

1 UNITED STATES PATENT AND TRADEMARK OFFICE

2

3

4 BEFORE THE PATENT TRIAL AND APPEAL BOARD

5

6

7 AIR PRODUCTS and CHEMICALS, INC.,

8 Petitioner

9

v.

10 EVONIK OPERATIONS GMBH and

11 EVONIK CORPORATION,

12 Patent Owner

13

14 Case IPR2024-00611

15 Patent 10,471,380 B2

16

17 VIDEO-RECORDED DEPOSITION OF

18 DR. RICHARD W. BAKER

19 Zoom Recorded Videoconference

20 12/08/2024

21 8:39 A.M. (PST)

22

23 REPORTED BY: AMANDA GORRANO, CLR

24 CLR NO. 052005-01

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12/08/2024

8:39 A.M. (PST)

VIDEO-RECORDED DEPOSITION OF
DR. RICHARD W. BAKER, held virtually via
Zoom Videoconferencing, before Amanda
Gorrone, Certified Live Note Reporter, and
Notary Public of the State of New York.

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A P P E A R A N C E S

(Via Zoom Videoconferencing):

ON BEHALF OF PETITIONER AIR PRODUCTS AND
CHEMICALS, INC. AND THE WITNESS:

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1 A P P E A R A N C E S

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35 ALSO PRESENT:
36 Jose Rivera, Trial Tech/Videographer –
37 Gregory Edwards

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I N D E X

WITNESS	EXAMINATION BY	PAGE
DR. RICHARD W. BAKER	MR. LANTIER	7

E X H I B I T S

EXHIBIT	DESCRIPTION	PAGE
Exhibit 1	"Natural Gas Purification".....	153

R E Q U E S T S

DESCRIPTION	PAGE
Read and sign.....	169

1	Dr. Richard W. Baker	
2	AUTOMATED MESSAGE: Recording in	
3	progress.	08:39
4	THE TECH: We are now on the	08:39
5	record. This is the remote	08:39
6	video-recorded deposition of	08:39
7	Dr. Richard W. Baker. Today is	08:39
8	Sunday, December 8th, 2024. The time	08:39
9	is now 8:39 a.m. Pacific Standard	08:39
10	Time.	08:39
11	We are here in the matter of Air	08:39
12	Products and Chemicals, Inc. versus	08:39
13	Evonik Operations GmbH and Evonik	08:39
14	Corporation.	08:39
15	My name is Jose Rivera, remote	08:39
16	video technician, on behalf of Gregory	08:40
17	Edwards LLC. I am not related to any	08:40
18	party in this action, nor am I	08:40
19	financially interested in the outcome.	08:40
20	The court reporter today is	08:40
21	Amanda Gorrone also on behalf of	08:40
22	Gregory Edwards LLC.	08:40
23	Counsel will now introduce	08:40
24	themselves for the record after which	08:40
25	the court reporter will swear in the	08:40

1	Dr. Richard W. Baker	
2	witness.	08:40
3	MR. LANE: John Lane for Air	08:40
4	Products and the witness from Fish &	08:40
5	Richardson.	08:40
6	MR. LANTIER: Good morning. My	08:40
7	name is Greg Lantier from Wilmer	08:40
8	Cutler Pickering Hale and Dorr LLP	08:40
9	here on behalf of Evonik. I'm joined	08:40
10	today by two of my colleagues from	08:40
11	WilmerHale, Amy Mahan and Seth Miller.	08:40
12	MS. LINN: I'm Janet Linn from	08:40
13	Tarter Krinsky & Drogin also on behalf	08:40
14	of Evonik.	08:40
15	MS. KIM: Grace Kim at Fish &	08:40
16	Richardson here on behalf of	08:40
17	Petitioner.	08:41
18	DR. RICHARD W. BAKER, called as a witness,	08:41
19	having been first duly sworn by a Notary	08:41
20	Public of the State of New York, was	08:41
21	examined and testified as follows:	08:41
22	THE WITNESS: I do.	08:41
23	THE COURT REPORTER: Thank you.	08:41
24	EXAMINATION	08:41
25	BY MR. LANTIER:	08:41

1 Dr. Richard W. Baker

2 Q. Good morning, Dr. Baker. 08:41

3 A. Hi. 08:41

4 Q. My name is Greg Lantier, and I 08:41

5 represent Evonik. And I'm here to take 08:41

6 your deposition today. 08:41

7 Do you understand that? 08:41

8 A. I do. 08:41

9 Q. And where are you sitting here? 08:41

10 A. I'm sitting in the offices of 08:41

11 Fish & Richardson here in Redwood City. 08:41

12 Q. And have you ever had your 08:41

13 deposition taken before? 08:41

14 A. Yes. 08:41

15 Q. About how many times? 08:41

16 A. I can't give a precise number 08:41

17 but maybe five to ten. 08:41

18 Q. Do you have any questions about 08:41

19 how the deposition process works? 08:41

20 A. No. 08:41

21 Q. And are you aware of any reason 08:41

22 that you can't give your full and best 08:42

23 testimony today? 08:42

24 A. There is no reason. 08:42

25 Q. Do you have any paper copies of 08:42

1 Dr. Richard W. Baker
2 documents with you in the room? 08:42
3 A. I do. 08:42
4 Q. What do you have? 08:42
5 A. I have my declaration. I have 08:42
6 the Ungerank patent, the Priske patent and 08:42
7 a paper by Scholz. 08:42
8 MR. LANE: And, Greg, just 08:42
9 before we get started, I'll represent 08:42
10 to you that I gave him clean copies. 08:42
11 There's no notes, stickies anything on 08:42
12 those copies. I just wanted him to 08:42
13 have the paper just dealing with -- I 08:42
14 thought we would be dealing with those 08:42
15 exhibits today, and I wanted him to be 08:42
16 able to look at the paper if he wanted 08:42
17 to instead of trying to do it on the 08:42
18 screen. 08:42
19 MR. LANTIER: Sure. Thank you. 08:42
20 MR. LANE: I also have clean 08:42
21 copies of some of the other exhibits 08:42
22 here with me that I might give him, 08:42
23 but I'll tell you if I do that. 08:42
24 MR. LANTIER: Yes. I'd 08:43
25 appreciate it. And I think it will 08:43

1 Dr. Richard W. Baker
2 expedite things if you have paper 08:43
3 copies, so I'm happy for you to 08:43
4 have -- 08:43
5 MR. LANE: Okay. 08:43
6 MR. LANTIER: -- the paper 08:43
7 copies of the various documents. 08:43
8 MR. LANE: And like I said they 08:43
9 are all clean. I checked them again 08:43
10 this morning. 08:43
11 MR. LANTIER: Sure. 08:43
12 BY MR. LANTIER: 08:43
13 Q. And, Dr. Baker, if you notice a 08:43
14 stray note or highlighting or anything on 08:43
15 any of the documents you have before you, 08:43
16 will you just let me know during the 08:43
17 course of the deposition today? 08:43
18 A. Sure. 08:43
19 Q. Just for record purposes, when 08:43
20 you said that you have your declaration, 08:43
21 is that the document with the designation 08:43
22 in the bottom right-hand corner, AP 1003? 08:43
23 A. That's right. 08:43
24 Q. Okay. And it's titled 08:43
25 "Declaration of Dr. Richard Baker"; is 08:43

1 Dr. Richard W. Baker

2 that correct? 08:43

3 A. That's correct. 08:43

4 Q. And when you said you had the 08:43

5 Ungerank patent, is that the document with 08:43

6 the designation in the bottom right-hand 08:43

7 corner, AP 1006? 08:43

8 A. It's not -- it doesn't have that 08:43

9 designation. But it's the Ungerank 08:43

10 patent, the '038 patent. 08:44

11 Q. Okay. It is United States 08:44

12 Patent 8,999,038; is that correct? 08:44

13 A. That's correct. 08:44

14 Q. And the Scholz paper that you 08:44

15 have, does that have a declaration -- 08:44

16 excuse me, a designation at the bottom 08:44

17 right-hand corner of AP 1007? 08:44

18 A. No. 08:44

19 Q. Okay. Is it a document that at 08:44

20 the very top of it says, Journal of 08:44

21 Membrane Science 474 (2015) 1-10? 08:44

22 A. That's it, yep. 08:44

23 Q. Okay. And it's titled 08:44

24 "Structural optimization of membrane-based 08:44

25 biogas updated processes," correct? 08:44

1 Dr. Richard W. Baker

2 A. That's correct. 08:44

3 Q. And then the other patent you 08:44

4 have that you referred to as the Priske 08:44

5 patent. 08:44

6 That is U.S. Patent 10,471,380; 08:44

7 is that correct? 08:45

8 A. That's correct. 08:45

9 Q. And could you just take a quick 08:45

10 look and confirm for me that for those 08:45

11 four documents that you have, you have 08:45

12 what appears to be a complete copy of each 08:45

13 of them? 08:45

14 A. I can. I'm looking at the last 08:45

15 page of the patent. It's got the claims, 08:45

16 and there's a bunch of text. 08:45

17 The other patent, the claims and 08:45

18 the text. 08:45

19 And the paper is about ten pages 08:45

20 and, yeah. It's got the last page and it 08:45

21 looks like it's about ten pages. 08:45

22 Q. Very good. 08:45

23 And then if you turn back to 08:45

24 your declaration, is that your signature 08:45

25 on the front page? 08:45

1 Dr. Richard W. Baker

2 A. Yeah, the bottom right. 08:45

3 Q. Could you tell me when you were 08:45

4 first contacted about working with Air 08:46

5 Products in connection with this matter? 08:46

6 A. I can't give you a correct -- an 08:46

7 absolute date. 08:46

8 Q. Could you give me your best 08:46

9 approximation, please? 08:46

10 A. I have 6 to 12 months ago, 08:46

11 more -- more like -- time goes by. It 08:46

12 could have been eight or nine months ago. 08:46

13 I wouldn't like to swear to that though. 08:46

14 Q. That's fine. But that's the 08:46

15 best recollection you have; is that 08:46

16 correct? 08:46

17 A. That's right. 08:46

18 Q. And prior to that, have you ever 08:46

19 done any work with or for Air Products? 08:46

20 A. No. 08:46

21 Q. Have you ever done any work with 08:46

22 or for Evonik? 08:46

23 A. No. 08:46

24 Q. What is your hourly rate? 08:46

25 A. For this -- for this, about \$250 08:46

1 Dr. Richard W. Baker

2 an hour. 08:46

3 Q. And is that more, less or equal 08:46

4 to the amount that you charge for other 08:47

5 similar engagements? 08:47

6 A. It's -- it's about the same. 08:47

7 Q. Approximately how many times 08:47

8 have you served as an expert witness in 08:47

9 connection with an inter partes review 08:47

10 proceeding? 08:47

11 A. An inter partes, this may be the 08:47

12 first one. I'm not exactly sure what 08:47

13 inter partes but when -- yeah, but not 08:47

14 many. 08:47

15 Q. Okay. Can you think of any -- 08:47

16 so can you think of any other matters that 08:47

17 were before the United States Patent and 08:47

18 Trademark Office where you served as an 08:47

19 expert witness? 08:47

20 MR. LANE: Objection to form. 08:47

21 A. I -- exact -- expert witness 08:47

22 within the patent office? 08:48

23 I -- I can't recall them, but 08:48

24 I'm pretty sure I've done one or two. But 08:48

25 it's -- it's many years, so I can't be 08:48

1 Dr. Richard W. Baker

2 sure. 08:48

3 BY MR. LANTIER: 08:48

4 Q. What -- what parties were you 08:48

5 working with in those proceedings? 08:48

6 A. Well, I worked with Zenon, which 08:48

7 is a company in Canada. I did a fair bit 08:48

8 of work with -- with a European company in 08:48

9 the -- in the Netherlands. That was a 08:48

10 matter in Australia. 08:48

11 I've -- I've been deposed a 08:48

12 couple of times, because of MTR's related 08:48

13 stuff, my -- my -- my own company. And I 08:48

14 was also deposed a number of times 08:48

15 relating to a patent in a previous company 08:48

16 that I had worked for, Bend Research. 08:48

17 That -- that -- that went on for several 08:49

18 years. 08:49

19 Q. In that last case, was the -- 08:49

20 the company that you were working for 08:49

21 asserting that another company infringed a 08:49

22 patent? 08:49

23 A. No. It was -- it was actually 08:49

24 related to a class action suit against -- 08:49

25 the company we had been working for is a 08:49

1 Dr. Richard W. Baker

2 research outfit, was -- was being sued, 08:49

3 and they were being sued over the -- a 08:49

4 patent that arise -- arose from my work, 08:49

5 and so I consequently was deposed several 08:49

6 times. Quite a few times in fact. 08:49

7 Q. Approximately how many times 08:49

8 have you been deposed as an expert 08:49

9 witness? 08:49

10 MR. LANE: Objection. Form. 08:49

11 A. Yeah. Probably five or six 08:49

12 times. 08:49

13 BY MR. LANTIER: 08:49

14 Q. Okay. And then in addition to 08:49

15 that, you were deposed as a fact witness 08:50

16 in connection with the case you just 08:50

17 mentioned? 08:50

18 MR. LANE: Dr. Baker, you have 08:50

19 to let him finish. The court reporter 08:50

20 can't take it down if you're talking 08:50

21 on top of each other. 08:50

22 THE WITNESS: Something has come 08:50

23 up on my screen. 08:50

24 MR. LANE: Sorry about that. 08:50

25 BY MR. LANTIER: 08:50

1 Dr. Richard W. Baker

2 Q. In the cases where you served as 08:50
3 an expert witness, were all of those 08:50
4 related to patents? 08:50

5 MR. LANE: Objection to form. 08:50

6 A. Yeah, almost all. 08:50

7 BY MR. LANTIER: 08:50

8 Q. What's the exception? 08:50

9 A. I was required -- asked once 08:50
10 to -- to be an expert for -- for a court 08:50
11 case, which related to a -- an employee of 08:50
12 a company, Abcor who had left the company 08:51
13 and then they -- they alleged he had 08:51
14 stolen trade secrets and was using them. 08:51
15 And I was an expert for Abcor. 08:51

16 Q. Prior to today, when is the -- 08:51
17 the most recent time that you were 08:51
18 deposed? 08:51

19 A. I think it's a little while ago. 08:51
20 Probably as much as ten years ago. 08:51

21 Q. Are you currently working as a 08:51
22 consultant or an expert on any other legal 08:51
23 matters? 08:51

24 A. No. 08:51

25 Q. How many hours did you spend 08:51

1 Dr. Richard W. Baker
2 preparing, in this case, before signing 08:51
3 your declaration? 08:51
4 MR. LANE: Objection. Form. 08:51
5 A. Quite a while, I would say. 08:51
6 I -- I can't give you an exact number, but 08:52
7 quite a while. Ten -- in aggregate, maybe 08:52
8 10 or 20 days. 08:52
9 BY MR. LANTIER: 08:52
10 Q. And could you explain the 08:52
11 process you went through in order to 08:52
12 generate the declaration that you signed? 08:52
13 MR. LANE: And before you answer 08:52
14 that, Dr. Baker, I'm going to caution 08:52
15 you. 08:52
16 Don't reveal your conversations 08:52
17 with attorneys, but you can answer the 08:52
18 question without revealing the 08:52
19 substance of your conversations with 08:52
20 attorneys. 08:52
21 THE WITNESS: Okay. 08:52
22 A. I met with the -- the -- 08:52
23 Mr. Lane, and he -- he described the case 08:52
24 and we looked at the patents. I -- 08:52
25 MR. LANE: Dr. Baker, I'm going 08:52

1 Dr. Richard W. Baker
2 to stop you right there. You're 08:52
3 getting into our -- 08:53
4 Greg, I think you've got to 08:53
5 break this down because you're 08:53
6 getting -- you're really asking about 08:53
7 our work process together that just -- 08:53
8 it's intertwined with privilege. 08:53
9 MR. LANTIER: John, I disagree. 08:53
10 And I think going forward if you can 08:53
11 keep your objections to objection to 08:53
12 form or if you have a privilege 08:53
13 objection, state it and decide whether 08:53
14 to instruct the witness not to answer, 08:53
15 not that -- that would be the more 08:53
16 proper way to proceed. I think that 08:53
17 the speaking objections are a bit 08:53
18 concerning. But I can -- I can break 08:53
19 this down. 08:53
20 MR. LANE: I'm going to instruct 08:53
21 him to not answer based on privilege 08:53
22 when you're asking for privilege. I'm 08:53
23 trying to get him to give you the 08:53
24 answer, the information without giving 08:53
25 privileged information. And I'm also 08:53

1 Dr. Richard W. Baker
2 allowed to make objections -- and, 08:53
3 well -- 08:53
4 MR. LANTIER: You can make 08:53
5 objections, but you can't give 08:53
6 speeches and you can't direct the 08:53
7 witness on how to answer questions 08:53
8 beyond saying, I instruct you not to 08:53
9 answer, if you believe that -- that 08:53
10 the question calls for privilege. 08:53
11 That's the limit on the -- the proper 08:54
12 conduct during a deposition. 08:54
13 MR. LANE: I don't agree with 08:54
14 that. We'll follow the practice 08:54
15 guidelines. 08:54
16 And by the way, pursuant to the 08:54
17 board's trial process guidelines, 08:54
18 Section 2, Appendix D, I don't believe 08:54
19 you're admitted in this proceeding, 08:54
20 Mr. Lantier, and I think it's improper 08:54
21 for you to be taking that -- this 08:54
22 deposition. 08:54
23 So pursuant to, like I said, 08:54
24 Section 2, Appendix D of the trial 08:54
25 practice guidelines, we object to you 08:54

1 Dr. Richard W. Baker
2 taking this deposition and reserve our 08:54
3 rights to seek relief on that basis. 08:54
4 MR. LANTIER: John, as you know, 08:54
5 we filed a motion for admission 08:54
6 pro hac vice that was unopposed by -- 08:54
7 by Air Products. And in that 08:54
8 circumstance, I don't believe that 08:54
9 there's anything improper about 08:54
10 proceeding with a deposition. 08:54
11 We could have, of course -- if 08:54
12 you wanted us to, we could have 08:54
13 postponed the deposition and -- and 08:54
14 postponed the filing of the patent -- 08:54
15 the patent owner response. 08:54
16 I think the better way to 08:55
17 proceed today is to go forward with 08:55
18 the deposition. 08:55
19 MR. LANE: Well, I'm allowed to 08:55
20 make objection again. And the 08:55
21 guidelines say you should proceed. 08:55
22 I made the objection. I'm 08:55
23 allowed to do that, and the trial 08:55
24 practice guidelines say go ahead and 08:55
25 proceed. 08:55

1 Dr. Richard W. Baker

2 BY MR. LANTIER: 08:55

3 Q. Dr. Baker, what was the first 08:55
4 document that you read once you were 08:55
5 engaged to offer your opinions in this 08:55
6 case? 08:55

7 A. I -- I can't recall that. 08:55

8 Q. Did you read the Priske '380 08:55
9 patent that's at issue here? 08:55

10 A. I've certainly read it. I'm not 08:55
11 quite sure if I read it first or when I 08:55
12 read it, but I've read it. I've read it. 08:55

13 Q. And how did you first come to 08:55
14 learn of the Ungerank patent? 08:55

15 I'm not looking for the content 08:55
16 of communications. I'm just asking you 08:56
17 how you first came to -- to know of that 08:56
18 patent. 08:56

19 A. I -- actually, I might have 08:56
20 known of that patent before Mr. Lane 08:56
21 contacted me or whatever. I'm not 08:56
22 completely sure of that. 08:56

23 But I write a report on -- on 08:56
24 patents for the North American Membrane 08:56
25 Society. And I certainly -- I look at 08:56

1 Dr. Richard W. Baker

2 every -- every membrane patent that at 08:56
3 least I can find, every quarter, and I 08:56
4 write a little piece, not on every one, 08:56
5 but just on the highlighted ones. 08:56

6 And I have, in fact, written a 08:56
7 little piece on -- on -- on the -- on a 08:56
8 related Ungerank patent. I'm not quite 08:56
9 sure if it's this one, but yeah. I -- I 08:56
10 have written something. 08:56

11 So I was aware of the Ungerank 08:57
12 patent or at least the general idea of the 08:57
13 Ungerank patent before -- before I met 08:57
14 Mr. Lane. 08:57

15 Q. Okay. Could you provide a 08:57
16 little more detail on the -- the quarterly 08:57
17 reports that you write for NME? 08:57

18 A. It's only maybe about three or 08:57
19 four pages, five pages. I'll pick maybe 08:57
20 three -- two or three or four patents out 08:57
21 of the -- there will be 50 or 100 patents 08:57
22 in the pile. I'll just flick through and 08:57
23 pick out the -- the three or four that 08:57
24 look interesting to me. And I'll -- I'll 08:57
25 write a little note on them, show -- show 08:57

1 Dr. Richard W. Baker

2 some -- a drawing or two from the patent, 08:57

3 make a comment or two. That sort of 08:57

4 thing. 08:57

5 And I do remember with -- I've 08:57

6 seen the Ungerank or at least a related 08:57

7 patent from Evonik about their biogas 08:58

8 process, which -- which, when it came out, 08:58

9 it was an interesting patent, so I -- I 08:58

10 commented on it. 08:58

11 Q. Who do the reports go to? 08:58

12 A. There's about maybe 500 to 1,000 08:58

13 members of the North America Membrane 08:58

14 Society. And so this little quarterly 08:58

15 newsletter, which has my section in it, 08:58

16 but it has a bunch of other stuff too, of 08:58

17 course, it goes out once a quarter. 08:58

18 Q. Are the newsletters available 08:58

19 online, to your knowledge? 08:58

20 MR. LANE: Objection. Lack of 08:58

21 foundation. 08:58

22 A. Nowadays -- they used to go out 08:58

23 in print. Nowadays they are only online. 08:58

24 Q. Understood. 08:58

25 Did you write the first draft of 08:59

1 Dr. Richard W. Baker

2 your declaration? 08:59

3 A. No. 08:59

4 Q. Is there any portion of your 08:59

5 declaration that you wrote? 08:59

6 A. Wrote? The actual words that 08:59

7 ended up in the piece of paper had -- have 08:59

8 information that I wrote -- I wrote the 08:59

9 pieces. There is a little section with 08:59

10 some equations, if you will, and I wrote 08:59

11 the preamble to that. I wrote that first. 08:59

12 And then it was sort of put into the 08:59

13 format of this declaration. That piece I 08:59

14 actually wrote. 08:59

15 The other pieces for the most 08:59

16 part were written by -- on information 08:59

17 that I'd -- we'd worked on over the 09:00

18 period, maybe over the -- over a month or 09:00

19 two before. So it incorporated stuff that 09:00

20 we'd talked about, and notes had been 09:00

21 passed here and there. But, uh-huh, 09:00

22 that's how it went. 09:00

23 Q. And when -- how long before you 09:00

24 signed your declaration did you see a 09:00

25 draft of your declaration for the first 09:00

1	Dr. Richard W. Baker	
2	time?	09:00
3	A. Probably, I got -- I got a	09:00
4	draft, and then actually, it's a longish	09:00
5	document, so I went through it fairly	09:00
6	carefully. I made sure everything was	09:00
7	okay, just -- just reading it by myself.	09:00
8	And then I know at the very end I went	09:01
9	through it again, a second or third time.	09:01
10	A couple of times I went through	09:01
11	it with Mr. Lane at the very end, just we	09:01
12	turned the pages one by one and looked at	09:01
13	every page.	09:01
14	MR. LANE: Dr. Baker, I'm going	09:01
15	to stop you there and instruct you not	09:01
16	to go into your conversations with	09:01
17	attorneys, please.	09:01
18	A. I checked it fairly carefully, I	09:01
19	have to say.	09:01
20	MR. LANE: Dr. Baker, just stop.	09:01
21	I'm instructing you not to answer	09:01
22	anymore. If Mr. Lantier wants to	09:01
23	follow up, he can follow up.	09:01
24	BY MR. LANTIER:	09:01
25	Q. I know you said you've served as	09:01

1 Dr. Richard W. Baker

2 an expert in some proceedings that 09:01

3 occurred outside the US, including in 09:01

4 Australia. 09:01

5 A. Uh-huh. 09:01

6 Q. Could I just focus you for a 09:01

7 moment on instances where you served as an 09:01

8 expert in connection with proceedings in 09:02

9 the United States? 09:02

10 A. Uh-huh, yeah. 09:02

11 Q. For proceedings that occurred 09:02

12 within the United States, for what 09:02

13 companies have you served as an expert? 09:02

14 A. Burroughs Wellcome, Abcor. In 09:02

15 the United States? General 09:02

16 Electric/ZENON. ZENON, I started work in 09:02

17 Canada, but they -- they were bought by 09:02

18 General Electric, which was in the US, so 09:02

19 it was sort of bought by a multicultural 09:02

20 encounter. 09:02

21 That's about it. I -- there 09:03

22 might have be more, but I can't quite 09:03

23 remember them all. 09:03

24 Q. Okay. But those are the ones 09:03

25 that you remember sitting here today? 09:03

1 Dr. Richard W. Baker

2 A. Yeah. 09:03

3 Q. Okay. But the first one, I 09:03

4 apologize. Did you say Bauer's Wellcome? 09:03

5 A. Burroughs Wellcome. They -- 09:03

6 later on it became SKF, and -- and now I'm 09:03

7 not quite sure what they are called. But 09:03

8 the Wellcome Foundation is an outcome of 09:03

9 the Burroughs Wellcome company. 09:03

10 Q. And what kind of a case was 09:03

11 that? 09:03

12 MR. LANE: Objection. Form. 09:03

13 A. It was a -- Burroughs Wellcome 09:03

14 was being sued by -- by various folks, as 09:03

15 a class action about a patent, and it was 09:03

16 a patent that I had been working on that 09:03

17 was -- I was one of the inventors, and 09:03

18 they were -- they had used the patent in 09:03

19 some drug registration issues, and for 09:04

20 whatever reason, they were being sued, 09:04

21 they had a class action suit on their 09:04

22 hands. 09:04

23 Q. Do you happen to remember what 09:04

24 state that case was proceeding in? 09:04

25 A. I was deposed in Washington, so 09:04

1 Dr. Richard W. Baker

2 I'm not quite sure. Burroughs Wellcome is 09:04

3 in North Carolina. I'm quite sure. 09:04

4 Q. And you said the second company, 09:04

5 was it Albacore? 09:04

6 A. Abcor. 09:04

7 Q. Abcor. What kind of case was 09:04

8 that? 09:04

9 MR. LANE: Objection. Form. 09:04

10 A. It was -- a former employee of 09:04

11 Abcor had set up his own company and was 09:04

12 selling products that Abcor felt, maybe 09:04

13 rightly, were using their technology. 09:04

14 Q. Do you remember in what state 09:05

15 that case was? 09:05

16 A. California. It was a -- I think 09:05

17 federal court but in California. 09:05

18 Q. And do you happen to remember 09:05

19 the last name of the individual who 09:05

20 they -- the other side is what I'm asking 09:05

21 for. 09:05

22 Do you remember the name of the 09:05

23 party that was on the other side? 09:05

24 A. No. The guy was called Chen Li, 09:05

25 but I can't remember. 09:05

1 Dr. Richard W. Baker

2 Q. And then finally, for the 09:05
3 GE/ZENON matters, what type of a case was 09:05
4 that? 09:05

5 MR. LANE: Objection. Form. 09:05

6 A. It was -- GE/ZENON WAS suing a 09:05
7 company called Mintech in Australia, and 09:05
8 who were using technology that was -- 09:05
9 ZENON thought was theirs. And -- and so 09:06
10 the thing in fact was -- I don't know why 09:06
11 they wanted to fight it out in Australia 09:06
12 but anyway they did, you know. And so it 09:06
13 was in Australia. 09:06

14 Q. Okay. So there was no component 09:06
15 of that case that was proceeding in the 09:06
16 United States as far as you can remember? 09:06

17 MR. LANE: Objection. Form. 09:06

18 A. I don't believe it -- no. 09:06

19 BY MR. LANTIER: 09:06

20 Q. Okay. 09:06

21 A. Mostly, mostly in Australia. 09:06

22 Q. Now, you have a large number of 09:06
23 patents on which you're named as an 09:06
24 inventor; is that right? 09:06

25 MR. LANE: Objection. Form. 09:06

1	Dr. Richard W. Baker	
2	A. Yes.	09:06
3	BY MR. LANTIER:	09:06
4	Q. Has anyone ever in any way	09:06
5	challenged the validity of any patent on	09:06
6	which you're named as an inventor?	09:06
7	MR. LANE: Objection. Form.	09:06
8	A. Not that I can think of, no.	09:06
9	BY MR. LANTIER:	09:06
10	Q. I have a few questions about	09:06
11	your -- your CV, and I'm happy to have you	09:07
12	download a copy if you need it, so I'll	09:07
13	ask the questions and if you want a copy,	09:07
14	just let me know. Is that okay?	09:07
15	A. That's fine.	09:07
16	Q. I was reading in your CV that in	09:07
17	2007 you stepped aside as president of MTR	09:07
18	but remained on as a member of the board	09:07
19	of directors; is that correct?	09:07
20	A. That's correct.	09:07
21	Q. My question is after 2007, were	09:07
22	you employed or have you been employed by	09:07
23	MTR?	09:07
24	MR. LANE: Objection. Compound.	09:07
25	BY MR. LANTIER:	09:07

1 Dr. Richard W. Baker

2 Q. Okay. I'll restate the 09:07
3 question. 09:07

4 Since 2007, have you been an 09:07
5 employee of MTR at any time? 09:07

6 A. I'm -- I have been an employee; 09:08
7 I am an employee. 09:08

8 Q. Okay. So what is -- I 09:08
9 understand you're on the board of 09:08
10 directors, but what is your title as an 09:08
11 employee of MTR? 09:08

12 A. It's a small company. We -- I 09:08
13 think I -- on my card it says, "Principal 09:08
14 Scientist." 09:08

15 Q. Okay. And during an average 09:08
16 week for you, between 2007 and the 09:08
17 present, about how many hours are you 09:08
18 spending doing work for MTR? 09:08

19 MR. LANE: Objection. Form. 09:08

20 A. I only work for MTR. I turn up 09:08
21 at 8 o'clock in the morning. I leave 09:08
22 at 5:00. 09:08

23 Q. Okay. So you're working 09:08
24 full-time -- I should have asked it that 09:08
25 way. 09:08

1 Dr. Richard W. Baker

2 You're working full time for MTR 09:08

3 today? 09:08

4 MR. LANE: Objection. 09:08

5 Objection. Form. 09:08

6 You have -- you have to let me 09:08

7 object, Dr. Baker. 09:08

8 THE WITNESS: Yeah. Sorry. 09:08

9 (Reporter clarification.) 09:09

10 BY MR. LANTIER: 09:09

11 Q. I'll restate the question. 09:09

12 You are a full-time employee of 09:09

13 MTR as of the present; is that correct? 09:09

14 A. Yes. 09:09

15 Q. I apologize if I missed this in 09:09

16 your -- your CV. 09:09

17 Have you ever taught any 09:09

18 courses? 09:09

19 MR. LANE: Objection. Form. 09:09

20 A. Occasionally. In the past, I 09:09

21 would. At the North American Membrane 09:09

22 Society meeting, they would have some 09:09

23 workshops before the meeting, and I 09:09

24 would -- I -- for several years, I taught 09:09

25 classes or a class on that -- in that 09:10

1 Dr. Richard W. Baker
2 workshop on gas separation. 09:10
3 Q. Have you ever had a position at 09:10
4 a college or university? 09:10
5 A. No. 09:10
6 MR. LANE: Objection. Form. 09:10
7 MR. LANTIER: I'll do this just 09:10
8 for the record. 09:10
9 If we could please put into the 09:10
10 link, so Dr. Baker can download it, a 09:10
11 copy of AP 1004, which is at Tab 2. 09:10
12 BY MR. LANTIER: 09:10
13 Q. And, Dr. Baker, this should show 09:10
14 up, and you should be able to download it 09:11
15 to your computer so that you can review 09:11
16 the document. 09:11
17 THE TECH: Do you want to mark 09:11
18 this as Exhibit 1? 09:11
19 MR. LANTIER: No. 09:11
20 THE TECH: Okay. 09:11
21 MR. LANE: Mr. Lantier, can you 09:11
22 tell me what that document is so we 09:11
23 can see if we have a hard copy here? 09:11
24 MR. LANTIER: Yes. It's 09:11
25 AP 1004. This is a copy of the CV 09:11

1 Dr. Richard W. Baker
2 that was attached to Dr. Baker's 09:11
3 declaration. 09:11
4 MR. LANE: Okay. I don't think 09:11
5 we have that here. 09:11
6 So, Dr. Baker, you're going to 09:11
7 need to go in the chat. Here, go in 09:11
8 the chat. Okay. And then here's the 09:11
9 document right here. Yep -- no, no, 09:11
10 no, no -- 09:11
11 THE WITNESS: There we are. 09:12
12 I've got it. 09:12
13 BY MR. LANTIER: 09:12
14 Q. Dr. Baker, my only question is 09:12
15 going to be whether this is a complete and 09:12
16 up-to-date copy of your CV. 09:12
17 A. Let's see how -- how recent it 09:12
18 is by the last reference, I guess. Okay. 09:12
19 I am getting close. 09:13
20 Okay. It's -- it's pretty 09:13
21 relevant. It -- it might not be bang up 09:13
22 to date. It goes to 2017, and in this -- 09:13
23 so -- so it's pretty much up to date. 09:13
24 There -- there are a couple of papers 09:13
25 after '17, so. And there's certainly more 09:13

1 Dr. Richard W. Baker
2 patents then after '17. 09:13
3 Let's see what the patents are 09:13
4 like. Okay. Okay. The last patent is 09:13
5 2017. It's -- there's probably another 09:14
6 three or four patents since then. So -- 09:14
7 so it may not be bang up to date. 09:14
8 Probably two or three years out of date. 09:14
9 And it doesn't include, you 09:14
10 know, reports to the government and stuff 09:14
11 like that. It's -- as the patents and 09:14
12 publications, it doesn't include every 09:14
13 piece of -- of all the reports that have 09:14
14 been signed off on over the years, but 09:14
15 it's fairly -- it's pretty complete. 09:14
16 Q. Okay. But when you say reports 09:14
17 signed off on, could you just give a 09:15
18 general overview of what type of reports 09:15
19 you're talking about? 09:15
20 A. Sure. 09:15
21 We, our company and me, we work 09:15
22 on government programs, more recently, in 09:15
23 recent years, on carbon capture. And 09:15
24 these are fairly big programs. We send in 09:15
25 a report at the end of the program, which 09:15

1 Dr. Richard W. Baker

2 is -- which is a public document. 09:15

3 And the Department of Energy has 09:15

4 a website where all sorts -- anybody can 09:15

5 go in and look and read these reports, and 09:15

6 people do. But they are not -- they are 09:15

7 not sort of the reports that people 09:15

8 normally will cite in publications, though 09:15

9 sometimes they do. So -- so I don't put 09:15

10 them on my CV. Some people might. I 09:15

11 don't do it. 09:15

12 Q. In your employment history on 09:15

13 Page 2 of your CV, just had a quick few 09:16

14 questions here. 09:16

15 It says here that you earned 09:16

16 your PhD in October of 1966 from Imperial 09:16

17 College at London University; is that 09:16

18 accurate? 09:16

19 A. That's correct, yes. 09:16

20 Q. And it's -- did you write a 09:16

21 thesis in connection with that? 09:16

22 A. Yep. 09:16

23 Q. What was the thesis on? 09:16

24 A. It was on diffusion of gases in 09:16

25 microporous media. That thesis title 09:16

1 Dr. Richard W. Baker

2 could be used today by somebody. 09:16

3 Q. And then it says that you earned 09:16

4 your -- your bachelor's of science in 09:16

5 August of 1963; is that accurate? 09:16

6 A. Yeah. That would be about 09:16

7 right, yeah, uh-huh. 09:17

8 Q. And what was the bachelor's 09:17

9 degree in? 09:17

10 A. Chemistry. 09:17

11 Q. I assume that somewhere in there 09:17

12 you earned a master's degree; is that 09:17

13 correct? 09:17

14 A. No. I -- in those days, if you 09:17

15 wanted to do a PhD, you went from your 09:17

16 bachelor's degree, you signed on and you 09:17

17 started a PhD. At least -- 09:17

18 Q. Okay. So you never earned a 09:17

19 master's degree yourself; is that correct? 09:17

20 A. That's correct. 09:17

21 Q. Now, when you took your job at 09:17

22 Amicon Corporation in November of 1966 -- 09:17

23 A. Uh-huh. 09:17

24 Q. -- what were you hired to do 09:17

25 there? 09:17

1 Dr. Richard W. Baker

2 MR. LANE: Objection. Form. 09:17

3 A. I -- I was part of the research 09:17

4 group at Amicon, and I was hired to make 09:18

5 or work on the first ultrafiltration 09:18

6 membranes. Ultrafiltration was a very new 09:18

7 thing at the time. 09:18

8 BY MR. LANTIER: 09:18

9 Q. What were those membranes 09:18

10 designed to filter? 09:18

11 A. Proteins from water, for 09:18

12 example, or they would separate 09:18

13 micromolecules -- proteins was a big 09:18

14 target -- from -- from water. And 09:18

15 microsolute would go through. Water and 09:18

16 microsolute go through. The membrane 09:18

17 would reject the protein and the 09:18

18 macromolecules and the bigger molecules 09:18

19 that were in the solution. 09:18

20 Q. Have you ever designed a 09:18

21 membrane gas separation system yourself? 09:18

22 A. Yes. Designed? 09:18

23 MR. LANE: Objection. Form. 09:18

24 A. You know, the word "designed," 09:18

25 you know, you've got to be a little 09:19

1 Dr. Richard W. Baker

2 careful. 09:19

3 Certainly, the overall scheme of 09:19

4 the thing and so forth, I've -- I've done 09:19

5 that many times. I've worked on that 09:19

6 area. 09:19

7 The actual mechanical part of 09:19

8 designing it, how -- how big the pipes 09:19

9 are, how you lay out the plant and stuff 09:19

10 like that, that's more mechanical 09:19

11 engineering. I'd -- I'm not involved in 09:19

12 that. 09:19

13 BY MR. LANTIER: 09:19

14 Q. Could you just provide a little 09:19

15 bit more detail on that, that distinction 09:19

16 that you're making and explain kind of 09:19

17 what -- what you've done? 09:19

18 A. Uh-huh. 09:19

19 MR. LANE: Objection. Form. 09:19

20 Objection. Compound. 09:19

21 A. In -- when you -- the beginnings 09:19

22 of a gas separation process or whatever, 09:19

23 membrane gas separation process, you would 09:19

24 have drawings. At the very beginning, you 09:20

25 have drawings such as in the Ungerank 09:20

1 Dr. Richard W. Baker

2 patent or the Priske patent. It's a 09:20

3 simple drawing. 09:20

4 There may be more sophisticated 09:20

5 drawings with more complete descriptions 09:20

6 of -- of the other components of the 09:20

7 system. And then the working out of the 09:20

8 flows and the separation and how much 09:20

9 approximately the membrane area is and so 09:20

10 forth and so on, that would all be done by 09:20

11 people like me. 09:20

12 At some point, you're going to 09:20

13 actually build the plant. Now, then you 09:20

14 call in mechanical -- more mechanical 09:20

15 people who will -- I just draw a circle 09:20

16 and put a few arrows for a compressor. 09:20

17 Now, a compressor is actually 09:20

18 quite a sophisticated piece of equipment. 09:20

19 Mechanical people will worry about what 09:21

20 the -- what compressor, how big is the 09:21

21 compressor, where are we going to put the 09:21

22 compressor, hooking up the compressor, the 09:21

23 controls for the system. All of that will 09:21

24 be done by other people, not me. 09:21

25 Q. Understood. 09:21

1 Dr. Richard W. Baker

2 So I'll use the term "design" 09:21

3 here, and I mean in the way that -- that 09:21

4 you've talked about the work you've done 09:21

5 in designing a system. 09:21

6 A. Right. 09:21

7 Q. When would you say was the first 09:21

8 time that you designed a membrane gas 09:21

9 separation system? 09:21

10 MR. LANE: Objection. Form. 09:21

11 A. A gas separation, I -- probably 09:21

12 in the 1980s. Early 1980s I began to work 09:21

13 on -- in this sort of area with gas 09:22

14 separation. I'd worked in other areas 09:22

15 before. 09:22

16 BY MR. LANTIER: 09:22

17 Q. Was that at Fraunhofer Research 09:22

18 Institute? 09:22

19 A. At Fraunhofer, I worked -- I 09:22

20 thought about it at Fraunhofer, but I 09:22

21 didn't really work on it; but mostly when 09:22

22 I started MTR. 09:22

23 Q. And approximately how many 09:22

24 membrane gas separation systems do you 09:22

25 think you designed between the early 1980s 09:22

1 Dr. Richard W. Baker

2 and 2014? 09:22

3 MR. LANE: Objection. Form. 09:22

4 A. Many. I can't put a number. 09:22

5 But it would be in the -- I've considered 09:22

6 and designed in one way or another 100 09:22

7 maybe. Not all were built. That's for 09:22

8 sure, but several hundred. 09:22

9 BY MR. LANTIER: 09:23

10 Q. Is the primary focus of Membrane 09:23

11 Technology and Research, Inc. membrane 09:23

12 systems for gas separation? 09:23

13 MR. LANE: Objection. Form. 09:23

14 A. It's the biggest piece. 09:23

15 BY MR. LANTIER: 09:23

16 Q. Has that been true consistently 09:23

17 since the company was formed in the early 09:23

18 1980s? 09:23

19 MR. LANE: Objection. Form. 09:23

20 A. Within one or two years of 09:23

21 starting, we -- we began to focus on gas 09:23

22 separation. 09:23

23 BY MR. LANTIER: 09:23

24 Q. And then since that time have 09:23

25 focused primarily on gas separation; is 09:23

1 Dr. Richard W. Baker

2 that correct? 09:23

3 MR. LANE: Objection. Form. 09:23

4 A. That's correct. 09:23

5 BY MR. LANTIER: 09:23

6 Q. Could you turn to your copy of 09:23

7 the -- your declaration, so this is the 09:23

8 document that is AP 1003. 09:23

9 A. I've got it. 09:23

10 Q. And if you could please turn to 09:24

11 Page 13. 09:24

12 A. Yep. 09:24

13 Q. Do you see that there is a 09:24

14 heading towards the bottom of that page, 09:24

15 Roman IV, "MATERIALS CONSIDERED"? 09:24

16 A. That's right. 09:24

17 Q. And then there's a bulleted list 09:24

18 that carries over on -- starting on 09:24

19 Page 13 through Page 14 and up to the top 09:24

20 of Page 15. 09:24

21 Do you see that? 09:24

22 A. I see it. 09:24

23 Q. Is this a complete and accurate 09:24

24 identification of the materials you 09:24

25 considered in formulating your opinions? 09:24

1 Dr. Richard W. Baker

2 A. It's a complete and accurate of 09:24
3 what -- of what was -- what's talked about 09:24
4 in the deposition. 09:24

5 We looked at other documents, 09:24
6 too. They, you know, didn't seem that -- 09:24
7 they didn't seem completely relevant, but 09:25
8 whatever. They weren't used, but these 09:25
9 ones were all sort of used. 09:25

10 Q. And this is a complete list; is 09:25
11 that correct? 09:25

12 A. Pretty much, yeah. Yes, I think 09:25
13 so. 09:25

14 Q. Do you notice any documents that 09:25
15 you considered and found to be relevant 09:25
16 that are not on this list? 09:25

17 A. No. I don't have any -- any 09:25
18 extras, as it were. 09:25

19 Q. If you could turn then to 09:25
20 Page 16 of your declaration. 09:25

21 A. Got it. 09:25

22 Q. Do you see the heading that's 09:25
23 Roman VI, "PERSON OF ORDINARY SKILL IN THE 09:25
24 ART"? 09:25

25 A. I see that. 09:25

1 Dr. Richard W. Baker

2 Q. This section sets forth your 09:25
3 opinions as to the -- the level of the 09:26
4 person of ordinary skill in the art, 09:26
5 correct? 09:26

6 A. That's correct. 09:26

7 Q. If you turn to Paragraph 58. 09:26

8 A. Uh-huh. Got it. 09:26

9 Q. Why did -- why did you say that 09:26
10 the person of ordinary skill in the art 09:26
11 would have at least three years of work 09:26
12 experience? 09:26

13 A. Well, work experience in 09:26
14 membrane systems for gas separations, 09:26
15 that -- that's in the art. The art we're 09:26
16 talking about is membrane gas separation, 09:26
17 so -- so you -- it's a person of ordinary 09:26
18 skill in the art is not a novice. You 09:26
19 know, he's not just -- this is the first 09:27
20 thing he's ever looked at. 09:27

21 On the other hand, it isn't a 09:27
22 guy with -- with 50 years' experience and 09:27
23 so forth, you know, an absolute super 09:27
24 expert as it were. It's -- it's a 09:27
25 reasonably competent guy who's been 09:27

1 Dr. Richard W. Baker

2 working in the area for a few years and 09:27

3 is -- in this particular area of 09:27

4 technology, and I think two or three -- 09:27

5 three years is a -- is a reasonable level 09:27

6 of experience. 09:27

7 Q. Now, as of 2014, you would have 09:27

8 had about 30 or so years of experience 09:27

9 with membrane systems for gas separation; 09:27

10 is that correct? 09:27

11 A. That's correct. 09:27

12 Q. So you would have been, as you 09:27

13 described, sort of a super expert in this 09:27

14 field at that point in time; is that 09:27

15 correct? 09:28

16 A. Yes. I wouldn't have been an 09:28

17 ordinary skill in the art. 09:28

18 Q. Could you turn to Page 22 of 09:28

19 your declaration? And you actually may 09:28

20 not need to go there for this question. 09:28

21 I'll ask it, and if you want to go there, 09:28

22 then you can. 09:28

23 Throughout your declaration, you 09:28

24 mentioned some computer simulation 09:28

25 programs and specifically identify one 09:28

1 Dr. Richard W. Baker

2 named Aspen and one named ChemCad; is that 09:28

3 correct? 09:28

4 A. That's correct. 09:28

5 Q. Have you run simulations using 09:28

6 Aspen yourself? 09:28

7 A. Not Aspen, ChemCad. 09:28

8 Q. Okay. So you've never run a 09:28

9 simulation yourself using Aspen; is that 09:29

10 correct? 09:29

11 A. No. That is correct. 09:29

12 Q. But you have used ChemCad to run 09:29

13 simulations; is that right? 09:29

14 A. That's right. 09:29

15 Q. What is the most recent time 09:29

16 that you used ChemCad to run a simulation? 09:29

17 A. Last week. 09:29

18 Q. Now -- now you may want to turn 09:29

19 to 22, Page 22 of your declaration, and in 09:29

20 particular the final paragraph, which is 09:29

21 Number 76. 09:29

22 A. Uh-huh. 09:29

23 Q. Do you see in the sentence that 09:29

24 carries over between Page 22 and Page 23 09:29

25 you say, "Scholz described using 'General 09:30

1 Dr. Richard W. Baker

2 Algebraic Modeling Systems (GAMS)' for 09:30

3 optimizing multi-unit membrane 09:30

4 processes..."? 09:30

5 A. Yes. 09:30

6 Q. Have you ever used GAMS? 09:30

7 A. No. 09:30

8 Q. Could you explain how you've 09:30

9 used ChemCad in your work at MTR? 09:30

10 MR. LANE: Objection. Form. 09:30

11 A. ChemCad is a computer simulation 09:30

12 package. It's something -- you get a 09:30

13 license to the package from ChemCad, which 09:30

14 you have to pay every year. And that 09:30

15 license allows one person to turn on the 09:31

16 computer and do simulations. 09:31

17 In our company, we use ChemCad 09:31

18 as the -- as the base simulation packet 09:31

19 for -- for basically all the design work 09:31

20 we do. We also occasionally use Aspen, 09:31

21 but basically we use ChemCad, and -- and 09:31

22 we have ten keys. 09:31

23 And -- and a different -- mostly 09:31

24 in the commercial side of the company, 09:31

25 they use ChemCad every day, working on 09:31

1 Dr. Richard W. Baker
2 designs for systems and working on people 09:31
3 having inquiries. They will -- they will 09:31
4 often simulate the process and try to 09:31
5 figure out an answer to the inquiry. 09:31
6 So it's that sort of tool. And 09:31
7 so that's how it's used. And -- 09:32
8 Q. Oh, sorry. 09:32
9 A. -- ChemCad, as delivered by the 09:32
10 ChemCad company, has a whole bunch of unit 09:32
11 operations in -- in the program. We have 09:32
12 our own code, which we -- which has been 09:32
13 developed over the years by people in our 09:32
14 company, which we -- as an additional 09:32
15 add-on to ChemCad. And our code is, in 09:32
16 fact, for membranes, of course, is much 09:32
17 more sophisticated than, say, the code 09:32
18 that ChemCad normally uses or other people 09:32
19 use on ChemCad. And probably Air 09:32
20 Products, even Evonik, I guess, have a 09:32
21 similar situation. 09:32
22 Q. When you used the word "code" 09:32
23 there, are you referring to computer code? 09:33
24 A. Yes. 09:33
25 MR. LANE: Objection. Form. 09:33

1 Dr. Richard W. Baker

2 BY MR. LANTIER: 09:33

3 Q. And I'm just trying to 09:33

4 understand what you were saying. 09:33

5 Are you saying that there's sort 09:33

6 of a -- there is a base ChemCad system 09:33

7 that would generally be available, and 09:33

8 then there's also sort of a -- an upgraded 09:33

9 version that a company like MTR would 09:33

10 have? 09:33

11 MR. LANE: Objection. Form. 09:33

12 Objection. Compound. 09:33

13 A. Yes. The extra form is -- 09:33

14 incorporates -- it might incorporate our 09:33

15 membranes. It might incorporate our 09:33

16 modules. It would tell us additional 09:33

17 information that a ChemCad model doesn't 09:33

18 ask. 09:33

19 Q. And is the version of ChemCad 09:33

20 that you use at MTR, is that version 09:33

21 specific to MTR? 09:33

22 MR. LANE: Objection. Form. 09:34

23 A. No. We -- we buy it from 09:34

24 ChemCad. It's upgraded by ChemCad every 09:34

25 year or so. And we use the latest version 09:34

1 Dr. Richard W. Baker

2 that ChemCad supplies, but we have our own 09:34

3 unit operation data code for various 09:34

4 membrane operations, which are a little 09:34

5 bit more sophisticated than the piece of 09:34

6 code that ChemCad is supplying with their 09:34

7 package. 09:34

8 Q. Have you ever used the base 09:34

9 version of ChemCad? 09:34

10 MR. LANE: Objection. Form. 09:34

11 A. I use it all the time for 09:34

12 non-membrane -- in the non-membrane piece. 09:34

13 I rarely -- I don't know if I have ever 09:34

14 done it, but I rarely -- rarely use the 09:34

15 piece of code they have. I use ours most 09:34

16 of the time. 09:35

17 BY MR. LANTIER: 09:35

18 Q. I just have a few questions 09:35

19 about how ChemCad works. 09:35

20 And I would ask if your answer 09:35

21 would be different depending on whether 09:35

22 we're talking about the base version or 09:35

23 MTR version. If you could just let me 09:35

24 know so we can make sure we have the 09:35

25 record clear. Okay? 09:35

1 Dr. Richard W. Baker

2 A. Okay. 09:35

3 Q. So what are the different 09:35

4 variables that can be manipulated in a 09:35

5 ChemCad simulation? 09:35

6 MR. LANE: Objection. Form. 09:35

7 Objection. Lacks foundation. 09:35

8 A. The -- in all -- the way that a 09:35

9 simulation works is you have to put in 09:35

10 some information. And then, and it has to 09:35

11 be sufficient information that the 09:35

12 simulation can converge. I mean, if you 09:35

13 ask it to do something and you don't give 09:36

14 it enough information, it can't -- it 09:36

15 can't do the calculation. 09:36

16 So you have to give it enough 09:36

17 information that it can converge. And 09:36

18 once you've done that, then -- then it 09:36

19 will converge, and it will give you an 09:36

20 answer. 09:36

21 BY MR. LANTIER: 09:36

22 Q. Maybe I'll focus my questions in 09:36

23 on a simulation of a gas membrane 09:36

24 separation system. Okay? 09:36

25 A. Okay. 09:36

1 Dr. Richard W. Baker

2 Q. Is it necessary in order to do a 09:36
3 ChemCad simulation to input the number of 09:36
4 gas separation stages of the system? 09:36

5 A. Yes. 09:36

6 Q. And then once -- once you've -- 09:36

7 MR. LANTIER: Well, strike that. 09:37

8 BY MR. LANTIER: 09:37

9 Q. Why don't we then assume that 09:37
10 we're doing a simulation where we've told 09:37
11 ChemCad that it's -- there are going to be 09:37
12 three stages. Are you with me? 09:37

13 A. Yep. 09:37

14 Q. What would be the minimum amount 09:37
15 of information you would have to give the 09:37
16 ChemCad program in order for it to 09:37
17 simulate a result for you? 09:37

18 MR. LANE: Objection. Form. 09:37

19 Objection. Lacks foundation. 09:37

20 A. You -- for it to work, the -- 09:37
21 you have to put in the properties of the 09:37
22 membrane. The permeance and the 09:37
23 selectivities, you have to put those 09:37
24 properties in; otherwise it doesn't know 09:37
25 what the membrane is going to do. 09:37

1 Dr. Richard W. Baker

2 So you put those in, and you 09:37
3 will have to put in the pressures too, the 09:38
4 feed pressure and permeate pressure of -- 09:38
5 at least you have to put some of the 09:38
6 pressures in. Maybe not every one, but 09:38
7 you have to put some of them in. 09:38

8 And then, of course, you need 09:38
9 some flows. Could be you need -- you 09:38
10 may -- well, it depends on your 09:38
11 calculation, but normally you would put in 09:38
12 the feed flow. 09:38

13 BY MR. LANTIER: 09:38

14 Q. Is there any other information 09:38
15 that you must give to ChemCad before it 09:38
16 can perform a simulation? 09:38

17 MR. LANE: Objection. Form. 09:38

18 A. That is normally the minimum, 09:38
19 what I've just told you. Sometimes you 09:38
20 can put in a -- you need what -- you need 09:38
21 three concentrations in a flow is a 09:38
22 typical result or at least -- and you 09:39
23 don't need the flow of every -- every 09:39
24 stream. You don't need the concentration 09:39
25 of every stream, but you do need the 09:39

1 Dr. Richard W. Baker

2 concentrations of some streams. And -- 09:39

3 and three concentrations in a flow is one. 09:39

4 If you had two flows, you might be able to 09:39

5 get away with two concentrations. I don't 09:39

6 know, but it depends. 09:39

7 BY MR. LANTIER: 09:39

8 Q. That's helpful. 09:39

9 Could you give an example of 09:39

10 what you mean by the concentrations of 09:39

11 different flows? 09:39

12 A. Well, you -- normally the thing 09:39

13 you're interested in is the -- you've got 09:39

14 the feed flow. You don't know what the 09:39

15 permeate flow is and the residue flow is, 09:39

16 the final -- final product flow. You've 09:39

17 got two product flows, two products. 09:40

18 You don't know quite what those 09:40

19 products are going to be, but you may have 09:40

20 some knowledge about the products. You 09:40

21 want it to be 2 percent CO2 and 2 percent 09:40

22 methane, you know, in this -- in these -- 09:40

23 this situation. So you know that. So you 09:40

24 have in a sense a concentration. 09:40

25 So you have one flow and two 09:40

1 Dr. Richard W. Baker

2 concentrations, so you're off. You may 09:40
3 not have all you need, but you've got a 09:40
4 lot, if you've got the permanences and the 09:40
5 selectivities and so forth. 09:40

6 Q. When you say -- and you were 09:40
7 just giving an example, that you want 09:40
8 2 percent CO₂. 09:40

9 Is another way to say that, that 09:40
10 you would want a methane recovery of at 09:40
11 least 98 percent? 09:41

12 A. Yeah. You, that -- yes, yes. 09:41
13 And you'd need the meth -- you know, in 09:41
14 this application, we're looking for a high 09:41
15 CO₂ permeate and a high methane in the 09:41
16 retentate. So you could put those in as a 09:41
17 requirement in the -- in the ChemCad. You 09:41
18 have the flows coming in, so you've -- 09:41
19 you're partially defining the problem. 09:41

20 Q. So if you -- if you're using 09:41
21 ChemCad and you enter the properties that 09:41
22 you mentioned as the ones that must be 09:41
23 entered and you also entered the feed flow 09:41
24 and the -- the parameters for the outputs 09:41
25 of the two product streams, what would 09:41

1 Dr. Richard W. Baker

2 ChemCad do in terms of calculating 09:42

3 membrane sizes? 09:42

4 MR. LANE: Objection. Form. 09:42

5 Objection. Compound. Objection. 09:42

6 Lack of foundation. 09:42

7 A. If you put in enough information 09:42

8 for it to converge, it will -- it will 09:42

9 spit out the membrane sizes. 09:42

10 BY MR. LANTIER: 09:42

11 Q. Will ChemCad assume that each of 09:42

12 the stages has the same size membrane in 09:42

13 the absence of other information? 09:42

14 MR. LANE: Objection. Form. 09:42

15 A. No. It -- it will -- that -- 09:42

16 that's a requirement. If you put that in, 09:42

17 you can do that. Well, you can try to do 09:42

18 that, but that would be a requirement. 09:42

19 It wouldn't -- sometimes you 09:42

20 can -- there are two ways ChemCad can 09:42

21 fail. One is it can't converge. The 09:42

22 other way is you -- you've given it an 09:42

23 impossible question -- a problem. 09:43

24 BY MR. LANTIER: 09:43

25 Q. When you say "it can't 09:43

1 Dr. Richard W. Baker

2 converge," could you just explain what you 09:43

3 mean by the word "converge"? 09:43

4 A. Converge is it comes to a 09:43

5 solution. It finds a solution. 09:43

6 Q. So then, could you explain for 09:43

7 me the difference between the two failure 09:43

8 scenarios you just mentioned? 09:43

9 A. Well, it can't find the solution 09:43

10 because you didn't put in enough 09:43

11 information. So -- so it won't do the 09:43

12 proper way. It will try to do, and it 09:43

13 will say, I need more info. 09:43

14 So you haven't put in enough 09:43

15 information to define the problem. That's 09:43

16 a common problem. 09:43

17 The other one is you've -- 09:43

18 you've asked it to do an impossible thing. 09:43

19 You -- you've put your membrane, a single 09:44

20 membrane, for example, and you've asked it 09:44

21 to determine -- to make ultra pure 09:44

22 product, and ultra pure retentate or - 09:44

23 ultra pure retentate, ultra pure permeate 09:44

24 with a single membrane stage. 09:44

25 It won't do it. It's an 09:44

1 Dr. Richard W. Baker

2 impossible problem. It can do one or the 09:44

3 other, but it can't do both. 09:44

4 Q. Yeah. Sort of a cheaper, 09:44

5 faster, stronger type scenario. 09:44

6 Understood. 09:44

7 MR. LANE: Objection. Form. 09:44

8 BY MR. LANTIER: 09:44

9 Q. So if you're using ChemCad and 09:44

10 you provide the -- the permeance and the 09:44

11 selectivities of the membranes, the -- the 09:44

12 pressures and the flows and concentrations 09:44

13 for the streams, will it calculate for you 09:45

14 the sizes of the membranes at the 09:45

15 different stages? 09:45

16 MR. LANE: Objection. Form. 09:45

17 A. Yes. 09:45

18 BY MR. LANTIER: 09:45

19 Q. When is the -- the first time 09:45

20 you used ChemCad? Just approximately the 09:45

21 year. 09:45

22 A. In the -- in the -- in the 09:45

23 1990s. I'm not quite sure when. In 09:45

24 that -- maybe ten years after we started 09:45

25 the company, so in the 1990s sometime. 09:45

1 Dr. Richard W. Baker

2 Q. And you said that you've never 09:45
3 used the Aspen program. 09:45

4 Why did you cite that one in 09:45
5 your declaration then? 09:45

6 A. It's the most well-known one 09:46
7 actually. It's -- it's probably the -- 09:46
8 the standard one. Ungerank, I think, used 09:46
9 Aspen. He mentions that. 09:46

10 Q. And do you understand how the 09:46
11 Aspen program works? 09:46

12 A. It -- it -- the -- in the sense 09:46
13 the product that comes out is very similar 09:46
14 to ChemCad. But the mechanical way that 09:46
15 you put in information and so forth is 09:46
16 different. 09:46

17 Q. And do you understand how Aspen 09:46
18 is different from ChemCad? 09:46

19 MR. LANE: Objection. Form. 09:46
20 Objection. Lack of foundation. 09:46

21 A. If I had to use the Aspen 09:46
22 program, I would -- I would probably need 09:46
23 somebody to sit with me the first couple 09:46
24 of times as I -- as I figured out how to 09:46
25 turn the thing on. It's not trivial. 09:46

1 Dr. Richard W. Baker

2 BY MR. LANTIER: 09:46

3 Q. And we -- we mentioned or talked 09:46

4 about for a moment the GAMS system that -- 09:46

5 that Scholz describes in that paper. 09:47

6 Do you remember that? 09:47

7 A. Yes. 09:47

8 Q. Is -- is GAMS a computer 09:47

9 simulation tool? 09:47

10 MR. LANE: Objection. Form. 09:47

11 A. The GAMS -- I'm not familiar 09:47

12 with GAMS. I've never used it. I -- 09:47

13 it's -- it's -- it's not a simulation 09:47

14 program in the form -- in the way that 09:47

15 we've been talking here. 09:47

16 BY MR. LANTIER: 09:47

17 Q. Okay. Understanding that you're 09:47

18 not familiar with it, what would you 09:47

19 describe GAMS as if it's not a computer 09:47

20 simulation program? 09:47

21 MR. LANE: Objection. Form. 09:47

22 A. My only knowledge of GAMS is 09:47

23 what I was reading in Mr. Scholz's paper. 09:48

24 So -- but my understanding reading from 09:48

25 his paper is that GAMS is a sort of a 09:48

1 Dr. Richard W. Baker
2 computer program that he -- we -- in using 09:48
3 ChemCad, you -- you -- as we just talked, 09:48
4 you can simulate the separation, and then 09:48
5 you can change your assumptions and 09:48
6 simulate the separation a second time, 09:48
7 looking to optimize the process. That's 09:48
8 how it's normally done. 09:48
9 He's trying to, as I understand 09:48
10 his paper, to -- to get rid of that 09:48
11 optimization step. He's trying to -- he's 09:48
12 taking a design, a single design, and -- 09:48
13 and trying to do the -- the total process 09:49
14 of the program, not just calculate it for 09:49
15 a -- for an initial set of assumptions, 09:49
16 but then to figure out what has the -- 09:49
17 what is the optimized, what is the sort of 09:49
18 lowest cost in his case, lowest cost 09:49
19 design. That's what he was trying to do, 09:49
20 I think. 09:49
21 MR. LANTIER: We've been going 09:49
22 for about an hour and a quarter, so 09:49
23 I'd suggest we take a break unless you 09:49
24 prefer to keep going. 09:49
25 MR. LANE: It's up to you. 09:49

1 Dr. Richard W. Baker

2 THE WITNESS: It's okay with me, 09:49

3 yeah. 09:49

4 MR. LANTIER: Okay. Let's take 09:49

5 a five-minute break, Doctor. 09:49

6 THE TECH: Okay. Stand by. 09:50

7 The time is 9:50 a.m. We're 09:50

8 going off the record. 09:50

9 AUTOMATED MESSAGE: Recording 09:50

10 stopped. 09:52

11 (Recess taken.) 09:52

12 AUTOMATED MESSAGE: Recording in 09:58

13 progress. 09:58

14 THE TECH: The time is 09:58

15 9:58 a.m., and we're back on record. 09:58

16 BY MR. LANTIER: 09:58

17 Q. Dr. Baker, I was hoping to ask 09:58

18 you a few questions about the Priske '380 09:58

19 patent. 09:58

20 A. Okay. 09:58

21 Q. So if you wanted to pull out 09:58

22 the -- the hard copy and have that 09:58

23 document. 09:58

24 A. Got it. 09:58

25 Q. When is the first time that you 09:58

1 Dr. Richard W. Baker

2 saw the Priske '380 patent? 09:58

3 A. I -- I think it would have been 09:59

4 about the first time that I met John and 09:59

5 was discussing this case. I don't think 09:59

6 I'd seen it before. 09:59

7 Q. Now, if you turn with me in the 09:59

8 Priske '380 patent to Column 2. 09:59

9 A. Uh-huh. 09:59

10 Q. And I direct you to Line 41. 09:59

11 A. Got it. 09:59

12 Q. Do you see there that it says, 09:59

13 "The examples below show the invest and 09:59

14 maintenance cost improvement over WO 09:59

15 2012/00727"? 09:59

16 A. That's right. 09:59

17 Q. What is WO 2012/00727? 09:59

18 A. I -- I haven't checked it 09:59

19 myself, but I've been told it's the 10:00

20 Ungerank patent. 10:00

21 Q. It's a -- 10:00

22 A. Different application of the 10:00

23 same patent. 10:00

24 Q. And so then the examples in the 10:00

25 Priske patent are all explaining the 10:00

1 Dr. Richard W. Baker
2 invention in reference to that 10:00
3 application, correct? 10:00
4 MR. LANE: Objection. Lack of 10:00
5 foundation. Calls for a legal 10:00
6 conclusion. 10:00
7 A. That was my understanding, yeah. 10:00
8 BY MR. LANTIER: 10:00
9 Q. Now, if you turn to Example 10:00
10 Number 5. 10:00
11 A. Yep. 10:01
12 Q. I apologize. I was at the wrong 10:01
13 place. 10:01
14 This is at Column 22 beginning 10:01
15 at Line 40, right? 10:01
16 A. Yes. 10:01
17 Q. And -- and do you see that it 10:01
18 says, "Example 5 and Comparative Example 5 10:01
19 are intended to show that the inventive 10:01
20 process and apparatus also works with high 10:01
21 selective membranes"? 10:01
22 A. I -- I -- let me read that. 10:01
23 Okay. Uh-huh. 10:02
24 Q. So the -- the invention claimed 10:02
25 in the '380 patent is also applicable to 10:02

1 Dr. Richard W. Baker

2 high selective membranes, correct? 10:02

3 MR. LANE: Objection. Lack of 10:02

4 foundation. Objection. Calls for a 10:02

5 legal conclusion. 10:02

6 A. Yeah. I guess, uh-huh. 10:02

7 BY MR. LANTIER: 10:02

8 Q. Now, in -- in your declaration 10:02

9 and in some of the materials we've -- 10:02

10 we've seen, there's reference to low 10:02

11 selectivity and high selectivity for 10:02

12 membranes, correct? 10:02

13 A. Uh-huh. That's right. 10:02

14 Q. As of 2014 in this field, what 10:02

15 would you consider to be a low selectivity 10:02

16 membrane? 10:02

17 MR. LANE: Objection. 10:02

18 Foundation. Objection. Form. 10:02

19 A. Well, the industry standard 10:02

20 membrane, which in a sense is the 10:02

21 competitive process, the low selectivity 10:02

22 membrane, is cellulose acetate and the 10:03

23 selectivity varies with the conditions of 10:03

24 the process and so forth, but between 15 10:03

25 and 20 in the -- in -- for biogas, 10:03

1 Dr. Richard W. Baker

2 relatively low pressure, high 10:03

3 concentration of CO₂, 15 to 20. 10:03

4 Q. And is it necessary to specify 10:03

5 whether that's pure gas or mixed gas in 10:03

6 order to be accurate? 10:03

7 A. Mixed gas. Mixed gas. 10:03

8 Q. So 15 to 20 for mixed gas would 10:03

9 be considered low selectivity in 2014; is 10:03

10 that correct? 10:03

11 A. Not low selectivity. 10:03

12 MR. LANE: Dr. Baker, you have 10:03

13 to let me object. 10:03

14 Objection. Form. Objection. 10:03

15 Misstates testimony. 10:03

16 Go ahead. 10:03

17 THE WITNESS: Oh, sorry. 10:03

18 A. I mean, they might. We sell 10:03

19 cellulose acetate membranes. We wouldn't 10:04

20 call them low selectivity membranes. But 10:04

21 in the context of this, what we're talking 10:04

22 about here, high selectivity is the -- the 10:04

23 membrane, the Ungerank -- Mr. Ungerank was 10:04

24 using 40, 45, whatever, 50, 60. And the 10:04

25 low selectivity is, say, the CA membrane, 10:04

1	Dr. Richard W. Baker	
2	15 to 20.	10:04
3	BY MR. LANTIER:	10:04
4	Q. Okay. And what would you then	10:04
5	call a membrane that, let's say, is 30?	10:04
6	MR. LANE: Objection. Form.	10:04
7	A. It's -- it's a great membrane.	10:04
8	But it's a very good membrane. Yeah.	10:04
9	BY MR. LANTIER:	10:04
10	Q. Okay. So -- and I'm not trying	10:04
11	to put words in your mouth, so, please --	10:04
12	I'm just trying to define what's what	10:04
13	here.	10:05
14	So in 2014, a membrane that was	10:05
15	15 to 20 mixed gas would be considered a	10:05
16	low selectivity membrane; is that correct?	10:05
17	A. No. No. It would be -- it	10:05
18	would be -- it would be the membrane	10:05
19	everybody was using in 20 -- 2014. Even	10:05
20	today, most of the membranes that are used	10:05
21	have selectivities, 15 to 20, for natural	10:05
22	gas processing and through methane	10:05
23	separation.	10:05
24	I wouldn't -- people don't call	10:05
25	them low selectivity membranes. They call	10:05

1 Dr. Richard W. Baker

2 them the standard membrane. 10:05

3 Q. When you use the term "low 10:05

4 selectivity" with respect to a membrane in 10:05

5 your declaration, what are you referring 10:05

6 to? 10:06

7 A. I'm -- I'm -- here I'm using the 10:06

8 language of -- of the -- the -- yeah, 10:06

9 you're right. You've caught me out. 10:06

10 In my declaration, I -- I'm 10:06

11 using "low selectivity" to mean somewhere 10:06

12 between -- low selectivity, calling the -- 10:06

13 the Ungerank patent a high selectivity 10:06

14 membrane. So in that sense, when I talk, 10:06

15 then I'm using Ungerank as high 10:06

16 selectivity. Cellulose acetate membrane 10:06

17 is -- compared to Ungerank is a low 10:06

18 selectivity membrane. 10:07

19 Q. I'm -- so I'm just trying to 10:07

20 understand sort of the -- where the line 10:07

21 is drawn, and it doesn't have to be an 10:07

22 absolute. I'm just trying to find -- 10:07

23 understand where the line is drawn between 10:07

24 a membrane that you would describe as low 10:07

25 selectivity in 2014, and a membrane that 10:07

1 Dr. Richard W. Baker

2 you would describe as high selectivity in 10:07

3 2014. 10:07

4 Could you -- could you explain 10:07

5 that? 10:07

6 MR. LANE: Objection. Form. 10:07

7 A. 2014, we're going back to -- the 10:07

8 Ungerank patent is out there. The P84 is 10:07

9 the Evonik material, which was a uniquely 10:07

10 high selectivity material. There was -- 10:07

11 in the sense of selectivity, it was an 10:07

12 extraordinary membrane, a unique membrane, 10:07

13 selectivities of 40 or more. The -- it 10:07

14 also had very low permeance. 10:08

15 So a POSITA back then, or myself 10:08

16 back then, compared -- if I compared the 10:08

17 membranes that were around the basic, what 10:08

18 was the standard membrane at the time, 10:08

19 compared to the Evonik membrane, it's a 10:08

20 lower selectivity membrane. 10:08

21 And the absolute top of the 10:08

22 membranes, it -- at that time and maybe 10:08

23 even close to that today, 30 would be a -- 10:08

24 would be the top, normally 15 to 20. 10:08

25 Maybe with some gas streams and whatever, 10:08

1 Dr. Richard W. Baker

2 you might get 30, not above. 10:08

3 But the Ungerank membrane was 10:09

4 uniquely high selectivity. It had 10:09

5 selectivities in the 40s, 50s maybe. 10:09

6 Q. So if we're using the 10:09

7 terminology of low selectivity and high 10:09

8 selectivity, as of 2014, 20 or below is 10:09

9 low selectivity, 40 or above is high 10:09

10 selectivity, and then in the middle there 10:09

11 is just in the middle? 10:09

12 MR. LANE: Objection. Form. 10:09

13 Objection. Compound. 10:09

14 A. Yeah. I mean, there are mem- -- 10:09

15 but the selectivity of a membrane, we talk 10:09

16 about mixed gas. It does depend upon the 10:09

17 gas mixture. And with low concentrations 10:09

18 of gas, you might get higher selectivity 10:10

19 than high concentrations. 10:10

20 So it's a -- it's not an 10:10

21 absolute number. It depends upon the 10:10

22 situation. But -- but I would say that a 10:10

23 selectivity of -- of 15 to 20 would cover 10:10

24 the bulk of the -- the applications that 10:10

25 were being looked at, at the time. And I 10:10

1 Dr. Richard W. Baker

2 don't think a cellulose acetate membrane 10:10

3 in any situation where you're talking 10:10

4 about mixed gas is going to give you above 10:10

5 30. 10:10

6 BY MR. LANTIER: 10:10

7 Q. So then in that case, then 30 10:10

8 would be a high selectivity for that -- 10:10

9 that type of membrane, correct? 10:10

10 A. Yeah. Yeah. 10:10

11 Q. And fair to say that anything 10:10

12 above 20 would be high selectivity for 10:10

13 that type of membrane? 10:10

14 A. It's -- 10:11

15 MR. LANE: Objection. Objection 10:11

16 asked and answered. Objection. Form. 10:11

17 A. It's on the -- it would be in 10:11

18 the upper range, uh-huh. It's in the 10:11

19 upper range. 10:11

20 BY MR. LANTIER: 10:11

21 Q. Now, is it your opinion that 10:11

22 lower selectivity membranes are always 10:11

23 less expensive than higher selectivity 10:11

24 membranes? 10:11

25 A. Okay. Here there's some 10:11

1 Dr. Richard W. Baker

2 confusion. 10:11

3 In my experience, and, in fact, 10:11

4 I -- it's universally true. 10:11

5 Higher selectivity almost always 10:11

6 goes with lower permeance, and lower 10:11

7 selectivity goes with higher permeance. 10:11

8 So the cost of the membranes per square 10:12

9 meter is -- there is a range. There are 10:12

10 some more expensive than others, but 10:12

11 it's -- they are all about the same. 10:12

12 But the -- the amount of 10:12

13 membrane area you require to do the 10:12

14 separation is very much a function of the 10:12

15 selectivity, so high selectivity membranes 10:12

16 have low permeance. You need a lot more 10:12

17 membrane area. The membrane cost is 10:12

18 higher. 10:12

19 Low selectivity membranes have 10:12

20 higher permeances. You need less 10:12

21 membrane area. The membrane cost of a 10:12

22 system of a process to -- to do the same 10:12

23 amount of gas is lower. 10:12

24 So -- so - and then, of course, 10:12

25 people oftentimes sort of abbreviate 10:12

1 Dr. Richard W. Baker

2 that -- that distinction and say low 10:12

3 selectivity membranes are less expensive 10:13

4 than high selectivity membranes. But 10:13

5 there can be a little bit of confusion 10:13

6 there. 10:13

7 Q. What they are really saying is a 10:13

8 system that uses membranes that are 10:13

9 smaller in size will be less expensive 10:13

10 from the membrane cost perspective than a 10:13

11 system that uses membranes that are larger 10:13

12 in size; is that correct? 10:13

13 A. That's it. That's it. 10:13

14 Q. If you could just turn to the 10:13

15 claims in the '380 patent, I just wanted 10:13

16 to ask you about Claim 1. 10:13

17 A. Got it. 10:13

18 Q. Claim 1 doesn't include the word 10:13

19 "selectivity," correct? 10:14

20 A. That's correct. 10:14

21 Q. And Claim 1 doesn't have any 10:14

22 limitations with respect to the 10:14

23 selectivity of the membranes, correct? 10:14

24 I'm sorry, sir. I have a little 10:14

25 head cold. Did you answer the question? 10:14

1 Dr. Richard W. Baker

2 A. Yeah, yeah. Sorry. That's 10:14

3 correct. 10:14

4 Q. Okay. Thank you. 10:14

5 Now, there is a limitation that 10:14

6 we've -- we've been referring to, and I 10:14

7 think you refer to it in your declaration 10:14

8 as limitation 1f, Romanette ii, and it 10:14

9 begins at Column 30, Line 47. If you 10:15

10 could just take yourself there, because I 10:15

11 had a couple questions about that one. 10:15

12 A. The one -- the total capacity, 10:15

13 is that the one you're referring to? 10:15

14 Q. Yes. Yes, Doctor. 10:15

15 A. Yep. Got it, uh-huh. 10:15

16 Q. Now, there it says, "the total 10:15

17 capacity of the gas separation membranes 10:15

18 in the retentate separation stage..." 10:15

19 Do you see that? 10:15

20 A. Uh-huh. Got it. 10:15

21 Q. Does that suggest to you that 10:15

22 there are -- there's more than one 10:15

23 membrane in the retentate separation 10:15

24 stage? 10:15

25 MR. LANE: Objection. Calls for 10:15

1 Dr. Richard W. Baker

2 a legal conclusion. Objection. Form. 10:15

3 A. One membrane. There may well 10:15

4 have been more than one membrane, but do 10:15

5 you mean type of membrane? 10:16

6 I read it to be there was never 10:16

7 a suggestion that there were different 10:16

8 types of membrane, but I take that to be 10:16

9 gas -- the gas separation membrane. 10:16

10 BY MR. LANTIER: 10:16

11 Q. And do you take it to mean that 10:16

12 physically there's -- there's going to be 10:16

13 more than one membrane or not? 10:16

14 MR. LANE: Objection. Form. 10:16

15 A. I -- yeah. Yeah. By that, the 10:16

16 membranes are normally packaged in as 10:16

17 modules. And in a -- in a gas separation 10:16

18 system, you will have a number of modules 10:16

19 that make up the stage, the -- the gas 10:16

20 separation -- in the separation stage. 10:16

21 So the separation stage is going 10:16

22 to be a -- a combination of a number of 10:16

23 membrane packages. 10:17

24 And all the membranes used in 10:17

25 those packages, I take to be the same; 10:17

1 Dr. Richard W. Baker

2 that is, the same properties, the same -- 10:17

3 they are essentially the same. But there 10:17

4 will be more -- more or less a number of 10:17

5 packages, depending on the size of the 10:17

6 system, the flow rate of gas to be 10:17

7 treated. 10:17

8 BY MR. LANTIER: 10:17

9 Q. You used the word "module," and 10:17

10 you also used the word "packages." 10:17

11 A. Uh-huh. 10:17

12 Q. Are -- are those two things 10:17

13 referring to the same thing -- 10:17

14 A. Pretty much. Yeah. Yeah. 10:17

15 MR. LANE: Let him finish, 10:17

16 Dr. Baker. 10:17

17 A. Yes. "Modules" is the term of 10:17

18 art we use. 10:17

19 BY MR. LANTIER: 10:17

20 Q. Could you explain what in -- in 10:17

21 this field a module is? 10:17

22 A. Sure. 10:17

23 There are -- it's -- it's 10:17

24 typically it will be anywhere from 10 to 10:17

25 maybe 100 square meters. Could even be 10:17

1 Dr. Richard W. Baker

2 some multitude, 200 square meters, of 10:18

3 membrane is somehow put together into a 10:18

4 package, which was a module. 10:18

5 And the module, if -- will have 10:18

6 various forms. If it's a flat sheet 10:18

7 membrane, it will be -- could be a spiral 10:18

8 wound module. If it were a hollow fiber 10:18

9 membrane, it would be packaged as a sort 10:18

10 of shell-and-tube heat exchange type 10:18

11 arrangement. It would look a little bit 10:18

12 like that, and it will be a different 10:18

13 form, a cylindrical vessel. 10:18

14 And each would have within it, 10:18

15 depending on the membrane and the size of 10:18

16 the modules, but typically 10 to 10:18

17 100 square meters of membrane. 10:18

18 Q. So if we're talking about a 10:18

19 hollow fiber membrane module, is that 10:19

20 going to be -- I think you said a 10:19

21 cylindrical object; is that correct? 10:19

22 A. That's right. It will be a 10:19

23 few -- few, maybe a 6 inches in diameter, 10:19

24 maybe 8 inches in diameter and a meter or 10:19

25 so long -- 10:19

1 Dr. Richard W. Baker

2 Q. The outside of that thing -- I'm 10:19
3 so sorry. I did not mean to cut you off. 10:19
4 Please finish your answer. 10:19

5 A. -- two meters, could be -- could 10:19
6 be as much as two meters long. 10:19

7 Q. And then is the outside of that 10:19
8 module typically some form of a metal? 10:19

9 A. It then -- the module itself 10:19
10 is -- is often made of just plastic or 10:19
11 whatever, a seal even, epoxy seals and so 10:19
12 forth. It will then be loaded into a -- 10:19
13 into a vessel -- pressure vessel, which is 10:19
14 typically cylindrical. 10:19

15 And you may have several modules 10:19
16 within a single vessel. And, in fact, 10:20
17 there's sometimes confusion of what is the 10:20
18 membrane cost. 10:20

19 The cost the membrane is one 10:20
20 thing. The cost of the membrane inside 10:20
21 the vessel and the peripheral equipment 10:20
22 is -- is another thing. And that's -- 10:20

23 Q. Yes. So just practically, if 10:20
24 you're buying a membrane module, what is 10:20
25 it that you're buying? Are you buying the 10:20

1 Dr. Richard W. Baker

2 whole cylindrical thing or just the 10:20

3 modules and then you put them into a 10:20

4 cylinder yourself, or how does that work? 10:20

5 A. Yeah. The first time you're 10:20

6 buying it, you're buying everything, of 10:20

7 course, including the vessel. But the 10:20

8 modules don't last forever. And when 10:20

9 you -- so periodically they're changed out 10:20

10 every few years. 10:20

11 So you remove the old one, you 10:20

12 put in the new one. And then you only 10:21

13 use -- you're only replacing the -- the 10:21

14 module itself. 10:21

15 Q. And you said the module itself 10:21

16 is -- is typically made of epoxy and other 10:21

17 materials but not metal; is that right? 10:21

18 A. That's right, yeah. 10:21

19 Q. Now, if we're focused back on 10:21

20 limitation 1f)ii), you see that there is 10:21

21 the reference there to the total capacity 10:21

22 of the gas separation membranes? 10:21

23 A. Yep. 10:21

24 Q. And that word "capacity," that's 10:21

25 not a word that is known in the -- in this 10:21

1 Dr. Richard W. Baker
2 art, correct? 10:21
3 MR. LANE: Objection. Form. 10:21
4 Objection. Lack of foundation. 10:21
5 A. It's not a word I would use -- 10:21
6 I've used. I mean, I've used the word 10:21
7 "capacity," I'm sure. I might even have 10:22
8 said the membrane capacity at some time. 10:22
9 I don't know. 10:22
10 But -- but it's certainly not a 10:22
11 common description of -- of -- I know -- 10:22
12 what's here. Here, I take it to mean, in 10:22
13 the reading the definition and reading the 10:22
14 patent, it means essentially membrane 10:22
15 area. 10:22
16 That -- that's not a normal use, 10:22
17 not normally. You wouldn't describe 10:22
18 membrane area, or if you were -- in using 10:22
19 that word. I've never heard of it used 10:22
20 that way. 10:22
21 BY MR. LANTIER: 10:22
22 Q. And you said that, in your view, 10:22
23 the patent defines that term "capacity" to 10:22
24 mean membrane area; is that correct? 10:22
25 A. The equivalent of membrane area. 10:22

1 Dr. Richard W. Baker

2 It's proportional to membrane area. It 10:22
3 doesn't tell you how many square meters, 10:23
4 but it does tell you that the -- when it's 10:23
5 talking about the capacity of something is 10:23
6 bigger than the capacity of the other 10:23
7 thing, it means the membrane area of this 10:23
8 one is bigger than the membrane area of 10:23
9 the other. 10:23

10 Q. And that's the understanding of 10:23
11 capacity that you applied in rendering 10:23
12 your opinions; is that correct? 10:23

13 A. Yes. I mean, and there's this 10:23
14 definition of measuring it and so forth, 10:23
15 yes. 10:23

16 Q. And that definition is set forth 10:23
17 in the patent beginning at Column 13, 10:23
18 Line 35 and following; is that correct? 10:23

19 A. I've got to look for it. Hold 10:23
20 on. 10:24

21 Q. Excuse me. I misspoke, Doctor. 10:24
22 I meant to refer you to Column 14, Line 51 10:24
23 and following. 10:24

24 A. Got it. Ah, here it is, uh-huh, 10:24
25 calculate -- is the reference guide -- 10:24

1 Dr. Richard W. Baker

2 uh-huh. Capacity equals permanence times 10:24

3 surface area, yeah, "Wherein the 10:24

4 permanence... is tested on the following 10:24

5 standard conditions... nitrogen..." 10:24

6 And do they give the -- oh, 10:24

7 pressure of 11 bara, permeate of 1.1 bara, 10:24

8 yep, uh-huh. Yeah. 10:24

9 Q. So here, at Column 14, Lines 54 10:24

10 to Column 15, Line 5, the '380 patent 10:24

11 defines how to calculate membrane capacity 10:24

12 for a hollow fiber membrane, correct? 10:25

13 A. Yes. Yes. 10:25

14 Q. And then at line -- at 10:25

15 Column 15, Line 6 to Column 15, Line 23, 10:25

16 the '380 patent defines how to calculate 10:25

17 membrane capacity for flat membranes, 10:25

18 correct? 10:25

19 A. That's correct. 10:25

20 Q. I had a few questions for you on 10:25

21 the Ungerank patent, if you could turn 10:25

22 your attention to that. 10:25

23 A. I've got it. Uh-huh. 10:25

24 Q. The first question really not 10:25

25 being about the Ungerank patent itself, 10:25

1 Dr. Richard W. Baker

2 but do you know Markus Ungerank? 10:26

3 A. I don't, no. I don't think 10:26

4 we've ever met, but maybe. You know, you 10:26

5 meet a lot of guys at meetings, but I 10:26

6 don't -- I don't recall meeting him. 10:26

7 Q. How about any of the named 10:26

8 inventors on the -- the face of the -- the 10:26

9 Ungerank patent, do you know any of them? 10:26

10 A. I -- Baumgarten, I know him. 10:26

11 I've met him a couple of times, yeah. I 10:26

12 think that's -- that's the guy. He's -- 10:26

13 he's the head of Evonik or at least the 10:26

14 research group at Evonik, I think. 10:26

15 He's -- but I'm not sure. Maybe. 10:26

16 Q. If you could turn with me to 10:27

17 Comparative Example 1 in Ungerank, which 10:27

18 is at -- starts at Column 10, Line 17. 10:27

19 A. Yep. 10:27

20 Q. And you studied Comparative 10:27

21 Example Number 1 before offering your 10:27

22 opinions in this case, correct? 10:27

23 A. That's correct. 10:27

24 Q. In Comparative Example Number 1, 10:27

25 Ungerank does provide the membrane 10:27

1 Dr. Richard W. Baker

2 selectivity, correct? 10:27

3 A. Yeah. It's at the very end, I 10:27

4 think. Membranes used -- here it is. 10:27

5 Membranes used exhibited a moderate mixed 10:27

6 gas selectivity -- moderate. Okay. 10:27

7 In the context of this patent, 10:27

8 it would be moderate at 20, uh-huh. Yeah. 10:27

9 Q. And in fact, in Comparative 10:28

10 Example Number 1, Ungerank states towards 10:28

11 the top which hollow fiber membrane module 10:28

12 is used in that example, correct? 10:28

13 A. Yep. 10:28

14 MR. LANE: Objection to form. 10:28

15 BY MR. LANTIER: 10:28

16 Q. And the module used there at 10:28

17 each stage is UBE (NM B01 A type), 10:28

18 correct? 10:28

19 A. That's what it says. 10:28

20 Q. Are you familiar with that 10:28

21 product? 10:28

22 A. No. I mean, have I -- have I 10:28

23 seen one? I don't think I've ever seen 10:28

24 one. And -- and -- the -- the module that 10:28

25 was used in this test uses fibers similar 10:29

1 Dr. Richard W. Baker

2 to the one that's used the NM B01 A, I 10:29

3 take it, which is a commercial module, I 10:29

4 think. 10:29

5 Is that correct? Or I believe, 10:29

6 when they are giving that number, they are 10:29

7 giving the number of a commercial module. 10:29

8 Is that -- I'm not sure. I don't know. 10:29

9 Q. You're not sure; is that right? 10:29

10 A. Yeah. 10:29

11 Q. Okay. Do you know what "UBE" 10:29

12 is? 10:29

13 A. No. It's a part of their naming 10:29

14 sequence, I guess. 10:29

15 MR. LANE: Don't speculate, 10:29

16 Dr. Baker. 10:29

17 BY MR. LANTIER: 10:29

18 Q. And do you see it says that 10:29

19 "Each stage consisted of a hollow fiber 10:29

20 membrane module consisting of hollow 10:29

21 polyimide fibers from UBE..."? 10:29

22 A. I don't know who that is. 10:29

23 Q. Okay. And I'm sorry, Doctor. I 10:29

24 should have directed you. 10:29

25 This is Column 10 starting at 10:30

1	Dr. Richard W. Baker	
2	Line 25.	10:30
3	A. Uh-huh.	10:30
4	Q. Do you see the sentence says,	10:30
5	"Each stage consisted of a hollow fiber	10:30
6	membrane module consisting of hollow	10:30
7	polyimide fibers from UBE..."?	10:30
8	A. I'm trying to think who else it	10:30
9	could be. I don't know who it is.	10:30
10	Q. Yes. Understood.	10:30
11	I was actually just asking	10:30
12	whether you saw what the sentence said,	10:30
13	because I wanted to ask you a different	10:30
14	question about that sentence.	10:30
15	A. I see the sentence.	10:30
16	Q. Okay. So where it says, "Each	10:30
17	stage" there, it's referring to each of	10:30
18	the three different separation stages in	10:30
19	the system of Comparative Example 1,	10:30
20	correct?	10:30
21	MR. LANE: Objection. Form.	10:30
22	A. Yeah. I believe that's correct.	10:30
23	BY MR. LANTIER:	10:31
24	Q. And it says that "Each of those	10:31
25	stages consisted of a hollow fiber	10:31

1	Dr. Richard W. Baker	
2	membrane module consisting of hollow	10:31
3	polyimide fibers from UBE (NM B01 A	10:31
4	type)," correct?	10:31
5	A. Yes.	10:31
6	Q. So in Comparative Example	10:31
7	Number 1, each of the three separation	10:31
8	stages is going to consist of a hollow	10:31
9	fiber membrane module from UBE, correct?	10:31
10	MR. LANE: Objection. Form.	10:31
11	A. That -- that's what I'm reading.	10:31
12	Uh-huh.	10:31
13	BY MR. LANTIER:	10:31
14	Q. And it then gives us the -- the	10:31
15	model number of that particular module	10:31
16	that's being used in each of the stages,	10:31
17	correct?	10:31
18	MR. LANE: Objection. Form.	10:31
19	A. I -- I think that, yes.	10:31
20	BY MR. LANTIER:	10:31
21	Q. Now, once you know the model	10:31
22	number of a commercially available	10:32
23	membrane module, you will know the	10:32
24	selectivity of that membrane module,	10:32
25	correct?	10:32

1 Dr. Richard W. Baker

2 MR. LANE: Objection. Form. 10:32

3 A. Well, we're talking about mixed 10:32

4 gas selectivity. The -- the supplier may 10:32

5 give you some information. But the 10:32

6 information he will give you, he will 10:32

7 often tell you just pure gas information, 10:32

8 which he can -- which he has. He might 10:32

9 not tell you what the mixed gases' 10:32

10 separation permeances are, and he may not 10:32

11 even do that. He may just say, "Here's my 10:32

12 module." Suppliers do not necessarily 10:32

13 supply all the permeation data you would 10:32

14 like to get. 10:32

15 BY MR. LANTIER: 10:33

16 Q. And before offering your 10:33

17 opinions in this case, you didn't look to 10:33

18 see what information UBE provided about 10:33

19 this particular module, correct? 10:33

20 A. That's right. I didn't. Is UBE 10:33

21 UBE? UBE module? 10:33

22 Q. And as we read down Comparative 10:33

23 Example 1, it provides the pressures 10:33

24 information for the different stages, 10:33

25 correct? 10:33

1 Dr. Richard W. Baker

2 A. That's correct. 10:33

3 Q. And it also provides feed flow 10:33
4 information, correct? 10:33

5 A. That's right. 10:33

6 Q. All right. You would agree that 10:33
7 the Comparative Example Number 1 in 10:34
8 Ungerank is being used as a point of 10:34
9 comparison to the other examples in 10:34
10 Ungerank that use higher selectivity 10:34
11 membranes, correct? 10:34

12 MR. LANE: Objection. Form. 10:34

13 Objection. Compound. 10:34

14 A. Yes. It's called a comparative 10:34
15 example. 10:34

16 BY MR. LANTIER: 10:34

17 Q. And each of the other examples 10:34
18 in Ungerank performs better than 10:34
19 Comparative Example 1, correct? 10:34

20 MR. LANE: Objection. Form. 10:34

21 A. That one is a little -- you've 10:34
22 got to be a little careful. I'm not quite 10:35
23 sure how -- how much membrane area is 10:35
24 being used in 1. But -- and they all 10:35
25 perform the same separation or close to. 10:35

1 Dr. Richard W. Baker

2 So -- so it -- you don't have 10:35
3 the -- enough, yeah, where -- where you 10:35
4 can't really say that its performing 10:35
5 better. It just -- they do the same 10:35
6 separation. 10:35

7 Q. If you turn, for example, to 10:35
8 Column 11, do you see there's Example 1 10:35
9 there? 10:35

10 A. Yep. 10:35

11 Q. And the last sentence of 10:35
12 Example 1 says, "The high selectivity of 10:35
13 45 compared to 20 in the comparative 10:35
14 example therefore enables a more 10:35
15 economically favorable process by a lower 10:35
16 recompression of 31.2% rather than 86.7%," 10:36
17 correct? 10:36

18 A. That's true. 10:36

19 Q. So in Ungerank, the -- the 10:36
20 examples say that the -- that Comparative 10:36
21 Example 1 performs the worst economically, 10:36
22 correct? 10:36

23 MR. LANE: Objection. Form. 10:36

24 A. No -- 10:36

25 MR. LANE: Objection. Form. 10:36

1 Dr. Richard W. Baker

2 A. -- not quite. If you're only 10:36
3 looking at the -- the compression, the 10:36
4 recycle, it performs better. It's a more 10:36
5 selective membrane. It has less recycle. 10:36

6 If you're looking at the -- the 10:36
7 total process, which is compression plus 10:36
8 membrane, or the cost -- cost of the total 10:36
9 process, then -- then you don't have 10:36
10 enough information to make that judgment. 10:36

11 BY MR. LANTIER: 10:36

12 Q. So you're sort of juxtaposing 10:36
13 the information provided in Ungerank as 10:37
14 compared to Scholz where he does give 10:37
15 the -- the complete view; is that correct? 10:37

16 MR. LANE: Objection. Form. 10:37

17 Objection. Misstates. 10:37

18 A. You were pointing me to saying 10:37
19 that Example 1 shows -- shows the thing to 10:37
20 be better, more -- lower cost than -- than 10:37
21 the comparative example, and -- and I can 10:37
22 agree that it has less recycle. I -- I 10:37
23 don't know from those two examples that it 10:37
24 has -- in fact, I suspect very much that 10:37
25 example -- the comparative example per 10:37

1 Dr. Richard W. Baker

2 unit of -- of gas that it's treating is -- 10:37

3 is using much less membrane area. So -- 10:37

4 so -- so -- so I'm not sure that you can 10:37

5 really draw the conclusion that it's lower 10:37

6 cost. 10:37

7 BY MR. LANTIER: 10:38

8 Q. If we go back up then to the 10:38

9 second sentence here where it says, "Each 10:38

10 stage consisted of a hollow fiber membrane 10:38

11 module consisting of hollow polyimide 10:38

12 fibers from UBE..." 10:38

13 A. Uh-huh. 10:38

14 Q. And this is in Comparative 10:38

15 Example 1. Are you back there? 10:38

16 A. Yep. 10:38

17 Q. So here it's telling us that in 10:38

18 this particular example each of the stages 10:38

19 used the same membrane module, correct? 10:39

20 MR. LANE: Objection. Form. 10:39

21 Objection. Asked and answered. 10:39

22 A. Not the same membrane module. 10:39

23 It says it uses the -- it -- consisting of 10:39

24 the hollow fibers. Maybe they bought 10:39

25 modules from UBE or -- but this is a very 10:39

1 Dr. Richard W. Baker

2 small system, so -- so I'm wondering if 10:39

3 maybe they just got an UBE module and 10:39

4 opened it up and then re -- reparted the 10:39

5 membranes themselves or -- or this is a 10:39

6 simulation. I -- I'm not quite sure. 10:39

7 BY MR. LANTIER: 10:39

8 Q. But the comparative example 10:39

9 doesn't say anything about making any 10:39

10 changes to that UBE module, correct? 10:39

11 MR. LANE: Objection. Form. 10:39

12 A. That's what it -- it's siloed. 10:39

13 I mean, it -- it -- I'm not completely 10:40

14 sure if this is a simulation or a -- or an 10:40

15 actual experiment. I say that because 10:40

16 first it says the module has -- has a 10:40

17 selectivity of 20. And all the numbers 10:40

18 here are -- you know, there's the three 10:40

19 significant figures, and the flow rates 10:40

20 are very small -- well, less than a meter 10:40

21 cubed per hour. 10:40

22 That's a pretty -- that's a -- 10:40

23 that's almost a lab scale system. I'm not 10:40

24 sure if this is -- is this a real 10:40

25 experiment or, that is, a real test with 10:40

1 Dr. Richard W. Baker

2 real modules or -- or is it a simulation? 10:40

3 Or if it was with modules, that's a very 10:40

4 small module. 10:41

5 Was it just using the membranes 10:41

6 from an UBE module but not the module 10:41

7 itself? I mean, I don't know. 10:41

8 BY MR. LANTIER: 10:41

9 Q. When you say "it's a very small 10:41

10 system," could you just explain what you 10:41

11 mean? 10:41

12 A. Sure. 10:41

13 Well, it's treating -- the total 10:41

14 amount of gas it's treating is less than 10:41

15 2 cubic meters per hour. That's a pretty 10:41

16 small amount of gas. 10:41

17 And this is a membrane with a 10:41

18 selectivity of 20, of 2 cubic meter per 10:41

19 hour. A typical module, so we're talking 10:41

20 of tens to hundreds of square meters per 10:41

21 hour. 10:41

22 Q. And just in general, what would 10:41

23 the number of square meters per hour be 10:41

24 for a commercial system? 10:42

25 MR. LANE: Objection. 10:42

1 Dr. Richard W. Baker

2 Foundation. Objection. Form. 10:42

3 A. I mean, I'm not sure I could 10:42

4 give you the exact number right now, 10:42

5 but -- but certainly more than a cubic 10:42

6 meter per hour. When -- 10:42

7 BY MR. LANTIER: 10:42

8 Q. Of hundreds of cubic meters per 10:42

9 hour or tens, or could you just give me a 10:42

10 range? 10:42

11 MR. LANE: Objection. Form. 10:42

12 Objection -- 10:42

13 A. Of a -- of a commercial system, 10:42

14 yes. 10:42

15 BY MR. LANTIER: 10:42

16 Q. Sorry. I think that our record 10:42

17 may have had different people talking at 10:42

18 the same time. 10:42

19 Could you just please give your 10:42

20 answer again? 10:42

21 A. A commercial system is treating 10:42

22 a few hundred, I mean, cubic meters per 10:42

23 hour. Tens to hundreds, several you can 10:42

24 see. 10:43

25 Q. Could you turn with me, please, 10:43

1 Dr. Richard W. Baker

2 to the -- the Scholz article, and I think 10:43

3 you have a paper copy of it. We're 10:43

4 talking about AP 1007 here. 10:43

5 And -- and my first question is 10:43

6 just whether you studied the Scholz 10:43

7 article in detail before offering your 10:43

8 opinions in this case. 10:43

9 A. Yes. I studied it. 10:43

10 Q. If you could turn with me to 10:44

11 Figure 7. And this is on Page 7. Just 10:44

12 let me know when you're there. 10:44

13 A. Got it. 10:44

14 Q. Here there's -- there's 10:44

15 Figure 7a and there's Figure 7b, correct? 10:44

16 A. Uh-huh. Uh-huh. Yep, that's 10:44

17 correct. 10:44

18 Q. And it says underneath the 10:44

19 figure, "Optimal process design and 10:44

20 process conditions for gas permeation 10:44

21 membrane CO₂/CH₄ selectivity of 20 and a 10:44

22 CO₂ permeance of 60 GPU. (a) The required 10:44

23 CH₄ recovery is higher than 95%. (b) The 10:44

24 required CH₄ recovery is higher than 10:45

25 99.5%. " 10:45

1	Dr. Richard W. Baker	
2	Is that correct?	10:45
3	MR. LANE: Objection. Form.	10:45
4	Objection. Misstates the document.	10:45
5	A. That's correct.	10:45
6	BY MR. LANTIER:	10:45
7	Q. Now, each of Figures 7a and 7b	10:45
8	on the right-hand side provide	10:45
9	Dr. Scholz's calculations of some	10:45
10	different data points for those systems;	10:45
11	is that correct?	10:45
12	A. Uh-huh.	10:45
13	MR. LANE: Objection. Form.	10:45
14	A. Yep.	10:45
15	BY MR. LANTIER:	10:45
16	Q. And so for each of the systems,	10:45
17	he's calculated an amount of profit.	10:45
18	Do you see that?	10:45
19	A. That's right.	10:45
20	Q. And the amount of profit is	10:45
21	stated in -- in terms of euro per -- per	10:45
22	year, correct?	10:45
23	A. That's right.	10:45
24	Q. And then there's also a cost	10:45
25	calculation that is in euros per year,	10:45

1 Dr. Richard W. Baker

2 correct? 10:45

3 A. That's correct. 10:45

4 Q. And he then gives the recovery 10:45

5 percentage. 10:46

6 Do you see that? 10:46

7 A. Where does he -- oh, yeah, 10:46

8 98 percent. Yes. I got that, uh-huh. 10:46

9 Q. And so that when we look at that 10:46

10 recovery percentage, is this the -- does 10:46

11 this correlate to what you were talking 10:46

12 about before when you said CO2 of 10:46

13 2 percent and -- and methane of 2 percent 10:46

14 in the -- in the example you gave? 10:46

15 MR. LANE: Objection. Form. 10:46

16 A. Yeah. They are in the same 10:46

17 range, you know. 10:46

18 BY MR. LANTIER: 10:46

19 Q. Yes. I didn't mean to ask if 10:46

20 they were the same. 10:46

21 I think what I was trying to 10:46

22 just confirm is that if the recovery is 10:46

23 98.7 percent, is that reflecting that 10:46

24 there's CO2 of 1.3 percent -- 10:46

25 MR. LANE: Objection. Form. 10:46

1 Dr. Richard W. Baker

2 BY MR. LANTIER: 10:46

3 Q. -- for that stream? 10:46

4 A. The actual number, you know, I'd 10:46

5 have to work it out. But the -- the 10:46

6 recovery is very high, 98, 99 percent. 10:47

7 That implies that the CO2 content in the 10:47

8 methane is 1 or 2 percent or less. And 10:47

9 the methane content in the CO2 similarly 10:47

10 is 1 or 2 percent. 10:47

11 Q. Now, in Figure 7a, Dr. Scholz 10:47

12 has calculated the optimal process design 10:47

13 where the required methane recovery is 10:47

14 higher than 95 percent, correct? 10:47

15 A. Well, the recovery is 98.7, so, 10:47

16 yes. 10:47

17 Q. Yes. Sorry. And I was going to 10:47

18 get to that in a moment. 10:47

19 So underneath Figure 7, he says 10:47

20 that -- that, (a), the required methane 10:47

21 recovery is higher than 95 percent, right? 10:47

22 A. Got it. Uh-huh, yes. 10:48

23 Q. And then when he -- when he 10:48

24 determined the optimal process design, he 10:48

25 found that the optimal recovery was 10:48

1 Dr. Richard W. Baker

2 actually higher than 95 percent. It was 10:48

3 98.7 percent, correct? 10:48

4 MR. LANE: Objection. Form. 10:48

5 A. Yes. 10:48

6 BY MR. LANTIER: 10:48

7 Q. And that's -- that's because 10:48

8 the -- the higher the recovery percentage, 10:48

9 he's assuming the more he can get for the 10:48

10 methane when he sells it; is that right? 10:48

11 MR. LANE: Objection. Form. 10:48

12 Objection. Compound. 10:48

13 A. Yes. I think that's what he's 10:48

14 getting at, uh-huh. 10:48

15 BY MR. LANTIER: 10:48

16 Q. And then he tells us what the 10:48

17 CO₂, CH₄ selectivity is in each of the 10:48

18 figures, correct? 10:48

19 A. That's right, uh-huh. 10:48

20 Q. And is that -- is that pure gas 10:48

21 is or is that mixed gas? 10:48

22 A. That's mixed gas. 10:49

23 Q. And he tells us then that the CO₂ 10:49

24 permeance is 60 GPU, right? 10:49

25 A. That's the number he used, 10:49

1	Dr. Richard W. Baker	
2	uh-huh.	10:49
3	Q. And then in the -- in the body	10:49
4	of Figures 7a and 7b, he provides	10:49
5	information about the pressures and flows	10:49
6	for the different streams, correct?	10:49
7	A. That's right.	10:49
8	Q. If you could turn back to	10:49
9	your -- oh, let me ask you this.	10:49
10	If you turn then to Scholz on	10:49
11	Page 4, I wanted to ask you about Table 3.	10:50
12	A. Got it.	10:50
13	Q. Okay. Now, Table 3 is titled	10:50
14	"Economic parameters used for optimization	10:50
15	of a membrane based biogas upgrading	10:50
16	plant," correct?	10:50
17	A. Uh-huh.	10:50
18	Q. And so the -- the Scholz paper	10:50
19	is talking about the commercial production	10:50
20	of methane, correct?	10:50
21	MR. LANE: Objection. Form.	10:50
22	Objection. Lack of foundation.	10:50
23	A. Yes.	10:50
24	BY MR. LANTIER:	10:50
25	Q. And in order to make his	10:50

1 Dr. Richard W. Baker

2 calculations of the optimal process 10:50

3 design, he has adopted a series of 10:50

4 assumptions about various costs, correct? 10:50

5 A. That's correct. 10:50

6 MR. LANE: Objection. Form. 10:51

7 BY MR. LANTIER: 10:51

8 Q. And those assumptions are set 10:51

9 forth in Table 3 on Page 4, correct? 10:51

10 MR. LANE: Objection. Form. 10:51

11 A. Yes. 10:51

12 BY MR. LANTIER: 10:51

13 Q. And -- and here, Dr. Scholz has 10:51

14 assumed electrical costs of 8 euro cents 10:51

15 per kilowatt hour, correct? 10:51

16 A. Uh-huh, yep. 10:51

17 Q. And that's an assumption that he 10:51

18 holds constant throughout all of the 10:51

19 examples that he gives in his paper, 10:51

20 correct? 10:51

21 MR. LANE: Objection. Form. 10:51

22 A. I haven't checked that, but I 10:51

23 imagine it's true. 10:51

24 BY MR. LANTIER: 10:51

25 Q. And in offering your opinions in 10:51

1 Dr. Richard W. Baker

2 this case, you haven't offered any opinion 10:51

3 as to whether 8 euro cents per kilowatt 10:51

4 hour was cheap electricity in 2014, 10:51

5 correct? 10:51

6 A. I haven't offered that opinion. 10:51

7 I mean, I have an opinion, but okay, 10:51

8 uh-huh. 10:51

9 Q. But you haven't offered it, 10:51

10 correct? 10:52

11 A. No. 10:52

12 Q. Now, if you could turn your -- 10:52

13 back to your declaration. 10:52

14 A. I've got it. 10:52

15 Q. And in particular, I direct you 10:52

16 to Pages 41 to 42. 10:52

17 A. Uh-huh. 10:52

18 Q. I have a few questions for you 10:52

19 on Paragraphs 131 to 133. If you wanted 10:52

20 to refamiliarize yourself with those 10:53

21 paragraphs and just let me know when 10:53

22 you're done. 10:53

23 A. Okay. 10:54

24 Q. So as you state on 10:54

25 Paragraph 131, Paragraph 131 to 133 are 10:54

1 Dr. Richard W. Baker

2 your opinions as to why "...a POSITA would 10:54

3 have looked to Ungerank's Comparative 10:54

4 Example 1, in the first instance...", 10:54

5 correct? 10:54

6 A. That's right. 10:54

7 Q. And the first reason you give 10:54

8 for that is "...because it employs 10:54

9 relatively low selectivity membranes," 10:54

10 correct? 10:54

11 A. That's right. 10:54

12 Q. And the second reason you give 10:54

13 is that it provides "...relatively 'pure 10:55

14 product streams'...", right? 10:55

15 A. That's right. 10:55

16 Q. The third, if we turn to 10:55

17 Paragraph 132, is that Comparative 10:55

18 Example 1 is "...a three-stage system with 10:55

19 a single compressor...", correct? 10:55

20 A. Yep. 10:55

21 Q. And the fourth reason you give 10:55

22 is that "...Ungerank's Comparative Example 10:55

23 1 provides detailed information on the 10:55

24 gases' compositions and flowrates, the 10:55

25 recycle volume, the pressures...and 10:55

1 Dr. Richard W. Baker
2 specifies the type of membranes used...", 10:55
3 correct? 10:56
4 A. Uh-huh, yep. 10:56
5 Q. And -- and there aren't any 10:56
6 other reasons that you identify in your 10:56
7 declaration as to why a person of ordinary 10:56
8 skill in the art would have looked to 10:56
9 Comparative Example 1 in the first 10:56
10 instance, correct? 10:56
11 MR. LANE: Objection. Form. 10:56
12 A. I -- I don't know if -- if there 10:56
13 were others, but, I mean, it shows the 10:56
14 process works. It works with low 10:56
15 selectivity membranes. The membrane that 10:56
16 was, and still is, 95 percent of the 10:56
17 systems being sold or 90 percent of the 10:56
18 systems being sold. 10:56
19 Membrane systems for this 10:56
20 application, CO2 for methane, have -- have 10:56
21 that type of selectivity or maybe a little 10:56
22 bit less. So it -- that's -- that's the 10:56
23 key -- key -- key result I got out of 10:57
24 Ungerank. This process works for -- for 10:57
25 these sort of membranes. 10:57

1	Dr. Richard W. Baker	
2	BY MR. LANTIER:	10:57
3	Q. Now, if you think about Scholz,	10:57
4	the article that we were talking about a	10:57
5	moment ago --	10:57
6	A. That's right, uh-huh.	10:57
7	Q. -- Scholz describes using	10:57
8	relatively low selectivity membranes,	10:57
9	correct?	10:57
10	A. Yes.	10:57
11	Q. And -- and Scholz describes	10:57
12	providing relatively pure product streams,	10:57
13	correct?	10:57
14	A. That's correct.	10:57
15	Q. Scholz Figures 7a and 7b are	10:57
16	each three-stage systems with a single	10:57
17	compressor, correct?	10:57
18	A. Correct.	10:57
19	Q. And Scholz, at Figure 7a and 7b,	10:57
20	provides detailed information on the	10:57
21	gases, composition and flow rates, the	10:57
22	recycle volume, the pressures, and the	10:57
23	types of membranes used, correct?	10:58
24	A. That's right.	10:58
25	Q. I had a couple questions for you	10:58

1 Dr. Richard W. Baker

2 about compressors. 10:58

3 The first is, generally 10:58

4 speaking, is a compressor for a larger 10:58

5 volume of gas going to be more costly than 10:58

6 a compressor for a smaller amount of gas? 10:58

7 MR. LANE: Objection. Form. 10:58

8 A. It's more costly, but it's not 10:58

9 linearly more costly. That is, you double 10:58

10 the flow, you don't get double the price, 10:58

11 double the cost. It will go up, but it 10:58

12 won't go up linearly. 10:58

13 BY MR. LANTIER: 10:58

14 Q. And generally speaking, is a 10:58

15 multistage compressor more expensive than 10:58

16 a one stage compressor? 10:58

17 MR. LANE: Objection. Form. 10:59

18 A. Multistage implies that the 10:59

19 compressor is built to go from -- from low 10:59

20 pressure to a fairly high pressure, so it 10:59

21 will be a more expensive machine than a 10:59

22 single stage. Trying to do a big pressure 10:59

23 ratio in a single stage, people do it, but 10:59

24 not -- not for any reasonable sized 10:59

25 machine. 10:59

1 Dr. Richard W. Baker

2 BY MR. LANTIER: 10:59

3 Q. And we're talking about a 10:59

4 multistage compressor just to make sure I 10:59

5 understand it. 10:59

6 It's a compressor where you 10:59

7 bring gas in and you compress it some 10:59

8 amount in one stage, and then you pass it 10:59

9 to another stage and it compresses the gas 10:59

10 further; is that correct? 10:59

11 A. That's correct. 10:59

12 MR. LANE: Objection. Form. 10:59

13 A. It's a little bit more 10:59

14 complicated machine, but it uses less 10:59

15 energy. And for bigger compressors, it's 10:59

16 definitely the way to go. 10:59

17 BY MR. LANTIER: 10:59

18 Q. Now, in Ground 1 of Air 10:59

19 Products' petition and, in your opinion, 11:00

20 you're offering the opinion that the 11:00

21 Ungerank Comparative -- Ungerank Patent 11:00

22 Comparative 1 -- 11:00

23 MR. LANTIER: Excuse me. Let me 11:00

24 start over. Strike that and new 11:00

25 question. 11:00

1 Dr. Richard W. Baker

2 BY MR. LANTIER: 11:00

3 Q. In connection with Ground 1 of 11:00

4 the petition at issue here, you're 11:00

5 offering the opinion that a person of 11:00

6 skill in the art would have combined 11:00

7 Ungerank Example 1, Comparative Example 1, 11:00

8 with the information in Figure 7 of the 11:00

9 Scholz article; is that correct? 11:00

10 MR. LANE: Objection. Form. 11:00

11 Objection. Compound. 11:00

12 A. It -- it would certainly be 11:00

13 driven -- since they are both on -- on the 11:00

14 same separation, the same process design, 11:00

15 you would certainly be driven to looking 11:01

16 at both of these things fairly carefully, 11:01

17 and they are both doing -- so he would 11:01

18 look at them and -- and he'd be given to 11:01

19 combining them. 11:01

20 He didn't necessarily have to do 11:01

21 that. He -- I mean, Ungerank pretty much 11:01

22 describes the whole thing. The only thing 11:01

23 it's missing is there is no -- no feeling 11:01

24 for how much membrane area you're going to 11:01

25 use, but -- but he would -- now he's got 11:01

1 Dr. Richard W. Baker

2 Scholz, so Scholz actually has some 11:01
3 membrane areas, so gives him a feel for 11:01
4 what's the relative size for compression 11:01
5 and membrane area. 11:01

6 So -- so Scholz is helpful; no 11:01
7 question about it. But I don't know if he 11:01
8 absolutely needed Mr. Scholz. 11:01

9 BY MR. LANTIER: 11:02

10 Q. I'm not sure I'm following what 11:02
11 you're saying here. 11:02

12 When you say you're not sure he 11:02
13 absolutely needed Scholz, could you 11:02
14 describe what you mean? 11:02

15 A. In many times you get a 11:02
16 reference and it's got the description of 11:02
17 the -- of the -- of some process, and 11:02
18 maybe there's a couple of things that 11:02
19 aren't included or whatever. But if 11:02
20 there's enough of the other stuff, the -- 11:02
21 whatever, you look at it and you think, 11:02
22 Okay, this process works, so no question 11:02
23 about that. And it looks like it's going 11:02
24 to work. 11:02

25 And just based on my own 11:02

1 Dr. Richard W. Baker

2 experience, if -- if that truly is true, 11:02

3 then -- then this will work. I don't need 11:02

4 anything more. 11:02

5 Mr. Scholz is -- is confirmation 11:03

6 of what he might have already figured out. 11:03

7 Q. So in other words, if somebody 11:03

8 is looking at Ungerank Comparative 11:03

9 Example 1, it already is telling you that 11:03

10 that system works and you don't -- there's 11:03

11 no need to look anywhere else; is that 11:03

12 correct? 11:03

13 MR. LANE: Objection. Form. 11:03

14 Objection -- 11:03

15 A. He -- it's always a good thing 11:03

16 to -- if someone else has done it before, 11:03

17 you better find out. It's always a good 11:03

18 thing to -- to -- it's the cheapest sort 11:03

19 of research, see what the other guys did. 11:03

20 BY MR. LANTIER: 11:03

21 Q. But I think what you just said 11:03

22 is that somebody looking and reading at 11:03

23 Ungerank Comparative Example 1 would 11:03

24 understand that that is an operative 11:03

25 system that accomplishes its objective, 11:03

1	Dr. Richard W. Baker	
2	correct?	11:03
3	A. That's correct.	11:03
4	Q. And you -- they wouldn't have	11:03
5	seen some deficiency in that system,	11:03
6	correct?	11:03
7	A. There's nothing there that jumps	11:03
8	out at you as a problem.	11:03
9	Q. If you would turn in your	11:04
10	declaration to Page 64.	11:04
11	A. Got it.	11:04
12	Q. And I wanted to ask you about	11:04
13	your opinions on Claim 17 in particular	11:04
14	here. And so that's at the bottom of the	11:04
15	page, and it carries over to Page 65.	11:04
16	Just let me know when you're there.	11:04
17	A. Multistage -- okay.	11:04
18	Q. So your opinion on Claim 17 is	11:05
19	all contained -- for Ground 1 is all	11:05
20	contained here in Paragraph 190; is that	11:05
21	right?	11:05
22	A. Yes.	11:05
23	Q. But it -- it also --you know, it	11:05
24	incorporates your opinions as to the	11:05
25	independent claims as well, correct -- or	11:05

1 Dr. Richard W. Baker

2 the independent claim as well, correct? 11:05

3 MR. LANE: Objection. 11:05

4 A. I mean, this is a -- you're 11:05

5 giving me stuff about claim language 11:05

6 that -- independent claims and so forth. 11:05

7 I'm not really a lawyer. 11:05

8 But what Claim 17 says, as I 11:05

9 understand it, is that if you've got a 11:06

10 multi -- if you've got a compound 11:06

11 compressor or a multistage compressor and 11:06

12 you've got these two recycle streams, then 11:06

13 you would send them to the appropriate 11:06

14 place in that compression system. 11:06

15 If -- if you have a multistage 11:06

16 compressor, especially a biggish one, it's 11:06

17 possible to introduce gases at the 11:06

18 beginning of the compression train or at 11:06

19 some intermediate place in the compression 11:06

20 train. 11:06

21 And if you have a gas stream 11:06

22 that has an intermediate pressure already, 11:06

23 you don't need to pay for the compression 11:06

24 of that gas up to the intermediate 11:06

25 pressure. You will introduce it into the 11:06

1 Dr. Richard W. Baker

2 middle of the compression train. 11:06

3 That's -- that's what you would do. 11:06

4 And that's what this claim is 11:06

5 suggesting you might do with the two 11:06

6 recycle streams that are coming from the 11:06

7 process. One of them is going to be at -- 11:07

8 at basically atmospheric pressure or maybe 11:07

9 a little bit above. And the other one 11:07

10 might be at some intermediate pressure and 11:07

11 so you'll -- you'll reintroduce that one 11:07

12 in the middle. 11:07

13 BY MR. LANTIER: 11:07

14 Q. And so here -- this is in 11:07

15 Paragraph 190. It's the second sentence. 11:07

16 You say that "Ungerank explains 11:07

17 that the compressor... in Figure 11 can be 11:07

18 a 'one-stage or multistage compressor...' 11:07

19 Do you see that? 11:07

20 A. Yeah, I see that. 11:07

21 Q. So, and your opinion in Ground 1 11:07

22 is that the person of skill in the art is 11:07

23 going to start with Ungerank Comparative 11:07

24 Example 1 and then combine it with some of 11:07

25 the information in the Scholz article, 11:07

1 Dr. Richard W. Baker

2 correct? 11:07

3 A. I don't think you -- this is all 11:08

4 about -- Scholz hasn't come up here. This 11:08

5 is for Ungerank, so. 11:08

6 Q. Yeah. So I wasn't trying to 11:08

7 confuse you on that at all. I agree that 11:08

8 you're not talking about Scholz in this -- 11:08

9 in this paragraph. I was just asking more 11:08

10 generally. 11:08

11 The opinions you've offered for 11:08

12 Ground 1 consist of an opinion that a 11:08

13 person of skill in the art in 2014 who's 11:08

14 looking at Ungerank Comparative Example 1 11:08

15 is going to design a system using some of 11:08

16 the information from the Scholz article, 11:08

17 correct? 11:08

18 A. Yes. He might. And Scholz, I 11:08

19 mean, has a couple of examples. I mean, 11:08

20 he maybe -- have other knowledge, uh-huh, 11:08

21 okay. 11:08

22 Q. And that -- that person is going 11:08

23 to have to choose in designing that system 11:08

24 between using a one-stage or a multistage 11:08

25 compressor, correct? 11:08

1 Dr. Richard W. Baker

2 A. Yeah. Okay. Yeah. I -- I 11:08

3 yeah -- yes, a multi -- it depends -- 11:09

4 whether you use a multistage compressor 11:09

5 is -- there are a number of things that go 11:09

6 into it. One is the size of the 11:09

7 compressor. If it's a small compressor -- 11:09

8 and many of these systems are relatively 11:09

9 small, and the pressures aren't very 11:09

10 high -- you might try to do that thing in 11:09

11 a single-stage compressor. 11:09

12 It just is cheaper. It's a 11:09

13 cheaper machine. It's not quite as 11:09

14 efficient as a multistage, but it's a 11:09

15 small machine. You would go with a 11:09

16 cheaper machine. 11:09

17 If -- if you're now talking 11:09

18 about a bigger system, you're going to use 11:09

19 a multistage compressor probably. Almost 11:09

20 surely for a big system, you're going to 11:09

21 use multistage. And for a big system, you 11:09

22 will -- the one advantage -- well, one 11:10

23 advantage of multistage is uses less 11:10

24 energy anyway. And the second advantage, 11:10

25 which you can use, is that you can 11:10

1 Dr. Richard W. Baker

2 introduce into the streams, not just at 11:10

3 the beginning but at an intermediate 11:10

4 stage. 11:10

5 And in the Scholz drawings, 7, 11:10

6 he doesn't do that. He -- he says this -- 11:10

7 these machines are 30 kilowatts, 11:10

8 50 kilowatts. 11:10

9 Maybe he just didn't think that 11:10

10 that was worthwhile, or maybe just didn't 11:10

11 know that you -- for a big compressor, you 11:10

12 might introduce that intermediate stream 11:10

13 at 2 or 3-bara and you save some energy, 11:10

14 and it doesn't cost you anything, pretty 11:10

15 much. 11:10

16 Q. You said earlier that -- the 11:10

17 system described in Comparative Example 1 11:10

18 is a very small system, correct? 11:10

19 A. Well, that one is very small, 11:11

20 yes, uh-huh. 11:11

21 Q. And so it wouldn't make sense in 11:11

22 that system to use a multistage 11:11

23 compressor, correct? 11:11

24 A. Probably not. Whether you use 11:11

25 multistage or -- or -- I mean, that is 11:11

1 Dr. Richard W. Baker

2 truly any POSITA better know that. He 11:11

3 isn't much of a POSITA if he -- if he's 11:11

4 not familiar -- if he's not familiar with 11:11

5 that sort of compression know-how. 11:11

6 Q. Sure. 11:11

7 And -- and any POSITA who's 11:11

8 looking at a system the size of that 11:11

9 described in Comparative Example 1 is 11:11

10 going to be inclined to use a single-stage 11:11

11 compressor, correct? 11:11

12 MR. LANE: Objection. Form. 11:11

13 A. In -- in Example 1, it's so 11:11

14 small, yeah, tiny. 11:11

15 MR. LANTIER: Why don't we take 11:11

16 another short break as long as that's 11:11

17 okay with you? 11:11

18 THE WITNESS: Fine with me. 11:12

19 MR. LANTIER: Thank you. 11:12

20 THE WITNESS: Okay. 11:12

21 THE TECH: Stand by. 11:12

22 The time is 11:12 a.m. We're 11:12

23 going off the record. 11:12

24 AUTOMATED MESSAGE: Recording 11:12

25 stopped. 11:12

1 Dr. Richard W. Baker
2 (Recess taken.) 11:12
3 AUTOMATED MESSAGE: Recording in 11:21
4 progress. 11:21
5 THE TECH: The time is 11:21
6 11:21 a.m., and we're back on record. 11:21
7 BY MR. LANTIER: 11:21
8 Q. Dr. Baker, I was hoping to ask 11:21
9 you a few more questions about that Scholz 11:21
10 article, if you could turn back to that. 11:21
11 A. Yep. Got it. 11:22
12 Q. Now, in the -- the Scholz 11:22
13 article, we have Figure 7a and 7b that use 11:22
14 low selectivity membranes, correct? 11:22
15 A. Uh-huh. 11:22
16 Q. And then Figure 5, which is on 11:22
17 Page 5, describes an optimal process 11:22
18 design using high selectivity membranes, 11:22
19 right? 11:22
20 A. That's correct. 11:22
21 Q. And the -- the Scholz article 11:22
22 demonstrates that using Figure 5 will 11:22
23 yield higher profits than using either 11:22
24 Figure 7a or Figure 7b, correct? 11:22
25 A. Used -- under the assumptions 11:23

1 Dr. Richard W. Baker

2 that were used for those two -- those two 11:23

3 sets of simulations, that's correct. 11:23

4 Q. And that Figure 5 will result in 11:23

5 a higher recovery percentage than either 11:23

6 Figure 7a or 7b, correct? 11:23

7 MR. LANE: Objection. Form. 11:23

8 A. It -- it has a better result. 11:23

9 It's not necessarily -- I mean, yes, it's 11:23

10 got a better result in terms of recovery. 11:23

11 But that -- that doesn't mean the other 11:23

12 guys couldn't get that recovery. It just 11:23

13 means that under -- under the way they 11:23

14 designed it, they got a lower recovery. 11:23

15 I mean, the recovery isn't that 11:23

16 much different. One is 99 and a bit. The 11:23

17 other one is 99.6, so it's a bit more. 11:23

18 That is recovery is an adjustable 11:24

19 parameter. 11:24

20 BY MR. LANTIER: 11:24

21 Q. Right. The -- the recovery in 11:24

22 Figure 7a is 98.7 percent, right? 11:24

23 A. Uh-huh. That's right. 11:24

24 Q. And that's nearly a percent 11:24

25 lower than the recovery in Figure 5, which 11:24

1 Dr. Richard W. Baker

2 is 99.6 percent, correct? 11:24

3 A. That's correct. 11:24

4 Q. And -- and the profitability of 11:24

5 Figure 5 is about 10,000 euro a year 11:24

6 greater than the profits for the -- for 11:24

7 the design of Figure 7a, correct? 11:24

8 A. That's right. 11:24

9 Q. But if we -- if we look to 11:24

10 Figure 7b, there, the recovery is much 11:24

11 closer to the recovery of Figure 5, 11:25

12 correct? 11:25

13 A. That's correct. 11:25

14 Q. But the -- the profitability is 11:25

15 substantially less than the profitability 11:25

16 shown in Figure 5, correct? 11:25

17 A. Yeah. There -- there are other 11:25

18 things that go into profitability, of 11:25

19 course, but -- but yes. 11:25

20 Q. In the Scholz model, there's 11:25

21 nothing else that goes into profitability, 11:25

22 correct? 11:25

23 A. He's got the cost of membranes 11:25

24 and the cost of the compression. So those 11:25

25 go to profitability. I mean, he -- the 11:25

1 Dr. Richard W. Baker

2 cost of capital. He's a using a discount 11:25

3 rate of -- interest rate of 9 percent. 11:25

4 Q. And if we -- if we look to 11:26

5 Figure 5 and compare it to Figure 7a in 11:26

6 terms of the membrane sizing? 11:26

7 A. Yep. 11:26

8 Q. While not exactly the same, the 11:26

9 membrane sizes, they're in the same 11:26

10 ballpark as one another, correct? 11:26

11 A. I think so, yeah, uh-huh. 11:26

12 Q. But in order to attain the 11:26

13 recovery rate of 99.5 percent in 11:26

14 Figure 7b -- 11:26

15 A. Uh-huh. 11:26

16 Q. -- the Scholz model required a 11:26

17 membrane that was 1300 square meters, 11:26

18 correct? 11:27

19 A. You mean for the second -- the 11:27

20 second stage? 11:27

21 Q. Correct. The second stage there 11:27

22 on the bottom of Figure 7b. 11:27

23 A. That was his optimized result, 11:27

24 which is a little odd, but yes. Uh-huh. 11:27

25 Q. And when you say it's "a little 11:27

1 Dr. Richard W. Baker

2 odd," why do you say it's "a little odd"? 11:27

3 A. Well, I mean, optimized tends to 11:27

4 mean, at least, his -- his equations, or 11:27

5 whatever his computer spat out, the 11:27

6 optimized answer. That was -- that was 11:27

7 the objective of his -- of his program. 11:27

8 And if this is the optimized 11:27

9 answer, it looks -- me, I -- if I was 11:27

10 looking at it, I would increase the 11:28

11 intermediate pressure. He's only got it 11:28

12 at 2.6 bara. So the delta P across that 11:28

13 second stage is only 1.6 bara and -- and 11:28

14 the delta P across the first stage is 11:28

15 16 -- it's about 13.4 bara. 11:28

16 So he's got way bigger delta 11:28

17 across the first stage and too -- too much 11:28

18 across the first stage and too little on 11:28

19 the second stage. That would be my 11:28

20 opinion without doing anything myself. 11:28

21 So just looking at it, I would 11:28

22 have -- I would have raised the 11:28

23 intermediate pressure. That would 11:28

24 increase the size of the unit for the 11:28

25 first stage, but it would have 11:28

1 Dr. Richard W. Baker

2 significantly reduced the size of the unit 11:28

3 on the second stage. 11:28

4 And I don't think it would have 11:28

5 used much more recycle, so I'm wondering 11:28

6 why the hell he didn't do that. But okay, 11:29

7 you know, this was his result. He -- 11:29

8 that's what we're going. 11:29

9 Q. In your experience, have you 11:29

10 ever seen a commercial system that used 11:29

11 that amount of membrane area, 1300 square 11:29

12 meters? 11:29

13 A. Oh, yeah. Yeah, yeah, yeah. 11:29

14 These are not big systems. These are 11:29

15 relatively small systems. 11:29

16 And the total cost of this 11:29

17 system is, you know, maybe a million 11:29

18 dollars or something. Here he says 11:29

19 143,000 euro. Well, it probably is more 11:29

20 than that, but it's not a big system. Gas 11:29

21 processing plants might be treating ten 11:29

22 times that much gas. 11:29

23 Q. And when you say "it's not a big 11:29

24 system," you're saying in the context of 11:30

25 commercial systems, this is on -- this is 11:30

1 Dr. Richard W. Baker

2 on the smaller end of commercial systems? 11:30

3 A. Exactly. Exactly. 11:30

4 Q. But it is a -- it is a very 11:30

5 significantly larger system than what 11:30

6 we're seeing in Comparative Example 1, 11:30

7 correct? 11:30

8 A. Absolutely. 11:30

9 MR. LANE: Objection to form. 11:30

10 A. Yes. Yes. Example 1 was small, 11:30

11 tiny. 11:30

12 BY MR. LANTIER: 11:30

13 Q. In Figure 7a, the recycle volume 11:30

14 is 51 percent, correct? 11:30

15 A. You -- you could tell me that 11:30

16 and I'll believe it, but it's not on -- on 11:30

17 the thing that I have in front of me, 11:30

18 so... 11:30

19 Q. Yeah. And I don't mean to be 11:30

20 unfair. 11:30

21 If you turn in your declaration 11:30

22 to Paragraph 205, which is on page -- 11:31

23 A. 205. 11:31

24 Q. 205, it's on Page 73 of your 11:31

25 declaration. 11:31

1	Dr. Richard W. Baker	
2	A. Uh-huh.	11:31
3	Q. You perform the calculation	11:31
4	there for the recycle percentage --	11:31
5	A. Yep.	11:31
6	Q. -- so maybe just refresh your	11:31
7	memory there.	11:31
8	A. Uh-huh. Okay. That's a	11:31
9	little -- obviously, that's in (b), okay.	11:32
10	Yep, yep. Got it.	11:32
11	Q. So in Scholz Figure 7a, the	11:32
12	optimum recycle percentage is	11:32
13	51.5 percent, correct?	11:32
14	A. Yep. Uh-huh.	11:32
15	Q. And in Figure 7b, the optimum --	11:32
16	optimal -- excuse me -- recycle percentage	11:32
17	is 135 percent, correct?	11:32
18	MR. LANE: Objection. Form.	11:32
19	A. Yes.	11:32
20	BY MR. LANTIER:	11:32
21	Q. And in the Scholz article, he's	11:32
22	indicating that any other recycle	11:33
23	percentage for the designed recovery in	11:33
24	Figure 7a or 7b will be less profitable,	11:33
25	correct?	11:33

1 Dr. Richard W. Baker

2 MR. LANE: Objection. Form. 11:33

3 A. I mean, his intent is to turn up 11:33

4 the -- optimize the lowest cost design and 11:33

5 the various assumptions. And he's put 11:33

6 those in and then he varies the areas and 11:33

7 the recycle rates and so forth, as you 11:33

8 just described. And apparently for this, 11:33

9 his program for this particular thing, 11:33

10 that's what it spat out. 11:33

11 BY MR. LANTIER: 11:33

12 Q. And in your -- in offering your 11:33

13 opinions, you didn't perform any type of 11:33

14 ChemCad or other simulation to show the 11:33

15 ramifications of seeking a different 11:34

16 recycle percentage, correct? 11:34

17 A. No. No. 11:34

18 Q. And you didn't offer any 11:34

19 opinions as to what the specific membrane 11:34

20 area sizes would be for a system that 11:34

21 would achieve any different recycle 11:34

22 percentages, correct? 11:34

23 MR. LANE: Objection to form. 11:34

24 A. I didn't do that, no. 11:34

25 BY MR. LANTIER: 11:34

1 Dr. Richard W. Baker

2 Q. Now, at Paragraph 208 of your 11:34
3 opinion, you say that a person of skill in 11:34
4 the art "...would have been guided by 11:34
5 Scholz to test within the range 11:34
6 encompassed by the systems in Scholz's 11:34
7 Figure 7 systems..." 11:34

8 Do you see that? 11:34

9 A. Yeah. Got it. 11:34

10 Q. And so are you saying -- well -- 11:34
11 and the -- on the one hand, we have a 11:34
12 recycle rate of about 51 percent in 11:35
13 Figure 7A, correct? 11:35

14 A. Uh-huh. Got it. Uh-huh. 11:35

15 Q. Yes. 11:35
16 And on the other hand, we have a 11:35
17 recycle rate of about 135 percent in 11:35
18 Figure 7b, correct? 11:35

19 A. That's right. 11:35

20 Q. So is it your opinion then that 11:35
21 a person of skill in the art would have 11:35
22 been inclined to test any value in between 11:35
23 those two numbers? 11:35

24 A. I think -- 11:35

25 MR. LANE: Objection. Form. 11:35

1 Dr. Richard W. Baker

2 A. -- for -- for -- if -- if the 11:35
3 guy was looking for -- for a certain 11:35
4 percentage range, and the two numbers that 11:35
5 you just quoted would -- would -- were 11:36
6 either side of the range that he was 11:36
7 looking for, I think he would be driven -- 11:36
8 if he wanted to have, for whatever reason, 11:36
9 to land in that range, maybe because of 11:36
10 compression or whatever or some other 11:36
11 reason, then he would just adjust his 11:36
12 assumptions a little bit to end up in the 11:36
13 range because he can see he can do it. 11:36
14 He's got one of them that's 11:36
15 51 percent. It's too little. One of them 11:36
16 135; too much. If he wants to be within 11:36
17 the range of 60 to 100, it's -- he's 11:36
18 straddled it. Okay. 11:36
19 Finally he figures it out. It 11:36
20 something in the middle. So he would 11:36
21 change the assumptions in order to get 11:36
22 within the range. 11:36
23 If -- if the numbers were too 11:37
24 high, both -- all -- both numbers were way 11:37
25 too low or both numbers were way too high, 11:37

1 Dr. Richard W. Baker

2 okay, now he's got a bit more of a 11:37

3 problem. But here, I mean, I think he's 11:37

4 got to be a fairly slow POSITA not to 11:37

5 figure out that, okay, this -- I can 11:37

6 change something and get into the range. 11:37

7 Q. So a person of skill in the art 11:37

8 would be able to change different 11:37

9 parameters in Scholz in order to get to a 11:37

10 recycle range between 60 and 100. 11:37

11 Is that what you're saying? 11:37

12 A. I think that's what he would do, 11:37

13 yes. 11:37

14 Q. You don't identify any specific 11:37

15 reason in your opinion here on Pages 73 to 11:38

16 76 of your declaration for why a person of 11:38

17 skill would be specifically motivated to 11:38

18 get to the -- the number 60 or something 11:38

19 between 60 to 100 as opposed to, for 11:38

20 example, 59, 58, or 101 or 102, correct? 11:38

21 MR. LANE: Objection. Form. 11:38

22 Objection. Compound. 11:38

23 A. That's -- you're going to have 11:38

24 to repeat the question. I'm sorry. 11:38

25 BY MR. LANTIER: 11:38

1 Dr. Richard W. Baker

2 Q. That's okay. I can repeat the 11:38
3 question. 11:38

4 If we focus on your declaration, 11:38
5 at Page 73 -- 11:38

6 A. Uh-huh. 11:38

7 Q. -- to 76, in those paragraphs, 11:38
8 you don't identify any specific motivation 11:38
9 for a person of skill in the art to design 11:39
10 a system that achieves a recycle rate 11:39
11 specifically of 60 percent or something 11:39
12 between 60 and 100 percent as opposed to, 11:39
13 for example, 59 percent or 101 percent, 11:39
14 correct? 11:39

15 MR. LANE: Objection. Form. 11:39
16 Objection -- 11:39

17 A. Yes. 11:39

18 MR. LANE: -- compound. 11:39

19 BY MR. LANTIER: 11:39

20 Q. And the person who's testing 11:39
21 this system would, for example, also be 11:39
22 testing, in your opinion, a recycle 11:39
23 percentage of, for example, 115 percent, 11:39
24 correct? 11:39

25 MR. LANE: Objection. Form. 11:39

1 Dr. Richard W. Baker

2 A. 135, yeah. I mean, we're into 11:39
3 the claims, which is sort of a legal 11:39
4 thing. I mean, I'm -- so in the claims, 11:39
5 I -- if I -- I can -- if the POSITA is -- 11:40
6 is told, can you make a system that's 11:40
7 between -- between 80 and 100 percent 11:40
8 given this information, he can do it. 11:40

9 If somebody tells him, I need 11:40
10 it -- it has to be, for whatever reason, I 11:40
11 need 60 to 100, he can do it. He's got 11:40
12 all the info he needs. 11:40

13 BY MR. LANTIER: 11:40

14 Q. And that's -- excuse me, sir. I 11:40
15 didn't mean to interrupt you. Were you 11:40
16 finished? 11:40

17 A. Yep. 11:40

18 Q. And that's your opinion at 11:40
19 Paragraphs 205 to 210 of your declaration, 11:40
20 correct? 11:40

21 A. Yeah. 11:40

22 Q. I have a question or two about 11:40
23 Paragraphs 123 to 125 of your declaration, 11:41
24 if you could turn there. 11:41

25 A. Okay. 120 -- 11:41

1 Dr. Richard W. Baker

2 Q. Yes. And I should give you the 11:41
3 page numbers. This is Pages 38 to 39. 11:41
4 And it's Paragraphs 123 to 125. 11:41

5 A. Got it. Uh-huh. 11:41

6 Q. And in particular, and we talked 11:41
7 a little bit about this earlier. 11:41

8 But in particular, if you look 11:41
9 at the first sentence of paragraph 125, 11:41
10 you say, "...it would have been obvious to 11:42
11 a POSITA in December 2014 to use 11:42
12 lower-selectivity, higher permeance (and 11:42
13 therefore smaller area and less costly) 11:42
14 membranes in that situation." 11:42

15 Do you see that? 11:42

16 A. Yep. 11:42

17 Q. Is your opinion based on an 11:42
18 understanding that lower-selectivity 11:42
19 membranes will have higher permeance? 11:42

20 A. That's -- yes. 11:42
21 Lower-selectivity membranes are almost 11:42
22 always -- are always associated with -- 11:42
23 virtually always associated with higher 11:42
24 permeance. 11:42

25 It's a trade-off. It comes up 11:42

1 Dr. Richard W. Baker

2 repeatedly in membrane technology. You 11:42

3 can have high selectivity or high 11:42

4 permeance, but it's very difficult to get 11:43

5 them both at the same time, so there's 11:43

6 always this trade-off. 11:43

7 And then people will sometimes 11:43

8 go for higher selectivity, and sometimes 11:43

9 they will -- or they will go for higher 11:43

10 permeance to reduce the size of a system, 11:43

11 but then -- and then they think -- other 11:43

12 times they will be driven to very high 11:43

13 selectivity just because of the 11:43

14 performance of the membrane. I've got to 11:43

15 have a selectivity of better than 11:43

16 whatever, in which case they -- they are 11:43

17 just going to have to bite the bullet and 11:43

18 use more membrane area. So there's always 11:43

19 this trade-off going on. 11:43

20 And any time you're looking at a 11:43

21 problem, that trade-off is in your mind if 11:43

22 you're a POSITA. 11:43

23 Q. But if we look at Scholz, do you 11:44

24 see that in Figure 7a the selectivity -- 11:44

25 the selectivity is 20 and the permeance is 11:44

1 Dr. Richard W. Baker

2 60? 11:44

3 A. Got it. 11:44

4 Q. But in Figure 5, the selectivity 11:44

5 is 60 while the permeance is again 60, 11:44

6 correct? 11:44

7 A. Uh-huh. I think that's a -- if 11:44

8 I was reviewing this paper -- and I didn't 11:44

9 review this paper. I don't know who 11:44

10 reviewed it. 11:44

11 But if I was reviewing it and I 11:44

12 spotted that, I would bring it to the 11:45

13 attention of the author. It's -- it's 11:45

14 not -- it -- Mr. Scholz is an academic. I 11:45

15 mean, he was a student and he's working in 11:45

16 an academic environment, but he's in a 11:45

17 good school. Aachen is -- is one of the 11:45

18 leading groups in membrane technology in 11:45

19 Germany. 11:45

20 He -- but he doesn't -- he's not 11:45

21 connected with the industry so well. 11:45

22 So -- so he had to figure out what -- what 11:45

23 sort of permeance should I associate with 11:45

24 these two different membranes. And I 11:45

25 don't think he knew, and so he used the 11:45

1 Dr. Richard W. Baker

2 same one for both. 11:45

3 Q. So -- 11:45

4 A. It would have been better had he 11:45

5 used a more realistic number. 60 is on 11:45

6 the low end for a membrane with 20 11:46

7 selectivity but not impossible. That's a 11:46

8 reasonable sort of number. 60 GPU for a 11:46

9 membrane with a selectivity of 60, whoa, 11:46

10 that -- that's pretty good. 11:46

11 Now, I missed -- Mr. Scholz 11:46

12 recognized that. I mean, he's got this -- 11:46

13 he knew that if he increased the 11:46

14 selectivity it was going to -- the 11:46

15 permeance was going to go way down. He 11:46

16 just didn't know how much. 11:46

17 So rather than -- than using the 11:46

18 information he had, he just -- he just 11:46

19 punted on that problem and used the same 11:46

20 selectivity for both. That -- I mean, it 11:46

21 was -- in his point of view, that doesn't 11:46

22 really matter. But... 11:46

23 Q. Are you saying that a person of 11:46

24 skill in the art reading Scholz in 2014 is 11:46

25 going to know that the permeance numbers 11:47

1 Dr. Richard W. Baker

2 can't be right as -- in Figure 7 and 11:47

3 Figure 5? 11:47

4 MR. LANE: Objection. Form. 11:47

5 Objection. Compound. 11:47

6 A. No. In Figure 5, the permeance 11:47

7 is too high. It is -- and I think even a 11:47

8 POSITA would probably recognize that too. 11:47

9 His permeance is 60 GPU and a 11:47

10 selectivity of 60. I mean, the realistic 11:47

11 number is maybe 10 or 20. It's certainly 11:47

12 maybe one-third of -- of what the 11:47

13 realistic number is for CA with a -- with 11:47

14 a selectivity of 20. 11:47

15 BY MR. LANTIER: 11:47

16 Q. And for Figure 7, you feel that 11:47

17 those are -- are reasonable selectivity 11:47

18 and permeance numbers? 11:47

19 A. They are close. I mean, I would 11:48

20 have used a slightly higher maybe 11:48

21 permeance, but -- but it's not that far 11:48

22 off. 11:48

23 Q. In 2014, if you were looking at 11:48

24 this, what - what permeance would you 11:48

25 probably have used? 11:48

1 Dr. Richard W. Baker

2 MR. LANE: Objection. Form. 11:48

3 A. I might have gone as high as 11:48

4 100. Membranes do get better, but CA has 11:48

5 been around a long time. I think 60 to 11:48

6 100, maybe even a bit more than that. But 11:48

7 100 may be a better number. 11:48

8 BY MR. LANTIER: 11:48

9 Q. And so a person -- and so a 11:48

10 person of skill in the art at this time 11:48

11 reading this would -- would know that 11:48

12 really the permeance is likely closer to 11:48

13 100 for the membranes that Scholz is using 11:48

14 here? 11:48

15 MR. LANE: Objection. Form. 11:48

16 Objection. Misstates testimony. 11:48

17 Objection -- 11:48

18 A. 60 is -- 11:48

19 MR. LANE: Dr. Baker, let me 11:48

20 object. 11:48

21 THE WITNESS: Oh, sorry. 11:48

22 MR. LANE: Objection. Form. 11:49

23 Objection. Misstates his testimony. 11:49

24 A. 60 is okay. It's maybe a little 11:49

25 low, but it's okay for CA. But 60 for 11:49

1 Dr. Richard W. Baker

2 P84, or whatever this membrane is that has 11:49
3 the selectivity of 60, is then -- then 60 11:49
4 GPU for that membrane is -- is too high. 11:49

5 It's got to be less than 11:49
6 cellulose acetate. It's got to be less. 11:49
7 Probably three times less. 11:49

8 BY MR. LANTIER: 11:49

9 Q. The membrane material used in 11:49
10 the Scholz membranes for Figure 7 is 11:49
11 cellulose acetate, correct? 11:49

12 A. Yeah. That's what he says, 11:49
13 uh-huh. 11:49

14 Q. That's not the same material 11:49
15 that is used in Comparative Example 1 in 11:49
16 Ungerank, correct? 11:49

17 A. That's correct. Ungerank, you 11:50
18 just pointed out to me, is polyimide, yes. 11:50

19 Q. And those are different membrane 11:50
20 materials with different properties, 11:50
21 correct? 11:50

22 A. Yeah. Those are the two 11:50
23 membrane -- the -- the polyimide is -- has 11:50
24 a small fraction of the market and is 11:50
25 competitive with cellulose acetate, and 11:50

1 Dr. Richard W. Baker

2 they both have -- whoops -- 11:50

3 MR. LANE: Restart later. 11:50

4 THE WITNESS: So my computer is 11:50

5 spitting out a -- 11:50

6 MR. LANE: No, no, no, no. This 11:50

7 is the power. Okay. Sorry about 11:50

8 that. 11:50

9 A. Let's -- let's start again. 11:50

10 No. I've lost my train of 11:50

11 thought. I'm sorry. 11:50

12 BY MR. LANTIER: 11:50

13 Q. That's okay. 11:50

14 MR. LANTIER: I -- and I can't 11:50

15 remember my question. Could we just 11:50

16 read the question back so that we're 11:50

17 sure we have Dr. Baker's full answer? 11:51

18 (Record read.) 11:51

19 A. Relatively similar properties, 11:51

20 yes. 11:51

21 BY MR. LANTIER: 11:51

22 Q. But they are different 11:51

23 materials, correct? 11:51

24 A. They are different materials. 11:51

25 Q. And the material used in 11:51

1 Dr. Richard W. Baker

2 Comparative Example 1 is relatively 11:51

3 uncommon in the market, correct? 11:51

4 MR. LANE: Objection. Form. 11:51

5 Objection. Misstates his testimony. 11:51

6 A. It's -- it has a fraction of the 11:51

7 market, but not a big fraction. Just to 11:51

8 clarify that. 11:52

9 It has a small fraction of the 11:52

10 market. Not necessarily because it's not 11:52

11 a -- not a competitive membrane. It 11:52

12 just -- cellulose acetate is made by 11:52

13 the -- by the dominant companies in the 11:52

14 market, Honeywell and Celanese. And they 11:52

15 happen to have the bulk of the market. 11:52

16 They both make CA. 11:52

17 Q. If you could turn with me -- now 11:52

18 I'm back in your declaration, Doctor. If 11:52

19 you could turn with me to Paragraph 178, 11:52

20 please. 11:52

21 And do you see here we've got 11:53

22 your opinion on Claim 12? 11:53

23 A. Uh-huh. Pure gas selectivity is 11:53

24 12 to 100 -- 20 to 100. Yep, got it. 11:53

25 Yeah. I remember this -- this 11:53

1 Dr. Richard W. Baker

2 issue, uh-huh. 11:53

3 Q. And if you look here in the 11:53

4 second paragraph, it says a person of 11:53

5 skill in the art "...in December of 2014 11:53

6 would have known that a membrane's 11:53

7 pure-gas selectivity is higher than its 11:53

8 mixed-gas selectivity, but nonetheless the 11:53

9 pure-gas selectivity for the types of 11:53

10 membranes in Comparative Example 1 would 11:53

11 not be more than 500% higher than the 11:53

12 mixed-gas selectivity for CO₂/CH₄. " 11:53

13 Do you see that? 11:54

14 A. I see that. 11:54

15 Q. And the -- the support you cite 11:54

16 for that statement is a document that's 11:54

17 been designated AP 1013, correct? 11:54

18 A. Okay. Which is -- 11:54

19 Q. Do you know what that is? 11:54

20 A. No. 11:54

21 Q. Okay. That is your textbook. 11:54

22 A. Oh, well, then it must be right. 11:54

23 Q. And so we have a copy of that. 11:54

24 If we could just -- 11:54

25 MR. LANE: We have a hard copy 11:54

1 Dr. Richard W. Baker
2 of it here, too. 11:54
3 MR. LANTIER: Oh, you do. Okay. 11:54
4 Very good. 11:54
5 MR. LANE: Yes. It's not the 11:54
6 book. It's just -- it's the exhibit. 11:54
7 It doesn't have the exhibit number on 11:54
8 it, but it is the exhibit. 11:54
9 BY MR. LANTIER: 11:54
10 Q. So, Dr. Baker, just for record 11:54
11 purposes, do you have before you a copy of 11:54
12 a document that's got the designation 11:54
13 AP 1013 in the lower right-hand corner on 11:54
14 the first page? 11:54
15 A. It doesn't have the designation. 11:55
16 Q. Okay. 11:55
17 A. But it is the third edition of 11:55
18 my book, Membrane Technology and 11:55
19 Applications, yep. 11:55
20 Q. Very good. Now, could you turn 11:55
21 with me to Pages 334 -- 11:55
22 MR. LANE: Greg, before you do 11:55
23 that, could you post that because we 11:55
24 only have one copy here and I don't 11:55
25 have a copy to look at. 11:55

1 Dr. Richard W. Baker

2 MR. LANTIER: Yes. 11:55

3 MR. LANE: I appreciate it. 11:55

4 MR. LANTIER: Could you please 11:55

5 drop into the chat, the document 11:55

6 that's at Tab 8? 11:55

7 THE WITNESS: Ah, here we are. 11:55

8 MR. LANTIER: I'm just going to 11:56

9 give everyone a moment to open that 11:56

10 up. 11:56

11 MR. LANE: It has to download 11:56

12 here, but I think I've got it now. 11:56

13 Yes, I've got it now. 11:56

14 BY MR. LANTIER: 11:56

15 Q. And so, Dr. Baker, if you could 11:56

16 turn to Page 334 of this textbook? 11:56

17 A. Yep, yeah. Got it. 11:56

18 Q. I apologize. I was momentarily 11:56

19 confused because I was looking at the 11:57

20 label at the bottom of AP 1013, which is 11:57

21 slightly different pagination, so, 11:57

22 Dr. Baker, I'm going to be a little bit 11:57

23 more specific about what page we're 11:57

24 looking at here. 11:57

25 You're looking at a page that in 11:57

1 Dr. Richard W. Baker

2 the upper left-hand corner has the number 11:57

3 334, correct? 11:57

4 A. Yep. 11:57

5 Q. Okay. And the page numbers in 11:57

6 your textbook are in the upper left-hand 11:57

7 corner as opposed to the bottom center of 11:57

8 the textbook, correct? 11:57

9 MR. LANE: Objection. Form. 11:57

10 A. Well, actually, it oscillates 11:57

11 between the top left and top right, but 11:57

12 okay. 11:57

13 BY MR. LANTIER: 11:57

14 Q. Okay. More information than we 11:57

15 need. 11:57

16 The reason I'm clarifying is 11:57

17 that in the exhibit that was submitted to 11:57

18 the board, there is a -- there are page 11:57

19 numbers that are at the bottom center of 11:57

20 the page, and I just don't want there to 11:58

21 be confusion about what it is we're going 11:58

22 to be talking about here. 11:58

23 Okay. So you're at Page 334 as 11:58

24 in the upper left-hand corner of the 11:58

25 document, correct? 11:58

1	Dr. Richard W. Baker	
2	A. Yep.	11:58
3	Q. And there you say, towards the	11:58
4	bottom of the page -- I think it's the	11:58
5	second-to-last full sentence, that "Figure	11:58
6	8.8 shows selected data for the separation	11:58
7	of methane and carbon dioxide using	11:58
8	cellulose acetate membranes."	11:58
9	Correct?	11:58
10	A. That's right.	11:58
11	Q. Now, that's the same material	11:58
12	that is used in Scholz, correct?	11:58
13	A. That's right.	11:58
14	Q. But it's a different material	11:58
15	than what's used in Ungerank, Comparative	11:58
16	Example 1, correct?	11:58
17	A. That's right.	11:58
18	Q. And if you turn back in your	11:58
19	textbook to -- I'm sorry, it's forward in	11:59
20	your textbook to Page 339.	11:59
21	A. Got it.	11:59
22	Q. We see there that in Table 8.2,	11:59
23	polyimide has different properties from	11:59
24	cellulose acetate, correct?	11:59
25	A. We're looking at Table 8.2?	12:00

1 Dr. Richard W. Baker

2 Q. Yes. 12:00

3 Do you see there that it says, 12:00

4 "Module designs used for various gas 12:00

5 separation applications"? 12:00

6 A. Yeah. Yeah. Well, here, ha, 12:00

7 ha, maybe not completely clear. 12:00

8 I was trying to -- to illustrate 12:00

9 the -- the properties of the membranes -- 12:00

10 the dominant membrane that's used for a 12:00

11 particular separation. And -- and, for 12:00

12 example, in the separation of oxygen from 12:00

13 nitrogen, there are probably three or four 12:00

14 membranes used, but a typical membrane and 12:00

15 maybe even the dominant membrane is 12:00

16 polyimide, which has the selectivity of 6 12:00

17 or 7 for oxygen and nitrogen and the 12:00

18 permeance or pressure-normalized flux, 12:00

19 that's permeance, is 10 to 30. 12:00

20 And then further down, I got 12:01

21 CA -- CO2 methane, so different 12:01

22 separation, so I do not show a different 12:01

23 membrane, cellulose acetate, the dominant 12:01

24 membrane. 12:01

25 There, I say the selectivity is 12:01

1 Dr. Richard W. Baker

2 15, pressure-normalized flux 100 to 200, 12:01

3 and could be spirals or polyfiber but 100 12:01

4 to 200. And this is a selectivity of 15. 12:01

5 Selectivity of 20, it would be a 12:01

6 little bit lower, going down to 60. 12:01

7 That's a little far, I think. Maybe 100 12:01

8 as we were talking about earlier. And so 12:01

9 forth, yeah. 12:01

10 Q. Now, I'm going to ask you to 12:01

11 just jump back the Priske patent, the '380 12:01

12 patent that we're -- that's at issue in 12:02

13 this case just for a moment. 12:02

14 A. Got it. 12:02

15 Q. And to turn to Claims 11 and 12. 12:02

16 A. Okay. 12:02

17 Q. Claim 11, which is in Column 31, 12:02

18 has a limitation that says "...wherein the 12:02

19 gas separation membranes in the feed 12:02

20 stream separation stage have a pure gas 12:02

21 selectivity for CO₂/CH₄ of at least 10." 12:02

22 Do you see that? 12:02

23 A. Got it. 12:02

24 Q. And then 12 is dependent from 12:02

25 Claim 11, but it adds the limitation 12:02

1 Dr. Richard W. Baker

2 "wherein the gas separation membranes in 12:02

3 the feed stream separation stage have a 12:02

4 pure gas selectivity for CO₂/CH₄ from 20 to 12:02

5 100. " 12:02

6 Do you see that? 12:02

7 A. Yeah. Yes. 12:02

8 Q. Now, if we go back to your 12:03

9 textbook just for a moment and turn to 12:03

10 Page 335, which has Figure 8.8 on it. 12:03

11 A. Yep. 12:03

12 Q. Are you there? 12:03

13 A. I'm there. Sorry. 12:03

14 Q. Okay. In Figure 8.8, there's no 12:03

15 data for membrane cell activity below 40 12:03

16 for pure gas, correct? 12:03

17 A. Uh-huh. Yeah. 12:03

18 Q. Thank you. 12:04

19 Let's turn back to your 12:04

20 declaration, just for a moment. If you 12:04

21 could turn to Page 230 -- I'm sorry, 12:04

22 Paragraph 238, which is on Page 85. 12:04

23 A. Uh-huh. 12:04

24 Q. Here you acknowledge that the 12:04

25 Scholz article doesn't specify if the 12:04

1 Dr. Richard W. Baker
2 selectivity numbers it's using are from 12:04
3 mixed gas or pure gas, correct? 12:04
4 A. Yeah. 12:05
5 Q. Let's take another short break. 12:05
6 A. It's the -- 12:05
7 THE TECH: Do you want to go off 12:05
8 the record really quick, counsel? 12:05
9 MR. LANTIER: Yes. Let's go off 12:05
10 the record, please. 12:05
11 THE TECH: Stand by. 12:05
12 The time is 12:05 p.m., and 12:05
13 we're off the record. 12:05
14 AUTOMATED MESSAGE: Recording 12:05
15 stopped. 12:06
16 (Whereupon, a lunch recess was 12:06
17 taken at 12:05 p.m. PST.)

18
19 * * *
20
21
22
23
24
25

1 Dr. Richard W. Baker

2 A F T E R N O O N S E S S I O N

3 (Time noted: 12:41 p.m. PST)

4

5 * * * 10:37

6 10:37

7 AUTOMATED MESSAGE: Recording in 12:41

8 progress. 12:41

9 THE TECH: The time is 12:41

10 12:41 p.m., and we're back on record. 12:41

11 MR. LANTIER: I would ask if we 12:41

12 could mark as Deposition 12:41

13 Exhibit Number 1 the document that's 12:41

14 at Tab 11. So let's put that in the 12:41

15 chat so that Dr. Baker can download 12:41

16 it. 12:41

17 (Whereupon, Exhibit 1, "Natural 12:41

18 Gas Purification", was marked for 12:41

19 identification.) 12:41

20 MR. LANTIER: 12:41

21 Q. Dr. Baker, take your time. My 12:41

22 first question is just going to be, what 12:41

23 is Exhibit 1? 12:42

24 THE WITNESS: Okay. Could you 12:42

25 help me with this? Oh, is that my CV? 12:42

1 Dr. Richard W. Baker

2 No. 12:42

3 MR. LANE: There we go. We have 12:43

4 it. 12:43

5 BY MR. LANTIER: 12:43

6 Q. Dr. Baker, once you have a 12:43

7 moment to review the document, can you 12:43

8 just tell us what Exhibit 1 is? 12:43

9 A. Seems -- hold on. Ah, uh-huh. 12:43

10 Okay. Now, all right. 12:43

11 It's -- yeah. Exhibit 1 is an 12:43

12 encyclopedia article that -- that I wrote 12:43

13 together with two of my colleagues, and 12:43

14 I -- I have to say, I haven't looked at 12:44

15 this thing since 2016, which is when it 12:44

16 came out. Okay. Yeah. Haiqing Lin is a 12:44

17 now a professor in Buffalo, and Kaaeid 12:44

18 Lokhandwala is the guy in charge of our 12:44

19 natural gas processing group at MTR. 12:44

20 Q. And there's also a Lloyd S. 12:44

21 White on that article. Who is that? 12:44

22 A. Steve White. Steve White is -- 12:44

23 he's now retired. He is -- was also at 12:44

24 MTR, and he -- he -- he's a membrane 12:44

25 scientist, I guess you would call it, 12:44

1 Dr. Richard W. Baker

2 yeah. He's in our research group. 12:44

3 Q. Is this -- was this article -- 12:44

4 excuse me. 12:44

5 MR. LANTIER: Strike that. 12:44

6 BY MR. LANTIER: 12:45

7 Q. Was this encyclopedia entry 12:45

8 written sometime around 2013? 12:45

9 A. Yeah. It might have 12:45

10 incorporated -- because I have a couple of 12:45

11 review articles that probably predate this 12:45

12 and, of course, my book, and there were a 12:45

13 number of things that we put in. But, 12:45

14 yeah, 2013 is -- is pretty much, yeah, 12:45

15 when -- when it was all put together. 12:45

16 Q. If you could turn back in your 12:45

17 declaration to Paragraph 125, I had one 12:45

18 more question for you on that one. 12:45

19 And I should say this question 12:45

20 is not about your encyclopedia entry, so 12:45

21 I'm not -- and I don't plan to go back to 12:45

22 your encyclopedia entry right now, so I'm 12:45

23 not trying to tie two things together that 12:45

24 are not related, and I don't want you to 12:46

25 be confused. 12:46

1 Dr. Richard W. Baker

2 A. Yep. 12:46

3 Q. Are you at Paragraph 125 in your 12:46
4 declaration, sir? 12:46

5 A. That's right. 12:46

6 Q. Do you see there that you -- you 12:46
7 say, "For example, I have described in my 12:46
8 book, Membrane Technology and Applications 12:46
9 how membrane systems had been installed on 12:46
10 offshore platforms, where small footprint 12:46
11 and low weight are important"? 12:46

12 A. That's right. 12:46

13 Q. Okay. And if we turn to that 12:46
14 book so AP 1013, which I think -- 12:46

15 A. Yep. 12:46

16 Q. -- you got the copy in front of 12:46
17 you to Page 363. 12:46

18 A. That's right. Got it. 12:46

19 Q. And actually, I think I want you 12:46
20 to start -- well, let me ask you this. 12:47

21 If we're looking at Page 363, 12:47
22 what -- what part of that page are you 12:47
23 referring to when you cite that page in 12:47
24 your declaration? 12:47

25 MR. LANE: Objection. Form. 12:47

1 Dr. Richard W. Baker

2 Objection. Lacks foundation. 12:47

3 A. Did I refer to this page in my 12:47
4 declaration? 12:47

5 BY MR. LANTIER: 12:47

6 Q. That's how I understood it, and 12:47
7 maybe I'm wrong. It says, you know, at 12:47
8 the end of that sentence that I read, the 12:47
9 "for example" sentence -- 12:47

10 A. Ah, it talks about dehydration 12:47
11 systems, yeah. 12:47

12 Q. Yeah. It says, "AP-1013, 363," 12:47
13 and so I was just trying to confirm why it 12:47
14 was that you cited that page so that we 12:47
15 know what you believe to be the relevant 12:47
16 portion. 12:48

17 A. Talking about offshore 12:48
18 platforms. 12:48

19 Q. And, again, I don't mean to 12:48
20 interrupt you at all. I just don't want 12:48
21 it to be a -- you know, a word search. 12:48

22 The word "offshore" or the 12:48
23 phrase "offshore platforms" does appear on 12:48
24 Page 363 in the -- the bullet marked with 12:48
25 the Number 3, if that's helpful, but I'm 12:48

1 Dr. Richard W. Baker
2 not trying to limit you as to what on this 12:48
3 page you were referring to when you cited 12:48
4 that. 12:48
5 A. Ah, okay. 12:49
6 (Reading to self) -- if the gas 12:49
7 contains less than 10 percent CO2. 12:49
8 I got that. Yeah. If -- okay. 12:49
9 If -- if the gas -- when would 12:49
10 you use a membrane plant or -- and when 12:49
11 would you use an amine plant to separate 12:49
12 CO2 from methane. 12:49
13 And one of the -- yeah. One of 12:49
14 the amine plants will work better if -- if 12:49
15 you only need to take a little bit of CO2 12:49
16 out. Say the gas has 5 percent CO2 and 12:49
17 you want to get -- you have to get down to 12:50
18 less than 2 percent CO2. 12:50
19 An amine plant is really quite 12:50
20 effective at that -- in that concentration 12:50
21 range because it's -- it's -- the -- the 12:50
22 size of the plant depends upon the mass of 12:50
23 CO2 that you have to remove. 12:50
24 But -- so -- so it's very 12:50
25 effective because there's -- you need -- 12:50

1 Dr. Richard W. Baker

2 you can treat a lot of gas. It's only got 12:50
3 5 percent CO₂. You've -- you've got to 12:50
4 remove some of that CO₂ to get down to 12:50
5 2 percent. 12:50

6 An amine plant will treat a lot 12:50
7 of gas fairly cheaply. But if the gas 12:50
8 had, say, 30 percent CO₂, ah, then the 12:50
9 amine plant would actually be about five 12:50
10 or six or seven times more bigger to treat 12:50
11 the same amount of gas because the amine 12:51
12 plant scales with the -- with the mass of 12:51
13 gas. 12:51

14 So -- so the amine plant would 12:51
15 not be -- is -- is less competitive when 12:51
16 it has high concentration of CO₂ in the 12:51
17 gas. But in the -- with membranes, it's 12:51
18 actually the other way around. 12:51

19 If they are treating high CO₂ 12:51
20 gas, they -- they are often very 12:51
21 competitive with amine. But if they treat 12:51
22 low CO₂ gas, they are not competitive. 12:51
23 And in the little drawing at the bottom 12:51
24 illustrating that, for example, the gas 12:51
25 has 30 percent CO₂. 12:51

1 Dr. Richard W. Baker

2 It's a hybrid plant. The 12:51
3 membrane unit takes it from 30 percent to 12:51
4 10 percent. 12:51

5 Now, you could make a membrane 12:51
6 unit and take it all the other way. But, 12:51
7 in fact, if plant's big enough, you would 12:51
8 take from 10 percent to 2 percent. You 12:52
9 would actually do it with an amine. 12:52

10 So that's the -- that's the 12:52
11 thought process that's going on when I 12:52
12 talk about here, so in -- in -- you can't 12:52
13 use amines -- yeah. 12:52

14 So -- so in general, membrane 12:52
15 system is too expensive to compete head to 12:52
16 head with amine if the gas contains less 12:52
17 than 10 percent -- system too expensive. 12:52
18 I may have got the thing around -- too 12:52
19 expensive. 12:52

20 That's a -- it should say 12:52
21 contains more than 10 percent CO2 -- 12:52
22 (reading to self). 12:52

23 No. If the gas contains less -- 12:53
24 that's all right. 12:53

25 So with head to head with 12:53

1 Dr. Richard W. Baker

2 amines, if the gas contains less than CO₂, 12:53

3 then -- then you would use an amine plant 12:53

4 if it's less than 10 percent. 12:53

5 But a few things have -- a few 12:53

6 membrane systems have been installed even 12:53

7 though the gas has less than 10 percent -- 12:53

8 if it has less than 10 percent CO₂ on 12:53

9 platforms and places like that where a 12:53

10 small footprint and so forth is required. 12:53

11 Yeah. 12:53

12 Q. Okay. So that when it says 12:53

13 "However, a large number of membrane 12:53

14 systems have been installed on offshore 12:53

15 platforms, where the small footprint and 12:53

16 low weight of membrane systems are 12:53

17 important," that's in comparison to an 12:53

18 amine -- 12:53

19 (Cross-talk.) 12:53

20 MR. LANE: Dr. Baker, you have 12:53

21 to wait for him to -- 12:53

22 MR. LANTIER: That's okay. 12:54

23 MR. LANE: All right. 12:54

24 BY MR. LANTIER: 12:54

25 Q. I was just clarifying that that 12:54

1 Dr. Richard W. Baker

2 statement there that says, "However, a 12:54

3 large number of membrane systems have been 12:54

4 installed on offshore platforms, where the 12:54

5 small footprint and low weight of membrane 12:54

6 systems are important," that that's a 12:54

7 statement that's being made in comparison 12:54

8 to an amine system, correct? 12:54

9 A. Yeah. That's correct. 12:54

10 Q. And then you say, "Membrane 12:54

11 systems are also used in carbon dioxide 12:54

12 enhanced oil recovery operations, or on 12:54

13 other gas streams containing high 12:54

14 concentrations of carbon dioxide that 12:54

15 favor membrane technology." 12:54

16 Do you see that there? 12:54

17 A. Yeah. Yeah, that's right. 12:54

18 Q. And there, is that a reference 12:54

19 to what you were talking about before that 12:54

20 if the — if the CO2 percentage is 12:54

21 30 percent or higher, then it will make 12:54

22 more economic sense to use membranes 12:54

23 rather than amine? 12:55

24 MR. LANE: Objection. Form. 12:55

25 A. Absolutely. Yeah. 12:55

1 Dr. Richard W. Baker

2 And then the biogas applications 12:55

3 we're talking about, there are a whole 12:55

4 number of reasons to use membranes; about 12:55

5 50 percent CO2 is one of them. 12:55

6 BY MR. LANTIER: 12:55

7 Q. And then the last sentence here 12:55

8 says, "As membranes improve, their market 12:55

9 share is increasing." 12:55

10 What was that about? 12:55

11 A. Well, you know, as a membrane 12:55

12 guy, I'm focused on the membranes. And 12:55

13 this is one of the bigger applications of 12:55

14 membranes. But, in fact, membranes even 12:55

15 now probably don't have more than -- more 12:55

16 than 20 percent of the market share. 12:55

17 Eighty percent of the market is still 12:55

18 using amine. 12:55

19 Q. And -- and there's no reference 12:55

20 in -- in this portion of your textbook to 12:55

21 the selectivity or the permeance of the 12:56

22 membranes that are used, correct? 12:56

23 A. Not in this portion, but 12:56

24 elsewhere there probably is. But at least 12:56

25 not -- I don't see it in this portion. A 12:56

1 Dr. Richard W. Baker

2 few pages earlier, we were looking at some 12:56

3 pages -- a table. 12:56

4 Q. And this section of your 12:56

5 textbook doesn't say anything about the 12:56

6 cost of energy, correct? 12:56

7 A. No. Not that I can recall. 12:56

8 Q. Now, if you could turn in your 12:56

9 declaration to Paragraph 137, which is on 12:56

10 Page 43 here. 12:56

11 A. I have it. 12:57

12 Q. And the heading here is "A 12:57

13 POSITA's Reasonable Expectation in 12:57

14 Combining Ungerank and Scholz's 12:57

15 Teachings." 12:57

16 Do you see that? 12:57

17 A. I got it, uh-huh. 12:57

18 Q. Now, I wanted to ask you a 12:57

19 question specifically about Paragraph 141, 12:57

20 if you could just review that one for a 12:57

21 moment. 12:57

22 A. Yes. 12:57

23 Q. And here, you're talking about 12:57

24 some other papers that discuss optimizing 12:57

25 three-stage systems, correct? 12:57

1 Dr. Richard W. Baker

2 A. Yes. 12:57

3 Q. And one of those that you point 12:57

4 to is a paper by Qi and Henson, AP-1009, 12:57

5 correct? 12:58

6 A. Yeah. 12:58

7 Q. Now, I don't know if your 12:58

8 counsel has a copy of that document, but 12:58

9 we'll put it in the chat. That should be 12:58

10 found at Tab 6. And if you have a paper 12:58

11 copy, by all means please use the paper 12:58

12 copy. 12:58

13 MR. LANE: Give me a second 12:58

14 while we find it. 12:58

15 A. We have a paper copy which is 12:58

16 just as well because -- yes, uh-huh. 12:58

17 BY MR. LANTIER: 12:58

18 Q. Now, just turning back to 12:58

19 Paragraph 141 for a moment, here for the 12:58

20 Qi document -- for the Qi reference, 12:58

21 you're citing Pages 2723 to 2724 and, in 12:58

22 particular, to Figures 4 and 5 on those 12:59

23 pages, correct? 12:59

24 A. Yes. Got it. Uh-huh. 12:59

25 Q. And now, are you looking at 12:59

1 Dr. Richard W. Baker

2 those figures? I think they are actually 12:59

3 both on Page 2725. 12:59

4 A. Got them, yeah. 12:59

5 Q. In the two figures here, this 12:59

6 Figure 4 and Figure 5 in the Qi reference, 12:59

7 AP-1009, there's only one recycle stream, 12:59

8 not two, correct? 12:59

9 A. That would go -- yes, because, 12:59

10 yeah, the -- it's a three -- it's a 13:00

11 two-step, two-stage system. But it's of a 13:00

12 different type of two step, two-stage 13:00

13 system than the Ungerank model that we're 13:00

14 normally looking at. So okay, go ahead. 13:00

15 Q. Yes. So these Figures 4 and 5 13:00

16 in Qi are different from the arrangement 13:00

17 in Scholz or Ungerank, correct? 13:00

18 A. Yes. Exactly, uh-huh. 13:00

19 Q. Because in Scholz and Ungerank, 13:00

20 both the retentate and the separation 13:00

21 stages feed back into the recycle stream, 13:00

22 correct? 13:00

23 MR. LANE: Objection. Form. 13:00

24 A. Yes. 13:00

25 BY MR. LANTIER: 13:00

1 Dr. Richard W. Baker

2 Q. Sorry, sir. Did you say yes? 13:00

3 A. Yeah. Yes. 13:00

4 Q. Okay. Now, if you would turn to 13:00

5 Page 10 of Qi -- well, I'm going to try to 13:01

6 point you to Figure 9 in Qi, which is on 13:01

7 Page 2728 of that article. 13:01

8 A. Wait -- got it. 13:01

9 Q. Okay. This is an example more 13:01

10 similar to the arrangement of stages in 13:01

11 Ungerank and Scholz, correct? 13:01

12 A. That's right. 13:01

13 MR. LANE: Objection. Form. 13:01

14 BY MR. LANTIER: 13:01

15 Q. Because here, we -- we do have 13:01

16 an example where both the retentate and 13:01

17 separation stages feed back into the 13:01

18 recycle stream, right? 13:01

19 MR. LANE: Objection. Form. 13:01

20 A. Yes. Yes. 13:02

21 BY MR. LANTIER: 13:02

22 Q. So I would like you to take a 13:02

23 look at the surface areas here of the 13:02

24 first and the second stages. 13:02

25 Do you see those numbers? 13:02

1 Dr. Richard W. Baker

2 A. Yes. Surface area, where is it? 13:02

3 Ah, yeah, there it is. Uh-huh. Okay. 13:02

4 Got it. Uh-huh. 13:02

5 Q. And -- and you would agree with 13:02

6 me that in Figure 9 of Qi, which is more 13:02

7 similar to Ungerank and Scholz, the 13:02

8 surface area of the membranes for the 13:02

9 first stage is larger than the surface 13:02

10 area for the membranes in the second 13:02

11 stage, correct? 13:02

12 MR. LANE: Objection. Form. 13:02

13 Objection. Compound. Objection. 13:02

14 Lack of foundation. 13:02

15 A. Yes. It is bigger, uh-huh. 13:02

16 MR. LANTIER: Thank you, Doctor. 13:03

17 I don't think I have any further 13:03

18 questions for you. We appreciate your 13:03

19 time. 13:03

20 THE WITNESS: Okay. Thank you. 13:03

21 MR. LANE: Is that for both 13:03

22 days? 13:03

23 MR. LANTIER: Yes. This will be 13:03

24 the completion of this -- of the 13:03

25 deposition as to Dr. Baker's opening 13:03

1	Dr. Richard W. Baker	
2	declaration.	13:03
3	MR. LANE: Okay. Give us a	13:03
4	minute. I don't think I have any	13:03
5	redirect, but I just want to talk to	13:03
6	Grace who's on too, real quick, just	13:03
7	to make sure. If you could give us	13:03
8	ten minutes.	13:03
9	MR. LANTIER: Of course.	13:03
10	MR. LANE: Thanks.	13:03
11	THE TECH: Stand by.	13:03
12	The time is 1:03 p.m., and we're	13:03
13	going off the record.	13:03
14	AUTOMATED MESSAGE: Recording	13:03
15	stopped.	13:03
16	(Recess taken.)	13:03
17	AUTOMATED MESSAGE: Recording in	13:09
18	progress.	13:09
19	THE TECH: The time is	13:09
20	1:09 p.m., and we're back on record.	13:09
21	MR. LANE: All right. We don't	13:09
22	have any questions for Dr. Baker.	13:09
23	But I did want to reserve his	13:09
24	read and sign.	13:09
25	(Whereupon, a request for Read	13:09

1	Dr. Richard W. Baker	
2	and sign was made.)	13:09
3	MR. LANTIER: Very good.	13:09
4	MR. LANE: All right. Thanks,	13:09
5	Greg. It was nice to meet you.	13:09
6	And thanks everybody else for	13:09
7	bearing with us on a Sunday.	13:09
8	MR. LANTIER: Nice to meet	13:09
9	everyone.	13:09
10	And thank you, Dr. Baker. We	13:09
11	appreciate your time.	13:09
12	THE WITNESS: No problem. Thank	13:09
13	you.	13:09
14	THE TECH: Stand by.	13:09
15	The time is 1:09 p.m., and we're	13:09
16	going off the record.	13:09
17	AUTOMATED MESSAGE: Recording	13:09
18	stopped.	13:09
19	THE COURT REPORTER: Do You want	13:09
20	the same delivery?	13:09
21	MR. LANE: No. We don't -- we	13:09
22	want the absolute lowest cost option.	13:10
23	THE COURT REPORTER: Mr. Lane,	13:10
24	did you want the rough draft?	13:10
25	MR. LANE: Actually, no. I	13:10

1 Dr. Richard W. Baker
2 don't need the rough. 13:10
3 MR. LANTIER: We'll take the 13:10
4 rough and as soon as possible final. 13:10
5 (Time noted: 1:11 p.m. PST.)
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ACKNOWLEDGEMENT OF DEPONENT

I, DR. RICHARD W. BAKER, do
hereby acknowledge that I have read
and examined the foregoing testimony,
and the same is a true, correct and
complete transcription of the
testimony given by me, and any
corrections appear on the attached
Errata sheet signed by me.

(DATE) (SIGNATURE)

CERTIFICATE OF SHORTHAND REPORTER

NOTARY PUBLIC

I, Amanda Gorrone, the officer
before whom the foregoing deposition
was taken, do hereby certify that the
foregoing transcript is a true and
correct record of the testimony given;
that said testimony was taken by me
stenographically and thereafter
reduced to typewriting under my
direction; and that I am neither
counsel for, related to, nor employed
by any of the parties to this case and
have no interest, financial or
otherwise, in its outcome.

IN WITNESS WHEREOF, I have
hereunto set my hand this 8th day of
December, 2024.



AMANDA GORRONE, CLR
CLR NO: 052005 – 01
Notary Public in and for
The State of New York
County of Suffolk
My Commission No. 01G06041701
Expires: 01/07/2027

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20 Under penalties of perjury, I declare that
21 I have read the foregoing document and
22 that the facts stated in it are true.

24 _____
25 DR. RICHARD W. BAKER