the Notice of Deposition, which is a memo dated June 29, 1977, "Paraquat Dichloride - Short-term dermal study in more than one specie."
Do you see that?
**A. Yes, I do.**
Q. And it's from a I. Pratt to Michael Rose, correct?
**A. That's correct.**
Q. And this is a document you've seen prior to today?
**A. Yes, it is.**
Q. There's a "Results" section midway and it includes "Epidermal effects," right?
**A. Yes.**
Q. And "epidermal" meaning skin?
**A. The epidermis is the layer just below the surface of the skin.**
Q. And in that layer just below the skin:
"Paraquat produced changes typical of a moderately strong chemical irritant."
Right?
**A. That's what the report says, yes.**
Q. And, once again, this is in multiple species, right?

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**A. Yes.**
Q. And it says:
"Effects were more severe in occluded than in non-occluded skin."
That's what's being reported here, right?
**A. That's correct.**
Q. And "occluded" meaning covered, right?
**A. Yes, that's right.**
Q. So the effects when the skin was covered after -- well, strike that.
So in these studies, paraquat would be applied to the animal, right?
**A. Mmm.**
Q. And then there would be a measurement or a observation as to the effects on the epidermis in this instance, right?
**A. Yes. So this was a pathological study, so the skin would be investigated under the microscope.**
Q. And so in some of the animals, they covered the skin after applying paraquat; in some they did not, right?
**A. That's right.**
Q. And in the animals in which the skin was covered, the epidermal effects were more severe,

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right?
**A. That seems to be the case, yes.**
Q. And that's the case and has been the case with respect to all species studied in the dermal studies with paraquat by ICI or Syngenta, right?
**A. Yes, yes.**
MR. NARESH: Objection; form.
THE WITNESS: Excuse me, can I just take one minute. I forgot to switch my phone off, which was very bad of me.
MR. NARESH: Go right ahead.
THE WITNESS: I don't want to be causing a disturbance. So apologies for that.
MR. NARESH: Could you just do your last -- I think he was checking his phone. Could you just do your last Q&A again, please.
THE WITNESS: Yeah, just give me a second, Ragan, please.
Okay, ready to go.
BY MR. DICKENS:
Q. And in ICI or Syngenta dermal studies, ICI and Syngenta have found that effects are more severe in occluded rather than non-occluded skin?
**A. Yes, yes.**
Q. Okay. If you can turn the page, the

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second page, number (3) lists some follicular effects, right?
**A. That's correct, yes.**
Q. And this is reporting on damage to hair follicles, right?
**A. That's right.**
Q. And damage to the hair follicles, that was seen in all species, right?
**A. Yes.**
Q. The effect being:
"... particularly marked in the hair bulb and dermal papilla, the growing point of the hair."
Right?
**A. Correct.**
Q. And in some species, follicular effects were seen at lower dose levels, particularly when that skin was covered.
Right?
**A. Yes, and there are probably -- the explanation for that is that the hair follicle is an easy route for substances to enter the skin.**
Q. In fact, on the next page, under "Points of interest," number 2, it says just that, right?
**A. Mmm.**
Q. "... the early changes in the follicles

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indicate a very rapid penetration of the chemical by this route."
Right?
**A. Yes, that's correct.**
Q. And that is true with respect to all species tested by ICI or Syngenta in dermal studies, right?
**A. Right.**
Q. And the same would be true with respect to humans, correct?
**A. Yes. I mean, there obviously is a big difference between humans and some of these species. Humans have far fewer hair follicles. We're not, basically, a hairy species, whereas a guinea pig and a rat are.**
Q. But it's true that in the areas where there are hair follicles, those would be the areas that would be more prone to greater dermal absorption in humans when exposed to paraquat?
**A. That is certainly plausible, yes.**
Q. It goes on:
"[The] pattern of damage does not appear to have been seen frequently with chemical irritants, and the selective [section] of the hair bulb and dermal papilla, leaving the upper part of the follicle

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untouched, is unusual as far as I know."
Right?
**A. Yes.**
Q. And there's a statement that this may explain the nail bed effects that were known.
Right?
**A. Yes.**
Q. And so it's reporting that while there's very rapid penetration through the hair follicles, paraquat is acting differently than other chemical irritants, right?
**A. That's what Dr. Pratt has suggested, yes.**
Q. And who was Dr. Pratt?
**A. Dr. Pratt was a pathologist, a senior pathologist.**
Q. And he would have been the one responsible for this particular study?
**A. It was a she, but yes.**
Q. Oh, okay.
**A. Yes.**
Q. Thanks.
Now, dermal absorption through damaged skin, that will happen virtually immediately after exposure to paraquat, right?
**A. It depends on the nature of the damage,**

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**how deep the damage is, so you can't generalize, but, obviously, a damaged skin will impact the amount and the time it takes for paraquat to get through.**
Q. And so, say, a large opening or lesion on the skin, that penetration would occur rapidly?
**A. It could do.**
Q. Almost immediately?
**A. Yes, it could do.**
**While less-damaged skin but still damaged would be more than intact skin?**
**A. Yes, because skin is actually a very effective barrier to paraquat. So intact skin, paraquat does not easily get across that barrier; the skin is a very effective barrier.**
Q. And that was seen in studies conducted on paraquat, right?
**A. Yes.**
Q. And paraquat alone?
**A. Yes.**
Q. What's a non-ionic surfactant?
**A. It's the kind of substance which is used in many different products, including pharmaceuticals as well as agrochemicals, other kinds of products, too, usually to improve what you might call the bioavailability of a substance; so it will help, in**

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**the case of a drug, to enable that drug to -- if it's a topical substance, to penetrate the skin to do its job.**
Q. Surfactants are also known as or referred to as "wetters"?
**A. They're called "wetters," yes; particularly in the agrochemical world they are, yes.**
Q. And farmers and other users of paraquat in the United States have always been instructed to mix paraquat with surfactants prior to spraying?
**A. That's right, and the instruction has been to use a non-ionic surfactant.**
Q. And prior to spraying, paraquat users in the United States would have to manually mix paraquat, surfactants and water in a tank prior to spraying?
**A. Just say that again.**
Q. Yeah. Prior to spraying, in the United States paraquat users would have to manually --
**A. Ah, right.**
Q. -- mix paraquat, surfactants and water?
**A. Yes, essentially and, of course, that's again meant to be done according to strict instruction on how you do that, where you do it and how you should protect yourself whilst doing that.**
Q. The paraquat formulations sold in the

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United States, have they ever contained a non-ionic surfactant in the formulation itself?
**A. In the United States, some of the products that have been sold have small amounts of non-ionic surfactant, and -- but they also come with the recommendation or instruction to then add further non-ionic surfactant in order to produce the substance that is then suitable for spraying.**
Q. So regardless, the formulation of non-ionic surfactant would always need to be added?
**A. That's really the only way in which it can effectively do its job as a herbicide.**
Q. Which formulations in the United States have contained small amounts of non-ionic surfactant?
(Stenographer clarification.)
MR. DICKENS: Yeah.
BY MR. DICKENS:
Q. Which products in the United -- or which formulations in the United States have included small amounts of non-ionic surfactants?
**A. It was one of the questions that I was discussing with Monty Dixon. I don't have that information to hand, but it's certainly true that we know what those products are.**
Q. You know them from the statement of

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formulas for those particular --
**A. I know them because Monty Dixon has confirmed that.**
Q. Okay. But you don't know the names of those as you sit here today?
**A. I've not got them immediately to hand. There are many different trade names that are used.**
Q. Okay. Now, the purpose -- you mentioned the purpose of surfactants in things like pharmaceuticals. The purpose of adding surfactants with paraquat is to enhance the amount of paraquat that can penetrate into the plant or weed that you're trying to kill, right?
**A. Yes. It's needed, really, to be an effective herbicide.**
Q. And whilst surfactants increase the absorption in plants, it also has the same effect on humans, right?
**A. Potentially, it could, but non-ionic surfactants are specifically recommended because that enhancing effect is not as significant as it would be with other types of surfactant.**
Q. But you do agree that non-ionic surfactants will increase the dermal absorption of paraquat?

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**A. There will be some degree of increase, yes.**
Q. Now, non-ionic surfactants will also increase the speed by which paraquat can reach peak concentration in the blood, in humans, of paraquat?
**A. They may have that. I'm not sure that I can immediately bring to mind a sort of, if you like, a systematic analysis of that, but, yes, theoretically, if you get faster or greater penetration of paraquat across the skin, that, in turn, could change the kinetics in the blood.**
Q. And, in turn, that addition of non-ionic surfactants will also increase the toxicity of paraquat, right?
MR. NARESH: Object to the form.
THE WITNESS: Well, it might. It depends on the actual amount that gets across. I think you would still need a significant exposure to paraquat, with or without surfactants, in order to see toxicity. As we've said this morning, the toxicity is generally seen when there is poor hygiene or, as you said earlier, where people have been using it with cuts and abrasions and so on. So under normal use, you don't see that toxicity.
///

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BY MR. DICKENS:
Q. Non-ionic surfactants, added to paraquat, will require less paraquat exposure to result in toxicity, right?
**A. In --**
MR. NARESH: Objection to form.
THE WITNESS: In theory, yes.
BY MR. DICKENS:
Q. And Syngenta has known that since the 1960s, that paraquat with surfactant would be more toxic than paraquat alone?
MR. NARESH: Objection to form.
THE WITNESS: And since the 1960s, we've done toxicity studies on formulated product as well as the active ingredient.
BY MR. DICKENS:
Q. Now, the studies on paraquat with surfactants, those have not been submitted to the United States Environmental Protection Agency, have they?
MR. NARESH: Objection to scope.
THE WITNESS: Studies of paraquat with surfactant added, yes, absolutely. It's a requirement that certain types of toxicity studies are submitted to the EPA.

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BY MR. DICKENS:
Q. Okay. What toxicity studies have been submitted to the EPA comparing paraquat versus paraquat with a surfactant?
MR. NARESH: Objection to scope.
Which topic is this?
MR. DICKENS: Topic 17.
MR. NARESH: Where does it talk about EPA in topic 17?
My understanding is that topic 84 is about --
MR. DICKENS: Sorry.
MR. NARESH: -- submitting studies to the EPA.
MR. DICKENS: Probably topic 6, sorry.
MR. NARESH: Where is --
MR. DICKENS: "Communications to the EPA about the effect of surfactants on the absorption of paraquat into mammals."
MR. NARESH: Are you asking about one of these specific studies or just generally?
MR. DICKENS: I'm asking about the general topic that's listed in topic 6 that specifically says we'll be asking the witness about:
"Communications to the EPA about the

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effect of surfactants on the absorption of paraquat into mammals."

MR. NARESH: I'll maintain my scope objection.

If you know the answer to any of these, it's obviously -- answer truthfully whatever you know, but if you don't, then you don't.

THE WITNESS: What I know is that studies were submitted to the EPA on paraquat as paraquat, and some studies were submitted to the EPA of paraquat as a formulated product and, largely speaking, those were studies that are required under regulatory guidelines.

BY MR. DICKENS:

Q. So do you agree that studies comparing paraquat and paraquat with the surfactant should have been submitted to the EPA?

**A. Those that are required, certainly, yes.**

Q. Has Syngenta submitted dermal absorption studies to the EPA comparing the absorption rates of paraquat versus paraquat with a surfactant?

MR. NARESH: Same objection as before as to scope.

THE WITNESS: I know that dermal absorption studies have been done and that includes, again, studies with the active ingredient and with

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formulated product. I am not able right now to be able to say what studies have been submitted to the EPA.

MR. DICKENS: Go ahead and mark Exhibit 17 for the record.

(Exhibit 17 marked for identification.)

BY MR. DICKENS:

Q. Before you take Exhibit 17, are there -- in other countries in which Syngenta sold paraquat formulations, have there been paraquat formulations that did not require the addition of a non-ionic surfactant prior to spraying?

MR. NARESH: Objection; foundation.

Answer if you know.

THE WITNESS: Again, there have been many, many formulations of paraquat. My understanding is that the majority, if not all, the recommendation has been either to add surfactant, or they've been sold with non-ionic surfactant already part of the formulation.

BY MR. DICKENS:

Q. Okay. Do you know, if we wanted to find out what studies have been submitted to the EPA involving a comparison of paraquat with paraquat and surfactant formulations, where would we go to find

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that out?

**A. Where would you go?**

Q. Yeah.

**A. I guess that information should be available from the EPA database.**

Q. All right. Exhibit 17 is a document identified in topic 6 of the Notice of Deposition, "Toxicity tests on Gramoxone for registration in the USSR," dated April 1967.

Do you see that?

**A. Yes.**

Q. And the report is authored by K. Fletcher. We discussed Dr. Fletcher previously, right?

**A. We did.**

Q. It's the same doctor?

**A. It's the same person.**

Q. Turn to page 2. It says:

"The Russian authorities require the following additional information on the toxicology of Gramoxone or paraquat."

Right?

**A. Yes.**

Q. And one of the things required is a cutaneous LD50.

Right?

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**A. Yes.**

Q. "Cutaneous" meaning skin?

**A. I assume that means a dermal LD50, yes. Skin.**

Q. And LD50 is the median lethal dose?

**A. That's right.**

Q. And that's the dose required to kill half of the animals in a tested study or a tested population?

**A. Yes, that's right.**

Q. And LD50 is used to estimate the potential hazards of a chemical on humans?

**A. Yes.**

Q. And so this test was to determine in LD50 the amount of paraquat that would cause an effect or hazard to humans, right?

**A. That's right.**

Q. If you can turn to page 3.

Now, in this study, the cutaneous LD50, three solutions were tested, right?

**A. It is the salt -- are you referring to -- yes, the dichloride and the dimethosulfate. Is that what you're referring to?**

Q. So on the top of page 3 --

**A. Oh, 3, I'm sorry. I'm sorry.**

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Q. -- there's a section "Cutaneous LD50."
**A. Yeah, okay. Yes, okay, got it.**
Q. And it says three solutions were used: (1) Gramoxone, containing no wetter.
Right?
**A. Right.**
Q. And so that is just paraquat with no surfactant?
**A. That's right.**
Q. Paraquat with 5% wetting agent, right?
**A. Yes.**
Q. And it lists which surfactants are included: Ethomeen and Lissapol, right?
**A. Yes.**
Q. Those are both non-ionic surfactants?
**A. I don't know. I'm not - unfortunately, I'm not a chemist with deep knowledge of surfactant chemistry. So I suspect so, but I don't know.**
Q. And then Gramoxone with 10 percent wetting agent, right?
**A. Right.**
Q. And the study was run with each of these solutions on the backs of rabbits, right?
**A. That's right.**
Q. And there was steps taken to reduce the

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possibility of oral ingestion, right?
**A. That's right.**
Q. In (a), it gives the results of 400 mg/kg of paraquat with no surfactant was left on the skin for 24 hours, right?
**A. Yes.**
Q. And what were the results when no surfactant was added?
**A. So it said on the fifth day, one animal died, although it says the cause of death wasn't discovered, and there was no obvious effects on the skin apart from mild erythema.**
Q. So no surfactants, there's no observable effects on the skin of those animals, right?
**A. Mild erythema, that's mild reddening of the skin.**
Q. And one animal died on the fifth day; no cause of death was discovered, right?
**A. That's right.**
Q. Then they did the experiment using the surfactants with -- I mean, sorry, paraquat with the surfactants, right?
**A. Yes.**
Q. And it gives us information with respect to what occurred in those animals, right?

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**A. Yes.**
Q. And there were deaths with the rabbits that were exposed to both surfactant -- or both paraquat and the surfactants, right?
**A. That's correct.**
Q. Now, these animals, they followed for four weeks, right?
**A. Right.**
Q. And there were deaths with surfactants at a dose of 100 mg/kg?
**A. With the 5 percent wetter only, interestingly, yes.**
Q. Okay. And then deaths in the 5 percent wetter with 200 mg/kg, correct?
**A. Yes.**
Q. Deaths for both in 300 and 400 mg/kg, right?
**A. That's right.**
Q. And therefore the approximate dermal LD50 to rabbits of paraquat with wetter is therefore 200 mg/kg, right?
**A. That's right. I don't know whether they've combined the 5 percent and 10 percent data to get that, but that's -- yes, that looks approximately right.**

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Q. And that is a lower LD50 than it would be for Gramoxone alone -- I mean, Gramoxone being paraquat without the wetter?
**A. Yeah, yeah. Well, strictly speaking, Gram- -- well, today, Gramoxone would actually be a description of a formulated product rather than the active ingredient, but I take that what's meant here is that "Gramoxone" meant pure -- essentially, pure paraquat.**
Q. So I should ask better. The 200 mg/kg of the paraquat with the surfactant is lower than the LD50 would be for paraquat alone?
**A. Right.**
Q. Now, do you know whether or not this toxicity test was submitted to the EPA?
MR. NARESH: Objection to the scope.
This was specifically agreed not part of Dr. Botham's testimony and this question was asked of Mr. Dixon for whom this topic was designated.
THE WITNESS: Yeah, so I don't know the answer to that question.
BY MR. DICKENS:
Q. Paraquat never got approved in the USSR, right?
MR. NARESH: Objection to scope.

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THE WITNESS: I really don't know. I mean, this, again, we're going back a long time here, 1967, so I'm afraid I don't carry that historical record.
BY MR. DICKENS:
Q. At least from the time -- well, you began working on paraquat in 2008?
**A. Thereabouts.**
Q. From the time you began working on paraquat, has paraquat ever been registered in the USSR?
**A. Well, I've got a list of where paraquat was and wasn't registered with me, so I can certainly check that point.**
Q. Sure.
**A. Yeah, so there's no mention here of the USSR.**
Q. No mention of paraquat being registered?
**A. No, it's not in the list of countries that I've got.**
Q. Now, the study we just looked at was a study involving rabbits, right?
**A. Yes.**
Q. Now, paraquat with surfactants have been shown to have a lower LD50 in other species as well,

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right?
**A. Yes, I believe that's true.**
Q. And that includes rats?
**A. Yes.**
Q. Monkeys?
**A. That's right, yes.**
Q. Cats?
**A. I think so.**
Q. Dogs?
**A. Yes.**
Q. Has Syngenta ever conducted a study testing absorption in man in paraquat versus paraquat and surfactants?
**A. It will have done work in -- using human skin, certainly.**
MR. DICKENS: I'll hand you what we'll mark as Exhibit 18 for the record.
(Exhibit 18 marked for identification.)
MR. NARESH: Is this within topic 6?
MR. DICKENS: It is, yes.
MR. NARESH: Yeah.
BY MR. DICKENS:
Q. Doctor, I've handed you Exhibit 18, which is a correspondence dated May 26, 1972, titled "Paraquat Strategy."

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Do you see that?
**A. I do.**
Q. And it's from an A. Calderbank to a T.C. Frears, right?
**A. Yes.**
Q. Both are ICI employees at this time?
**A. They are in the Plant Protection Division.**
Q. And in this correspondence, they're talking about new marketing plans, right?
**A. Yes.**
Q. It says:
"You may be aware of fairly recent work at IHRL which has demonstrated that paraquat is much more toxic to some species when administered as 'Gramoxone,' with wetter than as the pure chemical."
Right?
**A. Yes. Interestingly, making the point I was making earlier: "Gramoxone" is normally meant with wetter.**
Q. But we can agree that as of 1972, ICI knew that paraquat with wetter was more toxic in some species than paraquat alone?
**A. Indeed, and we've just recognized that in some of the studies that have been done, yes.**
Q. And:

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"... we cannot be sure that the presence of wetters significantly increases the toxicity of paraquat to man - but at least it seems probable that the toxicity would be increased to a certain extent."
Right?
**A. Yes, and that was, I guess, their hypothesis to say that the same could apply to man.**
Q. And they said it is probable, in light of the information we have at this point in 1972, that it would be more toxic in man, right?
**A. As I said, that was their hypothesis, yes.**
Q. At no point prior to 1972 had Syngenta informed any consumers that the addition of a surfactant would make paraquat more toxic, right?
MR. NARESH: Objection; scope, foundation.
THE WITNESS: I don't know what -- by "consumers," I assume you mean farmers who were using the product. I can't comment on what kind of communications may have been made.
BY MR. DICKENS:
Q. Has Syngenta ever publicly stated in any form that the paraquat with a surfactant would be more toxic than paraquat alone?
MR. NARESH: Same objections.
THE WITNESS: Well, we've obviously

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disclosed the studies we've done, which have been comparing the toxicities, so, in that sense, that information is in the public domain.
BY MR. DICKENS:
Q. When you say "disclosed," do you mean published?
**A. Published, submitted to the regulatory authorities; both.**
Q. It goes on:
"Thus, it could be argued we are making a toxic product even more toxic by [re]formulating it with wetter."
Right?
**A. Yeah, that's what it said.**
Q. There were discussions and considerations of marketing a formulation of paraquat with a non-ionic surfactant in the United States that would not require the addition of more, right?
**A. Yes.**
Q. And that was in response to products like Roundup, including glyphosate, which had a non-ionic surfactant already mixed in?
MR. NARESH: Objection; scope, foundation.
THE WITNESS: I don't think that you can make a connection with Roundup; I don't think that

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this was in response to that.
BY MR. DICKENS:
Q. But nonetheless, ICI and Syngenta was considering a product that would not require the addition of a non-ionic surfactant?
**A. That was one of the considerations, but, of course, you have to weigh up the benefit, does it do the job versus the potential increased risk.**
Q. And that increased risk being that it would be more toxic to man with the surfactant?
**A. It has the potential to be more toxic, yes.**
Q. And so that was the risk on why the company decided not to move forward with that product, right?
MR. NARESH: Objection to form.
THE WITNESS: Because to move forward with a product that didn't contain surfactant or...
MR. NARESH: There was a "that" in your question that was a little confusing.
MR. DICKENS: Okay.
BY MR. DICKENS:
Q. So the question was specific to the reason why the company decided to not move forward with a product including paraquat and a non-ionic

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surfactant at a quantity sufficient where you didn't need to add more in. The reason why they didn't move forward was because of the potential toxic effect to humans?
**A. I don't believe that that was the reason. I mean, certainly in the United States, as we said earlier, what has been sold and what is still sold today, generally, is a product which contains small quantities of surfactant to which you then have to add surfactant in order to be able to provide the product that works.**
Q. And my question was a little different. Just with respect to, was ICI and Syngenta considering marketing a product where you would not need to add more non-ionic surfactant in? It would already be included.
**A. Well, the challenge was obviously being thrown down in this memo, that's for sure. I don't know what -- whether any specific action was taken of that nature. I can only describe to you what actually was being sold and what is still being sold today.**
Q. And the determination as to whether or not to market that product or continue with a product that you would not need to add more non-ionic surfactant would be a risk-benefit analysis?

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**A. Undoubtedly, and if marketing a product which did not contain surfactant in the hands of a farmer and grower didn't do the job that they were expecting, then the benefit is clearly not -- no longer available to the farmer.**
Q. Okay. And, as discussed in this memo in 1972, the adding of a wetter or a surfactant could be said that you were making a toxic product, paraquat, even more toxic, right?
MR. NARESH: Objection; asked and answered.
THE WITNESS: Yes, that's a true statement, that there is a higher hazard.
(Exhibit 19 marked for identification.)
MR. DICKENS: I'll hand you what we'll mark as Exhibit 19 for the record.
BY MR. DICKENS:
Q. Let me know when you're ready, Doctor.
**A. Okay, yes.**
Q. I've handed you an exhibit which was produced by Syngenta in this litigation, which is a group of correspondence, and this is a document you've reviewed in preparation for today's deposition?
**A. I've certainly seen some of this document, yes.**

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Q. And there was multiple correspondence with dates. I'm going to start on the very back page, which appears to be one of the earlier dates, but this is a letter written from a Stelzer to an Ospenson.
Do you see that?
**A. Yes.**
Q. And it's dated May 13, 1975 and titled "Paraquat plus surfactant."
Right?
**A. Yes.**
Q. And this is a correspondence from Chevron; is that right?
**A. I think this is probably a correspondence within Chevron.**
Q. Okay. They state:
"Our initial approach has been to work with PPD..."
And that's the Plant Protection Division?
**A. That's right.**
Q. That's an ICI division?
**A. That's right.**
Q. "... collecting the data necessary to register their export formula (JF1682), which contains 10% surface active agents."
First of all, "surface active agents"

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referring to surfactants?
**A. Yes.**
Q. And what is export formula JF1682?
MR. NARESH: Objection; foundation.
THE WITNESS: I assume it's a formulation which is available for export to other countries.
BY MR. DICKENS:
Q. And PPD or ICI at the time had formulas of -- or paraquat formulations that included as much as 10 percent surfactants, right?
**A. Okay, mmm-hmm.**
Q. And formulations that contained 10 percent surfactants with paraquat, would those be formulations where you would not be required to add more non-ionic surfactant prior to spraying?
**A. Possibly so, yes. I mean, again, I'm not an expert in formulation technology, but that's -- certainly, there are formulations that have been produced which, indeed, do not require the addition of a further surfactant.**
Q. And those formulations have been marketed and sold by Syngenta in other places around the world?
**A. That's correct.**
Q. And PPD supplied that information, right?
**A. Yes.**

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Q. And that included information on the dermal LD50 that we discussed earlier, right?
**A. Yes.**
Q. As well as skin irritation and eye irritation, correct?
**A. Yes.**
Q. He says:
"... a red flag concerning oral toxicity has come to light and I recommend we defer all plans to register and market a paraquat + surfactant product."
Correct?
**A. Yes.**
Q. Last sentence of the second paragraph:
"... R. Cavalli has informed me that CTL..."
That's Central Toxicology Laboratories, right?
**A. It is, yes.**
Q. "... has unpublished data on dogs showing that the addition of surfactant to paraquat increases the rate of, and degree of, absorption from the gut into the blood; mortality is also increased."
Right?
**A. Yes.**

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Q. And you've reviewed that data specifically with respect to the dogs, right?
**A. We talked about that earlier, yes.**
Q. And that data -- you mentioned that data on paraquat-plus-surfactant toxicity would be available through publication or submission to the EPA, right?
**A. It normally would be the case.**
Q. It would not be the case for unpublished data; we can agree on that?
**A. Correct.**
Q. And this study specifically was unpublished, right?
**A. It's certainly suggestive of that, yes.**
Q. Last sentence of the last paragraph:
"The addition of surfactant appears to make a bad situation worse."
Right?
**A. Yes.**
Q. "Unless PPD can produce data to contradict the above, I strongly recommend we discontinue the exercise toward registering a product with built-in surfactant."
Right?
**A. Yes.**

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Q. PPD never produced additional data to Chevron in order to register a product in the United States with built-in surfactant, correct?
MR. NARESH: Objection; foundation, scope.
THE WITNESS: I can't comment on that.
BY MR. DICKENS:
Q. Well, certainly, neither ICI, Syngenta or Chevron attempted to register a product in the United States that included paraquat and 10 percent wetter or surfactant?
**A. I believe that's the case.**
Q. And that's the case due to concerns about toxicity?
MR. NARESH: Objection to form, foundation, scope.
THE WITNESS: I think that will have been one factor but probably not the only one.
BY MR. DICKENS:
Q. The surfactant made the bad situation worse, right?
MR. NARESH: Same objections.
THE WITNESS: In theory, it could, yes. And let me reiterate, this is about hazard and not necessarily risk. You can still use a substance which has got built-in wetter safely, but obviously it

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increases -- because the hazard is increased under situations of bad practice, bad use, you can make the toxicity worse. That's true.
BY MR. DICKENS:
Q. You agree that surfactant with paraquat increases the hazard at least with respect to toxicity?
**A. Yes.**
Q. And that's true with respect to humans?
**A. It is, yes.**
Q. You agree, in the United States farmers and other users of paraquat mix the surfactant in with the paraquat, right?
**A. That's my understanding.**
Q. So you'd agree that the end-use product being sprayed by farmers is more toxic than the paraquat they're pouring out of the jug that they purchase in the United States?
MR. NARESH: Object to form, foundation, and scope.
THE WITNESS: It has greater hazard potential.
BY MR. DICKENS:
Q. It's more toxic?
**A. Yeah.**

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MR. NARESH: Same objections.
MR. DICKENS: I'll go ahead and hand you Exhibit 20 for the record.
(Exhibit 20 marked for identification.)
BY MR. DICKENS:
Q. Showing you Exhibit 20. Once again, a document from topic 6 in the Notice of Deposition, a memo from a Paul Dugard, July 22, 1982, "Paraquat Formulations: Methods for assessing relative hazards of skin contact."
This is a document you've seen before, correct, Doctor?
**A. It is.**
Q. And there is a section here, "Skin Absorption: Human in vitro," right?
**A. Yes.**
Q. And it references previous permeability experiments with surfactants and non-surfactants.
Right?
**A. Yes.**
Q. Permeability being absorption studies?
**A. That's right. Permeability -- it would generally mean permeability across a biological surface, either the gut or the skin.**
Q. Okay. And the studies he's referring to

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here, do you know whether or not they're referring to -- or the previous permeability experiments involved human skin?
**A. I don't know whether the previous studies included human skin at that time. He's obviously now proposing that human skin could be used, and that's what I was referring to earlier in terms of the data that we did have available.**
Q. Do you know whether or not there had been, by this point in July of 1982, dermal absorption studies using human skin?
**A. No. That, I'm not absolutely sure about.**
Q. He states that those previous studies show:
"... that surfactants alter stratum corneum permeability to paraquat without intervention of a biological response."
That's what he's saying in 1982, right?
**A. Yes, that's correct.**
Q. And who is Paul Dugard?
**A. Paul Dugard was a toxicologist and he specialized in acute toxicity, short-term toxicity, and also, as this suggests, skin absorption. So this was his wheelhouse, this area.**
Q. So this is his particular wheelhouse of

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skin absorption studies for ICI?
**A. Yes.**
Q. Now, stratum corneum, that's the outermost layer of the skin, right?
**A. It is.**
Q. And it's the part of the skin that protects the body from the outside environment?
**A. That's right.**
Q. And what Paul Dugard is saying here is that surfactants themselves will alter the permeability of the stratum corneum.
Correct?
**A. Yes.**
Q. So surfactants themselves allow more of the chemical or product to be absorbed into the skin through that alteration?
MR. NARESH: Objection to form, foundation.
THE WITNESS: That's right. It's one explanation for the phenomenon that we have just been discussing.
BY MR. DICKENS:
Q. So that's without intervention of a biological response; so, at the end of the day, it's saying surfactants will allow more paraquat to absorb

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into the skin, right?
**A. That's correct.**
MR. DICKENS: I'll hand you Exhibit 21 for the record.
(Exhibit 21 marked for identification.)
BY MR. DICKENS:
Q. This is a document from a P. Slade, dated June 20, 1973, the topic "Safer Gramoxone."
Do you see that?
**A. Yes, I do.**
Q. Is this, once again, a document you've reviewed in preparation for today's deposition?
**A. Yes, I do recall this one.**
MR. NARESH: Can you just remind me, I don't see it within 6. Is it within a different one?
MR. DICKENS: It is in 6.
MR. NARESH: It is. Oh, there it is. It's in a double. I got it, thank you. 6D.
BY MR. DICKENS:
Q. And this document's marked "Confidential," right?
**A. Yes, it is.**
Q. It begins:
"Following our recent correspondence about

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the problem of minimizing the hazards of Gramoxone..."
Right?
**A. Yes.**
Q. The second paragraph:
"... we have insufficient toxicological information at present to make a firm decision about the effect of replacing the existing wetting agents in Gramoxone with an alternative."
Right?
**A. Yes.**
Q. What he can say is that:
"... the LD50 of Gramoxone is about 5-10 times greater than pure paraquat..."
Right?
**A. Yes. As he says, in some species but not all.**
Q. And as you said earlier, the Gramoxone reference, that would be paraquat with the surfactant?
**A. That's correct.**
Q. So Gramoxone with surfactant in some species are five times -- sorry, the LD50, or the median lethal dose of paraquat with the surfactant is about five to ten times greater than paraquat alone?
**A. Yes.**
MR. NARESH: I'll object on the rule of

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completeness grounds.
But go ahead.
BY MR. DICKENS:
Q. And he says "the extent of [...] of paraquat from paraquat/wetter solutions in the dog..." and that's judged by both urinary and blood levels, right?
**A. That's correct.**
Q. And that would depend on the nature of the wetting agent present, right?
**A. Yes.**
Q. And he says:
"With several wetting agents, the amount of paraquat absorbed is very much less than occurs when the normal Gramoxone wetters are used."
Right?
**A. Yes.**
Q. "... the effect of these alternative wetters on the acute toxicity of paraquat has not been measured."
Right?
**A. That's what it says.**
Q. Now, the normal Gramoxone wetters being referred to at this point are non-ionic surfactants, right?

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**A. That was my understanding, yes.**
Q. And so there were other wetting agents available which would be -- have a lower dermal absorption than the non-ionic surfactants with the paraquat, right?
**A. Indeed.**
Q. Okay. And those alternative wetters had not been tested or studied by Syngenta or ICI?
**A. That would appear to be the case.**
Q. And at no point in the United States was there ever a recommendation other than to use paraquat with a non-ionic surfactant?
**A. Correct.**
Q. Do you know how much -- or what percentage of surfactant is to be mixed in the United States by farmers and other users prior to spraying?
**A. I'm afraid I don't have that information to hand, no.**
MR. DICKENS: I'm going to hand you Exhibit 22 for the record.
(Exhibit 22 marked for identification.)
BY MR. DICKENS:
Q. I've handed you Exhibit 22, which is a PSAC Toxicity Working Group Minutes, July 2, 1986.
Do you see that?

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**A. I do.**
Q. What's the PSAC refer to?
**A. I can't remember what PSAC stands for, I'm sorry.**
Q. There's individuals who were at that meeting, right?
**A. Yes.**
Q. Lewis Smith who you talk -- or read his deposition prior to today's deposition, correct?
**A. Yes.**
Q. He was with CTL?
**A. Correct.**
Q. He was a toxicologist with CTL?
**A. That's right.**
Q. Number 1 there, "Effect of wetters on paraquat toxicity," right?
**A. Yes.**
Q. The last two sentences state:
"Recent CTL studies using undiluted doses to rats suggest an approximate 2x increase..."
And then it gives a conclusion, right?
"CTL conclude that for man the elimination of wetters from the standard formulation would lead at least to a 2x reduction in toxicity, i.e., a 2x increase in minimum lethal dose."

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Right?
**A. Yeah. I mean, I just want to point out that we've actually switched the area of attention here because I believe this is to do with GI tract absorption, so this is not to do with skin absorption.**
Q. Okay. Do you have any reason to believe that skin absorp- -- or that GI absorption would be any different than absorption into other organs within the body?
**A. Absolutely. It's quite conceivable that there would be differences in the -- well, obviously differences in the amount that could be absorbed but also differences in the effect that a surfactant could have because these are biologically very different barriers.**
Q. Okay. The skin and the GI tract, right?
**A. Yes, yes.**
Q. Would you agree that surfactants can increase the absorption into the brain?
**A. In theory, but I don't know that I have got direct evidence for that.**
Q. Has Syngenta ever studied the amount of paraquat getting into the brain of paraquat versus paraquat with surfactants?
**A. I don't recall seeing such data.**

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Q. So, as far as you know, no study like that has ever taken place?
MR. NARESH: Object to the scope.
THE WITNESS: I don't believe so.
BY MR. DICKENS:
Q. Do you agree that the end-use product being used by farmers and other paraquat users in the United States includes paraquat plus a surfactant, right?
**A. Yes.**
MR. DICKENS: I'll go ahead and hand you Exhibit 23 for the record.
(Exhibit 23 marked for identification.)
MR. NARESH: What's the topic number?
MR. DICKENS: Topic 6.
BY MR. DICKENS:
Q. Sir, I've handed you a document which is identified in topic 6 of the Notice of Deposition, which is a study, "The Blood-Brain Barrier: Bottleneck in Brain Drug Development," by William Pardridge.
Do you see that?
**A. Yes.**
Q. And this is a document that you would have reviewed in preparation for today's deposition?
**A. I think it was -- yes, I think it was part**

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**of that. I'm -- yes, I think so, yeah.**
MR. NARESH: And, Dr. Botham, if counsel is going to ask you questions about it, feel free to -- I know it's been a long couple of months --
THE WITNESS: It has, yes, so --
MR. NARESH: -- so if you want to refresh yourself on it, take your time.
THE WITNESS: I am doing. Thank you.
Yeah, okay, I understand the gist of this.
BY MR. DICKENS:
Q. And this is a document produced by Syngenta in this litigation, with the date of January 2005.
Do you see that? At the bottom.
**A. Yeah, yeah, at the bottom, yes. Got it. Mmm-hmm.**
Q. Turn your attention to the page ending 7147.
There's a section here, "Blood-Brain Barrier Disruption," and then a subtopic, "Solvent/adjuvant-mediated BBB disruption."
Correct?
**A. Yes.**
Q. "BBB" being blood-brain barrier, correct?
**A. Correct.**

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Q. It states:
"The blood-brain barrier, like cell membranes in general, is subject to solvent-mediated disruption with chemicals [...] [including] tween 80, also known as polysorbate 80."
Right?
**A. Yes.**
Q. Tween 80 is a non-ionic surfactant?
**A. It is, yes.**
Q. And so there are studies that were done with chemicals and a non-ionic surfactant to determine whether or not those chemicals could bypass the blood-brain barrier, right?
**A. Well, yes, I think that this is one of the mechanisms that was being either hypothesized or where there was maybe some evidence that adding a surfactant or a solvent might increase the ability of a drug to cross the blood-brain barrier in order to effect its disease treatment.**
Q. And, in fact, for various, as indicated in this article, there have been studies which have suggested that the addition of a non-ionic surfactant does allow chemicals to bypass the blood-brain barrier, right?
**A. I don't know whether the right word is**

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**"bypass." I think it can affect the ability of another agent to cross the blood-brain barrier.**
Q. Okay.
**A. I'm sure the mechanisms are more complicated than simply bypass.**
Q. And Syngenta certainly had the capability -- or has the capability to undertake a study to determine whether or not the non-ionic surfactant added to paraquat would allow paraquat to by- -- or to cross the blood-brain barrier?
MR. NARESH: Object to the form, foundation.
THE WITNESS: Well, we had no reason to want to do such an experiment. The concern that we've been talking about up until this point has been the increased toxicity that might come from skin penetration or gut penetration.
To look at the blood-brain barrier would mean that we felt there was a hypothesis that the brain could be damaged and we still to this day, of course, do not believe that that is the case.
BY MR. DICKENS:
Q. Syngenta does not know how much paraquat with a surfactant will end up in the brain of humans, correct?

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MR. NARESH: Objection; scope, foundation.
THE WITNESS: We've not done differential experiments comparing paraquat with and without a surfactant in terms of how much may get into the brain.
BY MR. DICKENS:
Q. And those mathematical modeling that you referred to earlier, that was done with pure paraquat, right?
**A. That was on the basis of the properties of the paraquat molecule itself.**
Q. This document, in the second column on the same page, page 7, it's closer to the bottom but there's a sentence beginning "Tween 80..."
**A. Yes.**
Q. "Tween 80, also known as polysorbate 80, is frequently administered in CNS drug formulations."
That's central nervous system, right?
**A. It is.**
Q. "A dose of [the non-ionic surfactant] will cause blood-brain barrier disruption in mice."
Right?
**A. Right.**
MR. NARESH: Rule of completeness.
///

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BY MR. DICKENS:
Q. It gives as an example: oligopeptide normally does not cross the blood-brain barrier, but it's possible, following the co-administration of the non-ionic surfactant.
Right?
**A. Yes, it's possible, but, I mean, I don't know whether they actually demonstrated that for real, but it's possible.**
Q. Do you have any reason to dispute what is said in this particular article?
**A. No, not at all. I mean, it's a reasonable hypothesis.**
Q. So would you agree, then, that Syngenta knows paraquat can enter the brain of humans, right?
**A. Yes.**
Q. That the addition of the non-ionic surfactant will allow more paraquat to enter the brain of humans?
MR. NARESH: Objection to form, foundation and scope.
THE WITNESS: Again, that would be a hypothesis and we don't actually know whether that is the case because --
///

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BY MR. DICKENS:
Q. Because --
**A. -- don't forget, humans, especially when we are talking about farmers who are using the product, will be exposed to very -- relatively low -- you know, very low concentrations of paraquat and surfactant. Here, you're -- this is -- you're talking about drug delivery, so you're talking about very high concentrations of both the surfactant and the pharmaceutical.**
Q. And we don't know whether or not that's the case because Syngenta has never undertaken such a study, right?
MR. NARESH: Objection; asked and answered.
THE WITNESS: We have certainly not done that, for the reasons that I indicated: that we didn't believe that there was a hypothesis that required testing.
MR. DICKENS: I'm going to move -- why don't we take a five-, ten-minute break.
THE WITNESS: Okay.
THE VIDEOGRAPHER: We are going off the record at 13:55.
(Break taken.)

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THE VIDEOGRAPHER: We are back on the record at 14:07.
BY MR. DICKENS:
Q. Doctor, we were discussing the effect of surfactants on dermal absorption and toxicity, but surfactants also increase the risk of inhalation toxicity with paraquat, right?
**A. In a similar way, yes, because of the effect on membranes.**
Q. And it would increase the absorption and toxicity of both the respirable particles as well as toxicity of larger particles that may not reach the lungs?
**A. Yes, that's true.**
Q. And the surfactants can facilitate transport across mucus membranes in the upper respiratory tract?
**A. Yes, because it's another membrane, as I've just been saying.**
Q. And that's true with respect to humans as well, right?
**A. Yes, indeed. Yes.**
MR. DICKENS: I'm going to hand you Exhibit 24 for the record.
(Exhibit 24 marked for identification.)

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BY MR. DICKENS:
Q. Exhibit 24 is another document identified in topic 6 of the Notice of Deposition, which is a summary report of a four-hour acute inhalation toxicity study conducted by Syngenta in the rat; is that right?
**A. Yes, that's right.**
Q. And is this a document you reviewed in preparation for today's deposition?
**A. It is, yes.**
Q. And the report, on page 2, the author is a Joanne Kilgour; is that right?
**A. Yes.**
Q. She was an inhalation toxicologist at Syngenta?
**A. That's right.**
Q. She's the author and study director of this particular study, correct?
**A. Correct.**
Q. On the next page, page 2, in the Introduction it identifies the purpose of the study, and that was:
"... to expose rats to a spray strength paraquat under conditions simulating potential worst-case operator exposure."

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Right?
**A. Yes.**
Q. And "spray strength paraquat," that would be the strength of the paraquat that's actually being sprayed by operators, farmers, users of paraquat, right?
**A. That's right, yes. So it's a diluted paraquat as a consequence, yes.**
Q. And it's meant to simulate the worst-case operator exposure from an inhalation standpoint, right?
**A. Yes.**
Q. It mentions Agral 90 was mixed with the formulation.
Do you see that?
**A. I do.**
Q. Agral 90 is a surfactant, right?
**A. It is.**
Q. And a non-ionic surfactant?
**A. Correct.**
Q. And it was added to the formulation since it may be included in tank mixes for tractor operation, right?
**A. That's right.**
Q. And it may be included with the

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formulation in the United States as well, right?
**A. Yes, potentially.**
Q. So this study is testing the end-use product that would be sprayed by users in the United States, right?
**A. If it was used in the United States, yes.**
Q. Turn to the next page. Under "Study Design":
"A group of five male and five female [...] rats were exposed in a manner designed to simulate 'downwind' exposure to a commercial spray head operating in its normal mode."
Right?
**A. Right.**
Q. And the results include an achieved test atmosphere and has analyzed paraquat ion concentration.
Do you see that?
**A. Yes, I do.**
Q. And what was that "analyzed paraquat ion concentration" in this study?
**A. 0.15 +/- 0.07 micrograms per liter.**
Q. Now, this study was never completed, was it?
**A. It's a preliminary study, so, yes, in that**

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**sense it was completed but it was not -- it was done at a single concentration, for example, so it was decided that this was sufficient information that was required at the time.**
Q. And then the conclusion, there was the death of an animal in this study that was deemed by the inhalation toxicologist, Dr. Kilgour, to be unexpected.
Right?
**A. Yes.**
Q. And that's because previous regulatory studies had shown the MLC -- what does MLC stand for?
**A. Median lethal concentration. It's the equivalent to the ML -- the median lethal dose that we've been talking about for oral and dermal studies.**
Q. And it was at a concentration of 1 microgram per liter, right?
**A. Yes.**
Q. And so that was significantly below what that LD50 or median lethal concentration would be, right?
**A. Yes, but it goes on to suggest that this may not actually have been associated with paraquat, actually. So it could have been a spontaneous finding for other reasons.**

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Q. Okay. Based on this study, the company did not know whether or not it was because of paraquat with surfactant, right?
**A. I think what this suggests, that it's actually unlikely to have been caused by paraquat. The weight of evidence would say that would have been very surprising to see paraquat toxicity at that concentration.**
Q. And so this finding was unexpected. It was also a new finding for Syngenta due to the unexpected death at such a low concentration, right?
MR. NARESH: Objection to form and foundation.
THE WITNESS: Yes.
BY MR. DICKENS:
Q. Are you aware of any inhalation studies on paraquat and with a surfactant prior to this study, dated December 18, 2002?
**A. There were, yes, I think a number of inhalation studies done prior to this date.**
Q. Inhalation studies with paraquat and a surfactant as used to simulate spray conditions of a user or farmer?
**A. Well, this was the unique feature here, so this was really trying to make it even more relevant**

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**to the farmer by generating the atmosphere in a way that might be the case when it's used in the field.**

Q. And this was the first of that type of study that would have been more relevant to the farmer, in your words?

**A. It --**

MR. NARESH: Objection; foundation, and scope.

THE WITNESS: That was the intention.

BY MR. DICKENS:

Q. And it was the first study, correct?

MR. NARESH: Same objections. Asked and answered as well.

THE WITNESS: I have not seen any other studies of this type.

BY MR. DICKENS:

Q. Okay.

Second paragraph in the Conclusion:

"Since Agral is known to be a severe eye irritant and, by inference, may have exacerbated the known effects of paraquat in this study, no further work was done pending clarification on the use of Agral in the field."

Do you see that?

**A. Yes.**

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Q. Now, at any point in time did Syngenta, or ICI, instruct farmers to stop using Agral while spraying paraquat?

MR. NARESH: Objection; foundation, scope, form.

THE WITNESS: I don't know the answer to that question. I would need to ask other colleagues about that.

BY MR. DICKENS:

Q. Was there any other work done to clarify the use of Agral in the field with paraquat?

MR. NARESH: Same objections.

THE WITNESS: Similarly, I would need to be reminded if that was the case. I don't -- I actually don't know.

BY MR. DICKENS:

Q. In your preparation for today's deposition, did you see any documents that would have been relevant to the use of Agral in inhalation studies?

**A. I've seen so many studies that I can't remember particularly at the moment.**

Q. But as this study says, no further work was done, at least with respect to this study, right?

**A. That's right.**

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Q. Do you know whether or not Syngenta manufactures Agral?

MR. NARESH: Objection; scope, foundation.

THE WITNESS: I don't know, but I would doubt it.

MR. DICKENS: I'll go ahead and hand you Exhibit 25 for the record.

(Exhibit 25 marked for identification.)

MR. NARESH: What's the topic number?

MR. DICKENS: Topic 6, still.

MR. NARESH: Is it specifically referenced in 6?

MR. DICKENS: I believe so.

MR. TRAVERS: 6.

MR. NARESH: I'm not seeing it, but maybe I'm missing it.

MR. TRAVERS: It's another combined one on 6Y. It's the second one.

MR. NARESH: Got it, thank you.

BY MR. DICKENS:

Q. Doctor, the findings of the last study, the four-hour inhalation study with Agral that we looked at, that was referred to Syngenta's Potentially Referable Findings Committee, correct?

**A. That's right.**

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Q. Also known as the PRF Committee?

**A. Correct.**

Q. There was also a committee in the United States responsible for determining whether information would need to be reported to the US EPA, right?

**A. Yes. The document you have just handed me is a minute of what's called the PRF Approach Committee, so it was -- this committee would hand its recommendations over to the US committee.**

Q. And were you a member of the PRF Approach Committee?

**A. I was for a period of time, yes.**

Q. Okay. Now, this document is titled "Data submission for consideration by the CTL Potentially Referable Findings (PRF) Committee," right?

**A. Yes.**

Q. And what is the purpose of this particular document?

**A. It's to summarize the findings in a study and why they may -- those findings may meet the criteria for referability under the US Regulation 6(A)(2).**

Q. And this particular document was submitted by Dr. Kilgour on June 29, 2000, right?

**A. That's right, because it was the**

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**responsibility of the study director to flag these.**
Q. And so this was particularly flagged by Joanne Kilgour due to the death of an animal on day 3 post-exposure, right?
**A. Yes.**
Q. And you said it was an unusual finding. I believe you said, right?
**A. Yes. And I think, you know, the report -- although it says here that the clinical observations are consistent with known effects of paraquat, I think the report itself doesn't actually come to that conclusion. There are clearly effects but I think the reason why Dr. Kilgour would have brought it to that committee was because it was not clear whether the effects were actually due to paraquat.**
Q. And then, so from this data submission or this referral, what happens next?
**A. If it's agreed that it is potentially referable, if the Approach Committee consider that it may meet the criteria, it is then submitted to the US PRF Committee, who is, if you like, the legally constituted committee within the US organization.**
MR. DICKENS: I'll hand you Exhibit 26 for the record.
(Exhibit 26 marked for identification.)

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MR. DICKENS: Which is still topic 6 of the Notice of Deposition.
BY MR. DICKENS:
Q. Document 26 are minutes from the PRF Standing Committee meeting, July 18, 2000, right?
**A. Yes.**
Q. And you were present at this particular meeting?
**A. Yes.**
Q. As a member of the PRF Committee?
**A. That's correct.**
Q. As well as other toxicologists within Syngenta?
**A. Yes. It was the senior group of toxicologists who comprised this committee.**
Q. And the senior group of toxicologists at Syngenta considered the acute inhalation study by Dr. Kilgour that we just looked at, right?
**A. It did.**
Q. And it looked at that because of the referral to the PRF Committee by Dr. Kilgour?
**A. Yes.**
Q. The minutes note that the purpose of the study, once again, was to establish a meeting -- MLC?
**A. The median lethal concentrate.**

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Q. Thank you.
"...but was to investigate the acute toxicity of the spray strength solution."
We discussed that earlier, right?
**A. Yes, we did, yes.**
Q. It goes on:
"It was further noted that this test material had not previously been tested in an acute inhalation study, and so the finding should be treated as a 'new finding' under the CTL guidelines."
Right?
**A. Yes. The CTL guidelines are what you would call very precautionary. So if in doubt, in other words, we're not -- in situations like this where we're not absolutely sure about what was going on, what was causing this effect, even in that situation we would normally refer or pass on to the US committee because, essentially, we feel that it's better to be open about that rather than to say, well, we can write this off.**
Q. And are you aware of EPA guidelines that say if you're in doubt you should submit them to the EPA?
**A. Well, it's not so much a guideline. I mean, it certainly comes from discussions which my US colleagues have had with the EPA, which is to say if you're in any doubt about whether you should submit, please do send them, and we will ascertain whether we feel it's something that is -- where we need to take any action.**
Q. Have you ever had a role on the US committee determining whether something should be submitted to the EPA?
**A. No, I've not been on -- in that committee.**
Q. And so the senior group of toxicologists at Syngenta reviewed this and were unsure as to whether or not it should be reported; is that right?
**A. This is the UK-based committee, the Approach Committee, that said that because it -- essentially, it's a new finding because we'd never even looked at this kind of formulation before, that if -- again, with the "If in doubt, refer," we chose to say to our US committee, "Consider referring."**
Q. Consider referring to the EPA?
**A. Yes.**
Q. When you say "this formulation," that's paraquat with Agral, right?
**A. Correct, yes.**
Q. And so the PRF Committee, you're saying, "This is a new finding with paraquat plus Agral, so

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you should consider submitting to the EPA"?
**A. Yes.**
Q. And on the next page, top of the page, it does lay that out:
"... the clinical effects noted were treatment related..."
Do you see that?
**A. Yes.**
Q. So there was a determination by the senior toxicologist at Syngenta that the death of the mouse was indeed treatment related, right?
**A. Yes. Which part of the treatment, if you like, was actually responsible was where we didn't -- we couldn't be sure.**
Q. But it would have been the result of the paraquat plus the surfactant --
MR. NARESH: Objection --
BY MR. DICKENS:
Q. -- in some measure?
MR. NARESH: Objection; foundation, scope.
THE WITNESS: We actually don't know as to whether it was the paraquat or the Agral itself or the combination of the two. I mean, this was a preliminary experiment, as you've indicated, so you would need to do more work to really tease apart, if

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it really is treatment related, which -- that's what I meant by which part of the treatment may have caused the effect.
BY MR. DICKENS:
Q. Syngenta never did that additional work, did they?
MR. NARESH: Objection; scope, foundation.
THE WITNESS: I don't believe they did, no.
BY MR. DICKENS:
Q. And, as you said, then, the precautionary or the safer approach would be to refer this information so that it could be considered, right?
**A. That's right.**
MR. NARESH: Objection; asked and answered.
BY MR. DICKENS:
Q. It notes the death of one animal, a very low concentration and, because of that, the study should be referred.
We just discussed that, right?
**A. Yes.**
Q. We can put that aside.
MR. DICKENS: I'll hand you Exhibit 27.
(Exhibit 27 marked for identification.)

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MR. NARESH: Is this the whole document?
MR. DICKENS: It is, yes.
MR. NARESH: Is there a family member, do you know?
MR. DICKENS: I don't believe so.
MR. TRAVERS: I'll check.
MR. DICKENS: All right.
MR. NARESH: I suspect there's embedded documents that will probably show up in the family.
MR. DICKENS: We don't know.
MR. TRAVERS: It just comes up as one document when we search.
BY MR. DICKENS:
Q. I've handed you a document identified in topic 6 of Plaintiffs' Notice of Deposition, and this is a document you've reviewed prior to today; is that right?
**A. You know, when I saw this just now I wasn't sure that I had seen this. I may have done, but, anyway, I can understand where it comes from.**
Q. It mentions "RAD Strategy Meeting Minutes."
Do you know what RAD refers to?
**A. Regulatory affairs department.**
Q. And what is the regulator [sic] affairs

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department at Syngenta?
**A. As it says on the tin, it's a department that deals with regulatory issues.**
Q. Is that global regulatory issues?
**A. I'm not quite sure at this particular time because we're talking about 2000, so it's just after Syngenta was formed, whether this was the European regulatory affairs department or whether it was the US one.**
**This is -- I'm not absolutely clear about that.**
Q. You mentioned there was a separate committee in the United States to determine whether or not information should be submitted to the US regulatory agencies. Was the same true with respect to other countries?
**A. Yes, that's right. So there was certainly, and still is, a process, which can be via committee, to look at referability in other countries.**
Q. Okay. Now, the RAD, regulatory affairs department, strategy minutes, did consider the four-hour inhalation study that we've been discussing, right?
**A. Yes.**
Q. And it begins:

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"Europe would like to develop a reduced-strength formulation [...] to avoid labeling as toxic or very toxic based on long-term effects."
Right?
**A. Yes.**
Q. And you're aware of that?
**A. Yes.**
Q. Later on, it notes -- the study says that:
"It should be noted that the 200..."
Is that grams per liter?
**A. It is.**
Q. "... SL formulation contains surfactants (Agral)."
So that's a formulation of paraquat with surfactants, right?
**A. Yes.**
Q. "... and these may have a bearing on the tox profile."
"These" being the surfactants, right?
**A. Yes.**
Q. Now, the regulatory affairs department, is that made up of regulatory people within the United States?
**A. Largely, yes.**
Q. Are there toxicologists on the regulatory

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affairs department?
**A. There certainly were at some point in time, yes.**
Q. Were you on the regulatory affairs department at this time?
**A. No.**
Q. Do you know whether or not the senior scientists who were on the PRF Committee were on the regulatory affairs department?
MR. NARESH: At the time?
BY MR. DICKENS:
Q. At the time.
**A. I don't know who exactly was on the -- I mean, let's assume that this was actually a US committee. I can't tell you, in 2000, exactly who those people were but there would certainly be some senior people in the regulatory affairs department.**
Q. And the third paragraph states:
"The meeting considered that the study did not provide clear evidence of a paraquat-related effect."
Right?
**A. Yes.**
Q. That being the four-hour inhalation study?
**A. That's the one we've just been talking**

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**about.**
Q. The one that the senior group of scientists at Syngenta said was treatment related, right?
**A. Treatment related, yes. This is actually specifically saying is it related to paraquat, and I think I've just answered that question: that this study itself, it wasn't really possible to determine whether those effects were due to paraquat or Agral, or a combination of the two, or to some other reason. So this committee obviously thought you can't say this is down to paraquat.**
Q. The study's purpose was to determine inhalation toxicity of the end-use product being sprayed by farmers, right?
**A. Yes.**
Q. And that treatment, the end-use product is what resulted in the related effect of the death of an animal at a low concentration, right?
**A. That's correct, but essentially for unknown reasons. We still don't understand that study.**
Q. And no efforts were undertaken further to understand that study?
**A. I don't believe so, and that's potentially**

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**because that particular formulation was not actually further developed. But I don't know precisely if that's true.**
Q. Was the 200 gram per liter SL formulation different in any way than the formulation on the market in the United States at this time?
MR. NARESH: Objection; foundation, scope.
THE WITNESS: I don't know. I'd have to look at more detailed information to make -- to answer that question.
BY MR. DICKENS:
Q. It says:
"It does not appear that the findings meet the criteria for submission as a PRF given that the single mortality at one exposure concentration of 0.15 microgram per liter does not alter the existing classification of this formulation."
**A. Mmm. Yeah.**
Q. Do you see that?
**A. Yes.**
Q. Now, this is in direct contradiction to the findings of the PRF committee, right?
**A. No, not really, because the -- when you actually translate what we've just been talking about into what the US committee does, and, actually, more**

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**important, what the US EPA does, what the US EPA wants these referable findings for largely is does this information have a bearing on our assessment of -- risk assessment of a substance, of a product. And that could include things like classification, and that will be true of other legislation, including Europe.**

**So I think the judgment here is that in spite of that, and in spite of not knowing whether it's due to paraquat or not, it wouldn't change, if you like, the risk profile of that formulation.**

Q. That was a decision that the regulatory affairs department at Syngenta made, right?

**A. That's right, yes.**

Q. The EPA was not afforded the ability to make that determination on its own?

**A. If it was not submitted, that would be the case.**

Q. Do you know whether or not it was submitted?

MR. NARESH: Again, scope.

I believe these questions were asked of Mr. Dixon.

MR. TRAVERS: We might want to go off the record because we did a supplemental Notice of Dep.

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MR. DICKENS: Okay.

MR. NARESH: Well, his answer may be "I don't know," so --

MR. DICKENS: Okay.

MR. NARESH: -- I don't know what --

MR. DICKENS: Right.

MR. NARESH: -- his answer is on this, so we -- why don't --

MR. DICKENS: Yes.

MR. NARESH: -- you ask your question again, answer it, and then we'll see where we are.

BY MR. DICKENS:

Q. Do you know whether or not the study was submitted to the US EPA?

**A. I don't know personally.**

Q. The PRF Committee did find that it met the criteria for submission as a PRF?

MR. NARESH: Objection; asked and answered.

THE WITNESS: The Approach Committee did, yes.

BY MR. DICKENS:

Q. Do you know whether or not the US 6(A)(2) or PRF Committee considered this study?

**A. Well, I'm saying, I'm wondering if this is**

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**actually the minute of their discussion or whether this is a minute of the European equivalent of that committee. That's not entirely clear to me.**

Q. Okay. This committee found that:

"... the findings would not be referred to either in the US or Europe..."

Right?

**A. Yes.**

Q. So that was a determination by some committee that not only would it not be referred in the US, but it also wouldn't be referred in Europe, right?

**A. Yes.**

Q. Would that be a finding that the US 6(A)(2) or PRF Committee would make as to whether or not it would be referred in Europe?

MR. NARESH: Objection to scope, foundation.

THE WITNESS: No. The way in which this worked, as I understood it, was, and certainly during most of the time that I was on the PRF Committee, is that the US committee, PRF Committee, would essentially make their own decision based on their -- on the 682 regulations in the US.

There will be a separate process to look

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at referability elsewhere in the world. This almost looks like it's been mixed up, which I -- is somewhat unusual.

BY MR. DICKENS:

Q. Unusual in the process in which this particular issue was handled?

**A. Well, unusual in the way in which it's been dealt with, because RAD does sound to me like it's the European regulatory affairs department, but I don't know for sure. And to actually say "it would not be referred either in the USA or Europe at this time," that's not what I've -- that's not been my experience generally, that they would be separate decisions.**

Q. It says:

"CTL will be informed of this conclusion..."

That's the toxicologists?

**A. Yes, we would always get feedback from these committees in order to -- just out of courtesy, just so we know what's happened to our recommendation.**

Q. So feedback from the regulatory people?

**A. Feedback from the -- yeah, from the PRF committees, mostly in the United States.**

Q. So the committee who made this ultimate

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decision, whether it's the RAD or the PRF Committee, they would give feedback as to the design of the study to the inhalation toxicologists who conducted the study?

**A. No, they would give feedback on whether or not they decided it, in their view, met the applicable reporting criteria in whatever region we're talking about and the reasons for that.**

**In the vast majority of cases, they agreed with the recommendation. In some, they might disagree, and here is an example of the latter.**

Q. They did more in this instance, though, didn't they? They indicated that "further work to better understand the finding" would be needed and expressed concern about the study design."

Right?

MR. NARESH: Objection to form.

THE WITNESS: Sure, there's a much more detailed commentary on this than would normally have happened.

BY MR. DICKENS:

Q. So the regulatory department's making or expressing concerns about Dr. Kilgour's study design for inhalation toxicology study?

**A. Well, you could interpret it that way and**

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**I don't think Dr. Kilgour would disagree because it was a preliminary study and, under normal circumstances, that might lead to another study where some of those issues would be addressed.**

Q. You can put that away.

MR. NARESH: Can you make a representation about any of the metadata surrounding Exhibit 27: dates, custodians, anything like that?

MR. TRAVERS: Give me a second.

MR. NARESH: Just so we have something on the record on that.

MR. TRAVERS: Yeah.

MR. NARESH: I suspect the dates because --

MR. TRAVERS: July 24, 2001, Andy Cook's the custodian --

(Stenographer clarification.)

MR. TRAVERS: The document's metadata says it's dated July 24, 2001 and the custodian is Andy Cook.

THE STENOGRAPHER: Thanks.

THE WITNESS: We're talking about that document?

MR. NARESH: This one.

THE WITNESS: Right.

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MR. DICKENS: I'll go ahead and mark Exhibit 28 for the record.

(Exhibit 28 marked for identification.)

BY MR. DICKENS:

Q. Doctor, these are minutes and actions from an inhalation exposure meeting at CTL on April 12, 2001.

Do you see that?

**A. Yes.**

Q. Joanne Kilgour is in attendance?

**A. Yes.**

Q. The others are other toxicologists at Syngenta, correct?

**A. They are. Apart from Sonia Ellis, I should say, by the way. Excuse me. Sonia Ellis was in the regulatory department.**

Q. Okay. Okay. If we can turn to page 6 -- sorry, page 2, number 6.

Number 5, first of all, is "Review of spray strength data to check consistency."

Do you see that?

**A. Yes.**

Q. And there were studies done on diquat, right?

**A. Yes.**

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Q. And the study design, the same as paraquat, "although in this case a Reglone formulation was used."

Right?

**A. Reglone is diquat.**

Q. Okay. And Agral was added, correct?

**A. That seems to be the case.**

Q. And it says "What are the consequences for paraquat?"

Right?

**A. Yes.**

Q. And then, in the second action item, it's:

"... evaluate risk of doing a study to reinforce arguments."

Do you see that?

**A. Yes.**

Q. It states:

"It was agreed at the previous meeting that Agral is likely to have an adverse effect on any testing and [won't] be included."

Right?

**A. Yes.**

Q. So any further testing with respect to inhalation toxicity with paraquat would not include Agral because it would increase the adverse effects?

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**A. Yes. And I -- what I don't know, but one would normally expect, is that that might therefore mean that Agral would not necessarily therefore be appearing in commercialized product.**

Q. Yet it wouldn't appear in commercialized product because of the increased toxicity, so we'll just have the farmers add it in later, right?

MR. NARESH: Objection to form, foundation.

THE WITNESS: Well, I think that's a kind of an information trail which I would need more information on. I honestly don't know what has happened, or what happened and what has ever happened to the addition of Agral.

BY MR. DICKENS:

Q. Do you have any reason to believe Agral would act any different than any other non-ionic surfactant?

**A. Well, non-ionic surfactants are not all the same, so inevitably you might expect there to be differences in their ability to do their job to act as a surfactant and, potentially, therefore in the effect they may have on toxicity.**

Q. Has Syngenta ever conducted toxicity studies on multiple surfactants to determine which is

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the safest of the non-ionic surfactants when added with paraquat?

**A. I'm not aware of, if you like, almost a systematic study which says, you know, here's a big bunch of non-ionic surfactants and here's what they all do. I think it's been much more directed towards we believe that we would like to add this to a formulation and we need to do an assessment of toxicity.**

(Background interruption.)

MR. DICKENS: Brian, can you go on mute?

MR. NARESH: Let's go off the record. Let's go off the record for a minute.

MR. DICKENS: I think he got it.

All right. We'll go ahead and mark 29 for the record.

(Exhibit 29 marked for identification.)

MR. DICKENS: 29 is still within topic 6 of the Notice of Deposition. These are minutes from an inhalation exposure meeting, August 15, 2001, so several months after the last one.

BY MR. DICKENS:

Q. Do you see that?

**A. Yes.**

Q. And, once again, Joanne Kilgour, as well

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as other toxicologists, are present?

**A. That's right.**

Q. And then there's a section towards the end of page 1 that begins "Agral."

Do you see that?

**A. I do.**

Q. And it was judged that:

"... Agral (a wetter) is very likely to contribute to enhanced inhalation toxicity of paraquat..."

Do you see that?

**A. Yes. To be clear, the second clause is important. So that wasn't based on that study that we were talking about earlier; it's a read-across from the fact that it has got greater irritancy to the eye.**

Q. Certainly, Joanne Kilgour and the others would have been aware of the previous study, right? Sorry, the four-hour inhalation study conducted with paraquat and Agral?

**A. Of course.**

Q. "Its surfactant properties may also contribute directly to increased absorption."

Right?

**A. Indeed. That's as we've been saying throughout this afternoon.**

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Q. So the toxicologists at Syngenta believed that Agral, or the non-ionic surfactant, will enhance both the absorption as well as the inhalation toxicity of paraquat, based on the information that they had at the time?

**A. Yeah, they've done a weight of the evidence to come to that conclusion.**

Q. The next section's with respect to additional tests, and the last sentence:

"Given the high risk of doing further testing..."

And this is high risk of doing further testing with paraquat and Agral, right?

**A. Right.**

Q. "... it was agreed that the present strategy..."

Is that the Pauluhn approach?

**A. Pauluhn, yes.**

Q. What is the Pauluhn approach, if you know?

**A. All I know is that Pauluhn was a very well-respected inhalation toxicologist and he had approaches for assessing the safety of materials. I'm not a deep technical expert in that area.**

Q. "... the present strategy ([using] Pauluhn

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approach [...]) should be pursued in the first instance."
Right?
**A. Yes.**
Q. Let me turn to the next page, at the very bottom, "Draft Presentation on Classification for Inhalation Toxicity."
Right?
**A. Yes.**
Q. The second paragraph mentions the weakness for the Pauluhn approach, right?
**A. Yeah.**
Q. And that's cases where a.i. -- do you know what a.i. is referring to?
**A. The active ingredient, so paraquat in this case.**
Q. So where paraquat "exerts its toxic effect systemically."
What do you understand exerting toxic effects systemically is referring to?
MR. NARESH: Objection to form.
THE WITNESS: It means that the principal toxicity is one which comes from exposure through, essentially, the blood supply, so hence affecting other organs, whereas in the case I think what Pauluhn

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was talking about was substances which only had toxicity locally in the respiratory tract.
BY MR. DICKENS:
Q. Paraquat exerts its toxic effect systemically, right?
**A. Yes, and locally.**
Q. And so the Pauluhn theory would not be used in -- where the active ingredient, paraquat in this instance, would incur --
(Stenographer interjection.)
BY MR. DICKENS:
Q. Yeah. The Pauluhn theory would not be used for active ingredients like paraquat which exert its toxic effect systemically, right?
**A. That's what they were recommending, yes.**
Q. Do you know whether or not they used the Pauluhn approach for paraquat for inhalation toxicity?
**A. I've not seen anything one way or the other on that. No, I don't know.**
Q. Well, do you know whether or not a four-hour acute inhalation study was conducted by Syngenta on paraquat without Agral?
**A. There were, you know, quite a number of four-hour acute inhalation studies done on paraquat formulations, and many of them would not have had**

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**Agral.**
MR. DICKENS: Can we go off the record for a minute.
THE VIDEOGRAPHER: We are going off the record at 14:53.
(Off the record.)
THE VIDEOGRAPHER: We are back on the record at 14:57.
BY MR. DICKENS:
Q. Now, by the time of the four-hour acute inhalation study with paraquat and Agral we looked at, Syngenta was aware of reports of deaths following inhalation exposure to paraquat, right?
**A. There were some reports, yes.**
Q. And those reports included autopsies or postmortem reports as well, right?
**A. Yes.**
Q. And there were individuals -- or strike that.
MR. DICKENS: Why don't we just go ahead and mark Exhibit 30 for the record and I'll do 31 right behind it.
(Exhibit 30 marked for identification.)
(Exhibit 31 marked for identification.)
///

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BY MR. DICKENS:
Q. Let me know when you're ready.
**A. Do you want me to look at both documents?**
Q. I can start with 30 and then we'll move on to 31.
Exhibit 30 is a coroner's report, dated January 19, 1973 involving the death of an individual exposed to paraquat, right?
**A. Yes, that's correct.**
Q. Okay. And there was a premortem urine sample as well as a postmortem urine sample, correct?
**A. Yes, that's right.**
Q. And both of those urine samples showed paraquat in the urine of this particular individual?
**A. Yes.**
Q. And the death in the opinion was secondary to paraquat poisoning, at the bottom of page 1?
**A. Yes, that's right.**
Q. And that was signed by the coroner, a P.J. Bofin, right?
**A. Correct.**
Q. P.J. Bofin, the coroner, determined that the death was the result of inhalation exposure of paraquat?
**A. Yes.**

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MR. NARESH: I'm sorry to interrupt. Which topic are we in?
MR. DICKENS: 17.
THE WITNESS: Actually, just to correct myself, if I may, I'm just looking for where the coroner said it was definitely due to inhalation exposure to paraquat. He certainly says it was due to paraquat poisoning.
BY MR. DICKENS:
Q. Okay. Why don't we look at Exhibit 31. That might be able to help. 31 is a report from a visit to Ireland, February 28, 1973, right?
**A. Yes.**
Q. And it's A.W., is that Waitt?
**A. A.W. Waitt, I -- yes, I don't know A.W. Waitt, but that's probably how it's pronounced.**
Q. The visit was on February 28, 1973 but the report was drafted in March of 1973, right?
**A. Yes.**
Q. It was circulated to individuals, including Dr. Swan who we discussed earlier, right?
**A. Yes. Yes.**
(Stenographer interjection.)
BY MR. DICKENS:
Q. The purpose of the visit to Ireland was

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specific to the report of the death in the individual we looked at in Exhibit 30, correct?
**A. Yes, it was.**
Q. And the introduction states:
"... a verdict of paraquat poisoning as a result of inhaling the spray solution was brought by Dr. Bofin, the coroner in Dublin."
Right?
**A. Yes, and I do remember that from reading these documents before and the reason for my correcting myself is that I'm still not sure from the autopsy report as to whether he was convinced that it was due to inhalation exposure. But that's what the record shows.**
Q. Now, the purpose of this visit, ICI/Syngenta informed the coroner, as well as the head of the Poisons Information Centre in Ireland, that deaths could not result from inhalation of paraquat spray, right?
**A. I think that there was a surprise in -- if that was the explanation, yes.**
Q. "Dr. Woodcock," it mentions, "was not convinced that death could not result from the inhalation of paraquat spray and [...] expressed persisting doubts about the safety of the agricultural

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use of paraquat and encouraged ICI to do more work."
Do you see that?
**A. Yes.**
Q. And the purpose of sending someone out was to discuss paraquat with Dr. Bofin and Dr. Woodcock in an attempt to convince them that deaths could not result from paraquat inhalation, right?
**A. I think it was rather like I'm doing now, to try and understand the strength of evidence that that was the cause of death.**
Q. If you can turn to the next page, page 305, there's a meeting with Dr. Bofin.
Do you see that?
**A. Yes.**
Q. Dr. Swan explains -- so Dr. Swan accompanied or was on this visit from ICI, right?
**A. Yes.**
Q. And he explained the background of the visit and their intention "to carry out a demonstration to confirm earlier work that paraquat sprays were of no significant hazard."
Do you see that?
**A. Yes.**
Q. Was it Syngenta's position at this time in 1973 that paraquat sprays presented no significant

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hazard to users or farmers?
**A. The view at this time was because of the size of the particles that are produced during paraquat spraying were very unlikely to achieve the systemic exposure that will be required to cause, in this case, a tragic death.**
Q. And so that's referring to the respirable particles, right?
**A. That's correct, yes.**
Q. And so Syngenta's position was that because the particles were too large, they could not reach the lungs?
**A. That was the position, yes.**
Q. There's a difference between the respirable particles and particles that can be breathed in either intranasally or through the mouth, correct?
**A. Yes, and those are described as inhalable.**
Q. And those inhalable particles can cause toxic effects even if they don't reach the lungs?
**A. They can cause local toxicity, yes.**
Q. Nosebleeds and the such?
**A. That's right.**
Q. Now, do you have an understanding that intranasal or inhalable particles of paraquat can

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reach the brain in areas outside of the blood-brain barrier?
**A. Well, we are now into the hypothetical because, again, theoretically, yes, because there is a direct route from the nose into the olfactory bulb in the brain, but, again, in terms of causing toxicity, that would depend on how much and for how long and so on.**
**So it's theoretically possible, but there was no direct evidence that it actually happened in practice with people who were using paraquat in its -- in the normal agronomic way.**
Q. We've looked at the first page, Dr. Woodcock expressed doubts and encouraged ICI to do more work.
Do you know whether or not ICI did any work with respect to inhalation toxicity as a result of this report of a death in 1973?
**A. I can't give you a direct link, as I sit here, between this incident and any further studies that were done. All I can say is that we continued to look at the toxicity of paraquat, including by the inhalation route, over a period of time beyond this.**
Q. Now, regulatory agencies have expressed concerns about toxicity of exposure to the larger

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non-respirable particles of paraquat, right?
MR. NARESH: Objection; form, scope, foundation.
THE WITNESS: Yes.
BY MR. DICKENS:
Q. And that includes the US EPA?
**A. Questions have been asked, yes.**
Q. And you saw documents to that effect in preparation for today's deposition, right?
**A. Yes, indeed.**
Q. And you saw statements from the US EPA concerned that those non-respirable particles could result in chronic toxicity?
**A. I'd need to be reminded exactly how they put that, so maybe you can help me with a document.**
MR. DICKENS: Why don't I start with an earlier report. I'll go ahead and mark Exhibit 32 for the record.
(Exhibit 32 marked for identification.)
MR. DICKENS: For the record, this is identified in topic 5 of the Notice of Deposition.
BY MR. DICKENS:
Q. Dr. Botham, this is a document from the -- Health and Welfare Canada, dated October 23, 1989.
And do you understand specifically it is

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the head of reassessment division; do you see that?
**A. That's right, yes, Dr. Riedel.**
Q. And you understand this is the regulatory agency for Canada?
**A. Yes.**
Q. And at this time, paraquat formulations were registered for market and sale in Canada?
**A. Yes.**
Q. And in the first section, it references some acute and short-term inhalation studies.
Do you see that?
**A. I do.**
Q. And those studies that are listed, do you understand those studies to have been done on paraquat itself without a surfactant?
**A. Yes, I think so.**
Q. Now, it mentions:
"... Chipman submitted an acute inhalation toxicity study in the rat, May 30, 1988."
Right?
**A. Yes.**
Q. Do you know what they're referring to for "Chipman," as submitting an acute inhalation toxicity study?
**A. Do you mean --**

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Q. Like, who is Chipman --
**A. Yeah. Well --**
Q. -- I guess is the easy way to ask it?
**A. -- I think my understanding is that Chipman was, essentially, the ICI Canada commercial organization.**
Q. And the second page in the middle, there's a paragraph beginning, "The above comments..."
Do you see that?
**A. Yes.**
Q. "The above comments indicate that toxic effects resulting from an acute exposure may be underestimated from this study. However, signs of respiratory distress, neurotoxicity and damage to lung tissue were evident in the rats exposed to the low nominal exposure level of 0.185 micrograms per liter [in the] air."
Do you see that?
**A. I do.**
Q. Now, Health Canada is reporting -- Syngenta, first of all, would have received a copy of this letter back in the 1989 time frame, right?
**A. Yes.**
Q. And it's being reported that inhalation toxicity study -- and this was an inhalation toxicity

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that was submitted by another company or ICI?
**A. Right, yes.**
Q. Is it ICI?
**A. It is I- -- it's another comp- -- I don't know whether it was owned by ICI, but, yeah, certainly very closely associated with ICI.**
Q. It's within the Syngenta realm?
**A. Exactly, yeah, yeah, yeah.**
Q. So Syngenta submitted an inhalation study and the Health Canada regulatory agencies are saying there were signs of neurotoxicity in the rats with a low nominal exposure level, right?
**A. That's what they said, yes.**
Q. And that exposure level is right around what we saw in the four-hour acute inhalation study, correct?
**A. Yes, and just to point out that this acute inhalation study was not, if you like, a standard acute inhalation study. So on the first page it says that this study was done to simulate practical use exposure level, so it wasn't trying to stress the system to do a medium lethal concentration as you would normally do.**
Q. And even at that practical-use exposure levels, there were signs of neurotoxicity, right?

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**A. Yes. I would need to have a look again at the report to see precisely what they meant by that because neurotoxicity can mean many different things.**
Q. But certainly someone within Syngenta underlined neurotoxicity in this particular document, right?
MR. NARESH: Objection; foundation.
THE WITNESS: I don't know if it was somebody from Syngenta, but somebody's underlined it.
BY MR. DICKENS:
Q. This document actually refers to the "invalidated IBT studies," right?
**A. Yes.**
Q. Turn to the next page.
**A. Mmm-hmm.**
Q. Health Canada mentions:
"These studies are not considered adequate by present standards..."
And there's a toxicology data gap for short-term inhalation toxicity.
Right?
**A. Yes.**
Q. It mention that there was an 80 percent mortality over 14 days in one group of rats after a single exposure to 1 microgram per liter in the air.

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Right?
**A. Well, that was in the repeat-dose study, I assume, was it? It occurred over 14 days in one group of rats -- oh, no, after single exposure, excuse me.**
**No, sorry, it was a delayed toxicity. Right.**
Q. "Delayed toxicity" meaning toxicity that occurs after some time?
**A. Yes.**
Q. And paraquat is known to result in delayed toxicity, correct?
**A. Yes.**
Q. "The above information indicates that very low concentrations of paraquat aerosols may result in irritation and damage to the lungs, and that respiratory protective equipment should be worn when paraquat is applied in the form of sprays."
Do you see that?
**A. I do.**
Q. Now, in 1989, Syngenta was not warning farmers or other users to wear respiratory protective equipment, right?
**A. Well, this is something that I discussed with Mr. Dixon, and I don't -- I've not got**

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**immediately to hand here, but there were certainly periods of time when we were recommending respiratory protection. I just don't have that date window at my fingertips.**
Q. And when you say "respiratory protection," does that include a dust mask or a fabric mask?
**A. An appropriate NIOSH-approved mask.**
Q. And that could just be a fabric mask, right?
**A. I'm not an expert in that, so I wouldn't know exactly what the constitution would be.**
MR. DICKENS: I'll hand you what we will mark as Exhibit 33.
(Exhibit 33 marked for identification.)
MR. DICKENS: 33 is a memorandum from the EPA to Syngenta.
BY MR. DICKENS:
Q. Is that right?
**A. Yeah -- this was from the Health Effects Division branch to another person in Health Effects Division, so this looks more like an internal memo.**
Q. You're right and I apologize for that. So this is an internal memo on a review of paraquat incident reports for inhalation, right?
**A. That's correct.**

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Q. And Syngenta would have received a copy of this report that was internal, this memorandum prepared by the EPA at some point in time, correct?
**A. That would seem to be the case, yes.**
Q. And the date of the report is August 10, 2000?
**A. Yes.**
Q. If we can turn to the last page, page 8.
MR. NARESH: This is topic 17?
MR. DICKENS: Sorry. This is 17, correct.
BY MR. DICKENS:
Q. And in the conclusion, the EPA, after their review of paraquat incident reports and inhalation, note that:
"... Wessling and NIOSH reports suggest that large droplets that could get into the nasal mucosa may pose a serious hazard."
That's what the EPA is finding, right?
**A. That's right, that's what it says.**
Q. And:
"These droplets may be swallowed or absorbed across the nasal membrane."
Correct?
**A. Yes.**
Q. "Nasal exposure to non-respirable droplets

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could cause serious and perhaps fatal poisoning by paraquat."
Do you see that?
**A. Yes.**
Q. And this was reported to Syngenta in the year 2000, correct?
**A. Yes.**
Q. And is that a statement that Syngenta agrees with, that non-respirable droplets of paraquat could cause serious and perhaps fatal poisoning?
**A. I think it was -- really, the data speaks for itself. The evidence is that in relatively rare cases this can happen and so it was a reinforcement of the need for further personal protective equipment, this tied to the respiratory tract.**
Q. And that respiratory equipment was meant to prevent exposure from inhalation to farmers and other users of paraquat?
**A. Yes.**
MR. DICKENS: Keep going. I'll hand you Exhibit 34 for the record.
(Exhibit 34 marked for identification.)
MR. DICKENS: For the record, this is on topic 63 within the Notice of Deposition.
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BY MR. DICKENS:
Q. This is a multiple email chain produced by Syngenta in the litigation. I will start at the bottom, from Barry Elliott to Nick Sturgess, dated August 5, 2005.
Do you see that?
**A. Yeah.**
Q. And this is referencing Defra, correct?
**A. That's right.**
Q. And that's the report that you mentioned earlier in the deposition, that you had reached out to someone for further information; is that correct?
**A. That's right, yes.**
Q. And Defra had conducted a study investigating paraquat?
**A. Yes. To be accurate, and this was probably true at this time, 2005, they were looking to place a contract which could include doing some studies which would involve exposing animals to paraquat, including by the intranasal route.**
Q. Now, at this point in 2005, Defra was proposing this work. Had Syngenta ever undertaken studies to investigate the effect of paraquat through the intranasal route?
**A. Not of -- no, we had not, no.**

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Q. Certainly, Syngenta had the capabilities prior to 2005 to have undertaken a study investigating paraquat through the intranasal route?
**A. We had the technical capability, yes.**
Q. And there's a highlighted section from Defra related to possible entry into the brain via the olfactory bulb.
Do you see that?
**A. Yes.**
Q. And the olfactory bulb, that's the upper part of the nasal cavity?
**A. Yes, and it is, as I said earlier, a potential route of entry into the brain which doesn't involve going through the blood-brain barrier.**
Q. As Defra states:
"'Chemicals could [...] enter the brain without having to cross the blood-brain barrier.'"
Right?
**A. Yes.**
Q. And then on the top of the page, Nick Sturgess responds on that same day, and Nick Sturgess -- who is Nick Sturgess?
**A. Nick Sturgess was our neurotoxicologist.**
Q. So you say he is the neuro- -- was he the only neurotoxicologist with Syngenta at the time?

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**A. At the time, I think yes, because the previous neurotoxicologist was Dr. Widdowson. I think Dr. Widdowson had left by that time.**

Q. The second paragraph begins -- in the second paragraph:

"Having read through some of the information provided by Paul..."

And you understand that to be Paul Hext?

**A. Yes, Paul Hext.**

Q. And Paul Hext is an inhalation toxicologist?

**A. Yes, he was the senior inhalation toxicologist.**

Q. The neurotoxicologist, Nick Sturgess, at Syngenta, said:

"... my opinion is that there certainly is a potential for paraquat to be transported to the olfactory bulb if the nasal mucosal epithelium comes into contact with paraquat."

Right?

**A. Yes.**

Q. And the way the nasal mucosal epithelium would come into contact with paraquat is through intranasal exposure?

**A. Yes.**

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Q. Breathing it in?

**A. Right, although let me just clarify there. When -- for example, here, there's a description of intranasal administration; again, that is an exaggerated way of applying a substance. It's not like you're asking the animals to breathe in naturally into the nose. You're actually, essentially, pushing a substance intranasally, so it gives exaggerated exposure compared to what human beings might be exposed to.**

Q. But that is the accepted method of undertaking an intranasal exposure study, right?

**A. It is, but it's rather like things like intraperitoneal exposure; it's accepted but it's also accepted to be not a physiological mechanism of exposure, if you like. It's an exaggerated exposure.**

Q. And is it on that basis why Syngenta has never undertaken an intranasal exposure study involving paraquat?

**A. I would say it was one reason, in that we didn't feel that an intranasal study was going to give any further information about actual human risk from exposure to paraquat and, also, you know, we were beginning at that time to do experiments using other routes of exposure.**

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**When we learned that Defra might be doing this, we -- it was another reason to say, well, let's see what they find. I mean, we -- there's no point in duplicating that kind of work.**

Q. Okay. And do you know what they did find, Defra?

**A. I don't believe they ever did such a study and that's why I looked at the record that I was telling you about before. So they ended up doing a lot of kinetic modeling and predicting what might happen had they done such a study, but from what I can gather, they never actually commissioned or did an intranasal toxicity study.**

Q. Didn't you say earlier in the deposition that kinetic modeling could be as accurate if not more accurate than direct measurements?

**A. It can be, yes. Yes.**

Q. So you understand -- do you know what the kinetic modeling undertaken by Defra found with respect to intranasal exposure to paraquat?

**A. I've got their report, certainly, yes.**

Q. What did they find?

**A. I'd need to -- I've not brought the report into the -- it's a very thick report, actually, so we'd need to look at that outside.**

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Q. You've reviewed that in preparation for today's deposition?

**A. I did.**

Q. Later on, Nick Sturgess says:

"The mechanism involved seems to be the transfer along the olfactory nerve pathway via some form of axonal transport, directly to the olfactory bulb in the brain, thereby circumventing the blood-brain barrier."

Right?

**A. Yes.**

Q. That's what the neurotoxicologist at Syngenta is reporting as of August 2005, correct?

**A. And I think it was -- that was really taking the example of manganese, so he was saying this is how manganese may actually reach the brain. Because he says whether the same would have happened -- could happen with paraquat is open to debate.**

Q. And the kinetics of this transport process would be quite rapid, within minutes following introduction into the nasal cavity.

Right? That's what's being reported?

**A. Yes, again, but this is all built on the experience or understanding of what happened with manganese, so it's not known what could happen with**

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**paraquat.**
Q. And not known because no studies had been done at this point in August --
**A. Not at this site, no -- not of this sort, no.**
Q. And, in fact, Nick Sturgess refers to:
"... the lack of definitive quantitative experimental data measuring olfactory bulb concentrations of paraquat following nasal exposure."
Right?
**A. Yes.**
Q. You can put that aside.
MR. DICKENS: I'll hand you Exhibit 35 for the record.
(Exhibit 35 marked for identification.)
MR. DICKENS: Exhibit 35 is more email correspondence produced by Syngenta in this litigation. For the record, it's topic 63 in the Notice of Deposition.
BY MR. DICKENS:
Q. Once again, this is an email chain that you reviewed prior to today's deposition, right, Doctor?
**A. It is, yes.**
Q. And beginning once again on the bottom

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email, this is from a Matthew Jacobsen to Nick Sturgess, subject "Olfactory lobe and paraquat entry," dated September 5, 2005, right?
**A. Yes.**
Q. Okay. It states:
"Nick, I've been thinking about this one."
Specifically olfactory lobe and paraquat entry, right?
**A. Yes.**
Q. And he discusses, at the very bottom, axonal transport of paraquat, right, and he says that it is possible in his opinion -- or if it's possible, sorry?
**A. Yeah. Look, I mean, my reading of this email from Matt is, essentially, it's Matt thinking aloud or contemplating a number of different scenarios that could be possible and, you know, you also have to read it in the context of what Nick had said in the previous email, that when you then try and do the translation to whether this could happen with paraquat, as against manganese, you're talking about massive volumes of paraquat needing to be -- if you like, to enter through the nasal cavity.**
**So it was a theoretical discussion.**
Q. You say massive amounts would need to go

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into the nasal cavity. Syngenta does not know that, however, because they'd never conducted a test as to how much would need to be ingested intranasally in order to lead to affects on the brain?
**A. Well, absolute -- yes, we -- but, equally, we do know that the amount of paraquat that is inhaled is, generally speaking, very low.**
**So I think it was a reasonable hypothesis that there would be a very big margin of safety, if you wish, from the likely volumes or amount of paraquat that somebody spraying the product would be exposed to versus that that would actually kind of generate the transport of paraquat in the way in which is being described.**
Q. You agree that intranasal exposure does occur?
**A. Nasal exposure, yes, that's right.**
Q. We began the deposition talking about the nosebleeds in the very early research studies, right?
**A. Indeed.**
Q. And nosebleeds are the most common adverse effect that have been reported with respect to paraquat?
**A. I don't know if it's the most common, but it's certainly common.**

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Q. And the evidence of nosebleeds itself is evidence that individuals, farmers and other users of paraquat are getting paraquat into the nasal regions, right?
**A. Yes, but we're talking about the lower -- I mean, the nosebleeds are coming from the lower part of the nose, so they're not coming from up here into the olfactory bulb, so it's exposure to -- you know, basically where you can feel yourself.**
Q. You can't say how much paraquat is getting into the upper regions or the olfactory bulb in a farmer or individual who has experienced a nosebleed, right?
**A. I can't sit here and give you a number, certainly.**
Q. It says:
"If axonal transport of paraquat is possible, then it could enter from cuts in the skin and reach the CNS."
Central nervous system, right?
**A. It's what I said before: This is thinking aloud; it's highly speculative thoughts, the kind of things that researchers do when they're talking to each other. So I don't think this is based on Matt saying "I know that this could definitely happen,"**

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**particularly when we're talking about axonal transport.**
Q. Who is Matt Jacobsen?
**A. He's a pathologist.**
Q. And he's a pathologist discussing paraquat entry through the olfactory lobe --
**A. Yes.**
(Stenographer clarification.)
MR. DICKENS: Sorry.
BY MR. DICKENS:
Q. He is a pathologist at Syngenta discussing paraquat entry into the olfactory lobe with the neurotoxicologist?
**A. Yes.**
Q. "... then it could enter from cuts in the skin and, and reach the CNS [...] via the peripheral nerves, or from the ophthalmic nerve from a splash in the eye. I [may] have a little dig on anatomy, time permitting."
Right? That's what he's reporting at this point?
**A. Right. But all of this, to repeat, highly speculative to imagine that you would get the transport of paraquat through nerves in the way in which it's been described into the brain.**

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Q. And you're saying it would be speculative. Nick Sturgess responds -- or, sorry, forwards Matt Jacobsen's email to Barry Elliott, right?
**A. Yes.**
Q. And who is Barry Elliott again?
**A. Barry at that time was the project manager in CTL for paraquat.**
Q. Okay. It says:
"Barry, I have the attached response from Matt re the olfactory transport to the brain issue."
Do you see that?
**A. Yes, and he said "theoretically possible." I suppose he's saying, like me, of course all things are theoretically possible, but, I mean, my reading of this is that it's highly theoretical.**
Q. He says "I have the attached response from Matt...," indicating that Matt was responding to an inquiry with respect to olfactory lobe and paraquat entry, right?
**A. Yes, yes.**
Q. So the neurotoxicologist and Barry Elliott specifically reached out to Matt Jacobsen for his viewpoint as to this particular issue?
**A. I don't know exactly how it went, how that conversation or inquiry was made, but I can imagine --**

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**I believe at this time that Matt Jacobsen may have been on a technical team, together with Nick Sturgess and Barry Elliott, who were focused on paraquat. So it probably happened within the context of the discussions within that team.**
Q. And you mention -- he said it's theoretical, correct?
**A. Yes.**
Q. But he said:
"If we are worried about our position on this, then it is possible to do some experiments as Matt describes."
Right?
**A. I think that's an off-the-cuff view on how easy it would be to do such experiments, particularly if we're talking about transmission through the nervous system. I think they would be extremely difficult to do, in practice.**
Q. Well, he doesn't say anything in his email about the ease of doing those experiments, right?
**A. No.**
Q. Or the cost of doing those experiments?
**A. No.**
Q. He does mention that the problem with doing such an experiment is that any positive finding

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would be reportable.
Right?
**A. Of course, yes.**
Q. And that's reportable to the regulatory agencies?
**A. Yes.**
Q. So Nick Sturgess doesn't say, "This would be such a hard study," or "I don't know what the results would show." He's saying, "If we do get a finding, we have to tell regulatory agencies"?
**A. Yeah, sure.**
MR. NARESH: Objection to form.
Go ahead.
THE WITNESS: Look, this is something which, again, you've got to have a sense of the context of why these discussions go on. Of course people were concerned about generating data which were potentially referable. But they also were having, at the same time, conversations about are these experiments really going to tell us about the risk from paraquat.
So reporting is just one element of that decision about whether it makes any sense whatsoever to invest in doing studies of this sort.
///

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BY MR. DICKENS:
Q. It says:
"... do we really want to go there?"
Right?
**A. Mmm.**
Q. "A negative, however, would put it to bed pretty well."
So Nick Sturgess is saying, "If we did do this study and it was negative, we wouldn't have to be worried about this issue," right?
**A. Well, sure, but then of course you can never prove a negative, so even that might be an exaggerated statement.**
MR. DICKENS: I'll move to strike everything after "Well, sure."
BY MR. DICKENS:
Q. Isn't the question of paraquat entry through the olfactory lobe a question that Syngenta would want answered?
**A. I think that we are starting -- were starting, and continue now to this day, to say that that might be relevant if we really thought that paraquat does cause, under the conditions of exposure that farmers and growers are subjected to in their work, that that could be causative in Parkinson's**

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**disease.**
**We do not believe that to be the case, and so these kind of experiments are really not necessary in that situation.**
Q. But as Nick Sturgess says, you could run a study and get the answer pretty easily, right?
**A. You could do many studies and get the answer easily, but let me just -- although you struck the previous one, I would say, you know, you can do many experiments and you don't see an effect and people will say, yes, but you didn't do this, you didn't have a high enough concentration, you didn't use the right species.**
**So it's very difficult to know when you get a definitive negative answer.**
Q. Has a intranasal study ever been done by Syngenta --
MR. NARESH: Objection; asked and answered.
BY MR. DICKENS:
Q. -- on paraquat?
**A. No.**
Q. Syngenta did, though, however, get price estimates for an intranasal study, right?
**A. We did.**

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Q. And price estimates to run the exact intranasal study to determine the amount of paraquat entry through the olfactory lobe, right?
**A. The kinetic component was part of that, yes.**
Q. And that was through WIL Research?
**A. That would have been an option for us, yes. That's where we got one of the price estimates.**
MR. DICKENS: I'll hand you Exhibit 36 for the record.
(Exhibit 36 marked for identification.)
MR. NARESH: What's the topic number?
MR. DICKENS: Good question. Topic 35.
MR. NARESH: Thank you.
BY MR. DICKENS:
Q. Doctor, I've handed you a document from Syngenta's production, dated July 17, 2008. "Study Title: Evaluation of the effect of intranasal administration of paraquat in the C57B16 mice."
Right?
**A. Yes.**
Q. And this is a quotation for a study by WIL Research Laboratories, right?
**A. It is.**
Q. And the objective:

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"To evaluate the neurochemical and histological effects of paraquat on male and female [mice] following intranasal administration."
Right?
**A. Correct.**
Q. And under this study, there would be some brain neurochemistry, correct?
**A. Yes.**
Q. And in this study, WIL Research gave a price quote of $667,000 to run this study, right?
**A. Yes.**
Q. At no point did they ever say, "We can't do this particular study"?
**A. No, they didn't, no.**
Q. This study would have included sectioning of the brains for striatum and substantia nigra --
**A. Yeah --**
Q. -- and review --
**A. -- the histology, yes.**
Q. Okay. So there would have been stereology as to the effect of paraquat on the substantia nigra within the mouse brains?
**A. That was the intention, yes.**
Q. Following intranasal administration?
**A. That's right.**

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Q. And this was specific to identify whether or not intranasal exposure would have neurotoxic risks, right?

**A. Right. So, again, a sense of context because I did look at this again myself. So this quotation was asked for as a consequence of a -- discussions we'd been having in what was then known as the Health Science Team about a number of potential experiments that we might do.**

**The reason why we asked for this is -- I think pretty self-evident from the discussions we've just been having, because it is a genuine experimental option; however, we, again, at that particular time, were still under the assumption that the Defra contract would have requested such a study to be done.**

**So one reason -- not the only reason -- why we didn't go ahead with this is because we thought it might be duplicating what was being done somewhere else.**

Q. Now, Syngenta had communications with Defra with respect to the study that they were doing on paraquat, right?

**A. As much as we were able, with confidentiality and conflict of interest.**

Q. And, certainly, Syngenta could have asked

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Defra what type of intranasal study were they contemplating, right?

**A. We were very careful about the nature of our communications. There were some communications with them, but we were not having ongoing detailed dialogue about the details of -- and, in fact, to be fair, even Defra were -- when I had a discussion, a little bit unclear exactly what was being done by the successful winner of that contract, Exponent.**

Q. No one at Syngenta ever asked anyone at Exponent or with Defra as to what type of intranasal administration study they were conducting?

**A. I don't personally remember having that kind of conversation and, to reiterate, we needed to take some care about, you know, being perceived as trying to have some influence over what Exponent were doing because, you know, we may have been sitting here today and you'd have been showing me emails to say, you know, "Why did you have these discussions?"**

Q. You were on the ACP panel at Defra overseeing the study, were you not?

**A. Not overseeing the study. No, I was not on the ACP. That's the Advisory Committee on Pesticides. That's the regulatory advisory committee. I was on a group, a sort of shadow group to that,**

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**called the Medical and Toxicological Panel, which included people from industry.**

**That was the legitimate interaction that we could have from industry with Defra and with the advisory committee. So I was not involved at all in the contract and the output of that contract from Defra, other than knowing a little bit about it from time to time in the Medical and Toxicological Panel meetings.**

Q. Okay. You provided peer-review comments as to the Exponent study?

**A. I was asked to comment on that, yes.**

Q. And when was that?

**A. I can't remember the date. It was around about this kind of time. I don't have the exact year to hand.**

Q. Do you know whether it was before or after July of 2008?

**A. I'd need to be reminded. I know that there is an email with my report on it. I just haven't got the date to hand.**

Q. And you gave peer-review comments. Did that include peer-review comments specific to the intranasal findings in the Defra study?

**A. I don't think I did because I don't**

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**think -- no, I think, again, I would just need to look at that to remind myself. I think it was more to do with the study that was done on some of the stereological information.**

Q. Syngenta notified WIL Research that they would not be moving forward with the intranasal study prior to Defra's study being made available, right?

**A. This is the interesting thing here because the Defra study, you might argue, was never really made fully available. It was never properly externally published, so I got hold of a report because of the links that I was -- just described. There were two presentations made, posters. That's all that ever appeared from that project.**

Q. Okay. And understanding it wasn't publicly available, it certainly was available to Syngenta, right?

**A. Eventually, yes.**

Q. And did Syngenta notify WIL Research they would not be going forward with the intranasal administration study before or after receiving the report internally from Defra?

**A. I can't remember. I would need to see the chronology of this again. I didn't manage to put all that chronology together as preparation, so I'm sorry**

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**I can't give you an answer today.**
Q. Has Syngenta reached out to WIL Research or any other contract research organization to do an intranasal administration study after receiving the Defra results?
**A. Not that I'm aware of.**
MR. DICKENS: Okay. Why don't we take a break.
THE VIDEOGRAPHER: We are going off the record at 15:48.
(Break taken.)
THE VIDEOGRAPHER: We are back on the record at 16:05.
MR. DICKENS: Dr. Botham, I'm going to hand you what we'll mark as Exhibit 37 for the record. This is Topic No. 102 in the Notice of Deposition.
(Exhibit 37 marked for identification.)
BY MR. DICKENS:
Q. This document are minutes from a meeting to discuss the possibility for a paraquat symposium at IHRL, meeting taking place October 7, 1971.
Is that right?
**A. It is.**
Q. This is a document you reviewed in preparation for today?

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**A. It is.**
Q. And it lists individuals who were present, right?
**A. Yes.**
Q. Who are these individuals, just generally?
**A. Well, they are people from various parts of the ICI organization. Different divisions of ICI.**
Q. Okay. And what type of divisions are represented?
**A. Well, it looks like we've got a representation from what was then called Mond Division, which is kind of the bulk chemicals business of ICI, Plant Protection people from IHRL, the predecessor of CTL, and possibly others as well.**
**I don't know everybody who was on this list.**
Q. And the meeting was called because, in the next paragraph:
"Last year it [was] suggested that a round-table discussion on paraquat should be held with all registration authorities."
And is it your understanding that refers to regulatory authorities?
**A. Yes, indeed.**
Q. And:

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"IHRL had since heard that an outside body was considering a paraquat symposium and thought it would be far better if such a move came from within ICI, and [...] would be a more effective means of getting the paraquat information over to the authorities."
Right?
**A. Yes.**
Q. So there was a discussion or consideration as to whether or not ICI should have a meeting with regulatory agencies to discuss paraquat?
**A. Yes.**
Q. And this was with respect to discussion as to the toxicity risks as well as benefits of paraquat?
**A. Yes, that's right. The document goes into that further down.**
Q. It notes:
"It has been requested by PPL..."
And that's -- who is that, PPL?
**A. Plant Protection Limited.**
Q. Okay. What was Plant Protection Limited's role in the overall ICI in comparison to IHRL?
**A. So Plant Protection Limited was the commercial part of ICI involved in crop protection.**
Q. So PPL was the marketing division, if you

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will?
**A. Yes. It also had some regulatory and other functions, but, yes, principally marketing.**
Q. Okay. So PPL, the commercial component, requested "the symposium be restricted to the European sphere" because:
"... dealings with the Americas, Australia and the Far East have been running smoothly to date."
Right?
**A. Yes, that's what it says.**
Q. And:
"Dr. Fletcher visualized the proceedings as running along the lines of a scientific symposium."
Right?
**A. Yes, that's right.**
Q. Okay. And then there are some advantages and disadvantages of having such a symposium, right?
**A. Yes.**
Q. I'll have you turn to the second page. On the second page is listed some of the disadvantages of actually having this symposium with the regulatory agencies, right?
**A. Yes.**
Q. Number 1 -- and your understanding from these minutes are these would have been disadvantages

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that would have been discussed at the minute -- or the meeting of the ICI individuals, right?
**A. That would be my assumption, yes.**
Q. And the disadvantages, number 1:
"Too many facts may be unearthed..."
And:
"... we would have to be prepared to give information freely and without reservation."
Do you see that?
**A. I do.**
Q. And that's what was reported as a disadvantage for meeting with the regulatory agencies in the symposium, correct?
**A. Yes.**
Q. Implication being that ICI would like to hold some information back with respect to paraquat at that point in time, right?
**A. I really wouldn't like to say what the specific issues are that might have been of concern at that time. I think that would be very speculative.**
Q. Number 3:
"In some cases, i.e., safer paraquat formulations it is not economic to consider further work in certain directions. If we are talking to academic people and minutes are within the reach of

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the general public, will these people understand this placing of economics before safety?"
Right?
**A. Yes.**
Q. That's what the minutes state as discussed at this ICI meeting in 1971, correct?
**A. Yes.**
Q. Would the public and others understand us as a company putting economics or profit over safety?
**A. Yes, and it's -- I mean, I'm always, shall I say, disappointed when I see statements like that, recognizing that we are talking about more than 50 years ago now when we were in a different world. It's not -- it's certainly not the kind of statement that Syngenta would make today or would have made in my -- most of my working lifetime.**
Q. You weren't with Syngenta or ICI at this point in time, correct?
**A. I was not, no.**
Q. And ICI was the predecessor of Syngenta, correct?
**A. Yes.**
Q. And this was indeed a statement that was in the minutes of a meeting from 1971?
**A. Correct.**

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Q. And ICI was the company that was responsible for the sale and marketing of paraquat in the United States as of October 7, 1971?
**A. Yeah. Those windows of when it was ICI and when it was Chevron and when it was both, I just don't have those dates to hand, so -- but yes.**
MR. DICKENS: I'll hand you what we'll mark as Exhibit 38.
(Exhibit 38 marked for identification.)
MR. DICKENS: This is topic 97 in the Notice of Deposition.
BY MR. DICKENS:
Q. This is a document dated May 18, 1966, from a Dr. Swan to a Dr. Toland at Chevron.
Do you see that?
**A. Yes.**
Q. And we've discussed Dr. Swan and his role, correct?
**A. Yes.**
Q. There's other individuals listed on the top, including a Dr. Boon?
**A. Yes. I don't know these individuals, but, yes, Dr. Boon and Mr. Cronshey are from Plant Protection Limited that we were talking about before.**
Q. And Dr. Swan, he's with ICI at this time,

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right?
**A. That's correct.**
Q. And he writes to Dr. Toland at Chevron and states:
"We are puzzled and concerned that you are considering changing the label for paraquat at this moment, when the present label has been agreed with the US authorities and in the petition which is filed with the US F&DA is now presumably under consideration."
Right?
**A. Yes.**
Q. "It seems to [ICI] that the introduction of skull and crossbones implies [...] a greater hazard than exists."
Correct?
**A. Yes.**
MR. NARESH: I'll just object to completeness.
BY MR. DICKENS:
Q. And so --
MR. NARESH: Go ahead.
BY MR. DICKENS:
Q. -- ICI, at this point in time, did not agree with a proposal by Chevron to change the label

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to include, among other things, a skull and crossbones, right?

**A. Yeah, I mean, when I looked at this document, I think I came to the conclusion, particularly if you read it towards the end, so on page 3 where you've got the words that are underlined, Dr. Swan was not disagreeing that we shouldn't be warning people who are using this product, and, essentially, the language that's underlined is effectively what the skull and crossbones tell you.**

**So for some reason he was objecting to that pictogram of representing the hazard, and it may have been because at that time paraquat could have been out of line with other products.**

**I really don't know because this is way before my time.**

Q. Dr. Swan indicates that there is:

"... no reason to make a major point of the oral toxicity of paraquat."

Right?

**A. Well, he's saying that it's important that we do make sure that people understand that it can be fatal if swallowed. So I don't think that he's -- that's what he's saying on the last page, on page 3, so I don't think he's trying to dismiss oral toxicity.**

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Q. On the last page, he does state his concern about a possible consequence and he says:

"It appears to us that the possible consequences of the step you are contemplating are serious and could well prejudice the attitude of the F&DA to the petition for paraquat which they are at present reviewing."

Right?

**A. Yes.**

Q. And that's petition for registration, as far as you know?

**A. Well, I assume so, yes. My reading of this is that, at the time, Dr. Swan may have been advised or thought that the appearance of skull and crossbones could actually affect that registration.**

Q. And you didn't -- Dr. Swan didn't, and ICI didn't, want to prejudice paraquat in the eyes of the F&DA, correct?

**A. Well, that's the way it's been written, certainly.**

Q. And you understand the F&DA at that time was the regulatory agency that was responsible for approving registrations for pesticides?

**A. Yeah, because the EPA has not actually come to pass at that time.**

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MR. DICKENS: Exhibit 39 for the record.

(Exhibit 39 marked for identification.)

MR. DICKENS: This is topic 95 within the Notice of Deposition.

BY MR. DICKENS:

Q. This is another letter from Dr. Swan, this time dated February 12, 1969, to the manager of research and development at Chevron.

**A. Yes.**

Q. Do you see that?

**A. Yes.**

Q. Now, it begins saying:

"[We have] learned from Dr. Dye..."

We have seen Dr. Dye's name before. He was an individual at Chevron responsible for regulatory matters, right?

**A. Okay.**

Q. It says:

"[We have] learned from Dr. Dye that our discussion with Dr. Hayes was successful to the extent that he has given up [a] threat to withdraw registration of 'Gramoxone' in return for stronger label warnings..."

Right?

**A. Yes.**

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Q. And that would probably include the skull and crossbones.

**A. Yes.**

Q. It notes that Hayes -- and your understanding is Dr. Hayes is with the F&DA?

**A. That was my assumption.**

Q. "... had been strongly influenced by the misrepresentations of the Cornell newsletter item."

Do you see that?

**A. Yes.**

Q. And then he goes on, at the bottom, to say he had an opportunity to read copies of Chevron releases on paraquat and diquat which were handed over at a meeting.

Correct?

**A. Yes.**

Q. And those documents were handed over July 25 and addressed to all marketing personnel, right?

**A. Yes.**

Q. Now, Chevron at this time was in charge of the marketing of paraquat within the United States?

**A. Right.**

Q. And, according to Dr. Swan, ICI did not believe that those marketing documents adequately

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bring out considerable distinction on the toxicity of paraquat and diquat.
Do you see that?
**A. Yes, that's one of his concerns, yes.**
Q. And one of those "grossly incorrect statements," according to Dr. Swan, was that:
"... hazards of spray mist makes no distinction between large particles which impact in the nose and smaller 'respirable' particles which can reach the lungs..."
**A. Yes.**
Q. "... and which are not produced by low-pressure spray equipment."
Right?
**A. Yes.**
Q. And as we saw later on, years later, in the year 2000, the EPA actually wrote a memorandum saying that those larger particles could be serious and indeed fatal, right?
**A. Yes.**
Q. Dr. Swan also takes issue with the statement:
"Paraquat can be absorbed through the skin and can cause delayed systemic reactions, including damage to the lungs.'"

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Do you see that?
**A. Yes. And again --**
Q. Now --
**A. -- for a sense of context, we have to remember this was written in 1969 when, really, what we now understand about how paraquat can cause toxicity was not fully understood, so the damage to the lung, for example, is a great example of that, that the lung can be damaged because of systemic exposure. There was, I think, a period of time when people thought, well, that might happen because of inhalation exposure.**
**And so I think some of this has to be recognized as not being -- as being written at a time when there was kind of an incomplete understanding.**
Q. Well, Chevron obviously believed there was enough information in order to arm its marketing personnel with those statements to bring to users and distributors of paraquat, right?
**A. Mmm-hmm.**
MR. NARESH: Objection to form, foundation.
BY MR. DICKENS:
Q. That's a yes?
**A. Yes.**

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Q. And we can agree that paraquat can cause delayed systemic reactions, right?
**A. Yes, and those are the kind of things that I've been describing, but it's because when you get absorption from whatever route into the bloodstream, that the lung is the target organ and that is a delayed toxicity.**
Q. And Dr. Swan takes issue with the statement that:
"Diluted paraquat presents a greater potential hazard than some herbicides in that [its] toxic effects are cumulative and delayed.'"
Right?
**A. Yes.**
Q. Dr. Swan does not believe that that information should be told to the public at this point in time?
**A. That was his view at the time. I presume he was, as it says there, comparing with other pesticides which must have had, in his view, a more significant toxicological profile.**
Q. Now, ICI knew at this time, or around this time, that paraquat could cause cumulative and delayed toxic effects, right?
**A. That was the emerging information, yes.**

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Q. And not -- emerging as in right around this time that he wrote this letter in February 12 of 1969?
**A. Yes.**
Q. Dr. Swan also knew at this time that cumulative and delayed toxic effects were different than other herbicides, right?
**A. Yes, and that is what I was referring to earlier, in that we now understand why -- what was happening.**
Q. Okay. But he understood that right around this time, well, within a month of writing this letter in 1969, right?
**A. To some extent, yes, but, I mean, that, I think, is really sort of making my point: You know, it was still the -- what was happening with paraquat was really just beginning to be fully understood and making sure there was a shared understanding at around about this time.**
Q. Well, shared understanding not with anyone outside of ICI or Chevron, as he's indicating that these statements should not be included in the documents handed to the marketing personnel responsible for marketing paraquat within the United States, correct?

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MR. NARESH: Objection; foundation, form.
THE WITNESS: I mean, look, again, we're talking about 50 years -- well, yes, 50-odd years ago. I can't comment on why that was seen to be the right thing to do at that time.
BY MR. DICKENS:
Q. He ends that paragraph by saying:
"... I strongly suggest that this particular document [...] not be given any further circulation."
Right?
**A. Yes.**
MR. DICKENS: Moving to Exhibit 40.
(Exhibit 40 marked for identification.)
MR. DICKENS: For the record, this is topic 18 within the deposition notice.
BY MR. DICKENS:
Q. This is an internal ICI document, dated March 11, 1969, "ICI Pilkington-Sullivan Works: Delayed Irritant Effects."
Do you see this?
**A. I do.**
Q. And this is, roughly, almost exactly one month from Dr. Swan's letter to Chevron telling him not to further circulate the marketing documents,

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right?
**A. Absolutely, yes.**
Q. And one of those reasons he said don't circulate it is the comparison to other herbicides and the fact -- or the statement that paraquat's toxic effects could be cumulative and delayed.
Right?
**A. Yes.**
Q. This document, internal ICI document, states:
"Paraquat is, however, different from most corrosive chemicals because its effects are not immediate."
Right?
**A. Yes.**
Q. That's what ICI is telling each other in this particular document, right?
**A. Yes.**
Q. Pretty much exactly what Chevron was planning to tell individuals who would be purchasing paraquat, right?
**A. But a very different scenario. Here, we've got people who are actually -- excuse me, are involved in the production of paraquat, and so their likely exposure would be significantly higher.**

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Q. So at this point in time in 1969, Chevron and Syngenta did not have a full understanding as to what amount of paraquat would cause toxic effects in humans, right?
MR. NARESH: Objection; foundation.
THE WITNESS: Quantitatively, I guess the answer to that is yes, but, obviously, I think it was clear that, you know, the more you're exposed the more likely it is you are to get exposure. We were talking about this earlier on; so when you've got exaggerated exposure because of wet clothing or your skin is damaged, then, clearly, you get more toxicity.
So in that sense it was understood, but there were still things of which we didn't know at this time.
BY MR. DICKENS:
Q. Okay. And, as you mentioned, the individuals who'd be working in the -- is it the manufacturing plant?
**A. Yes. Yes.**
Q. Okay. There was specific guidelines implemented for the individuals who would be exposed to paraquat within those manufacturing plants, right?
**A. Yes.**
Q. And these would be all employees of ICI?

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**A. That, I presume, is correct, yes. They are talking about apprentices, so they would be employed.**
Q. So all employees of ICI who would be exposed to paraquat:
"... must undergo a medical examination at Pilkington-Sullivan Works."
That's the manufacturing plant, right?
**A. Yes.**
Q. "... before they commence work."
Right?
**A. Yes.**
Q. And that was due to concerns about the potential toxic effects of paraquat?
**A. From my understanding of this, it was to see if there might be people who could be more susceptible to what were then the known toxicities of paraquat because, for example, they had a tendency to have compromised skin, skin irritation, or they had a history of nosebleeds, because that might increase their -- the exposure to paraquat.**
Q. And, in fact, the apprentices had experienced incidents of delayed irritant effects from paraquat?
**A. Yes.**

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Q. And there was a concern that these individuals may not recognize the risk because of the fact that those effects were indeed delayed.
Right?
**A. That's the concern, yes.**
Q. So the concern is these individuals who splashed themselves or may get paraquat on them may not really know that there's a risk there because they may not see an immediate reaction on their body to paraquat?
**A. Yeah, you don't get -- like you would do from a caustic soda, you don't get the immediate "Ouch, must wash that off" reaction, necessarily.**
Q. So it's important, then, to warn those individuals within ICI of those delayed irritant effects?
**A. Indeed.**
Q. But according to ICI, it is not important to warn the actual users or farmers of delayed irritant effects, correct?
**A. But, again, I don't know from the time, but the exposure situations would be different, the concentrations of paraquat would be different.**
**You know, here, we're talking about concentrated paraquat and unfortunately, at that time,**

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**of course, occupational hygiene standards which are not the same as they are today.**
Q. Well, we can agree that Chevron thought it was important to warn users and farmers about the delayed irritant effects of paraquat?
**A. I agree there was clearly a debate going on between Chevron and ICI about what should be done about that, and the record shows that it wasn't -- there wasn't an immediate agreement about that fact.**
Q. Now, ICI also required anyone exposed to paraquat to receive individual -- or receive special individual instruction on the hazards of paraquat, right?
**A. Yes.**
Q. Now, when paraquat was initially registered in the United States, it could be sold for residential use, right?
**A. My understanding, again from discussions with Monty Dixon, is that we've never actually sold a product in the United States for residential use. So there may have been a registration, but it was never sold.**
Q. Okay. And that's based on information told to you by Monty Dixon?
**A. Yes.**

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Q. Did you undertake any review of documents to confirm that?
**A. I received a confirmatory document to that effect, but I've not gone back and double-checked that.**
Q. Do you know whether or not Chevron did stop the circulation of their documents provided to marketing personnel?
**A. I've got no idea, no.**
MR. DICKENS: I'll hand you what we'll mark as Exhibit 41.
(Exhibit 41 marked for identification.)
MR. DICKENS: This is a document produced by Syngenta in this litigation, which is a letter from Dr. -- or from a D.F. Dye to T.W. Reed, dated April 23, 1969.
BY MR. DICKENS:
Q. Do you see that?
**A. Yes.**
Q. It's referencing Geigy. Correct?
**A. Yes.**
Q. Do you know what Geigy Agricultural Chemicals's relationship with respect to paraquat would have been at this time in 1969?
**A. Sorry, I've got no idea, no.**

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Q. Do you know whether or not Geigy was a manufacturer of atrazine at this time?
**A. I don't know.**
Q. This is reporting:
"We [...] discussed Geigy's attitude [towards] paraquat."
Do you see that?
**A. Yes.**
Q. "John said that Geigy felt that paraquat was a potentially hazardous chemical and they were not doing any research on this product."
Right?
**A. Yes.**
Q. "Their marketing people have been advised to not promote or encourage the use of paraquat in any way."
Right?
**A. Yes.**
Q. "He advised that Geigy is very conservative with [respect] to highly toxic or hazardous chemicals."
Correct?
**A. Yes.**
Q. And we agree, at this point in 1969, paraquat would be considered a highly toxic and

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hazardous chemical, right?
**A. We understand -- we understood its toxicity, as we've just been describing, yes.**
Q. In fact, the marketing people at Geigy sent out a notice to their salesmen telling them not to encourage the use of paraquat with any of Geigy's products.
Correct?
MR. NARESH: Objection; foundation.
THE WITNESS: That's what this letter says.
BY MR. DICKENS:
Q. Part of the reason is they didn't want to increase their liability by having paraquat included with their own products, right?
MR. NARESH: Can I have a standing objection as to the whole questioning about this document as to foundation?
(Stenographer clarification.)
MR. NARESH: Can I have a standing objection as to foundation, as to any questioning about this document, or do you want me to object each time?
MR. DICKENS: That might be the last question, but you can have a standing objection.

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MR. NARESH: Okay.
THE WITNESS: I mean, this is an internal Chevron document. I can only say it is what it is. I mean, I've got no kind of further information about it.
BY MR. DICKENS:
Q. Did you undertake any efforts to discover Geigy's relationship to ICI at this time in 1969 when you reviewed this document in preparation for the deposition?
**A. No, I did not do that.**
Q. Did you look for any additional correspondence between Geigy and Syngenta with respect to paraquat?
**A. Well, my colleagues who were, you know, helping with this may have tried to look for that. If they did, nothing was passed my way.**
Q. All right. And I don't want any communications with counsel. When you say "my colleagues," are you referring to attorneys?
**A. I'm talking -- exactly, yes.**
Q. Okay. And so the only document with respect to Geigy that you reviewed for this deposition is the document right here before you as it applies to 1969?

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**A. I believe this is the only one which includes Geigy, yes.**
Q. Now, in 1969, the FDA and USDA were receiving letters from senators and congressmen making inquiries as to why they permitted paraquat, right?
**A. So I understand, yes.**
Q. And it was a determination that, with that bad publicity in 1969, that the paraquat would cost more, right?
MR. NARESH: Objection to form.
THE WITNESS: I can't remember what the evidence for that is, but there may be a document which you can remind me of.
MR. DICKENS: Mark Exhibit 42 for the record.
(Exhibit 42 marked for identification.)
MR. DICKENS: This document has been identified in topic 90 and 106 of the Notice of Deposition.
MR. NARESH: Very thorough of you to have two topics on it. Thank you for that.
BY MR. DICKENS:
Q. This is a letter produced by Syngenta in this litigation dated January 16, 1974, from a Warren Lewis to a Gerry Jenkins at Plant Protection Limited.

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Do you see that?
**A. I do.**
Q. And Plant Protection Limited, once again, was within ICI?
**A. Yes. It's as we've discussed before, PPL, yes.**
Q. And they are the marketing or commercial arm of ICI, right?
**A. That's right.**
Q. All right. And Chevron's writing to PPL and saying:
"[I have attached] a memo from our Lemac Hopkins to apprise you of the growing seriousness of the paraquat health-hazard situation in the United States."
Right?
**A. Yes. Well, I believe this was specifically a concern in California.**
Q. Okay.
**A. And I should say, by the way, that I did ask if I could see a memo from Lemac Hopkins and no such document was provided, so I don't even know who or what Lemac Hopkins is.**
Q. Were there any other documents that you requested for your preparation for this deposition

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that could not or were not provided to you?
**A. I can't -- no. Very, very few. I mean, this was one that I particularly remember because of my question about Lemac Hopkins, but mostly things were made available.**
Q. And at this point, he mentions:
"With glyphosate nearly on the scene and facts of efficacy and health hazard extremely widespread, we no longer have the usefulness and need for paraquat as a defensive argument."
That's what Chevron's telling ICI at this point, right?
**A. It's certainly what Mr. Lewis's view was, yes.**
Q. And glyphosate at this point in 1974 was not yet on the market but close, correct?
**A. I don't know. I don't know the history of the dates of glyphosate, so I'll accept what you say.**
Q. And glyphosate is the active ingredient within Roundup and Roundup products, right?
**A. It is, yes.**
Q. Manufactured by Monsanto?
**A. At that time.**
Q. All right. Glyphosate and glyphosate products are now the top-selling broad-spectrum

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herbicides?
**A. I --**
MR. NARESH: Objection; foundation and scope.
BY MR. DICKENS:
Q. If you know.
**A. I don't know. I mean, that's not information that I've looked at.**
Q. When it mentions "facts of efficacy and health hazard extremely widespread," that's specific to paraquat, right?
**A. That's the context of this document, it would seem, yes.**
Q. And because of glyphosate coming -- and you understand that glyphosate was considered as a safer and more effective herbicide?
**A. Could you repeat that, please, because I was just -- my eye was caught by something which I was wanting to look -- do say it again.**
Q. Do you have an understanding that glyphosate was considered, or generally considered, a safer and more effective broad-spectrum herbicide?
**A. Right. So --**
MR. NARESH: Objection to the form, foundation and scope.

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THE WITNESS: I mean, I certainly remember, even after this date, that glyphosate was seen to be a safer herbicide, certainly. Effective? Different question. Paraquat and glyphosate have different herbicidal properties, so they're not equivalent.
BY MR. DICKENS:
Q. But we can agree it's considered safe?
**A. It has got a very different safety profile and certainly doesn't have some of the toxicity that paraquat has.**
Q. And Syngenta itself manufactures glyphosate?
MR. NARESH: Objection; scope, foundation.
THE WITNESS: I don't know whether we manufactured it. We certainly sold it.
BY MR. DICKENS:
Q. It goes on:
"Paraquat is in serious trouble, particularly in California but also in other states. Paraquat, as you know, is an extremely well-known compound, and news of a hazardous nature travels fast."
Right?
**A. Right.**

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Q. Chevron tells ICI:
"If it sounds like we are alarmed, we are."
Right?
**A. Yes.**
Q. And then Chevron details some of the concerning information with respect to paraquat, including:
"... the building up clash head-on with previously held toxicological facts."
Right?
**A. Yes.**
Q. And some of those facts are that:
"Medics indicate that spray droplets are being inhaled - in spite of data to the contrary, because the claim is that conditions and methods of application and resulting particle size do not necessarily parallel those of previous studies."
Right?
**A. I think Mr. Lewis, here, is not, clearly, a sort of technical expert. He's a market development individual. So I think he's not got a full understanding of the sort of things we've been talking about and the difference between inhalable and respirable.**

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Q. But what he is reporting is that medics are reporting to Chevron that spray droplets are being inhaled, right? That's what's being reported here?
**A. Yes.**
MR. NARESH: Objection to form.
BY MR. DICKENS:
Q. And when you hear "inhale," you're talking about the respirable particles?
**A. Well, it's difficult to know. When "Medics say spray droplets are being inhaled," I don't know if they mean getting into the lungs or whether they just mean getting into the nose.**
**Because there's a tendency for casual language sometimes to be used.**
Q. Well, certainly, these medics aren't just calling Chevron up for no reason. These are individuals who are treating people who had been injured after spraying paraquat, right?
MR. NARESH: Objection; foundation, form.
THE WITNESS: Well, I assume that these were farmers, but he doesn't actually say so, yes.
BY MR. DICKENS:
Q. At least individuals exposed to paraquat, we can agree?
**A. Yes.**

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MR. NARESH: Same objections.
BY MR. DICKENS:
Q. They're apparently seeing medics after breathing in paraquat in spite of data and statements to the contrary by Chevron and Syngenta -- or ICI at this time?
**A. By which you mean the warning labels to avoid that? Is that what you're...**
Q. I'm saying at this point in time, ICI and Chevron were instructing farmers and other users of paraquat that there was no risk of inhalation or breathing in paraquat because of the particle size.
**A. Yes, and that's why this is creating, I'm sure at the time, some confusion over the implications of particle size.**
Q. And, in fact, as we discussed earlier, the Chevron document for the marketing personnel had specifically included information about spray mist and the inhaling of paraquat causing severe irritation to the nose and throat, right?
**A. Yes.**
MR. NARESH: Objection to form.
BY MR. DICKENS:
Q. And that's a statement that Dr. Swan at ICI said, "We should not be providing"?

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**A. Yes, we've been through that, I agree.**
MR. DICKENS: Exhibit 43 for the record.
(Exhibit 43 marked for identification.)
MR. DICKENS: And this is topic 17.
BY MR. DICKENS:
Q. This document is from a G.A. Willis, manager of Product Safety and Registration Group at ICI, dated February 14, 1983, deemed confidential, subject "Paraquat labeling USA."
Do you see that?
**A. I do.**
Q. This reports that:
"Chevron has obtained EPA's approval for detailed wording changes to the Ortho Paraquat CL labeling."
Do you see that?
**A. I do.**
Q. And that would have been the paraquat that was on the market in the United States at the time?
**A. Yes, I assume that's what it would mean.**
Q. And these detailed wording changes to the paraquat labeling was in response to a lawsuit that had been filed against Chevron, right?
**A. That is my understanding of what this says, yes.**

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Q. Move to page 2. Towards the bottom of the page, it says:
"As a result of these arguments and an overall re-evaluation of their wording, Chevron amended their labeling..."
And it gives how it was amended, right?
**A. That's right.**
Q. And it was arguments that were made within the lawsuit filed by a user who had experience in adverse effects that he alleged was from paraquat, right?
**A. That's correct.**
Q. You can turn the page to the top of page 3, ending in 20363. ICI claims that:
"The main driving forces for these changes were the Chevron lawyers and the Chevron Environmental Health Center."
Right?
**A. Yes.**
Q. And those lawyers had:
"... concerns for being able to defend Chevron in law as well as possible and CEHC is called upon to provide 'expert witnesses' for the toxicological aspects of the defense."
Right?

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**A. Yes.**
Q. And the defense of paraquat specifically?
**A. Yes.**
Q. Now, ICI provided some comments on the proposed rewording to Chevron, right?
**A. They did.**
Q. And ICI was not very happy because they did not believe there was a practical problem with dermal or inhalation poisoning using the product?
**A. I think it was specifically with regard to the risk of fatality in that way, yes.**
Q. At the very bottom of the page:
"One concern which has been expressed to me relates to the possibility of adverse impacts of Chevron's label."
And that's the label for paraquat in the United States, right?
**A. Yes.**
Q. So the label shared by Chevron and ICI with respect to being able to sell paraquat in the United States?
**A. Yes.**
Q. And, according to ICI, they've lived with the problem with US labeling being more severe than other places in the world:

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"... and the recent changes will accentuate the difference further."
Right?
**A. That was clearly one of the concerns that Mr. Willis was suggesting.**
Q. ICI notes:
"[The] changes do not alter the overall appearance of the label and they are likely to go unnoticed by all but those who make a specific effort to compare the old and new texts in detail."
Right?
**A. I guess he was saying that these would be subtle changes.**
Q. Those changes so subtle that unless someone held up the labels next to each other, they'd go unnoticed, right?
MR. NARESH: Objection to form.
THE WITNESS: That's certainly the inference from the way this was written.
BY MR. DICKENS:
Q. And written by a member of ICI, correct?
**A. Yes.**
Q. And those changes -- when it says the changes would go unnoticed, that includes by farmers or others who were spraying around -- spraying

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paraquat in the 1983 time frame?
**A. Well, I guess so, yes. But, I mean, look, I knew and know Mr. Willis. I mean, I think he was really in no way saying that that change of wording, or the subtlety that we're talking about, would, in his view, take away the warning that would be required by farmers and growers to use paraquat safely.**
**So, Mr. Willis always was, and still is as far as I know, concerned about the health protection of people using the product.**
Q. And that's what you say now. At this point in 1983, according to Mr. Willis's letter, he actually advises Chevron not to circulate a letter to distributors drawing attention to the label changes, right?
**A. Yes.**
Q. He's telling Chevron, these won't be -- these label changes would go unnoticed "unless we draw attention to them."
**A. Yes.**
Q. So we should not draw attention to them, right?
MR. NARESH: Objection to form.
THE WITNESS: Yes, and this is another one of those emails where, I think, again, looking

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through -- at this through today's lens, this is certainly not the way in which we would tackle this problem right now.
And I think also, as I said a few minutes ago, it probably doesn't actually give, you know, sufficient justice to the fact that Jeff Willis was certainly concerned about safety.
BY MR. DICKENS:
Q. Another situation of putting economics over safety?
MR. NARESH: Objection to form.
THE WITNESS: No, I don't think that -- I mean, there's very little discussion, if any, of economics in this. This was, really, whether the proposed changes that Chevron wanted to do were essentially an overreaction, that you didn't need to actually put that -- the word "fatal" in, as they were describing, in order to properly protect people.
BY MR. DICKENS:
Q. "I believe that without such a letter the label changes would pass mainly unnoticed."
Right?
**A. That's what I mean by that's not the kind of wording that I think would be appropriate.**
Q. Because that wording suggests that ICI and

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Jeff Willis did not want users and farmers to know that a label change would be made, right?
**A. That's what that suggests, yes.**
Q. But Chevron lawyers deem that circulation of the letter was mandatory to meet their legal obligations, right?
**A. Yes.**
Q. "If we are to use senior level inputs to modify Chevron's behavior pattern [...], I would place a high priority in seeking to persuade them not to circulate any such note."
Right?
**A. Yes.**
Q. Don't let people know a labeling change has been made.
MR. NARESH: Objection; asked and answered.
BY MR. DICKENS:
Q. Right?
**A. Yes.**
MR. DICKENS: Is now a good time for that break before we...
MR. NARESH: Yeah.
THE VIDEOGRAPHER: We are going off the record at 16:56.

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(Break taken.)
THE VIDEOGRAPHER: We are back on the record at 17:04.
BY MR. DICKENS:
Q. Dr. Botham, earlier in the deposition we were discussing the Defra study.
Do you recall that?
**A. Yes.**
Q. And you indicated you had reviewed Defra in preparation for today's deposition?
**A. As much information as I could find.**
MR. DICKENS: I'll go ahead and mark Exhibit 44 for the record.
(Exhibit 44 marked for identification.)
MR. NARESH: What topic number?
MR. DICKENS: The document itself is not specifically identified in the Notice of Deposition.
MR. NARESH: I'll do a standing scope, but if Dr. Botham can answer questions --
MR. DICKENS: You can have a standing objection.
MR. NARESH: Okay.
MR. DICKENS: What I've handed you, Exhibit 44, which -- is a document Evidence Project Final Report, Defra.

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BY MR. DICKENS:
Q. Is this the document you reviewed in preparation for today's deposition?
**A. It's a different version of a document that I saw, I think. I've not seen one in this format.**
Q. So you saw it in a different format but it has the same content and information?
**A. Well, I would need to read this in more detail to -- but, probably, from just a very, very quick look at this.**
Q. I just want to go over certain items that I believe you brought up with respect to Defra, and specifically on page 2 there's an "Executive Summary" listed here.
Do you see that?
**A. Yes.**
Q. And then there's Study 1 and it identifies a PBPK model, right?
**A. Yes.**
Q. And it says:
"Commercial Gramoxone, a paraquat formulation, was spiked with radiolabeled paraquat at a dose specific to the route of exposure and tested for good detection in a pilot study."

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Right?
**A. Yes.**
Q. And when it says "radiolabeled paraquat," what's that referring to?
**A. It means that it's -- on the molecule of paraquat, it's got a radiotracer label on it so that you can quantify -- you can see where it gets to and quantify that.**
Q. Okay. So you could see where -- you know, if paraquat, for example, can get into the brain, you'd be able to see that, right?
**A. Yes. You would be able to measure it.**
Q. And on the next page, that next line notes:
"At a designated time after dosing, the animals were sacrificed and the amount of paraquat in blood and brain was measured."
Right?
**A. Yes.**
Q. And then the next page for Study 1, it notes "Modeling Exposure"?
**A. Yes.**
Q. It says:
"The study was designed to generate data on which to fit a PBPK model of human field exposures

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to paraquat, using the brain as the target organ."
Right?
**A. Yes.**
Q. But in this study:
"Adult mice were given single doses of paraquat according to the three routes of exposure..."
**A. Yes.**
Q. Correct?
**A. Yes.**
Q. And so the purpose of this study was to generate data in order to generate a PBPK model for human field exposures to paraquat?
**A. Yes, that's correct.**
Q. And then two pages later, at the top of the page, after the animals were dosed, they were:
"... sacrificed [...] to create a 24-hour time course."
Right?
**A. Yes.**
Q. And then:
"After sacrifice, blood and brain samples were taken and measured for paraquat radioactivity."
Right?
**A. Yes.**
Q. So they actually did take samples of the

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brain in order to determine how much paraquat made it to the brain in these particular studies.
**A. Okay.**
Q. And that's your understanding?
**A. Yes. And I can see now, the more I read this, there's actually more detail in this report than the one that I saw.**
Q. And then on page 13 of 17 --
MR. NARESH: And, Dr. Botham, in light of your comment just now, you know, read as much or as little as you feel like you need to to be able to answer the questions, given the length and density of the document, in order to contextualize it as you need to.
BY MR. DICKENS:
Q. And I'm going to ask you about the paragraph "Future Work - Intranasal Transport," so if you need time to read it, just let me know when you're ready.
**A. Okay, I've read that.**
Q. What the study research scientists noted in the intranasal transport side is that:
"... intranasal dosing in the PBPK model portion of this study indicated a fast and extensive circulation of paraquat in the brain tissue - the

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amount of paraquat detected in the brain after intranasal exposure was tenfold higher than the model predicted based on systemic flow."
Right?
**A. Yes.**
Q. So the amount of paraquat that was found in the brain of the animals after sacrifice was actually ten times higher than what was expected through their use of the PBPK model?
**A. That's right. And if I could add at this point, I mentioned earlier that there were a number of reasons why an intranasal study was something that we, in the end, didn't actually do, and there was -- one other reason, which this reminds me of, is that rather like with the intraperitoneal injection studies that we see frequently, which we did ourselves, intranasal administration of substances to animals was done in the PBPK section of this, is a very exaggerated mechanism of exposing the animals.**
**So it's not like a nasal drop. You know, you're literally forcing it up into the top of the nasal cavity, which is way exaggerating what would come from a normal exposure of an operator in the field, for example.**
MR. DICKENS: I'll move to strike

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everything after, "That's right."
MR. NARESH: I'll object to that.
BY MR. DICKENS:
Q. The study authors report that:
"To better understand the risk, a study would be needed to examine the intranasal arterial hypothesis, including the pattern of paraquat distribution to the brain, and confirmation of the amount in the brain regions after intranasal administration."
Right?
**A. Well, not unreasonable, yes. I mean, so they're not saying -- they're saying here they don't know how much got into the brain and where it went to.**
Q. All they know is what was actually in the brain was tenfold higher than what was expected in their model?
**A. Yeah, yeah.**
Q. And they're saying in order to better understand the risk, additional studies would be necessary?
**A. Yes.**
Q. Syngenta has never undertaken any additional studies to investigate that risk?

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**A. No.**
Q. At this point in 2012, was Syngenta undertaking its own studies or is that farmed out to third parties?
**A. In 2012, we were fully engaged in our very significant study, large study, using that intraperitoneal injection model, and the reason we were doing that, even though it does, again, exaggerate exposure, is because this was a study which we, in part, were seeing whether the findings that other scientists had made of an effect on the substantia nigra in the brain, following an IP administration of paraquat, whether that was something that could be replicated and, if so, at what kind of concentrations do you see that and are those concentrations relevant to human exposure.**
Q. In 2012, did Syngenta have the ability to run a test through an inhalation chamber with animals?
**A. It could have done, yes.**
Q. It did not do that, right?
**A. It did not do that.**
Q. Page 4 once again of Defra, under "Modeling Exposure," the adult mice were given single doses of paraquat, three routes of exposure that were meant to be "relevant to human field conditions for

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pesticides," including intranasal.
Right?
**A. Yes. But the intranasal, as I said earlier, nevertheless exaggerates the actual likelihood of that dose, whatever it is, of getting into the brain, for example.**
Q. We can put that aside.
Dr. Botham, are you aware of a ECCO group within the toxicology department of Syngenta, or ICI?
**A. Is that E-C-C-O, ECCO?**
Q. Correct.
**A. Yes, I've seen a document recently which had that on it.**
Q. Okay. In preparation for today's deposition?
**A. Yes.**
Q. Do you know what ECCO stands for?
**A. I can't remember, actually, no.**
Q. Okay.
MR. DICKENS: I'll hand you Exhibit 45 for the record.
(Exhibit 45 marked for identification.)
MR. NARESH: What's the topic number, please?
MR. DICKENS: 23.

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BY MR. DICKENS:
Q. Okay. This is a document dated June 12, 1997, "Paraquat toxicology, ECCO meeting outcome."
Do you see that?
**A. Yes.**
Q. And it's provided on behalf of Andy Cook, who was currently on holiday at that time.
Do you see that?
**A. Yes.**
Q. Andy Cook had some responsibilities for paraquat?
**A. Yes. So at this time he would have been the regulatory manager in Europe for paraquat.**
Q. And in your prior deposition, you had spoken to Andy Cook in preparation for your deposition on behalf of Syngenta, right?
**A. Yes.**
Q. You did not speak to him in preparation for today's deposition?
**A. I did not, no.**
Q. And this document doesn't necessarily specify what the ECCO refers to. This doesn't jog your memory in any way, does it?
**A. Well, you asked me what it stands for. So I don't know what E-C-C-O means. I think EC**

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**probably is to do with European Community. I mean, this is a group associated with the European Commission, so it's the European regulatory authorities and it was some kind of specialized meeting, which our regulatory people had access to.**
Q. And it's related to a meeting between June 3 and 5 of 1997.
Do you see that?
**A. Yes.**
Q. And there's a PSD attendee, Ian Dewhurst.
Do you know who that is?
**A. Yes, he was the toxicology lead in -- PSD is the Pesticides Safety Directorate. That's the UK regulatory authority for pesticides.**
Q. Do you know whether or not Ian Dewhurst was involved in Defra at all?
**A. Yes. Ian Dewhurst was one of the people who led on the project proposal, if you wish, or the call for tender.**
Q. And he was apparently an attendee at this meeting with respect to the paraquat and toxicology issues in Europe, right?
**A. Yes.**
Q. And there's a section midway down page 1 of "Operator Exposure."

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Do you see that?
**A. Yes.**
Q. And we discussed earlier just operator exposure studies and you mentioned the ones that were done in the Far East, right?
**A. Mmm-hmm.**
Q. That's a yes, sorry?
**A. Yes.**
Q. Okay. And those operator exposure studies are designed to measure the amount of paraquat that a user or a farmer or operator of paraquat would be exposed to during spraying activities?
**A. Yes.**
Q. As well as mixing and loading, right?
**A. Yes.**
Q. Now, it mentions:
"NL raised a concern that the in vitro skin absorption study was unoccluded."
And we discussed occluded versus unoccluded with respect to dermal absorption studies, right?
**A. We did.**
Q. And the occluded, or covering, of the skin actually resulted in higher dermal absorption, right?

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**A. Yes, and that was in the animal model that we were discussing earlier.**
Q. Right. And because of that:
"The meeting considered that the absorption of paraquat through skin may increase if occluded ([or] clothing was present)."
Right?
**A. Yes.**
Q. And:
"... operator exposure studies (in Sri Lanka and USA) did not represent EU conditions [for] personal protection equipment as most workers wore shorts [and] shirt."
Right?
**A. Right.**
Q. And:
"It was considered possible that the exposure may [actually] be greater if long trousers were worn."
Right?
**A. Yes.**
Q. And so the ECCO group proposed that a new operator exposure study be undertaken, right?
**A. Yes.**
Q. Do you know whether or not that operator

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exposure study was undertaken?
**A. I'm not sure whether that study was done specifically in response to that. It is 1997, so I suspect the answer is probably no because it's very close to the Court of First Instance judgment on paraquat.**
Q. And that was with respect to an action brought by Sweden?
**A. Yes.**
Q. In which -- what did the -- what was your understanding of the Court of First Instance judgment on paraquat?
**A. Well, this was Sweden leading on an objection to the way in which the European Commission had proceeded with regard to the re-registration of paraquat in the European Union. So it was a procedural objection.**
Q. And the Court found that the procedure was sufficient, right?
**A. The Court found that -- found in favor of Sweden and said that, really, the European Commission had not acted appropriately.**
Q. Had not acted inappropriately?
**A. Had not used -- had not followed the appropriate procedures.**

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Q. We'll look at that probably tomorrow at this point.
MR. DICKENS: I will go ahead and mark Exhibit 46 for the record. Topic 17 on the Notice of Deposition.
(Exhibit 46 marked for identification.)
BY MR. DICKENS:
Q. Okay. I've handed you a document titled "Paraquat Operator Exposure - A review of operator exposure studies" by Graham Chester and Andy Cook, December 2009.
You've reviewed this document previously?
**A. I did.**
Q. Turn to page 3, Executive Summary.
It notes that:
"A total of 22 studies have been conducted to determine operator exposure to paraquat during the use of appropriate, recommended spray application equipment. Eleven of these studies have been published."
Right?
**A. Yes.**
Q. Now turn to the next page. In the Introduction, it notes the purpose of the review, and it was:

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"... intended to be a critical appraisal for the paraquat operator exposure studies in the published literature and those conducted by Syngenta and its legacy companies with a particular emphasis on scientific integrity and suitability for use in the quantitative assessment of risk of exposure to paraquat under typical conditions of use."

Right?

**A. Yes.**

Q. And then the summary, in the preamble, it notes that:

"There are two types of study: pre- and re-registration studies, and post-registration surveillance studies."

Correct?

**A. Yes.**

Q. The pre- and re-registration studies would have been "done in full compliance with the requirements of the product label."

Correct?

**A. Yes, yes.**

Q. And that would have included "recommended application rates, protective clothing and equipment," right?

**A. Yes.**

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Q. And the studies of the other type, or post-registration surveillance studies, would have been done according to those users' "typical or habitual working practices," right?

**A. Yes, that's the phrase, "habitual"; so actually what happened in reality when they were -- people were using the product.**

Q. So Syngenta, or whoever the individuals are who were conducting this study, would not intercede and instruct the users to wear particular types of clothing; it would be how they would normally typically apply paraquat, right?

**A. That's correct. This was to look at what the reality was in the field.**

Q. Turn to page 5.

Now, the second study here notes a recent European regulatory study on knapsack spray operators.

Right?

**A. Okay.**

Q. And that was in Spain in 1997.

**A. Okay, right. Yes.**

Q. That was the Findlay study?

**A. Yes.**

Q. And in the Findlay study all workers generally complied with the product label

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recommendation for protective gloves and face shield when mixing and loading.

Right?

**A. Yes.**

Q. And with the filing, the labeling recommendations, paraquat was found in the urine of 18 of the 20 workers involved in that study.

Right?

**A. Yes.**

Q. So at this point, the personal protective equipment worn by the workers in this study did not completely protect them from exposure to paraquat.

We can agree on that?

**A. And that is not -- was not a surprising finding, yes.**

Q. It then mentions:

"... a 2007 study in Martinique in knapsack spray operators..."

Right?

**A. Yes, yes.**

Q. And that's a Brouwer 2007 (a) study?

**A. Yes.**

Q. And that operator is wearing a standardized set of PPE on banana plantations, right?

**A. Right.**

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Q. And the prototype PPE included PVC trousers.

Do you know what PVC refers to?

**A. Polyvinyl chloride; yeah, plasticized trousers.**

Q. And a PVC poncho, long-sleeved shirts and a hat with a protective neck guard, right?

**A. Yes.**

Q. "In addition, gloves, long rubber boots and [...] disposable respiratory mask were worn throughout the three days..."

Right?

**A. Yes.**

Q. Okay. In that particular study, there were ten operators whose paraquat was mostly completed on the days of use after the last -- sorry, the excretion of paraquat was mostly complete on the days of use or within one day after the last of their three days of use.

Right?

**A. Yeah.**

Q. But one operator continued to excrete paraquat up to four days post application, right?

**A. Okay.**

Q. So one operator who was exposed to

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paraquat had paraquat in their body or in their system four days after their last exposure to paraquat, right?

**A. That's right.**

Q. Andy Cook and Graham Chester note:

"There was no clear explanation for this other than an observed incident of contamination..."

Right?

**A. Indeed, yes.**

Q. Now, this Brouwer study was not the only study undertaken by Brouwer for measuring the amount of paraquat that operators were exposed to, right?

**A. Yes, that's right, yes. Brouwer worked for a contract research organization that was doing a number of different operator exposure studies.**

Q. Okay. And operator exposure studies on behalf of Syngenta specifically, right?

**A. That's right, yes.**

Q. Page ending in -- oh. Page 7 of this document.

At the very bottom, it notes:

"In 2006-7, a series of related, habitual-use biological monitoring studies was done in vines and bananas in mainland France and Martinique..."

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Right?

**A. Yes.**

Q. And they were in compliance with the OECD guidance and GLP, correct?

**A. Correct.**

Q. And what is the significance of being in compliance with OECD and GLP?

**A. Well, that it was, if you like, an approved protocol; so the methodology that was used would have -- would be acceptable as a good-quality study and backed up by the fact that it was done to good laboratory practice.**

Q. The formulation used in those studies was R-BIX containing 100 grams of paraquat.

Do you know what was in the formulation of the R-BIX used in this particular study?

**A. Do you mean what surfactants were in there?**

Q. What surfactants or other ingredients other than the paraquat?

**A. No, I can't tell you off the top of my head what else was there.**

Q. Do you know whether or not there was a surfactant included in that study?

**A. I don't.**

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**I suspect there was because it was called an SL formulation, which suggests that there would be surfactant in there.**

Q. If you can turn to the next page, page 8. Right above 3.3, it notes:

"The French and Martinique studies are the most modern, guidance-compliant studies available and are the ones of choice for assessment of absorbed dose for risk assessment purposes under the specific conditions of habitual use."

**A. Yes.**

Q. Right?

**A. Yeah.**

Q. And that's being used by operators how they would typically apply paraquat?

**A. That's what "habitual use" means, yes.**

Q. And so these two studies were deemed to be the best for risk assessment purposes for how users were actually spraying paraquat, right?

**A. Indeed, yes.**

Q. And, once again, Graham Chester and Andy Cook are employees of Syngenta?

**A. Yes. Andy Cook we've talked about before. Graham Chester was an employee of Syngenta up to a certain point in time. I don't know exactly when,**

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**but he was very much an expert in operator exposure studies.**

Q. All right. At the very top of the page --

MR. NARESH: Still page 8?

MR. DICKENS: Page 8 still, yeah.

BY MR. DICKENS:

Q. -- it references the study involving a single day's use of paraquat in vines in France, right?

**A. Yes.**

Q. This is the French study that was part of what was deemed as the most modern guidance compliance studies for habitual use, right?

**A. Yes.**

Q. And the excretion of paraquat was calculated to be a mean absorbed dose of 8.54 micrograms per kilogram, right?

**A. Yes.**

Q. And that would equal 0.0084 milligrams per kilogram?

**A. Yes.**

Q. And what is the AOEL? What does that refer to?

**A. The AOEL is deemed to be -- it's called a reference dose, so it's calculated from -- you start**

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**with a 'no effect' level in a toxicology study, a toxicity study. You then divide that by a safety factor, and that gives you an AOEL.**

Q. And that is the acceptable amount that a human could be exposed to paraquat without causing adverse health effects, right?

**A. Yes.**

Q. And the AOEL for paraquat is 0.0005 --

**A. That's --**

Q. -- milligrams per kilogram, right?

**A. That's correct, yes.**

Q. So the excretion of paraquat in this study and the mean absorbed dose as determined by the study authors actually exceeded the AOEL, right?

**A. Right. Now, my understanding is that that exceedance of the AOEL was restricted to two individuals; so not every individual had an exceedance of that AOEL.**

Q. But two individuals with habitual use of paraquat exceeded the AOEL in this particular study, right?

**A. That's right, yes.**

Q. Okay. The study that was deemed the best choice for assessment of absorbed dose for risk assessment purposes?

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**A. Mmm-hmm. Yes.**

**But those exposures, by the way, just to complete the answer, they did not exceed the 'no effect' level from the toxicity study. So there is that margin of safety which I described.**

Q. Looking back at that last line where it's the 8.54, now, that indicates it's a geometric mean of the nine operators with quantifiable paraquat in their urine, right?

**A. Yes.**

Q. So it actually included all nine operators who were deemed to have paraquat in their urine, not just the two who exceeded the AOEL on their own, right?

**A. I mean, I'm now wondering whether we -- I mean, there are so many different studies here.**

**Your calculation of 0. -- of 8.54 and then comparing that with the AOEL, and, you're quite right, it says the geometric mean.**

**My understanding was, and maybe it wasn't this particular study, so I'm getting rather late in the day here, was that there were only two individuals in one of these studies where there was exceedance of the AOEL.**

Q. I actually want to turn back to page 6.

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At the very bottom, it references, under "Habitual Use Studies," a study in Sri Lanka in 1987 by Chester.

Right?

**A. Yes.**

Q. And is that Graham Chester who --

**A. It's the same one, yes.**

Q. And this is the Sri Lanka study that was referenced in that ECCO meeting that we looked at earlier?

(Stenographer clarification.)

BY MR. DICKENS:

Q. Yeah. This is the same Sri Lanka study that we looked at in that ECCO meeting?

**A. Well, I assume it may have been. You can't make a direct assumption of that, but let's -- I think we can assume it probably was.**

Q. And in that Sri Lanka study, blood samples were also taken of the individuals who were exposed to paraquat, right?

**A. Yes.**

Q. So this is a ICI, or Syngenta, operator exposure study, right?

**A. Yes.**

Q. And so Syngenta actually not only took

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urine samples but took blood samples of those individuals exposed to paraquat?

**A. Yes.**

Q. You can put that aside.

MR. DICKENS: I'll hand you 47.

(Exhibit 47 marked for identification.)

BY MR. DICKENS:

Q. This document refers to Dunlop Estate worker exposure studies to paraquat in Malaysia, right?

**A. Yes.**

Q. And the objective was:

"To obtain data on sprayman, carrier and tapper dermal and respiratory exposure..."

Right?

**A. That's right.**

Q. Now, there's a "Determination of dermal exposure," and it notes:

"Dermal exposure pads were attached to clothing (or skin, if exposed)..."

Right?

**A. Yes, indeed.**

Q. And that was on various locations on the individual?

**A. Yes.**

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Q. Now, they ran into some problems for dermal exposure, at the bottom of the page, in that:

"... saturation of the exposure pads to the lower leg and thigh..."

Or there was:

"... saturation to the exposure pads to the lower leg and thigh [of paraquat] as the worker walked through sprayed vegetation."

Right?

**A. Yes.**

Q. And so that:

"... necessitated removal of the pads after a relatively short period of spraying - sometimes as little as 30 minutes."

Right?

**A. Mmm-hmm.**

Q. So the legs and the pads within the legs of those individuals became so saturated with paraquat that they had to be removed, correct?

**A. That's right.**

MR. DICKENS: I want to look at another Malaysian study. This is Exhibit 48.

(Exhibit 48 marked for identification.)

BY MR. DICKENS:

Q. This is a report from a B.H. Woollen,

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"Paraquat: Analysis of urine and plasma samples from a Malaysian operator exposure study," May 26, 1998.

Do you see that?

**A. Yes, indeed. That's 1988, actually.**

Q. I said --

**A. '98.**

Q. -- '98? You're correct, 1988. And on the next page, it notes that:

"In February 1988, an exposure study was carried out in Malaysia involving knapsack spray operators who were exposed to paraquat."

**A. Yes.**

Q. Right. Now, this actual study, this was not included in the summary of operator exposure studies that we looked at in the previous exhibit by Graham Chester and Andy Cook, correct?

**A. I would need to double-check that, but let's assume that you're correct for now.**

Q. And in this case, much like the Sri Lanka study, they actually undertook both urine as well as plasma samples from the individuals?

**A. Yes.**

Q. And plasma being blood?

**A. It's a component of blood.**

Q. If you can turn to page ending in 7570,

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end of the first paragraph:

"It's noteworthy that while paraquat excretion declined rapidly at the end of the spraying period between days 3 and 4, the decline was much slower thereafter and paraquat was still detectable in urine on day 10 for six of the subjects."

Right?

**A. Yeah. Yes.**

Q. So there were individuals in this study who still had paraquat in their urine ten days after their last exposure, right?

**A. I assume it's after their last exposure and that they weren't still subject to some form of exposure at that period in time, which is another alternative, of course.**

Q. Now, with respect to plasma, it notes:

"Paraquat was detectable at low concentrations in 12 out of 50 samples collected during days 1 and 3 when spraying occurred, but not in samples collected on day 5."

Right?

**A. Okay. Yeah, indeed.**

Q. This study specifically indicates that paraquat was not only getting into the body and excreted through the urine but paraquat was actually

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getting into the blood of users who were spraying paraquat, right?

**A. Well, indeed, in order to get into the urine it's highly likely that it will have gone via the circulation.**

Q. And in this, they specifically measured the plasma paraquat concentrations in order to determine the total operator exposure to paraquat in Malaysia at this point in time, right?

**A. I would need to understand that in a little bit more detail as to why they felt it was important to look at the plasma as well as the urine. I'm not sure that it was -- I wouldn't describe it in the way in which you had done, so I wouldn't like to say whether that was the intention and purpose here.**

MR. DICKENS: Two last ones for today. Get up to 50. I'll hand you Exhibit 49 for the record.

(Exhibit 49 marked for identification.)

MR. DICKENS: For the record, this is topic 17 in the Notice of Deposition.

BY MR. DICKENS:

Q. This is an email chain, "For your personal information: Meetings in Malaysia," August of 2002, from a Martin Wilks, bottom of the first page.

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Do you see that?
**A. I do.**
Q. And then on the bottom of the second page, the first email in this email chain is from a Bruce Woollen to Martin Wilks and Mike Clapp, right?
**A. Yeah.**
Q. And he's reporting on meetings he had in Malaysia. Bruce Woollen, he was -- was he the neurotoxicol- -- okay.
Who is Bruce Woollen?
**A. Right. Well, as in the previous document, which Bruce Woollen was an author on, he was our analytical expert, analytical chemistry expert.**
Q. And he's noting that he spoke to individuals in Malaysia and they were wishing to carry out a paraquat exposure study, right?
**A. An individual in Malaysia was wishing to do that and he was discussing this with other scientists in Malaysia.**
Q. And that's because the Pesticides Safety Board were not prepared to accept previous ICI studies on the basis that they were not considered to be impartial, right?
**A. That --**
MR. NARESH: Object to the form.

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Go ahead.
THE WITNESS: Sorry. Yeah, that was the reason given, yes.
BY MR. DICKENS:
Q. And:
"A key influencer was the man who visited with Bala [...] 18 months ago. He had [...] taken a strong position that if Syngenta did commission an independent study, [...] paraquat measurements should be done in blood plasma."
Right?
**A. Yes.**
Q. If you turn to the page -- to the last page, the second paragraph:
"Having convinced Bala of these arguments, he tried to arrange a meeting with the key influencer in the hope that I could convince him that plasma measurements would be futile."
Right?
**A. Yes.**
Q. Bruce Woollen is attempting to get the -- any Malaysian exposure studies not to include a measurement of paraquat within the blood or plasma?
MR. NARESH: Objection to the form.
///

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BY MR. DICKENS:
Q. Is that your understanding?
**A. Indeed, and probably for the same reason that I was saying it's not, to me, clear why plasma was -- plasma paraquat levels were measured in that previous study. The urine levels are the key parameter.**
Q. Okay. Part of the reason, on page 1, email from Martin Wilks, the last paragraph on page 1:
"More importantly, there is a real danger of generating data which could cause a great deal of harm to the global paraquat position."
Right?
**A. Yes.**
Q. And paraquat being found in the blood or plasma of users was considered data which would cause great harm to Syngenta and its business with paraquat, right?
MR. NARESH: Objection to form.
THE WITNESS: I don't know whether the specific concern was about detecting paraquat in the blood. I'm not able to make a judgment about specifically Martin's concern.
BY MR. DICKENS:
Q. It states at the very end:

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"If additional work is unavoidable, we must try to maintain as much control as possible."
Right?
**A. Yes.**
Q. And that's in order to influence what is happening, right?
MR. NARESH: Objection to form.
THE WITNESS: I think it's -- as is -- has been the case in another -- a number of examples: we wanted to -- I guess the better word would be to collaborate in order to create -- if a study was to be done, it would be done using the best possible approach, using the best possible protocol.
MR. DICKENS: Let's look at the last of the day, Exhibit 50, which is topic 17, still, in the Notice of Deposition.
(Exhibit 50 marked for identification.)
BY MR. DICKENS:
Q. This is an email chain in May of 2007 which, once again, includes Bruce Woollen.
Do you see that?
**A. Yes.**
Q. Okay. Let's start on the first email, which is on the second page. It's an email sent to Bruce Woollen on May 30, 2007 and it appears that a

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group was planning to do an operator exposure with samples of urine and plasma from plantation workers for a chronic exposure study.
Right?
**A. Yes.**
Q. And this would have been an outside group who would have been doing this operator exposure study of chronic exposure to paraquat, right?
**A. Yes.**
Q. Turn back to page 1, Bruce Woollen writes back, right?
**A. Yes.**
Q. And in the third paragraph, he states:
"Regarding operator exposure studies, I would advise you against blood sampling."
Right?
**A. Yes. And this actually says, in different language, exactly what I've been saying in the last -- with the last two exhibits: that the use of measurements in plasma are less meaningful than would be the case with urinary samples.**
MR. DICKENS: I'll move to strike.
BY MR. DICKENS:
Q. Dr. Woollen notes, in the next paragraph:
"In all our biological monitoring studies

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in the last 20 years [...], we have always used urine and never blood sampling."
Right?
**A. He said that, yes.**
Q. That's not true, correct?
**A. Well, when you look back and -- it's clear that he'd forgotten the study that we were looking at earlier, yes.**
Q. He forgot both the Sri Lankan study as well as the Malaysian study that we looked at, right?
**A. That's what we were looking at, yes. The Malaysian study I was -- is the one that I was referring to, yes.**
Q. And in the report or review that was done by Chester and Cook, we looked at the fact that blood samples were taken in the Sri Lankan study, right?
**A. Okay, yes.**
Q. So now there's two studies, biomonitoring studies that were done by Syngenta prior to 2007 where they have measured blood sampling, right?
**A. Yes.**
Q. And so the comment in this statement, through Bruce Woollen, to this independent researcher, simply isn't true, right?
MR. NARESH: Object to the form, asked and

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answered.
THE WITNESS: Well, it's inaccurate, but I think he's also saying that, perhaps with the benefit of hindsight, he now believes that the measurement in urine is a much more robust way of assessing exposure to paraquat.
BY MR. DICKENS:
Q. Well, he actually gives us the reason for why he said that in his email to Martin Wilks on May 30, 2007, right?
**A. Yes.**
Q. He says:
"My efforts to try and influence Teh..."
And that's the individual who had emailed him, right?
**A. Yes.**
Q. "My efforts to try and influence Teh to influence his supervisor continue, both technically and to avoid a potential 'can of worms' from plasma analysis results."
Right?
**A. Yes.**
Q. There was fear that plasma results of paraquat in the blood would open up a can of worms?
MR. NARESH: Objection to form.

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THE WITNESS: Yes, because they are -- as is said here, they are a snapshot in time and you can -- they don't provide you with the robustness of conclusion that urine samples over a period of time provide.
MR. DICKENS: We can go ahead and end for the day.
THE VIDEOGRAPHER: We are going off the record at 17:59.
(Whereupon, the deposition concluded for the day, to resume on Wednesday, September 18, 2024 at 09:00 a.m.)

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CERTIFICATE OF WITNESS

I, PHILIP BOTHAM, declare that I have read the entire transcript of Volume I of my Syngenta Corporate Representative deposition, or the same has been read to me, and certify that it is a true, correct and complete transcript of my deposition given on Tuesday, September 17, 2024, save and except for changes and/or corrections, if any, as indicated by me on the attached Errata Sheet, with the understanding that I offer these changes and/or corrections as if still being questioned.

Signed_____
Philip Botham

Dated this.....day of.....20...

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CERTIFICATE OF STENOGRAPHER

I, LEAH M. WILLERSDORF, Registered Merit Reporter, Certified Realtime Reporter, Fellow of the British Institute of Verbatim Reporters, Qualified Realtime Reporter Level 2, and Certified LiveNote Reporter, do hereby certify that:

PHILIP BOTHAM appeared before me on Tuesday, September 17, 2024, agreed to tell the truth under the penalties of perjury, and was thereupon examined by counsel; the testimony of said witness was taken by me stenographically; the foregoing is a true and accurate record to the best of my knowledge, skill and ability; I am neither a relative nor employee of any party to the action in which this testimony was taken; I am neither relative nor employee of any attorney or counsel employed by any party thereto; and, further, I am not financially or otherwise interested in the outcome of the action.

LM Willersdorf
_____
LEAH M. WILLERSDORF
RMR, CRR, FBIVR, ACR, QRR2, CLR
(September 27, 2024)