

1 UNITED STATES PATENT AND TRADEMARK OFFICE
2 BEFORE THE PATENT TRIAL AND APPEAL BOARD DIVISION

3 TOPSOE, INC., Petitioner)
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VS.) CASE NO. IPR2025-01454

) PATENT 11,286,168

CASALE S.A.)

ORAL VIDEOTAPED DEPOSITION

JAMES RITTER, Ph.D.

April 30, 2026

ORAL VIDEOTAPED DEPOSITION OF JAMES RITTER,
Ph.D., produced as a witness at the instance of the
Respondent and duly sworn, was taken in the
above-styled and numbered cause on the 30th day of
April, 2026, from 9:02 a.m. to 4:18 p.m., before
Shauna Foreman, Certified Shorthand Reporter in and
for the State of Texas, reported by computerized
stenotype machine at the offices of Spencer Fane,
3040 Post Oak Boulevard, Suite 1400, Houston, Texas,
pursuant to the provisions stated on the record or
attached hereto.

1 APPEARANCES 2 FOR TOPSOE, INC.: 3 JEFFREY J. PHILLIPS, ESQ. 4 SPENCER FANE 5 3040 Post Oak Boulevard 6 Suite 1400 7 Houston, Texas 77058 8 Email: jphillips@spencerfane.com 9 10 FOR CASALE S.A.: 11 CHASE COLLARD, ESQ. 12 DORSEY & WHITNEY 13 1400 Wewatta Street 14 Suite 400 15 Denver, Colorado 80202 16 Email: sherri.stucki@dorseywhitney.com 17 ALSO PRESENT: 18 Ray Burchette, Videographer 19 Kyril Talanov 20 21 22 23 24 25 Page 2	1 THE VIDEOGRAPHER: Good morning. 2 We're going on record at 9:02. Today's date is April 3 30th, 2026. This is Media 1 of the video-recorded 4 deposition of James Ritter. Ms. Court Reporter, 5 please swear in the witness. 6 JAMES RITTER, PH.D., 7 having been first duly sworn, testified as follows: 8 EXAMINATION 9 Q. (BY MR. COLLARD) Good morning. 10 Dr. Ritter, correct? 11 A. Yes. 12 Q. Okay. Good morning, Dr. Ritter. My name 13 is Case Collard. I'm with Dorsey & Whitney, and I 14 represent Casale. I am going to be asking you some 15 questions today. And before we really get into it, I 16 just want to go over a couple of background issues. 17 One is if I ask you a question and you 18 don't understand it, will you please ask me to 19 clarify or re-ask my question? 20 A. Yes. 21 Q. Okay. And then that's another issue. You 22 need to answer any of my questions orally so that -- 23 rather than just with head nods so that our court 24 reporter can take down your response. 25 Will that be okay? Page 4
1 INDEX 2 PAGE 3 JAMES RITTER, PH.D. 4 Examination by Mr. Collard 4 5 6 EXHIBITS 7 8 NUMBER DESCRIPTION PAGE 9 Exhibit 1 Petition 11 10 Exhibit 2 Curriculum Vitae 23 11 Exhibit 3 Report 24 12 Exhibit 4 '168 Patent 28 13 Exhibit 5 IFA Presentation Slides 87 14 Exhibit 6 Declaration of Mina Ching 96 15 Exhibit 7 Lako Paper 101 16 Exhibit 8 Patent - Price 119 17 Exhibit 9 Patent - Rytter 126 18 Exhibit 10 Patent - Fjellhaug 144 19 20 21 22 23 24 25 Page 3	1 A. Yes. 2 Q. So have you had your deposition taken 3 before? 4 A. Yes. 5 Q. How many times? 6 A. Approximately, I think it's about four 7 times. 8 Q. Four times? When was the most recent? 9 A. Probably just after COVID or just before. 10 That time frame. It's been a few years. 11 Q. About five years ago? 12 A. Ish. I didn't -- I didn't look at my 13 record. 14 Q. That's fine. 15 For all of those depositions, were 16 those in -- for work as an expert witness? 17 A. Yes. 18 Q. Yes? 19 And then is there any reason that you 20 can't give, you know, your full and complete, 21 truthful testimony today? 22 A. There's no reason. 23 Q. All right. And are you taking any 24 medications that might affect your testimony today? 25 A. No. Page 5

1 Q. And if you need a break, that's fine. Just 2 let me know, and we can go off the record. We'll all 3 need to agree to do that, but I just -- answer any 4 pending question, and then let's take a break after 5 that. So if at the end of one of your answers you 6 want to take a break, that would be a great time to 7 mention that, okay? 8 A. I understand. 9 Q. Okay. Did -- who wrote your expert report 10 in this matter? Did you write it? 11 A. I did. 12 Q. Okay. Did you, you know, start with a 13 blank page and then, you know, start writing, or did 14 you get a template from your counsel? Did you draft 15 the entire thing start to finish, or was there -- 16 were there other drafters involved? 17 A. The former. There were some parts that 18 were drafted, I drafted some parts, and there were 19 iterations. 20 Q. Okay. The other parts that were drafted, 21 those were drafted by counsel and you reviewed them. 22 Is that fair? 23 A. Yes. They were mostly the legal sections. 24 Q. Okay. 25 A. The legal language parts. Page 6	1 Do you have a range? Do you know if 2 it's more than 50,000 that you've billed on this? 3 A. I don't think it's more than 50,000. 4 Q. Okay. All right. And then you have 5 something in front of you. I want to talk about 6 what -- what do you have here in front of you? 7 A. It's a folder with my declaration and 8 several -- what do we call them -- exhibits. 9 Q. Yeah. 10 A. That's it. 11 Q. Okay. And we're going to mark some 12 exhibits here today because we need to do that for 13 the record. So, for example, your declaration is a 14 good example. I'm going to mark it as an exhibit. 15 I'm going to hand you a copy. I don't care if you 16 use the copy that I hand you or you use the copy 17 that's in your notebook, but I want to be clear that 18 if I'm asking you about your declaration and you 19 think there's something different about the copy you 20 have, we're going to be going off the copy that's 21 going to be -- that I'm going to mark here today, 22 okay? If something comes up, you think you're 23 missing a page or something, you need to call that 24 out. 25 Do you understand? Page 8
1 Q. And then were you working with anybody else 2 sort of on -- on your end of the thing, a graduate 3 student at University of South Carolina or something 4 like that, or were you the -- the only non-attorney 5 expert that was working on the report? 6 A. I was alone. 7 Q. Okay. And then how much time do you think 8 you spent on your -- your expert report? 9 A. It's been many hours. I think the 10 declaration is dated July of last year, and then 11 there was a long pause until recently. 12 Q. Uh-huh. 13 A. And I don't recall, but it's been, I don't 14 know, 50 hours. 15 Q. Okay. 16 A. I don't know. 17 Q. And then what is your hourly rate in this 18 matter? 19 A. \$450 per hour. 20 Q. 450. Do you know approximately how much 21 you have billed in total in this matter up until now? 22 A. No, I don't keep track. I work on several 23 different projects where I have to bill people and 24 fill out invoices, and it becomes a blur. 25 Q. That's fine. Page 7	1 A. I understand. I can always turn to the 2 other one. 3 Q. I'm not trying to say you can't use your 4 notebook. I just wanted to be clear we have to be a 5 little careful since we're making a record. 6 What did you do to prepare for today's 7 deposition? 8 A. Considerable reviewing of the exhibits. 9 Q. Reviewing of your declaration? 10 A. Yeah, that's one of the exhibits. 11 Q. Yes. So do you -- I think I've already 12 done it. Do you understand what I mean if I call it 13 your report, if I call your declaration your report? 14 A. Yes. That would be fine. 15 Q. It's okay if I use those interchangeably? 16 A. Yes. 17 Q. If we do a little of this early in the 18 deposition, sometimes things go a little more 19 smoothly. 20 And then what other exhibits other 21 than your declaration or report did you review? 22 A. For this deposition? 23 Q. Yeah. 24 A. I think just one other patent. I pretty 25 much focused on the exhibits. Page 9

1 Q. I'm sorry. Maybe my question wasn't clear. 2 Other than your declaration itself, 3 what other exhibits did you review? 4 A. There's seven of them labeled. Would you 5 like the numbers? 6 Q. Sure. 7 A. I don't know if -- they are not in order. 8 Q. That's okay. 9 A. 1001, 1006, 1008, 1012, 1010, 1011, and 10 1009, I believe. Yes. 11 Q. Okay. And then you said there's one that 12 wasn't an exhibit. What is that one that you 13 reviewed? 14 A. Taria. Well, it's Exhibit 107. Sorry. 15 1007. 16 Q. All right. And I don't know those numbers 17 perfectly. I'm going to ask is one of those the '168 18 patent, the patent at issue in this matter? 19 A. 1001 is the patent. 20 Q. And did you meet with people to get 21 prepared? 22 A. Yes. 23 Q. Who did you meet with? 24 A. Jeff Andrews, and I forget your -- 25 MR. PHILLIPS: Jeff Phillips. The Page 10	1 your declaration is introduced. That's what I want 2 to look at, is Page 12 of the petition. It's at the 3 bottom. 4 Do you see where it says -- 5 A. Section 5? 6 Q. Uh-huh, yeah. 7 A. Challenge claims -- 8 Q. It says that "This petition is accompanied 9 by the declaration of Dr. James Ritter, an expert in 10 the processes and systems for syngas production with 11 over 42 years of experience in the industry." 12 What -- this word "industry," what 13 word -- what does that industry refer to? Do you 14 know? What industry? 15 A. Processes and systems for syngas 16 production, that industry. 17 Q. So you've been working in the syngas 18 production industry for 42 years? 19 A. No. 20 Q. Okay. Can you help me understand -- you 21 just -- I don't understand those two answers. I 22 asked you what industry, you said processes and 23 systems for syngas production, and I said, "So is it 24 the syngas production industry," and you said no. 25 So can you help me understand what Page 12
1 Jeffs. 2 A. And Kyril. 3 Q. (BY MR. COLLARD) Anybody else? 4 A. No. 5 Q. And about how long did you guys meet? 6 A. On and off for a few weeks. 7 Q. Total time, what do you think? 8 A. 10 hours. 9 Q. All right. I want to turn a little bit to 10 your background. 11 Are you an expert in processes and 12 systems for syngas production? 13 A. Yes. 14 Q. Okay. And in some of the materials, it 15 says you have 42 years -- well, you know, let's just 16 look at it. There's no reason to -- I'm going to go 17 ahead and mark the petition as Exhibit 1. 18 (Exhibit 1 marked) 19 Q. (BY MR. COLLARD) Do you have a copy of the 20 petition in your notebook? 21 MR. COLLARD: Do you want a copy? 22 MR. PHILLIPS: I'll just make a pile 23 here. 24 A. I do not. 25 Q. (BY MR. COLLARD) All right. On Page 12, Page 11	1 industry this refers to? 2 A. Processes and systems for syngas 3 production. I have experience in that industry. 4 Q. Okay. But not -- let me ask it this way. 5 How much experience do you have in 6 syngas production? 7 A. On and off, over 42 years. I've been very 8 familiar with the processes and syngas production. 9 Q. Okay. You seem to be making a distinction 10 between the processes and systems for syngas 11 production and then the syngas production industry. 12 Can you explain what that distinction 13 is in your head, if any? 14 A. Yes. I have never worked in this industry. 15 I have done research and evaluations of the 16 technologies in this industry. So I'm distinguishing 17 between -- except maybe as a consultant. I guess 18 that's considered work. But I've never been employed 19 by a company except as a consultant for some of these 20 processes. 21 Q. Okay. Which companies have employed you as 22 a consultant for these processes? 23 A. That's a good question. ExxonMobil, I 24 think would be one of them. 25 Q. Okay. What did you do for ExxonMobil? Page 13

1 A. It was mostly associated with the hydrogen 2 purification steps. 3 Q. Any other companies that you did consulting 4 for on syngas production? 5 A. If I remember correctly, I think Department 6 of Energy. I was part of the group there. 7 Q. What did you work on for the Department of 8 Energy related to syngas production? 9 A. That was a while ago. I don't recall the 10 specifics, but it was related to this industry, if 11 you will. 12 Q. Okay. Any other entities or companies that 13 you have consulted for related to the syngas 14 production industry? 15 A. I'm trying to remember. Most of the work 16 I've done in this area was well over 20 years ago 17 until recently, and I've consulted -- I think my CV 18 says about 40 companies. I haven't updated that part 19 of it in a long time. I'm well over 60 companies, 20 and it becomes a blur at some point. 21 Q. Dr. Ritter, that's fine. It's not a memory 22 test, but I do ask my questions in a certain way and 23 we may look at your CV later and go through more 24 companies. I appreciate that you've listed them 25 there. Part of this is just seeing sort of sitting Page 14	1 A. It was on and off over many years maybe in 2 the late Nineties. Mostly in the early naughts. 3 Q. Sitting here today, do you recall any other 4 companies or entities that you've done consulting for 5 on syngas production? 6 A. At the moment, no. If it comes to me, I'll 7 let you know. 8 Q. Thank you. 9 And then you talked a little bit that 10 you have never worked in this industry and where, you 11 know, your main employer was employing you to do 12 syngas production work. 13 Is that fair -- is that a fair 14 characterization of your experience? 15 A. Correct. I've never been a process 16 engineer -- I would call it a process engineer -- or 17 working for a company in their R&D group on syngas. 18 It's all been related to my background as a Ph.D. 19 student and/or faculty member for the last 33, 34 20 years. 21 Q. Thank you. 22 And, Dr. Ritter, that makes some sense 23 because most of your career has been in academia; is 24 that correct? 25 A. Except for four years at the Savannah River Page 16
1 here today to talk to you about, you know, which 2 experiences you've had in the syngas production 3 industry that, you know, were more recent or are 4 prominent in your mind or things like that. Again, 5 if you don't remember, it's fine to say "I don't 6 remember. I think it's in my CV." 7 Other than ExxonMobil and Department 8 of Energy, just sitting here today, do you recall any 9 other companies or entities that you've consulted for 10 related to syngas production? 11 A. Air Products & Chemicals. 12 Q. Okay. What did you do for them? 13 A. It was all about replacing reformers with 14 absorption-enhanced reaction processes. 15 Q. What time frame was that? 16 A. Air Products introduced some of that 17 technology in the late Nineties, and then we had 18 several projects on similarly related -- where it was 19 actually funding from DOE to look at that same 20 technology where you're replacing the reformer and 21 the shift reactor and doing it in one vessel and also 22 separating out the CO2. 23 Q. I'm sorry. My question was a little 24 simpler. 25 When did you do that work for them? Page 15	1 National Lab. 2 Q. That's what I wanted to talk about. So you 3 spent four years -- you -- in your CV, you call that 4 commercial experience. 5 Does that really just mean 6 non-academic experience, that you were in the kind of 7 commercial industry there, or what do you mean -- you 8 know, strike that. 9 Can I ask a different question? 10 A. Yes. 11 Q. What do you mean by "commercial 12 experience"? 13 A. I was employed by Westinghouse at the time, 14 and except for not having to make a profit because we 15 were -- at that time, it was a federal lab. Now it's 16 a national lab. That was very much what I would call 17 industrial experience. I did everything from bench 18 to pilot to full-scale process design and development 19 and safety to produce a product. 20 Q. What was the product? I thought it was 21 nuclear waste disposal. 22 A. I was going to tell you what this product 23 was. It's a nasty product. They were 10-foot 24 diameter -- 10-foot tall, 2-foot diameter glass logs 25 that were encased in stainless steel that was Page 17

1 hermetically sealed and that would last -- they would 2 be radioactive for about 25,000 years. We did -- a 3 team of us -- I came in late, if you will, for this 4 process, but there was a group of us who did 5 everything. 6 When I first got there, we discovered 7 two safety issues, and they were already building the 8 full-scale plant. And so, we did a lot of 9 bench-scale, pilot-scale testing to resolve these 10 safety issues. And I can say I did many, many hours 11 doing startup of the full-scale plant. I was their 12 off-gas analyzer specialist, and it has been 13 running -- I left there in '93, and it's been running 14 ever since. They have produced thousands of these 15 glass logs. 16 Q. Well, just to clarify for our purposes, 17 there was no ammonia production at this facility, 18 correct? 19 A. Not correct. 20 Q. Incorrect? 21 A. Incorrect. 22 Q. Okay. 23 A. It was accidentally produced as a 24 by-product in the reactions that were going on when 25 we were processing new waste, and one of the safety Page 18	1 adsorption. 2 Is that fair to say? 3 A. Yes. 4 Q. All right. What is pressure swing 5 adsorption? 6 (Reporter clarification.) 7 A. It's a gas separation technique that uses 8 solid porous adsorbents or materials that everybody's 9 familiar with -- like activated carbon or activated 10 charcoal, as an example -- that separates gases by 11 virtue of the differences in the way gases adhere or 12 adsorb to the surfaces. Different gases -- different 13 gases adsorb in different amounts, and we call that 14 selectivity, the ratio of those amounts relative to 15 the gas phase. And, hence, you can separate gases -- 16 you adsorb at high pressure, you desorb at low 17 pressure, and it's pressure swing adsorption. So you 18 regenerate the adsorb. 19 Q. (BY MR. COLLARD) So how long have you 20 studied pressure swing adsorption? 21 A. I was introduced to it in 1985. That was 22 the topic of my Ph.D. dissertation. 23 Q. That was your Ph.D. dissertation, and you 24 successfully defended it? 25 A. It was one chapter or two chapters. I Page 20
1 issues because we were getting ammonia in the off-gas 2 was ammonium nitrate formation because they stored 3 this sludge waste in nitric -- or nitrated solutions 4 that made the solutions anti-corrosive for the tanks. 5 Q. Okay. 6 A. So indirectly, we had ammonia production. 7 Not the kind of ammonia production where we're going 8 to sell it. 9 Q. That's fine. 10 So there was no intentional ammonia 11 synthesis at this facility, correct? 12 A. Correct. 13 Q. And there was no intentional syngas 14 production at this facility, correct? 15 A. We had a component of the syngas being 16 produced also as a safety issue. 17 Q. But my question was: There was no 18 intentional syngas production at this facility? 19 MR. PHILLIPS: Objection to form. 20 A. There was no intentional syngas production 21 at this facility. 22 Q. (BY MR. COLLARD) Right. 23 A. We had hydrogen production, however. 24 Q. So looking through your CV, it seems like 25 there is a focus in your work on pressure swing Page 19	1 wanted to call my Ph.D. dissertation Random Topics in 2 Adsorption because I also worked on thermodynamics 3 and other fundamental areas that were chapters in my 4 dissertation. 5 Q. Oh, that's helpful. But it was all focused 6 on adsorption, and you are answering my specific 7 question about pressure swing adsorption? 8 A. Yes, yes. 9 Q. Do you have peer-reviewed articles on 10 adsorption? 11 A. Have I authored -- 12 Q. Uh-huh. 13 A. Many. 14 Q. Do you have patents on adsorption? 15 A. A few. Not many. A few. 16 Q. Would it be fair to say that working on 17 adsorption and, you know, random topics on adsorption 18 is your life's work? 19 MR. PHILLIPS: Objection to form. 20 A. No. 21 Q. (BY MR. COLLARD) Why not? 22 A. Because a significant fraction of my time 23 as a chemical engineer, student, graduate student, 24 researcher at Savannah River, and as a faculty 25 member, a significant fraction has been spent doing Page 21

1 things other than just adsorption, as you sort of put 2 it. We've worked in many different fields and have 3 worked with companies, like I was saying, that -- on 4 projects we can't talk about. I can't publish. But, 5 you know, it -- like my Ph.D., the gases we were 6 separating and I was doing for my master's were all 7 related to coal gasification instead of off-gas 8 production, and you won't see a publication on that. 9 If you can find some DOE reports that are about 10 2 inches thick, my name's all over them, and it's all 11 about that. I wrote so many reports for Professor 12 Yang, who was my advisor. So it's that kind of 13 tangible experience that I have with these processes 14 associated with the '168 patent. 15 Q. That's fine. 16 Is there any technology area where you 17 would say that you have focused your work on more 18 than adsorption? I know you've done lots of 19 different things, but have you focused on something 20 more than you focused on adsorption? 21 A. That's probably the majority of the work 22 I've done, certainly the majority of the 23 publications. You'll see publications on hydrogen 24 storage materials. That was akin to adsorption. We 25 did work in magnetic drug targeting, all related to Page 22	1 This is Exhibit 1004, the CV of Dr. Ritter. So I 2 want you to have that copy, and then I'm actually -- 3 I'm going to actually mark your report. 4 (Exhibit 3 marked) 5 Q. (BY MR. COLLARD) All right. What I want 6 to ask you about is on Pages 9 and 10 -- sorry -- 10 7 and 11 of your report, of your declaration, 8 Paragraph 11. 9 A. Paragraph 11? 10 Q. Yeah. 11 A. I'm there. 12 Q. All right. So in Paragraph 11, you have 13 a -- you know, a very full CV. We just marked it as 14 an exhibit. But in Paragraph 11 of your report, you 15 highlighted about 14 items. 16 Do you see where I am at Paragraph 11? 17 A. Yes. The bulleted items? 18 Q. Yeah. 19 A. Yes. 20 Q. How did you choose those items from your CV 21 to highlight in the body of your report? 22 A. They were specifically related to hydrogen 23 and ammonia-type processes and research I was doing. 24 Q. Are any of these items peer-reviewed 25 articles? Page 24
1 metal line (phonetic) adsorption. So that was all 2 related. 3 And many of the processes in the 4 Casale patent where my experience comes in is how did 5 we replace some of that technology with adsorption 6 processes. So in that sense as a chemical engineer, 7 if you're going to replace something, you better 8 understand what you're replacing and it better be 9 better both functionally via performance and 10 economically. 11 Q. So is adsorption always a part of the 12 syngas production process? 13 A. Absolutely. And I could clarify that, if 14 you would like. 15 Q. What about the ammonia production process? 16 Is adsorption always a part of that? 17 A. Absolutely. 18 Q. I'm sure we're going to get into that as we 19 go along so we'll be able to clarify. 20 In your -- do you have a copy of your 21 CV? 22 A. Yes, I do. 23 Q. I'm going to go ahead and mark it. 24 (Exhibit 2 marked) 25 Q. (BY MR. COLLARD) I'm marking Exhibit 2. Page 23	1 A. The first four. 2 Q. The first four are peer-reviewed articles? 3 Okay. And then how would you 4 describe -- the next six look like they are some sort 5 of presentations at the AIChE conference. 6 So how would you describe those 7 materials? 8 A. They are presentations that I gave or one 9 of my students might have given at a professional 10 society conference, the American Institute of 11 Chemical Engineers annual meeting. 12 Q. And what about the last four? Those seem 13 like grants for specific types of work. 14 Is that fair? 15 A. Yes. Those were funded projects related to 16 ammonia synthesis and separation and production. 17 Q. All right. So just looking at the 14 that 18 you've chosen to highlight from your CV -- and again, 19 just reading, for example, the titles -- all of these 20 except the very first one, the titles mentioned 21 adsorption. 22 Do you agree with that? 23 A. The Office of Naval -- I agree with you. 24 The Office of Naval Research in the title does not 25 mention adsorption, so I put it in at the bottom to Page 25

1 indicate what I was working on because that was a 2 very -- multi-PI project. That's where I mention -- 3 it's just clarifying what wasn't in the title. 4 Q. That's a very good clarification. You are 5 correct. It is not in the title. 6 But in the title or description for 7 all of these, it mentions adsorption. Fair? 8 A. Yes. 9 Q. Except for the very first one, which says 10 Implementing a Hydrogen Economy. 11 So is adsorption technology required 12 by the '168 patent that's at issue? 13 MR. PHILLIPS: Objection to form. 14 A. I'm going to say yes and use the word it's 15 inherently required. And I probably need to explain 16 that. 17 Q. (BY MR. COLLARD) Okay. What do you mean 18 by "inherently required"? 19 A. All heterogeneous catalytic reactions of 20 which are in the steam methane reformer, the water 21 gas, the methane reaction, they are all heterogeneous 22 gas phase reactions. Using a solid surface that 23 necessarily has pores, adsorption has to occur on 24 those surfaces for the species to get together, 25 react, and then desorb from those surfaces, which is Page 26	1 Q. But it's not always? 2 A. They need a CO2 separator. I think they 3 generically talk about a CO2 separator which opens 4 the door to PSA systems which is commonly used in 5 this steam methane reforming. 6 Q. So it could be required, but it could not 7 be required, right? 8 A. As a process, yes, that's correct. 9 Q. Okay. Do the claims of the '168 patent 10 require pressure swing adsorption? 11 MR. PHILLIPS: Objection to form. 12 A. I never saw the words in the claims. 13 Q. (BY MR. COLLARD) Okay. 14 A. Never saw "pressure swing adsorption" 15 mentioned. 16 Q. Let me go ahead and mark the patent as 17 Exhibit 4. 18 (Exhibit 4 marked) 19 A. If you need it, I do have a couple of this 20 in my folder. 21 Q. (BY MR. COLLARD) No, no. We've got -- 22 we've got lots. 23 So I would like to direct your 24 attention to Column 4, Line, oh, 58. 25 A. Excuse me. Which line? Page 28
1 another reason why I'm very familiar with this 2 technology. 3 Knowing my career was going to be in 4 adsorption once I was introduced to the topic in 5 1985, I probably read a thousand or more articles. 6 Anything to do with adsorption, I photocopied at 10 7 cents a page -- anything -- because to be competitive 8 in this field, you have to understand it and where it 9 occurs. And what I found out is it occurs 10 everywhere. That's well-known. So it's inherent, 11 right, in all those reactors that adsorption has to 12 occur or the reactions could not take place. 13 Q. I understand. Let me ask it a different 14 way. 15 Is adsorption required by the claims 16 of the '168 patent? 17 A. Adsorption standing alone, it's a steam 18 methane reformer reactor that they are talking about, 19 right, to make synthesis gas. Adsorption is 20 required. Otherwise, reactions won't occur. So 21 maybe you should phrase it a little differently. 22 Q. I will try. 23 Is pressure swing adsorption required 24 by the '168 patent? 25 A. It could be. Page 27	1 Q. 58. 2 A. Thank you. 3 Q. It's the paragraph that starts the 4 purification section. 5 A. I found it. 6 Q. Great. So this section does refer to 7 pressure swing adsorption unit. 8 Do you see that? 9 A. Yes, I do. 10 Q. And it says that in some embodiments -- 11 well, let me back up. 12 This paragraph is talking about a 13 purification section in the invention. Do you see 14 that? 15 A. Yes. 16 Q. It says "the purification section may 17 comprise." 18 A. Correct. 19 Q. All right. And then it says "In some 20 embodiments, said purification section comprises a 21 PSA, a pressure swing adsorption unit." 22 Do you see that? 23 A. Yes. 24 Q. So it's possible for the '168 patent to 25 include a PSA. It discloses that idea, right? Page 29

1 A. Yeah. I think I said that for a separator. 2 Q. Not disagreeing, Dr. Ritter, necessarily. 3 Please don't take my questions as meaning I am 4 disagreeing with you. I am just trying to confirm it 5 now that we are looking at the patent to make sure 6 that we are all on the same page. 7 And then it says "In other 8 embodiments, said section comprises at least one 9 dryer for separating residual CO2 and water." 10 Do you see that? 11 A. Yes, I do. 12 Q. So in that embodiment, there would be no 13 pressure swing adsorption unit. There would be a 14 dryer instead. 15 Is that fair? 16 A. No. 17 Q. Why? 18 A. Because air dryers are PSA units. So 19 pressure swing -- one of the first applications of 20 pressure swing adsorption was removing moisture from 21 the air. 22 Q. You, in your work, refer to dryers as 23 pressure swing adsorption units? 24 A. Air dryers. 25 Q. Air dryers? Page 30	1 is not? 2 A. If I was going to do exactly what they were 3 saying, I would use a PSA unit for taking out CO2 and 4 water and then follow by a cryogenic unit, which 5 means just plain chilling, no adsorption. 6 Q. That's not what they say. They say use a 7 dryer. They don't say use a pressure swing 8 adsorption unit. 9 A. In my 45 years of understanding the 10 applications of PSA technology, I think anybody who's 11 an expert in gas separation and purification, when 12 they see that word "dryer," it's the technology of 13 choice, pressure swing adsorption. That's all. 14 Q. I mean, but there are other options because 15 you said it could be. It doesn't have to be. So 16 it's surprising to me that you would say, "I see what 17 the patent says and, if I were trying to do that, it 18 says Option 1 is use a pressure swing adsorption 19 unit, Option 2 is use a dryer." And you're saying, 20 "When I read that, Option 2 to me means pressure 21 swing adsorption unit." 22 Aren't you ignoring what the patent 23 says in that if you interpret it that way? 24 MR. PHILLIPS: Objection to form. 25 A. I'm just saying how I would interpret it. Page 32
1 A. So are all air dryers PSA units? No. 2 Q. But you think this one would be? 3 A. Could be. 4 Q. Could be? 5 A. Could be. 6 Q. Okay. Where is the pressure swing in this 7 dryer that is listed here? 8 A. It's not. 9 Q. Okay. So there's no pressure swing 10 described with the dryer here that would -- that 11 would in your mind then make it a pressure swing 12 adsorption unit? 13 A. My experience in this area, I don't know 14 how else they remove CO2 and water without it being 15 an adsorption system. 16 Q. Sorry. I said pressure swing adsorption. 17 A. Yeah. 18 Q. You said adsorption happens everywhere. 19 And so, I'm trying to focus on pressure swing 20 adsorption. And you're saying the dryer is a 21 pressure swing adsorption unit. 22 Is that your testimony? 23 A. I believe I said it could be, as an 24 example. 25 Q. Okay. Can you tell if it is here or if it Page 31	1 You might be able to do it with a membrane unit. 2 Q. (BY MR. COLLARD) Okay. 3 A. Dry the gases. That's why I said "could." 4 Q. All right. 5 A. I wouldn't use a membrane. 6 Q. Would you refer to the choice to use a 7 pressure swing adsorption unit or a dryer with a 8 membrane as a design choice? 9 MR. PHILLIPS: Objection to form. 10 A. No. I just believe it was well-understood 11 at the time by someone working in this area that CO2 12 and water could be removed by a PSA dryer. 13 Q. (BY MR. COLLARD) Okay. I know, but you 14 said you could also use a dryer with a membrane, not 15 a PSA dryer. 16 So my question is: Is the choice 17 between using a PSA dryer and a dryer with a membrane 18 a design choice? 19 A. Yes. 20 Q. Dr. Ritter, what is blue ammonia? 21 A. Pardon? 22 Q. What is blue ammonia? Do you know? 23 A. I believe so. 24 Q. What is it? 25 A. If it's like blue hydrogen, it would -- Page 33

1 blue ammonia would be made from sources that are more 2 environmentally friendly. 3 Q. Do you know that, or do you know about blue 4 hydrogen and you're extrapolating? 5 MR. PHILLIPS: Objection to form. 6 A. I believe I know that. 7 Q. (BY MR. COLLARD) How do you know that? 8 A. I've heard the term. 9 Q. Where did you hear it? 10 A. I don't recall. 11 Q. What's your experience with blue ammonia 12 technology, if any? 13 A. Same experience with ammonia technology. 14 Q. Do you know whether or not the technology 15 for -- described in the '168 patent refers to blue 16 ammonia technology? 17 A. If my understanding is correct, it would be 18 because they are trying to make ammonia with a more 19 environmentally-friendly process by decreasing the 20 amount of CO2, carbon dioxide, that enters the 21 atmosphere due to combustion and/or reaction. 22 Q. Are you -- 23 A. Same thing. Combustion/reactions. 24 Q. Are you familiar with Dr. Collin Wolden? 25 A. Could you say his name again? Page 34	1 turn to it. It's on Page 25 of your report -- 24 and 2 25 of your report. 3 A. It might not be. 4 Q. I'm on the right page, 25 and -- 24 and 25. 5 MR. PHILLIPS: It might be easier to 6 go paragraph numbers. 7 Q. (BY MR. COLLARD) Sure. Paragraph 35. 8 A. I found it. 9 Q. You found it? Okay. Why don't you just 10 read that paragraph to yourself and tell me when 11 you're done? I want you to have it in your mind. 12 A. (Witness reviews the document.) Okay. 13 Q. Okay. How did you come up with that 14 definition? 15 A. To me, a person of ordinary skill of the 16 art relating to the '168 patent would be a chemical 17 engineer. The technology associated with the '168 18 patent is very common, very well-known. It's in 19 hundreds, if not thousands, of textbooks. So I 20 consider a master's degree and three or four years of 21 experience working in an industry or field that 22 involves syngas production would be appropriate, and 23 that three to five years of experience could be 24 exchanged or substituted with more education and vice 25 versa. Page 36
1 Q. Dr. Collin Wolden, W-O-L-D-E-N. 2 A. No. 3 Q. No? 4 MR. COLLARD: We're under an hour. Do 5 you want to take a break, or do you want to keep 6 going? 7 MR. PHILLIPS: Are you at a breaking 8 point? 9 MR. COLLARD: I'm at a fine point. 10 MR. PHILLIPS: Well, I mean, it's up 11 to you. 12 MR. COLLARD: It's really up to him. 13 THE WITNESS: I'm fine. 14 MR. COLLARD: You're fine? 15 (Discussion off the record) 16 THE VIDEOGRAPHER: Off the record at 17 9:53. 18 (Recess from 9:53 a.m. to 10:04 a.m.) 19 THE VIDEOGRAPHER: Back on the record 20 at 10:04. Please proceed. 21 Q. (BY MR. COLLARD) Dr. Ritter, in your 22 declaration, you have a definition of what you think 23 a person of ordinary skill in the art of the '168 24 patent, who that -- that person would be. 25 Do you recall that section? We can Page 35	1 Q. All right. So that describes what you 2 wrote, but I'm asking a different question. 3 How did you come up with that 4 definition? 5 A. I thought I answered it when I said 6 chemical engineers understand this technology. It's 7 in textbooks. And I considered, you know, that a 8 master's degree would be sufficient with three to 9 five years of experience. It's very well-known, very 10 well-understood technology that is studied in 11 chemical engineering undergraduate and a little more 12 so in some graduate schools. 13 Q. Why would a person of ordinary skill for 14 the -- relating to the technology of the '168 patent 15 need industry or field experience in addition to 16 their master's degree? 17 A. It's well-understood in the academic 18 circles that three to five years of experience after, 19 for example, a master's degree is obtained in some 20 fields, including syngas and ammonia production, 21 would be equivalent to someone with more advanced 22 education and understanding -- for example, a Ph.D. 23 I don't think just coming out with a 24 master's would be enough. You need some experience 25 working in the industry, whether that be at the plant Page 37

1 or as a consultant. 2 Q. Okay. So your testimony is the 3 technology at issue in the '168 patent is very 4 well-known, very common, in thousands of textbooks, 5 studied in undergrad, but you can't understand it -- 6 you're not a person of ordinary skill just with a 7 master's degree? 8 A. That's what I said. 9 Q. All right. Why did you include in your 10 types of experience the water/gas shift process? 11 A. These are the three main sections of a 12 typical syngas production plant: reforming methane, 13 followed by water gas shift, followed by syngas 14 purification. 15 Q. Okay. Of those three main sections, do you 16 know which section would potentially have an 17 autothermal reformer? 18 A. Yes. 19 Q. Which section? 20 A. The first section. 21 Q. Reforming the methane? 22 A. Yes. 23 Q. So if someone had experience in the 24 water/gas shift process or in the syngas purification 25 process, does that mean that they would know how to Page 38	1 me ask a clean question for the record. 2 What do you point to to fill the 3 industry experience requirement of the POSA 4 definition that you have here? 5 A. My consulting background. And probably 6 more so just my academic background, which is 7 cumulatively longer than my bouts with consulting, 8 right? 9 Q. That's fine. Thank you, Dr. Ritter. I'm 10 not arguing with you. The reason I asked the 11 question again -- and I think it's probably worth 12 saying this. Our record was a little unclear, so 13 sometimes I'll ask a question again not because I 14 don't think you answered it, but because I'm trying 15 to ask a more clear question to prompt a more clear 16 answer. It's my fault, not yours. So I wasn't 17 disagreeing with you. I was just trying to get a 18 clear record. 19 I want to look at Paragraph 186, 20 please. 21 A. 186? 22 Q. No, no, no. I have that wrong. I want to 23 look at -- I don't know why I had that -- 24 Paragraph 63. Sorry. It's on Page 43. 25 Are you there? Page 40
1 design or set up an autothermal reformer? 2 MR. PHILLIPS: Objection to form. 3 A. They would certainly most likely understand 4 it. 5 Q. (BY MR. COLLARD) Okay. 6 A. Water/gas shift process is very similar. 7 There's a heterogeneous catalytic reaction inside a 8 reactor. That's what chemical engineers study. 9 Q. You consider yourself a person of probably 10 extraordinary skill in the art, but you meet this 11 definition of a person of ordinary skill, Dr. Ritter? 12 A. I like your second or the "extraordinary." 13 Yes, I meet or exceed it. 14 Q. You meet or exceed this definition? 15 A. Yes, I do. 16 Q. What do you point to for your three to five 17 years working -- experience working in an industry or 18 field that involves syngas production -- actually, 19 let me ask it this way -- or are you substituting 20 your additional education for industry experience? 21 A. Both. 22 Q. You have additional education, and you have 23 the industry experience? 24 A. Via consulting. 25 Q. Okay. And that's where we're going. Let Page 39	1 A. Yes. 2 Q. In Paragraph 63 of your declaration, you 3 say "The basic process claimed in the '168 patent 4 includes the following steps," and you list eight 5 steps. 6 Do you see where I am? 7 A. Yes. 8 Q. All right. And would a person who has a 9 master's in chemical engineering have studied all of 10 these eight steps? 11 A. I probably wouldn't use the word "studied." 12 Q. What word would you use? 13 A. This is fundamental -- a degree in chemical 14 engineering, especially with a master's, lays the 15 groundwork for understanding fundamental concepts in 16 chemical engineering, and every one of these steps 17 should be understood by a person of ordinary skill in 18 the art that's a chem E as I described one. 19 Q. I'm going to stop you because that's 20 changing my question a little bit. I'm not asking 21 about a person of ordinary skill as you define them 22 because you define them as a master's plus additional 23 experience. 24 I'm asking about just somebody that 25 has a master in chemical engineering. Should they Page 41

1 understand these fundamental concepts that are listed 2 in Paragraph 63? 3 A. Yes. 4 Q. Thank you. Sorry to jump around a little 5 bit, but I want to go back to Paragraph -- back a few 6 pages to Paragraph 42. 7 A. 42, sir? 8 Q. Uh-huh. 9 A. I found it. 10 Q. Great. It's the one that starts with 11 "notably," and it is talking about the integration of 12 processes to make a variety of products. 13 And it says "Such integration takes 14 advantage of the various process streams, similar 15 equipment needs, and/or the use of the same raw 16 materials." 17 I want to know what you mean when you 18 say "similar equipment needs." What does that mean? 19 A. Similar -- I wear hearing aids. Similar 20 equipment needs? 21 Q. Yeah. What does that mean? 22 A. Okay. Similar equipment needs means 23 similar unit operations within the process flow 24 sheet. 25 Q. What are unit operations? Page 42	1 two similar items in the system? Are you saying you 2 would have to make a choice between one of the two of 3 them? 4 A. You asked for an example of similar 5 equipment needs to make synthesis gas, those are -- 6 they require a reformer of some sort. 7 Q. Dr. Ritter, that's not what you're talking 8 about here. You're talking about integrating syngas 9 and ammonia production to make other processes -- to 10 make other products, and you're saying that takes 11 advantage of similar equipment needs. 12 And then you gave me -- so I thought 13 that that means that you are going to be able to 14 leverage one piece of equipment for two processes, 15 but you gave me two pieces of equipment for one part 16 of the process. 17 So can you help me understand what you 18 mean here? I'll try to ask a question. I'm trying 19 to explain where I'm coming from. 20 When you say that integration takes 21 advantage of similar equipment needs, what are you 22 referring to? 23 A. I should have read on. Similar equipment 24 is used to produce a variety of chemicals, including 25 ammonia, methanol, some other chemicals that I know Page 44
1 A. For example, steam methane reformer would 2 be a unit operation. A shift reactor would be a unit 3 operation. A CO2 separator would be a unit 4 operation. 5 Q. Okay. And so, what do you mean by -- can 6 you use one of those examples and tell me what you 7 mean by "similar equipment needs" when you're 8 integrating other processes? 9 A. Well, syngas and ammonia production, just 10 as I say in the first sentence, often requires 11 similar pieces of equipment that function in a 12 similar way. 13 Q. Give me two examples of two similar pieces 14 of equipment, I guess is what I would say, that you 15 are referring to here. 16 A. Steam methane reformer and autothermal 17 reformer. 18 Q. All right. How are they similar in this 19 circumstance? 20 A. They are both used to produce a stream 21 containing hydrogen, CO, and CO2. 22 Q. So I -- I guess what I'm trying to 23 understand is that -- are you saying that the steam 24 methane reformer and the ATR in this example, that 25 they would both be in this system and there would be Page 43	1 are listed in my declaration. They all start with 2 essentially a syngas plant as an upfront unit. 3 Q. Okay. 4 A. That's the similar equipment needs. And 5 then a few things may change downstream whether you 6 want to make methanol or ammonia or dyothelete or 7 something. 8 Q. Okay. Have you ever been involved in the 9 design of an ammonia plant? 10 MR. PHILLIPS: Objection to form. 11 A. I heard the front part of the question. I 12 don't know if I heard the last part. Could you 13 repeat it? 14 Q. (BY MR. COLLARD) Sure. Have you ever been 15 involved in the design of an ammonia plant? 16 A. Yes. 17 Q. Which one? 18 A. The one we were going to demonstrate in my 19 laboratory. 20 Q. Okay. So let me ask a different question. 21 Have you ever been -- taken part in 22 the design of a commercial ammonia plant? 23 A. I hope to be soon, as I have a patent 24 pending on a new ammonia production technology. 25 Q. Okay. Page 45

1 A. But no, not in the past. 2 Q. Have you -- and maybe this will get to your 3 other answer. 4 Have you been involved in the design 5 of theoretical ammonia plants as a part of your -- 6 your teaching? 7 MR. PHILLIPS: Objection to form. 8 A. Yes. Ammonia flow sheets where you start 9 with raw materials to make ammonia as a product, yes. 10 Q. (BY MR. COLLARD) So you've done it as an 11 academic exercise, but you haven't yet participated 12 in that in a commercial plant. 13 Is that fair? 14 MR. PHILLIPS: Objection to form. 15 A. I've only done it at the bench scale, and 16 we've done some scale-up calculations. 17 Q. (BY MR. COLLARD) What about for -- my 18 question was about an ammonia plant. What about for 19 a methanol plant? Same answer, or is it different? 20 A. My group didn't have interest in methanol, 21 so I haven't looked at that. 22 Q. So you haven't done even kind of an 23 academic design of a methanol plant before? 24 A. There was no reason for me to. 25 Q. All right. How long is the design process Page 46	1 A. It would be in the millions. 2 Q. At least in the millions? 3 A. Yes. 4 Q. Do you know if it might be in the billions? 5 A. That depends on the scale. 6 Q. Okay. Could be? There could be an ammonia 7 plant that would be in the billions of dollars to 8 design and build? 9 A. I hope not. 10 Q. Okay. But you don't know? This is just 11 your sense of it? 12 A. My sense of it would say that is a huge 13 ammonia plant, but that's my sense. I'm bench scale. 14 It's much smaller. I've done some scale-up 15 calculations, never costing. I haven't done the 16 economics. 17 Q. That's fine. And -- and we should stop. 18 What is bench scale? 19 A. It can be done on a desktop-size scale, 20 maybe 1 liter. It varies depending on the lab or 21 whether it's academic or industrial. But in crude 22 terms, it's probably the first scale that would be 23 demonstrated or that would demonstrate a new 24 technology, say a new way to make ammonia. You would 25 probably do bench scale first. Page 48
1 for a commercial ammonia plant? Do you know? 2 A. The question is vague. From what starting 3 point? 4 Q. From when you hire the design engineers or 5 the process engineers until you say, yes, that's our 6 design and we're ready to build it. 7 A. I do not know. 8 Q. Okay. How long does it take to -- do you 9 have a sense of how long it takes to design and then 10 build an ammonia plant? 11 A. I have a sense. 12 Q. What's your sense? 13 A. If I was a company, two to five years. 14 Q. Two to five years? So these are years' 15 long projects? And that's just design and build, not 16 permitting and things like that, right? 17 A. I took the word "build" as functioning. 18 Q. Okay. And then are these -- do you have a 19 sense of how expensive it might be to design and 20 build a commercial ammonia plant? 21 MR. PHILLIPS: Objection to form. 22 A. No. 23 Q. (BY MR. COLLARD) Do you know if it costs 24 thousands of dollars, millions of dollars, billions 25 of dollars? Page 47	1 Q. Okay. And I think you see where I'm going, 2 is I'm trying to build a sense of scale here and 3 scope. 4 And so, you are doing kind of a proof 5 of concept on a bench scale. But if something were 6 actually implemented in an ammonia plant, how much 7 bigger would it be than bench scale? 8 A. A lot bigger. 9 Q. Okay. And you mentioned you've done some 10 scale-up calculations. 11 A. I think we did. We're talking about some 12 of the projects that I was on I think in the middle 13 of the naughts, like 2005, because we wanted to see 14 how competitive we were with some of the existing 15 technology. 16 Q. Okay. So I want to understand. You said a 17 lot bigger, but I'm going to try and be a little more 18 specific. 19 For a commercial ammonia plant 20 compared to a bench-scale plant, it could be hundreds 21 or thousands of times larger than whatever is being 22 produced on a bench scale. 23 Is that fair? 24 A. That's fair. 25 Q. Okay. Page 49

1 A. Maybe, yes. 2 Q. Maybe even more than that? 3 A. That comes back to your billion-dollar 4 question. How big do you want to make these things? 5 There is economy of scale in most chemical 6 engineering processes. Not all. So the bigger it 7 is, the cheaper it is to make; but then, you know, 8 there could be some engineering issues you're going 9 to run into. 10 Q. Okay. Okay. Let's go ahead to 11 Paragraph 45. 12 A. 45? 13 Q. Yeah, 45. 14 A. Okay. 15 Q. Do you see that? "The primary ways" is how 16 it starts. 17 A. Yes, I do. 18 Q. All right. You describe the primary ways 19 in which methane is converted into hydrogen involve a 20 reaction with either steam (steam reforming), oxygen, 21 (partial oxidation), or both in sequence, which is 22 autothermal reforming. 23 Do you see where I am? 24 A. Yes. 25 Q. Does -- when you say "both in sequence," do Page 50	1 Q. Okay. I'm trying to understand what you 2 mean when you say "both in sequence." 3 Does that -- 4 A. The both occur inside -- steam methane 5 reforming and partial oxidation or oxidation via 6 oxygen. So steam and oxygen are both fed to 7 autothermal reformers. So you get steam reforming 8 and oxidation going up. 9 Q. That still doesn't address my question, 10 which is: What do you mean when you say "both in 11 sequence"? 12 A. Both reactions. 13 Q. Okay. What's the sequence of the reaction? 14 MR. PHILLIPS: Objection to form. 15 Asked and answered. 16 A. You want me to write down reactions? 17 Q. (BY MR. COLLARD) No, I want you to tell 18 me, if you can, what the sequence of the reaction is. 19 You said they both happen in sequence? 20 A. They occur in different sections of the 21 ATR. 22 Q. Okay. What's the sequence of their 23 occurrence? 24 A. I believe -- 25 MR. PHILLIPS: Objection to -- Page 52
1 you mean that those happen in series, the steam 2 reforming first and then the oxidation second? 3 A. The word "sequence" I think is pretty 4 clear, that they would be sequential. So some kind 5 of reformer could be up front of an autothermal 6 reformer. 7 Q. I'm sorry. You're saying that both occur 8 in the autothermal reformer. I'm not talking about 9 adding some sort of reformer. Just this sentence, 10 you're saying that an autothermal reformer includes 11 steam reforming and partial oxidation, and I'm asking 12 you how an autothermal reformer works. 13 Do those happen in series with one 14 happening first and then the second? Is that what 15 this that means? 16 A. No, they both happen inside the autothermal 17 reformer. 18 Q. Do they happen at the same time? 19 A. I don't believe so. There's different 20 sections in an autothermal reformer. 21 Q. And so, they don't happen simultaneously? 22 A. These are steady-state processes. So if 23 you have one section operating followed by another 24 section in the same reactor, they are happening 25 simultaneously because they are steady-state. Page 51	1 objection to form. Asked and answered. 2 A. If I'm not mistaken, I believe reforming 3 happens in the lower section, and the upper section 4 is where partial oxygen -- partial oxidation or full 5 oxidation takes place. Usually partial oxidation. 6 So that's the sequence. 7 Q. (BY MR. COLLARD) Okay. So you -- when you 8 say "both in sequence," you mean in different 9 sections of the autothermal reformer? 10 A. Yes. 11 Q. All right. You're not referring to the 12 timing of the reactions? 13 A. No. They are steady-state. They are 14 occurring simultaneously. 15 Q. Let's go to Paragraph 47, please. My 16 question's about something at the end. So it's 17 actually on the next page, the part that I want to 18 ask you about. 19 The part I want to ask you is on the 20 next page where -- is it your opinion that the ATR 21 process does not require external heat input? 22 A. That's what I said in my declaration. 23 Q. Is that -- yes, I see that, but is that 24 your opinion sitting here today? 25 A. Yes. Everything in my declaration is my Page 53

1 opinion. 2 Q. Okay. So the ATR process, autothermal 3 reforming, that happens at, like, a thousand degrees 4 Celsius, right? 5 Do you know? 6 A. Probably -- probably depends on many 7 factors. It's high temperature. I'm not going to 8 put a number on it. 9 Q. Do you know sitting here today how -- what 10 the temperature range of autothermal reforming is? 11 A. I would say it's around that order, but it 12 would probably depend on the pressure of the systems. 13 Q. Okay. 14 A. And the feed composition going into an ATR. 15 Q. But your testimony is that it doesn't 16 require external heat input to get to the thousand 17 degrees operating temperature? 18 A. That's what I said in my declaration. 19 Q. Is that your opinion, sir? 20 A. I believe that's why it's called an 21 autothermal reformer. 22 Q. Okay. Do some ATRs require external heat? 23 A. They shouldn't. 24 Q. Okay. Does -- do you know if the '168 25 patent describes using external heat to get the ATR Page 54	1 Your opinion in 47 that the ATR 2 process does not require external heat input, when 3 you say "ATR process," you are limiting that to what 4 is happening right inside the ATR, not the feed. 5 Is that fair? 6 A. Yes. 7 Q. Okay. Let's look at Paragraph 59 of your 8 declaration, please. 9 A. 59? 10 Q. Yeah, 59. 11 A. I'm there. 12 Q. Here you discuss that the process described 13 by the '168 patent -- that's what you're discussing 14 in this paragraph -- and I want to direct you to kind 15 of the middle of the paragraph. It says "The '168 16 patent explains that reduced CO2 emissions are 17 obtained by removing CO2 from syngas and then 18 splitting that CO2-depleted syngas stream so it could 19 be used as fuel." 20 Do you see what I just read? 21 A. Yes. 22 Q. Respectfully, the '168 patent actually 23 doesn't say "just used as fuel." It says "used as 24 fuel for a furnace," correct? 25 A. I would say no, not correct. Page 56
1 up to operating temperature? I'm just asking if you 2 sitting here whether or not -- if you recall, does 3 the '168 patent discuss using external heat to get 4 the operating temperature? 5 A. I believe it has an auxillary heater up 6 front. 7 Q. What is that for? Have you switched over 8 to looking at the patent? I just want to make sure 9 we're -- are you looking at the patent? 10 A. Yes. 11 Q. Okay. What is that auxillary heater for? 12 A. It's pre-heating the feed. 13 Q. Okay. So when you say the ATR process does 14 not require external heat input in Paragraph 47, does 15 that include the idea of pre-heating the feed to the 16 ATR? 17 A. No. 18 Q. No? So that -- I'm going to ask it the 19 other way now. 20 So when you say the ATR process does 21 not require external heat input, does that exclude 22 the idea of pre-heating the feed to the ATR? 23 A. Yes. 24 Q. All right. So thank you for clarifying 25 that. Page 55	1 Q. Why? 2 A. There's sections of where I quoted, 3 Column 3, Lines 5 to 35, that just talk about the 4 fuel fraction being directly separated from process 5 flow and -- where did it go -- a part of the process 6 flow to the fuel fraction. The fuel fraction being 7 directly separated from the process flow and having 8 the same composition. But at that point, they don't 9 really say what the fuel is going to be used for. 10 Q. So I'll direct you, then, to Line 26 of 11 Column 3. This is within what you cited where it 12 says "The invention suggests using a process gas part 13 as fuel for one or more furnaces of the reforming 14 section differently from the prior art which for this 15 purpose uses part of the natural gas, i.e., 16 hydrocarbon." 17 So it actually does say using fuel for 18 a furnace is what distinguishes it from the prior 19 art. 20 MR. PHILLIPS: Objection to form. 21 Q. (BY MR. COLLARD) Correct? 22 A. In this section of the patent. But in 23 other sections of the specification, they talk about 24 using the fuel for other purposes. But in this part, 25 it does say for furnace -- furnaces of the reforming Page 57

1 section -- one or more furnaces of the reforming 2 section. 3 Q. Your testimony is in other parts of the 4 patent, it talks about using it for other purposes. 5 Can you give me an example? What are you thinking 6 of? 7 A. Column 7, Lines, oh, between 40 and 45. 8 Q. Uh-huh. 9 A. "A part of the fuel fraction may be 10 allocated in some" -- 11 (Reporter clarification.) 12 Q. (BY MR. COLLARD) Dr. Ritter, pause one 13 second. Reading is a particularly tricky and fast 14 issue, and you have to go slower than you think. So 15 you may read it if you want to. I'm going to re-ask 16 my question just so that we have a clear record, if 17 that's okay. 18 Can you point me to the other areas of 19 the patent where it discusses using the fuel for 20 something other than a furnace? 21 MR. PHILLIPS: Objection to form. 22 A. Yes. Column 7. 23 Q. (BY MR. COLLARD) Where? 24 A. 41 to maybe 43. 25 Q. Okay. That says "A part of the fuel Page 58	1 want to just understand what your understanding is of 2 claim construction. 3 A. With regard to an IPR, the claim should be 4 interpreted in terms of plain and ordinary language 5 as viewed from a person of ordinary skill in the art. 6 Q. That's pretty much the definition. Let's 7 look at it now and talk about it. Are you on 8 Paragraph 19 of your declaration? 9 A. Yes. 10 Q. Okay. So you agree that the principle is 11 to give the words their ordinary and customary 12 meaning from the perspective of a person of ordinary 13 schedule in the art? And then I would add "at the 14 time of the invention." 15 Is that fair? 16 A. Yes. 17 Q. And then in Paragraph 20, you go on and you 18 say that your opinion is that each claim can be 19 easily understood by a skilled artist and without 20 further construction, right? 21 A. Yes. 22 Q. And sitting here today, is that still your 23 opinion? 24 A. Yes. 25 Q. And so, is that true for all the terms in Page 60
1 fraction may be allocated in some embodiments to 2 furnaces for the production and/or superheating of 3 steam." So that is still talking about using the 4 fuel fraction for furnaces. 5 So do you have another example where 6 you think the patent is using something -- the fuel 7 for something other than a furnace? 8 A. I see your point. I was thinking about in 9 that previous passage where they talked about being 10 used for the reformer. The fuel is being used for 11 furnaces, yes. 12 Q. Are you familiar with the concept of claim 13 construction, Dr. Ritter? 14 A. Yes. 15 Q. Just at a general level, what is your 16 understanding? 17 A. I talk about that in my specification or my 18 declaration. 19 Q. I understand that you do, Dr. Ritter, and I 20 just want to get sort of your common understanding as 21 you sit here today rather than having you read some 22 portion of your declaration. 23 How do you understand claim 24 construction? We will look at that, so I'm not 25 trying to hide it from you; but before we do that, I Page 59	1 the -- in the claims of the '168 patent? 2 A. Yes. 3 Q. So the '168 patent uses the term -- the 4 '168 patent claims use the term "furnace." 5 So what is the ordinary and customary 6 meaning for the term "furnace"? 7 A. A POSA would understand the term 8 "furnace" -- of course, before the priority date of 9 the '168 patent -- to be a device -- to be a fired 10 heater where combustion takes place. 11 Q. So is it fair to say that a furnace 12 produces heat? 13 A. I think that's fair, yes. 14 Q. In your experience, would you use a furnace 15 to produce power? 16 A. Yes. 17 Q. Can you give me an example of when you have 18 used a furnace to produce power? 19 A. Would I personally use a furnace to produce 20 power? 21 Q. Sure. In your experience -- I said, "In 22 your experience, would you use a furnace to produce 23 power?" You said yes. I said, "Can you give me an 24 example?" 25 A. That's based on my -- that answer was based Page 61

1 on my knowledge of chemical engineering and how 2 furnaces are used. 3 Q. Okay. So can you please give me an example 4 of when you would use a furnace to produce power? 5 A. A gas turbine can be used to produce power 6 via its furnace. 7 Q. Okay. So is a gas turbine a furnace? 8 A. Yes. 9 Q. Is that what you teach in your classes when 10 you say, "We're going to talk about furnaces. Here's 11 a gas turbine that's a type of furnace"? 12 Is that what you tell your students? 13 A. I would tell my students the definition of 14 a furnace is a place where -- is a fired heater where 15 combustion takes place, and that definitely happens 16 in gas turbines. It could happen internally or 17 externally. 18 Q. That's not my question, Dr. Ritter. My 19 question is: Do you tell your students that a gas 20 turbine is a furnace? 21 MR. PHILLIPS: Objection to form. 22 Asked and answered. 23 A. Yes. 24 Q. (BY MR. COLLARD) If you had a question on 25 a test for your students that said name -- you know, Page 62	1 Q. I agree. I understand. 2 A. So as an example, that is a furnace. 3 That's a functioning furnace where heat is generated, 4 gas is expand and spin the turbine in that place. 5 Q. Fine. Is your opinion that a gas turbine 6 has a furnace in it or that a gas turbine is a 7 furnace? 8 A. I don't see the difference. 9 Q. Are a furnace and a turbine 10 interchangeable? 11 MR. PHILLIPS: Objection to form. 12 A. Depends on the function of the furnace. 13 Depends on your application. 14 Q. (BY MR. COLLARD) Can you give me an 15 example of an application where a furnace and a 16 turbine are interchangeable? 17 A. What do you want to use the furnace for? 18 Q. Sir, you're the one that told me that there 19 are implementations where a furnace and a turbine are 20 interchangeable. So do you have an example of that 21 or not? 22 A. I would not use a gas turbine furnace as a 23 heat source to heat my house, but it would work. It 24 would be an overkill, a little too expensive. I 25 think that's an example where a gas turbine can be Page 64
1 describe the use of a furnace in a syngas plant and 2 they gave you an answer about a gas turbine producing 3 power, would you count that as a correct answer? 4 You're under oath. 5 A. Yes. I would like to turn to one of the 6 exhibits and show you where a gas turbine functions 7 as a furnace to produce power and steam. 8 Q. Sir, that was not my question. If you have 9 something that your counsel wants to ask you about, 10 you can. 11 My question was a hypothetical about 12 how you would grade a student's exam if they called a 13 gas turbine a furnace, and you're saying you would 14 count that, that that's your common understanding of 15 what a furnace is, is that it includes a gas turbine. 16 Everybody knows that. 17 If I ask other members of AICHE, do 18 you think they would agree with me that a gas turbine 19 is a type of furnace? 20 A. I would clarify my answer, if I wasn't 21 clear, that a gas turbine has a furnace in it or 22 external to it. 23 Q. So a gas turbine is not a furnace? 24 A. There's combustion in a fired chamber 25 inside a gas turbine, or could be external. Page 63	1 used as a furnace. 2 Q. You think a gas turbine and a furnace are 3 interchangeable when it comes to heating a house? 4 That's your testimony? 5 A. If I need a heat source to heat my house, a 6 gas turbine could do that. I could get heat off a 7 gas turbine. 8 Q. Okay. You can get heat off a nuclear 9 reaction, but you wouldn't say that is 10 interchangeable with your furnace at your house. 11 MR. PHILLIPS: Objection to form. 12 Q. (BY MR. COLLARD) What do you mean by 13 "interchangeable," then? You think a gas turbine is 14 interchangeable with a home furnace? That's your 15 testimony? 16 A. I'm going to come back to your nuclear 17 reaction. Remember those glass logs I talked about? 18 Q. They are pretty hot, aren't they? 19 A. No, they are not that hot. Each one 20 produces 500 watts of power. 21 Q. Okay. 22 A. I asked many times if I could have maybe 10 23 or 20 of them to bury in my backyard and run a heat 24 exchanger through it and heat my house. I could do 25 it, and the radiation wouldn't reach me or anybody Page 65

1 else. 2 Q. So you would say the nuclear heat is 3 interchangeable? Your definition of 4 "interchangeable" is so broad that anything that 5 creates heat is interchangeable with a furnace? 6 A. That's why I asked you what's the 7 application of your furnace. If you simply want a 8 heat source, a turbine could provide that. It 9 wouldn't be the best use of a turbine, no, but it 10 functions as a furnace -- as a place where combustion 11 takes place in a fired heater. 12 Q. Okay. So for the purposes of your opinion 13 when you are considering whether something is 14 interchangeable with a furnace, your only 15 consideration is whether it produces heat. 16 Is that fair? 17 MR. PHILLIPS: Objection to -- 18 objection to form. 19 A. No. That's what you mentioned. You 20 mentioned does a furnace produce heat, and I said 21 yes. 22 Q. (BY MR. COLLARD) All right. Let's start 23 over, then. 24 A. If I remember correctly. We would have to 25 read back the record. Page 66	1 Q. And a gas grill? 2 A. Depends on the application. 3 Q. But it could include a gas grill, like a 4 Weber? 5 A. I don't think it would function very well 6 in a chemical process plant, but it would function to 7 generate heat. 8 Q. Does it meet your definition of a furnace? 9 A. A place where -- a fired heater where 10 combustion takes place, if that's what I needed to 11 do, yes. 12 MR. COLLARD: All right. Let's take a 13 break. 14 THE VIDEOGRAPHER: Off the record at 15 11:03. 16 (Recess from 11:03 a.m. to 11:20 a.m.) 17 THE VIDEOGRAPHER: Back on the record, 18 11:20. Please proceed. 19 Q. (BY MR. COLLARD) All right. I would like 20 to talk about what the '168 patent says about a 21 furnace, so let's go to Paragraph 60 of your 22 declaration, please. 23 A. 60? 24 Q. 60. At the very bottom of the page, it 25 starts talking about furnace. All right? Page 68
1 Q. Let's start over. 2 A. Go ahead. 3 Q. In your experience as a chemical engineer 4 and for the purposes of your opinion in this case, 5 are a furnace and a turbine interchangeable? 6 MR. PHILLIPS: Objection to form. 7 A. I said a turbine can function as a furnace. 8 A fired heater in general where combustion takes 9 place may not be able to function as a turbine if it 10 doesn't have furnace -- if it doesn't have turbine 11 blades, but it would provide heat. So I went one 12 way. I wouldn't go the other way. 13 Q. (BY MR. COLLARD) All right. So you 14 couldn't use -- no, strike that. 15 Is a steam boiler a furnace? 16 A. Yes. 17 Q. Is a gas grill a furnace? 18 A. In the broad definition, yes. 19 Q. So in -- in your view -- in your analysis, 20 you used the customary meaning of "furnace"? 21 A. The ordinary and customary meaning of 22 furnace, yes. 23 Q. And for you, that includes a gas turbine, 24 right? 25 A. Yes. Page 67	1 A. Okay. 2 Q. You've seen the quote from the patent about 3 a furnace? 4 A. Starts with "an apparatus"? 5 Q. Yes. 6 A. Yes. 7 Q. The first thing I think we need to do is 8 correct that quote citation. And so, I would like 9 you to look at the patent, as well, because I think 10 you have the wrong citation there. I think it should 11 be Column 2. So I want you -- I just want -- 12 housekeeping, I just want to look at that and make 13 sure we get that corrected. 14 A. What did I put? 15 Q. You put Column 4 at the end of that quote. 16 A. Yes, I agree. I was just checking to make 17 sure the numbers -- the rows were correct. 18 Q. Okay. So you agree that that should be 19 Column 2 in your report? 20 A. Yes. 21 Q. All right. So I now want to ask you about 22 your quotation. You left out -- after the word 23 "among," you left out a colon. 24 Do you see that in the patent as 25 compared to your report? Page 69

1 A. Could you repeat that question? What did I 2 leave out? 3 Q. You left out a colon after the word "among" 4 when you wrote the quote in your declaration. 5 Do you see that? It is missing the 6 colon that is in the patent. 7 A. I do see it in the patent. I do not see it 8 in my declaration. 9 Q. Okay. So do you think that having a colon 10 there changes the meaning of that sentence? 11 A. No. 12 Q. Okay. You have in the quote in your 13 declaration three dots, which indicates that you have 14 left something out of the quote from the patent. And 15 if you go look at the patent, the thing that you left 16 out are the words "these apparatus," comma. 17 Do you see where you left that out and 18 put in three dots instead? 19 A. Yes. 20 Q. Why did you omit "these apparatus" when you 21 put this quote in your declaration? 22 A. I don't recall. I wrote this almost a year 23 ago and probably quite a bit before that before it 24 was actually finalized. 25 Q. So looking at -- do you think it was your Page 70	1 Q. (BY MR. COLLARD) So far what we've seen in 2 the '168 patent regarding the discussion of furnace, 3 does this match, in your opinion, the customary 4 meaning of "furnace"? 5 A. Customary meaning of what word? 6 Q. Furnace. 7 A. Furnace? No. I believe a POSA, as I've -- 8 I can't think of the word, but as I -- a POSA before 9 the priority date of the patent by definition, right, 10 would have understood the word "furnace" in a very 11 general term with these being examples of furnaces. 12 Q. I may have asked a not very clear question. 13 Is there anything in what the '168 14 patent has described so far that is inconsistent with 15 your working definition of furnace? For example, one 16 of these items is not a customary, you know, furnace 17 or something like that? 18 MR. PHILLIPS: Objection to form. 19 A. Those four items are examples of furnaces 20 that operate by means of combustion in a closed 21 chamber, fired heater -- 22 Q. (BY MR. COLLARD) Uh-huh. 23 A. -- and a POSA would have understood that as 24 a furnace, right, the general meaning, because 25 there's nothing special about those terms -- Page 72
1 decision to leave that out, or do you think that that 2 was one of the parts that counsel wrote? 3 A. It would have been my decision. 4 Q. Okay. But you don't remember why? 5 A. No. 6 Q. So let's look at the actual quote in the 7 patent, please. 8 Would you agree that "these apparatus" 9 refers back to a steam reformer, a charge pre-heater, 10 a steam generator, or a steam superheater? 11 A. After reading this patent, that paragraph, 12 the rest of the specification, parts of which I cited 13 in my declaration, a POSA would have understood those 14 to be -- those four items to be examples of furnaces 15 that operate by means of combustion. 16 Q. So my question is a little simpler, I 17 think, and a little shorter. 18 The words "these apparatus" in the 19 sentence starting in Column 2, Line 49, do you agree 20 that "these apparatus" refers to the four items named 21 in the previous sentence: a steam reformer, charge 22 pre-heater, steam generator, and steam superheater? 23 MR. PHILLIPS: Objection to form. 24 A. Yes, it is reporting back to those four 25 items. Page 71	1 Q. All right. 2 A. -- or apparatus. 3 Q. These are consistent with the customary 4 definition of "furnace"? 5 MR. PHILLIPS: Objection to form. 6 A. They are types of furnaces, yes. 7 Q. (BY MR. COLLARD) All right. The '168 8 patent, when it was listing these four types of 9 furnaces, did not list a gas turbine, did it? 10 A. It mentions gas turbines later on. 11 Q. That wasn't my question. Will you please 12 answer my question, sir? 13 A. It did not list a gas turbine as one of the 14 four examples of furnaces? 15 Q. Yes. 16 A. No, sir. It lists a steam generator as one 17 of them. It does not list a turbine. 18 Q. What's a fired heater? You've been using 19 that term a little bit. I would like to define it. 20 A. It's a place where combustion takes place. 21 Q. Have you ever used the term "fired heater" 22 to describe a furnace? 23 A. Yes. It's a common term. I don't think 24 there's anything unusual or special. It's -- 25 Q. Fired heater is almost another way to say Page 73

1 furnace? 2 A. It's almost colloquial, right? It's -- 3 Q. Is a fired heater -- do you use that 4 interchangeably with the word "furnace"? 5 MR. PHILLIPS: Objection to form. 6 A. No. I think a fired heater is where 7 combustion takes place. 8 Q. (BY MR. COLLARD) Sir, I actually -- 9 A. So I wouldn't use it interchangeably with 10 the word "furnace." 11 Q. Sir, I actually would have you close -- I'm 12 not asking you about your declaration right now. I'm 13 asking about you, about your knowledge as an expert 14 in chemical engineering and your experience in 15 chemical engineering. 16 So do you mind please putting away the 17 report for this moment while we talk about this? 18 MR. PHILLIPS: I disagree with that. 19 He doesn't need to put his report away. Leave your 20 report out if you want to, Dr. Ritter. You can 21 answer his question. 22 Q. (BY MR. COLLARD) Okay. Well, I don't care 23 about putting the report away or not, but my point is 24 this is not about your report. 25 I want to know: In your experience in Page 74	1 In your experience and understanding, 2 is that steam generator used to produce electricity, 3 or is it used to generate steam? Does that question 4 make sense? 5 A. Whose opinion would you like? 6 Q. I want your -- your opinion, what you -- do 7 you think that means it's a steam generator to 8 generate electricity or a steam generator in the 9 sense that it generates steam? 10 A. Both. 11 Q. It generates steam and electricity? 12 A. Yes. They are called cogeneration. 13 Q. Okay. That's -- I'm genuinely asking the 14 question. 15 A. It could be an and/or. You may need steam 16 for a purpose where you wouldn't generate 17 electricity, you may need electricity that you could 18 generate through a steam generator, or do both. 19 Q. Do you -- thank you. 20 Do you know which one it's referring 21 to here in Column 2 of the '168 patent? 22 A. No. 23 Q. Okay. All right. Let's go back to your 24 declaration. So we're in the same place, but going 25 to the next sentence. You say, "These furnaces also Page 76
1 40 years as a chemical engineer, are the terms "fired 2 heater" and "furnace" used interchangeably? 3 MR. PHILLIPS: Objection to form. 4 A. All fired heaters where combustion is 5 taking place would be some kind of furnace, yes. 6 Q. (BY MR. COLLARD) Okay. In your experience 7 in your 40 plus years of chemical engineering, do you 8 think the term "fired heater" is used to describe a 9 turbine, a gas turbine? 10 A. All gas turbines -- 11 Q. Sir, I am not asking about your report. 12 MR. PHILLIPS: You cut him off. He 13 was answering the question. 14 MR. COLLARD: He's reading -- 15 A. I was looking down. I'm not reading from 16 it. 17 Q. (BY MR. COLLARD) You were pointing to it. 18 A. I'm actually adjusting my back because it's 19 a bit sore. Could you repeat the question, please? 20 MR. COLLARD: Let's read it back. 21 (The record was read as requested.) 22 A. No. 23 Q. (BY MR. COLLARD) Okay. I have a question 24 about this steam generator that is listed here in 25 Column 2. Page 75	1 include those for the production and/or superheating 2 of steam." 3 Do you see that, where I am? 4 A. Yes. 5 Q. You say, "which also includes steam 6 generators and gas turbines for generating 7 electricity." And you're quoting to Column 7 of the 8 '168 patent, so let's go look at that, please. And 9 it's starting at 41 and then going through Line 53. 10 Have you had a second to look at that? 11 A. 41 to 53? Okay. 12 Q. Okay. So in the paragraph on 41 to 43 -- 13 this is the one we looked at before where it talks 14 about using a fuel fraction for furnaces for the 15 production or superheating of steam. 16 Do you see that? 17 A. Yes. 18 Q. Okay. The next paragraph, which is part of 19 your quote, it says "The invention also allows to 20 produce electricity," and then says, "for example, in 21 the following ways: using a turbo generator or a gas 22 turbine." 23 Do you see that? 24 A. Yes. 25 Q. Okay. Now I want to go back to your Page 77

1 report. You've looked at the quotes that are in your 2 report, and we talked a lot about the first sentence 3 with the quote from Column 2. 4 Now we're on the next sentence where 5 you -- and you say, "These furnaces" -- which is 6 referring to the furnaces identified in Column 2 -- 7 "also include those for the production and 8 superheating of steam, which also include steam 9 generators and gas turbines for generating 10 electricity." 11 What is the link between the furnaces 12 that are listed in Column 2 and the gas turbine 13 listed in Column 7? 14 MR. PHILLIPS: Objection. Form. 15 Q. (BY MR. COLLARD) Why do you say "these 16 furnaces" and then include the gas turbine five 17 columns later? 18 A. To me and also to a POSA, which is what 19 this declaration is written in terms of, the 20 perspective of a POSA, a turbine generator and a gas 21 turbine are essentially the same type of apparatus. 22 Q. As the furnaces in Column 2? 23 A. Well, gas turbine is using steam generated 24 from a furnace, and I've said a gas turbine includes 25 a furnace. Otherwise, how would it function? And Page 78	1 art. 2 Q. (BY MR. COLLARD) Okay. 3 A. Prior to the priority date of the '168 4 patent. 5 Q. Your previous testimony was that a gas 6 turbine is a furnace. 7 Is that still your testimony sitting 8 here? 9 MR. PHILLIPS: Objection to form. 10 Mischaracterizes testimony. 11 A. I believe I meant to say -- and I did say 12 it several times -- a gas turbine includes a furnace. 13 Q. (BY MR. COLLARD) Okay. But it isn't a 14 furnace itself. You wouldn't refer to a gas turbine 15 as a furnace? 16 A. We went down that path and I said 17 colloquially, if you need a heat source, you could 18 use it as a furnace. In a chemical process plant, it 19 would be used to generate steam and/or electricity. 20 Q. Actually, what the -- the -- where we left 21 it was I said, "What's the difference between a gas 22 turbine that includes a furnace and a gas turbine is 23 a furnace?" So let's ask that again. 24 What is the difference between saying 25 the gas turbine includes a furnace and the gas Page 80
1 so, they are both -- I mean a turbo generator is not 2 a gas turbine, but they are similar in function. 3 Q. So I'm going to -- I don't actually think 4 that answered my question, respectfully. 5 My question is: What is the link 6 between the furnaces identified in Column 2 and the 7 gas turbine and the turbo generator identified in 8 Column 7? Because in your declaration, you say 9 "these furnaces," referring to Column 2, "include a 10 gas turbine and a" -- well, you just say a gas 11 turbine. 12 Why would you say the furnaces of 13 Column 2 include the gas turbine listed five columns 14 later? 15 A. The sipronis (phonetic) in a gas turbine -- 16 turbine can be used to generate steam. 17 Q. Okay. Is there a link in the patent 18 between the furnaces listed in Column 2 and the gas 19 turbine listed in Column 7? 20 MR. PHILLIPS: Objection to form. 21 A. From a POSA's point of view, that would 22 have been understood, that a gas turbine can be used 23 in cogeneration. It could be used to generate 24 electricity, followed by steam, and that would have 25 been understood by a person of ordinary skill in the Page 79	1 turbine is a furnace? Do you see any difference 2 between those? 3 A. The region where volume or combustion can 4 take place in a gas turbine can be inside the gas 5 turbine and make direct contact with the blades, or 6 it could be external. So you are asking about heat 7 source and, to me, you know, gas turbine is a 8 furnace, can be used as a furnace. Does it include a 9 furnace? They make gas turbines with the furnace 10 inside of them. So by general definition, it's a 11 turbine. They also make gas turbines called indirect 12 gas turbines where the furnace is separate. So it 13 still functions as a furnace for certain purpose. 14 Q. The way that the '168 patent uses "gas 15 turbine" is always referring to the production of 16 electricity; isn't that right? Not heat. 17 A. The specification mentions the production 18 of electricity. A POSA would understand that there's 19 several ways furnaces and gas turbines could be used. 20 Heat integration is extremely important in chemical 21 plants. It's been important for the last 30 or 40 22 years, maybe before that. And if -- you know, if 23 you're losing heat off a combustion process -- hence, 24 a heat source -- then you may want to recover that. 25 Q. Sorry. That didn't actually answer my Page 81

1 question. My question's about the '168 patent 2 itself. The '168 patent is consistent in only 3 talking about using turbines to produce electricity, 4 correct? 5 MR. PHILLIPS: Objection to form. 6 A. And my answer was as an example, that's 7 what the '168 presents, but a POSA would have 8 understood that cogeneration existed long before the 9 '168 patent came out and that a gas turbine could be 10 used to generate electricity and then with the 11 off-gas being used to generate steam -- hence, a 12 steam generator, which is one of the examples in 13 Column 2. 14 Q. (BY MR. COLLARD) So let me ask it the 15 other way. 16 Do you have any examples in the '168 17 patent where they say "use a gas turbine to generate 18 heat"? 19 A. I have an example in one of my exhibits 20 that I talked about. 21 Q. In the '168 patent where they used -- 22 A. I just told you a POSA would have 23 understood that a gas turbine at the time prior to 24 this one's priority date would have easily understood 25 that a gas turbine could have multiple functions. Page 82	1 A. Yes. 2 Q. It says "The specification describes 3 removal of a CO2-depleted stream for use as fuel and 4 pre-heating a stream for use in the ATR with a 5 furnace, including a gas turbine." 6 So are you suggesting here that the 7 '168 patent discusses pre-heating a stream for use in 8 ATR with a gas turbine? 9 A. No. I'm referring to its use as a fuel. 10 Q. Okay. So the furnace that is here, you're 11 not saying that the furnace which can be used to 12 pre-heat a stream in an ATR -- that furnace could not 13 be a gas turbine? 14 A. Correct. My meaning here is if you removed 15 just -- if I read it -- for example, "CO2-depleted 16 stream for use as a fuel, including a gas turbine." 17 So including in a gas turbine. That's -- that's what 18 I meant. 19 Q. Thank you. 20 "Accordingly, aside from the nature of 21 the fuel fraction, the description of the invention 22 does not differ from the description of the prior 23 art." That's the next sentence in Paragraph 69. I 24 just have a question about it. 25 What do you mean when you say "the Page 84
1 Q. I understand that, and I am forced by the 2 nature of this job to ask questions in little bites. 3 And so, you telling me something that's slightly 4 broader than what I'm asking -- which I understand 5 why that is, because you're trying to be helpful. 6 You're saying there's a broader world here that 7 people would have understood, but I'm starting with 8 what's in the '168 patent, and then the next step is 9 what a person of ordinary skill would understand, 10 things like that. So to have a clear record, I have 11 to take it piece by piece. 12 You're not pointing to anything in the 13 '168 patent where the inventors suggest using a gas 14 turbine to generate heat, are you? 15 A. No, and I don't say that in my declaration 16 also. I say gas turbines for generating electricity. 17 Q. Okay. All right. Let's flip ahead to 18 Paragraph 69 of your declaration, please. 19 A. Which number was it? 20 Q. 69. 21 A. Thank you. I found it. 22 Q. Thank you. 23 So in 69, it's about the fuel 24 fraction. 25 Do you see that? Page 83	1 nature of the fuel fraction"? 2 A. That phrase is referring to -- it's stated 3 "aside from the nature of the fuel fraction." I'm 4 referring most likely to the composition, 5 temperature, and pressure -- its nature. So aside 6 from that, the description of the invention is not 7 different from the description of the prior art with 8 respect to the fuel fraction. 9 Q. Just to make sure I heard you, you said 10 composition, temperature, and pressure? 11 A. Yes. 12 Q. Okay. So -- thank you. I genuinely wasn't 13 sure what it meant. 14 So now my follow-on question is: Does 15 the nature of the fuel fraction as you describe it 16 here differ from the prior art? 17 A. No. It's -- 18 Q. I'm just not following the -- the grammar 19 or the English. And I'm not trying to be -- I don't 20 know. Maybe I am trying to be difficult. I'm trying 21 to be exacting. I just don't -- I genuinely don't 22 understand what you mean, then, because you say in 23 that sentence, "Setting aside the nature of the fuel 24 fraction, the invention does not differ from the 25 description of the prior art." So that indicates to Page 85

1 me that the nature of the fuel fraction may differ 2 from the prior art. 3 Can you explain what you mean? 4 A. I had to think about this one for a while. 5 I'm referring specifically to the fuel fraction -- 6 Q. Okay. 7 A. -- in this paragraph. 8 Q. Okay. 9 A. And aside from the nature -- I believe 10 because I'm only focusing on the fuel fraction and 11 that it's CO2 depleted, the nature -- where it came 12 from in the process upstream or -- right, the 13 description of the invention regarding the fuel 14 fraction does not differ from the description of the 15 prior art. Probably more associated with the origin 16 of the fuel fraction. This paragraph is not 17 discussing that at all. 18 Q. Okay. 19 A. Not necessarily its temperature and 20 pressure and composition, but -- 21 Q. So you're changing -- I don't mean that too 22 harshly. You're reconsidering that now that you've 23 looked at it more closely? 24 A. Yeah. I had to rethink what I'm getting at 25 a year ago in using the word "nature," and it's just Page 86	1 Association 2007 conference on March 13, 2007? 2 A. No, I did not. 3 Q. In your report in Paragraph 83 -- so that's 4 on Page 52 -- that's where you discuss the 2007 IFA 5 slides. I would like to direct your attention to 6 that, please. 7 A. Correct. I'm there. 8 Q. Okay. You're already there. You're one 9 step ahead of me. 10 In that first paragraph, 83, you say 11 that these slides -- you say, "The presentation was 12 presented to attendees of that conference." 13 How do you know that? 14 A. Because all the proceedings from that 15 conference were put on the IFA website. 16 Q. Okay. But how do you know that they were 17 actually presented to the attendees? How do you know 18 one wasn't canceled, or how do you know that that 19 list of materials reflects what was presented to 20 attendees at the conference? 21 A. Generally -- I've been to hundreds and 22 hundreds of conferences. I've presented over 300 23 papers -- or my students -- and generally in this 24 type of area if you don't present your slides, they 25 don't get included in the list of slides in the Page 88
1 a fuel fraction that's depleted of CO2 no matter 2 where that fuel fraction comes from, right? And this 3 is what it's being used for. 4 Q. Okay. 5 A. I think that's dealt with in other parts of 6 my declaration. This is just referring to a fuel 7 fraction. 8 Q. Okay. 9 A. In a sense, that's not needed. 10 Q. Much ado about nothing. 11 MR. COLLARD: Let's take a break. 12 THE VIDEOGRAPHER: Off the record at 13 12:00. 14 (Recess from 12:00 p.m. to 1:05 p.m.) 15 THE VIDEOGRAPHER: Back on the record 16 at 1305. Please proceed. 17 (Exhibit 5 marked) 18 Q. (BY MR. COLLARD) Dr. Ritter, while we were 19 on lunch break, I marked Exhibit 5, and it is now in 20 front of you. It is the 2007 IFA slides. You'll see 21 it's marked with the blue exhibit sticker. 22 A. Yes. 23 Q. Okay. Are you familiar with that document? 24 A. Yes. 25 Q. Did you attend the International Fertilizer Page 87	1 proceedings. That's just common knowledge for 2 academics and researchers who do this kind of stuff. 3 Q. So other than your general or your common 4 knowledge about this, do you have any specific 5 knowledge that these slides were presented to 6 attendees at the 2007 March conference? 7 A. That is my specific knowledge. It was 8 included with all the other presentations that 9 presented in the proceedings. 10 Q. Let me ask it a different way. Other than 11 the fact that it was included with all the other 12 presentations associated with that on the website, do 13 you have any specific knowledge that it was, in fact, 14 presented? 15 A. I was not there; so no. 16 Q. Okay. And then in Paragraph 84, you say 17 that the slides were published. We'll start with 18 that. 19 When were the slides published? 20 A. I state later on in my declaration when I 21 believe they were published. 22 Q. Okay. You're talking about the Internet 23 Archive material that talks about -- you talk about 24 when they may have been published based on that in 25 the Lako paper. Page 89

1 A. That's the first time I believe I mention a 2 date. 3 Q. We'll get to that in a second. But here in 4 '84, you say the slides were published, and my 5 question is when they were published. 6 So just sitting here today, do you 7 know when they were published? 8 A. There was no date up until this point. 9 They were just available on the IFA website. 10 Q. Okay. And it's a similar question for the 11 next phrase. You say they were made available to the 12 interesting -- interested public. 13 Do you know when they were made 14 available to the interested public? 15 A. According to my later paragraphs in my 16 declaration, yes. 17 Q. Okay. Sitting here, can you tell me when 18 they were made available to the interested public? 19 A. I believe in 2010. 20 Q. Okay. And you're basing that off of the 21 internet archive information you received? 22 MR. PHILLIPS: Objection to form. 23 Q. (BY MR. COLLARD) Good point. Are you 24 basing that off of the internet archive information 25 that you received? Page 90	1 ago, probably more than a year ago. So -- 2 Q. So your testimony is that you didn't 3 receive this from counsel, that you -- you found this 4 yourself and then you provided it to counsel and 5 decided to put it in your report? 6 A. My testimony is I don't recall. 7 Q. Okay. That's fine. I really like -- 8 A. Except for what I say in here. 9 Q. Sir, this is -- again, if you could please 10 stop reading your report right now. I just want to 11 ask you some questions and then we will get to all of 12 the content of your report, but I really prefer if 13 you could just -- my question wasn't about what's in 14 your report. It's about what you remember. 15 A. I'm here because of my declaration. 16 Q. I understand, but you still have to answer 17 the questions I ask. And if they don't refer to your 18 declaration, then -- I'm allowed to ask you questions 19 that don't refer to your declaration and see if you 20 can answer them without reference to your 21 declaration. So if you would -- we will get to it, 22 but if you would start with answering my questions, I 23 would appreciate it. 24 So your testimony is you don't recall 25 if you found the 2007 IFA slides or if counsel found Page 92
1 A. I'm basing it on -- I think it's called 2 Wayback -- Wayback Machine. 3 Q. Are you basing it on anything other than 4 that? 5 A. I have other dates that I mention in here 6 based on a reference I found. 7 Q. Okay. Well, let's get to that. Other than 8 the reference and the Wayback Machine -- let me ask 9 it a different way. 10 Looking at Paragraph 84 when you go to 11 the IFA website, was there any way to tell when it 12 was first made available to the public by looking on 13 that website? 14 A. No, not from first looking at this. 15 Q. All right. So now I want to talk about the 16 reference generally. It's marked as Exhibit 5, the 17 IFA -- 18 A. Yes. 19 Q. -- 2007 slide deck. 20 How were you first made aware of this 21 slide deck? 22 A. Honestly, I don't recall. I may have found 23 it -- I did a lot of searching -- it says here I 24 found it through this search. So this is what I 25 would call -- this was done, you know, almost a year Page 91	1 those slides; is that correct? 2 A. Yes. 3 Q. Okay. Do you use the IFA website in 4 your -- in the normal course of your work? 5 A. In the normal course of my work over four 6 decades. But probably more recently over the last 7 maybe two decades where the internet became a 8 household word, I have gone to thousands of websites 9 for searching for background information on things I 10 published and reports I wrote. So I may have gone to 11 the IFA website. I may not have. I've done a lot of 12 work in ammonia, and I don't know. It wasn't 13 something I go to every day to see if there was 14 something published. 15 Q. So fair to say you don't go to the IFA 16 website on a regular basis as a part of your work? 17 A. Not on a regular basis. That's fair to 18 say. 19 Q. Okay. I'm going to ask this specific 20 question. I think you've answered it implicitly but, 21 again, I'm trying to make a clear record. 22 Do you remember if you had a copy of 23 these IFA 2007 slides before you went to the IFA 24 website and searched for them, or do you -- is your 25 recollection that you went to the IFA website, Page 93

1 searched for them, and that's how you found them for 2 the first time? 3 A. That's what I said. I don't remember. I 4 did answer that, yeah. 5 Q. Thank you. 6 A. I have been to that website, and I have 7 downloaded those slides from there. 8 Q. I understand, but you don't remember if you 9 already had them -- 10 A. Correct, correct. 11 Q. -- first? Thank you. 12 All right. So do you know when the 13 IFA Resources page was first available for public 14 use? 15 A. I believe that I already answered that 16 question also, is that's referring to Paragraph 84 17 that says IFA Resources. In general was IFA 18 Resources pages available, or specifically to this -- 19 Q. So this is really why I need you to listen 20 to my question. I'm not asking you about something 21 in your report. I'm just asking you if you know when 22 the IFA Resources page was first available for public 23 use. 24 A. No. 25 Q. Do you regularly use the Wayback Machine as Page 94	1 URL of the IFA web page? 2 A. It captures the URL in the search. 3 Q. What search? What do you mean? What does 4 "capture the URL in the search" mean? 5 A. It put it up on the screen. 6 Q. Put what up on the screen? 7 A. The URL. 8 Q. Okay. How do you know the Wayback Machine 9 is reliable? 10 MR. PHILLIPS: Objection to form. 11 A. How do I know the Wayback Machine was -- 12 Q. (BY MR. COLLARD) Reliable. 13 A. I don't. 14 Q. In your work, do you generally rely on 15 declarations from someone at the internet archive or 16 things that the Wayback Machine tells you? 17 MR. PHILLIPS: Objection to form. 18 A. I think I answered something similar to 19 that. I rely on all kinds of websites and search 20 engines and archival sources to find information that 21 might be relevant to a publication I'm working on or 22 a paper I'm working on or a proposal I'm working on. 23 (Exhibit 6 marked) 24 Q. (BY MR. COLLARD) Okay. Let's look at 25 Exhibit 6. What is this document, if you know? Page 96
1 a part of your -- of the normal course of your work? 2 A. No. 3 Q. Is using the Wayback Machine a part of your 4 expertise? 5 A. No. 6 Q. Okay. So let's go ahead to Paragraph 88. 7 A. 88? 8 Q. 88. 9 A. Thank you. 10 Q. This says "To confirm the public 11 availability of 2007 IFA, I checked the internet 12 archives Wayback Machine to understand whether the 13 2007 IFA was available on the IFA's website before 14 the earliest priority date of the '168 patent. The 15 Wayback Machine captured the URL of the IFA page for 16 the 2007 IFA technical meeting on March 10, 2010, 17 that included a link to download 2007 IFA." 18 So is your testimony that you 19 personally used the Wayback Machine to capture the 20 URL of the IFA web page as of March 10, 2010? 21 A. Yes. I had been to this website, and I had 22 seen this link. 23 Q. Into what website? 24 A. The Wayback Machine. 25 Q. Okay. So what does it mean to capture the Page 95	1 MR. PHILLIPS: For the record, is this 2 Exhibit 1019? 3 MR. COLLARD: It is. 4 Q. (BY MR. COLLARD) Dr. Ritter, the question 5 is just what is this document, if you know? 6 A. Pardon? 7 Q. What is this document is the question 8 pending. 9 A. It's a declaration of Mina Ching. 10 Q. I see that's what it's labeled, but can you 11 describe to me what the document is? You've been 12 looking at it for a couple of minutes. 13 A. It's something about the Wayback Machine. 14 She apparently did a search. 15 Q. Okay. Do you know Mina Ching? 16 A. I don't believe so, no. 17 Q. Have you ever talked with her? 18 A. No. 19 Q. Do you know anything about the work that -- 20 that she did to run searches on the Wayback Machine? 21 A. No. 22 Q. So I want to look at Paragraph 89 in your 23 report. You said, "Thus, to confirm the 2007 IFA was 24 publicly accessible before the earliest priority date 25 of the '168 patent, I investigated whether 2007 IFA Page 97

1 had been cited in publicly-available prior art 2 publications." 3 Do you see that? 4 A. Yes. 5 Q. Let me go back, actually. So strike that 6 last question. 7 Sitting here today, do you know 8 whether the Wayback Machine had a copy of the actual 9 material that you rely on as Exhibit 1006, these IFA 10 2007 slides? 11 MR. PHILLIPS: Objection to form. 12 Vague. 13 A. I was able to download it like a month ago. 14 So -- 15 Q. (BY MR. COLLARD) I understand you were 16 able to download it now -- 17 A. The slides -- 18 Q. -- but were you able to use the Wayback 19 Machine to download -- to figure out exactly what was 20 available in March 2010? 21 A. No. 22 Q. So there's some additional investigation 23 you did around this paper, the Lako paper. I see 24 that in Paragraph 89. Is that -- 25 A. Lako, Lako. Page 98	1 knowledge that it was, in fact, available as of 2 March 2009? 3 A. Once again, this is a publication that's 4 dated March 2009, and it's generally understood in my 5 circles that that would be when it was available. 6 Q. That's totally fine, and I'm not really 7 arguing with that. This is the other thing I have to 8 do in a deposition. I have to make sure I have 9 completed your answer. Do you have any other 10 reasons? And so, I'm not doing that because I don't 11 accept that answer. I just have to make sure there's 12 no other reasons that are unstated. So I'll ask a 13 question so you have a question to respond to. 14 Other than your general understanding 15 that papers are published around when they are dated 16 in your industry, do you have any personal knowledge 17 that the paper was, in fact, publicly-available as of 18 March 2009? 19 A. I wouldn't need any. That is an 20 indication -- that date is an indication to me and 21 any of my colleagues that we haven't talked about, 22 POSA, but that's what that would indicate to me. It 23 was published around March 2009. 24 Q. Okay. But you don't have any other 25 confirmation other than the date that's on the -- on Page 100
1 Q. Okay. How do you -- you don't know? 2 A. I don't know. I've been calling it Lako. 3 Q. Lako. Okay. So why did you search for, 4 you know, this -- why did you conduct a search where 5 you ended up finding what's in this Lako paper? 6 A. I wanted to try to confirm when the 2007 7 IFA was publicly-available. I don't know where I 8 started, but this is where I ended up. 9 Q. That's fine. Why -- and maybe you can just 10 tell me. 11 Why did finding the -- the Lako paper 12 help you feel like you could confirm that the 2007 13 IFA paper was publicly-available? 14 A. Lako cited -- cited the conference. 15 Q. Okay. So Lako -- sorry. Go ahead. 16 A. Cited the talk from the conference. 17 Q. Okay. Do you know when the Lako paper 18 itself was publicly-available? 19 A. It's dated March 2009. 20 Q. But -- 21 A. And published by the Energy Research Center 22 of the Netherlands. 23 Q. Do you have any personal knowledge that it 24 was, in fact, available in March 2009? I understand 25 that's the date on it, but do you have any personal Page 99	1 the paper? 2 A. I do not. 3 Q. All right. And so, for you, you're not 4 relying on any sort of confirmation from the Wayback 5 Machine about when the Lako paper was available? 6 A. No. I think I did to sort of confirm it. 7 I thought I did, but maybe not. Yeah. Yeah, it says 8 it right here. 9 Q. Says what? 10 A. "Using the Wayback Machine" -- I'll go 11 slow -- "I confirmed that the Lako paper was 12 publicly-available prior to the effective filing date 13 of the '168 patent (see Exhibit 1020, Internet 14 Archive Declaration and the Lako paper)." 15 (Exhibit 7 marked) 16 Q. (BY MR. COLLARD) So here's Exhibit 1020. 17 It's Exhibit 7 for this deposition. And I think this 18 is why I'm confirmed [sic]. This is Mina Ching 19 talking about the Internet Archive. 20 Did you use the internet -- sorry. 21 Did you use the Wayback Machine to do this? 22 A. Yes. 23 Q. Okay. 24 A. In fact, I did it again like a month or two 25 ago. Page 101

1 Q. Okay. 2 A. Just to make sure everything was there. 3 Q. All right. But you don't know if the 4 Wayback Machine is reliable? 5 A. It worked fine for me. 6 Q. Okay. You previously testified you don't 7 have -- you don't know whether it's reliable or not. 8 A. I won't change my answer. I don't know if 9 it's reliable. 10 Q. All right. So I want to ask you about the 11 citation. So you show that here and talk about that 12 more in Paragraph 90 and 91. 13 Do you see where I am? 14 A. Which document? 15 Q. Sorry. Your declaration, Paragraph 90 and 16 91. 17 A. Okay. I'm there. 18 Q. There is the citations -- you do a little 19 screen shot of the citation that you're talking about 20 in Paragraph 91. 21 Do you see that? 22 A. Yes. 23 Q. And you're saying that the Lako paper cites 24 to Nielsen 2007A and that that corresponds to the 25 2007 IFA slides, correct? Page 102	1 right? You can look in your report for that. 2 A. Yeah, because we go on -- yes. 3 Q. That's the only one? 4 A. Yeah. 5 Q. Yes? 6 Okay. Now I want to talk about what 7 that corresponds to in Exhibit 5, which is the IFA 8 slides. You have a copy of those in front of you. 9 A. Yes. 10 Q. It's also in your report. It corresponds 11 to the slide titled Historical Development-Ammonia 12 Plants. 13 Do you see that? 14 A. Yes. 15 Q. Okay. And, in fact, it's specifically 16 citing the third bullet point on that slide, correct? 17 A. It's the same number, same units -- well, 18 the units are different. 19 Q. When you get this into the details, maybe 20 they even made a mistake in their citation. 21 A. No, no. This is a metric ton, and I 22 believe the small T is MT. 23 Q. Okay. So that's sort of my point. 24 Just to ask a cleaner question on 25 this, you would agree that the one citation to the Page 104
1 A. Yes. 2 Q. You've pointed to one single citation in 3 the Lako paper, and that's what you're relying on to 4 say that the IFA 2007 slides were available as of the 5 time of the Lako paper, correct? 6 A. Absolutely. 7 Q. Okay. So -- and that citation is about -- 8 it's on Page 26 of Exhibit 1020, and it says "This 9 ranking appears to be confirmed by the fact that 10 ammonia plants that have been revamped exhibit a net 11 energy efficiency of at best," and then has a figure, 12 7.1 giga calories per ton. 13 Is that the right -- 14 A. Let me find it here. It's a little 15 clearer. Yes, I think it's giga calories per ton 16 ammonia. 17 Q. "According to Nielsen 2007A." 18 So that's the citation back to the IFA 19 slides, right? 20 A. Yes. 21 Q. You don't identify any other citations in 22 all of Lako that's, you know, a 50-page paper to the 23 slides. 24 This is the only citation to the 25 slides in the Lako paper that you've identified, Page 103	1 IFA 2007 slides in Lako is to the third bullet on the 2 slide titled Historical Development-Ammonia Plants? 3 A. I think there's one more citation -- one 4 more number that's pulled from this slide or pulled 5 from this talk. 6 Q. Okay. Where is that? Can you help me? 7 A. Well, I highlighted it. 6.6 to 6.89. And 8 then on the next slide, Nielsen, there's the 6.8 -- 9 Q. So it's bullets -- 10 A. The first bullet on Page 3 of 10. 11 Q. Okay. 12 A. That's why I highlighted it. 13 Q. I don't have the highlighting. I'm sorry. 14 A. It's in Table 3.5. 15 Q. Oh, okay. 16 A. And any -- 17 Q. I'm sorry. It's in Table 3.5, but can you 18 be more specific? 19 A. Column one, two, three, four -- 20 Q. Uh-huh. 21 A. Bottom number, 6.6-6.89. And the 6.6 is on 22 the previous slide, fourth bullet. 23 Q. Okay. So is it -- so it's just the 6.6 24 number is from here? 25 A. Both numbers. Page 105

1 Q. Where's the 6.89? 2 A. Page 2, bottom slide, last bullet of 3 Nielsen, 6.6. 4 Q. Yep. 5 A. And then the general consumption is first 6 bullet, 6.8, on the following slide. 7 Q. Where is the 6.8 here, though? 8 A. Well, 6.89. 9 Q. I know. So how does that come from this? 10 A. 6.8, 6.89. To me, they are the same 11 number. Maybe it's a typo. 12 Q. Okay. 13 A. I mean, that's the range, and he cites 14 that. Lako cites Nielsen. 15 Q. But Nielsen doesn't have 6.9 in it? 16 A. 6.8. If I was looking at this, I would 17 quote that. It's probably a typo, but I can't say -- 18 he cites this. I found the two numbers. That's all 19 I can say. 20 Q. That's fine. As you know, we're here to be 21 precise. 22 The -- what you're pointing to in the 23 Lako paper, the citation to 6.6 to 6.89, the 6.89 24 number does not appear in the IFA 2007 slides. The 25 number in the IFA 2007 slides is 6.8. Page 106	1 Do you know if Lako attended the 2 International Fertilizer Association 2007 conference 3 on March 13, 2007? 4 A. I do not. 5 Q. The Lako paper in the citation -- and you 6 cut this out into your report -- specifically cites 7 the presentation. It doesn't cite to a slide deck. 8 Do you agree? 9 A. A presentation is a slide deck. Never seen 10 one that wasn't. 11 Q. Okay. But to be clear, there's nothing in 12 this particular citation that references the 13 materials from the presentation? 14 A. Nor should there be. 15 Q. That's not my question. I will ask a 16 follow-up if there should be or could be -- or your 17 counsel can -- but there's no reference in this 18 citation to any of the presentation materials, is 19 there? 20 A. Nor should there be. The answer is no, and 21 there should not be. 22 Q. Okay. 23 A. You don't cite things like that ever. No 24 one does. I've been doing this 45 years. This is 25 how you cite a conference proceedings. Page 108
1 You agree with me, right? 2 A. The one in the table is 6.6 to 6.89. The 3 one in the slide is 6.6 to 6.8. 4 Q. Okay. 5 A. Those are the numbers. 6 Q. Okay. Other than these three bullets that 7 we've identified on these two slides, you don't 8 identify any other citations by the Lako paper 2007 9 IFA slides to your report, correct? 10 A. Well, the fact that this column is strictly 11 labeled Haldor Topsoe. So anybody, including a POSA, 12 would interpret that as being the same numbers from 13 this table. 14 Q. Okay. Other than that, is there any 15 citation to -- in the Lako report that is to the IFA 16 2007 slides that you are aware of? 17 A. I don't believe so. 18 Q. Okay. Do you know if -- sorry. Well, just 19 P. Lako is the person's name. Do you know if it's a 20 man or a woman, this Lako person? I don't know. 21 A. No, I do not. 22 Q. Okay. Do your know -- 23 A. I never saw the first name. 24 Q. I'm just going to call them by their last 25 name, then. Page 107	1 Q. So in Paragraph 91, you say "Taken 2 together, this confirms that the IFA was 3 publicly-accessible at least as the publication of 4 the Lako paper in 2007." 5 Do you see that on Paragraph -- at the 6 end of Paragraph 91? 7 A. Yes, I do. 8 Q. Okay. But you really don't have any 9 evidence that anything other than these two slides 10 from the presentation were available to Lako as of 11 2007? 12 A. That's a typo, by the way. 13 Q. What is? 14 A. I thought it was. 2007. 15 Q. The Lako paper is 2008? 16 A. March 2009, which was cited earlier. Sorry 17 about that. 18 Q. No, that's -- 19 A. I was like, "Wait a second. That might be 20 before the conference." 21 Q. Let me ask it again, then, with the correct 22 number. 23 A. Okay. 24 Q. All right. Based on your analysis that 25 we've just walked through, the only parts of the 2007 Page 109

1 IFA presentation that we know Lako had access to are 2 these two slides that we've looked at, one titled 3 Historical Development-Ammonia Plants and the other 4 Energy Efficiency-Ammonia Plants. 5 We don't have any evidence that Lako 6 had access to any other slides? 7 MR. PHILLIPS: Objection to form. 8 A. In my walk of life when someone cites a 9 conference paper like that, they have the entire 10 talk. It's fact. 11 Q. (BY MR. COLLARD) Okay. 12 A. But you would cite it this way. If not, if 13 it was personal communication, you cite personal 14 communication. If it was Haldor Topsoe, someone from 15 there, you would cite it that way. 16 So this is just understood to be a -- 17 anybody at my level would see this as a normal 18 citation where someone had the presentation in hand 19 and only needed to pull a few numbers from it. 20 Q. What if you were present at the 21 presentation, you took notes, you don't have a copy 22 of the presentation, and you wanted to cite it in 23 your paper? Isn't that how you would cite it, how 24 it's cited in Paragraph 90, if Lako attended and just 25 had their own notes and wanted to put those figures Page 110	1 Development of Ammonia Plants and Energy 2 Efficiency-Ammonia Plants, that you point to being 3 cited in Lako, you don't use either of those slides 4 in your actual validity analysis of the '168 patent, 5 do you? 6 MR. PHILLIPS: Objection to form. 7 A. I took all these slides as a whole like 8 anything. I mean, it's -- it's a reference. 9 Q. (BY MR. COLLARD) Okay. But you didn't 10 cite to or copy these specific slides in your 11 analysis, did you? 12 A. No. I didn't need to. 13 Q. Okay. All right. Let's continue with the 14 slides, actually. Let's go to the slide on the 15 bottom of Page 7. 16 Do you see that? It's called CO2 17 Reduction Potential 1. Are you there? 18 A. Yes, I am. 19 Q. What type of fuel does this refer to for 20 use in the steam reformer on this slide? 21 A. What type of fuel are they talking about in 22 this slide? 23 Q. Yeah. 24 A. Hydrocarbon fuel. 25 Q. Hydrocarbon fuel? Page 112
1 in their paper? 2 A. That would be very uncustomary because if 3 I'm writing this kind of 50-page paper, I would -- 4 like any scientist/engineer, I would make sure they 5 had the whole story. I mean -- because there's a lot 6 of information in Nielsen and -- 7 Q. But that would explain, wouldn't it, why 8 the numbers are slightly different? Perhaps Lako 9 took notes and the number presented was 6.89 and not 10 6.8. 11 So that could explain why the numbers 12 are different if the numbers come from Lako's notes 13 instead of this presentation? 14 A. I don't think that's a good explanation for 15 why the numbers would be different. 16 Q. Is it possible? 17 A. Whoever typed up that slide or that table 18 in the paper probably had a typo. 19 Q. It's a possible explanation, though, isn't 20 it? 21 A. It is a possible explanation. 22 Q. So these two slides -- the slides aren't 23 numbered, so that's why I keep referring to them by 24 their title. 25 These two slides, the Historical Page 111	1 Okay. And then on the top of 2 Page 8 -- so the next slide -- CO2 Reduction 3 Potential 2, there are four items listed. 4 Does this list include using syngas as 5 fuel for a furnace? 6 A. It's listing ways that CO2 reduction 7 potential can -- ways to reduce CO2, and the first 8 one is reduce fuel firing in a plant by 20 to 9 25 percent reduction. So -- 10 Q. Does that suggest to you that means using 11 syngas as a fuel to get that 20 -- 20 to 25 percent 12 reduction? 13 A. Yes. I can explain why. 14 Q. That's fine. 15 On the next slide, it's called the 16 Integration of a Gas Turbine Driver in the Ammonia 17 Process. 18 Can you tell me what type of fuel is 19 coming in on the top left? 20 A. Yes. 21 Q. What type of fuel is that? 22 A. Based on this presentation by Nielsen and 23 they are talking about CO2 reduction potential, it's 24 a mix of natural gas and hydrogen fuel. 25 Q. You can tell that just by looking at the Page 113

1 label "fuel" and the slide before it? 2 A. I can tell that by looking at two slides 3 down. 4 Q. Okay. Well, Nielsen wasn't there in the 5 presentation yet, so, you know, he was -- I don't 6 know what he was saying as he presented this. And 7 I'm asking you why you think at this stage in the 8 presentation when he says "fuel" he's talking 9 about -- what did you say, natural gas combined 10 with -- 11 A. A mix of natural gas and CO2 depleted 12 hydrogen fuel. 13 Q. Why do you think at this stage in the 14 presentation that's what that fuel refers to? 15 A. Because he labeled natural gas fuel as 16 natural gas -- I think it's a he -- and he labeled 17 hydrogen fuel as hydrogen fuel. And then this is 18 just general fuel. And the slide above it, they want 19 to reduce the fuel firing in a plant by 20 to 20 25 percent, which is -- and you can't do that with 21 within an existing plant because you still need the 22 Btus that you've always needed. So you can't just 23 cut back on the fuel, right? You cannot. Your plant 24 wouldn't work. So you have to use a fuel. 25 If you're going to cut back on the Page 114	1 combust -- fired heater where combustion takes place. 2 They spin a turbine. They take the off-gas from that 3 turbine -- gas turbine, which has oxygen in it -- 4 they don't burn all the oxygen. They'd like to, but 5 they don't. Maybe 8 percent, typical stack gas. 6 They mix more fuel with it and notice 7 there's no additional oxygen source or air source. 8 They burn it again or ignite it, and they make -- 9 they send it into a high-pressure steam boiler or 10 steam generator. 11 And you can tell it's combusted 12 because that line goes to the stack and then the 13 steam in separate chambers -- obviously it would be, 14 like, some kind of shell tube heat exchanger -- make 15 super-heated, high-pressure steam, and it runs the 16 turbine to make electricity. So emphatically, those 17 are furnaces. 18 Q. Okay. Does this show using fuel to 19 pre-heat the charge of an autothermal reformer? 20 A. No. 21 MR. COLLARD: All right. Let's take a 22 quick break. 23 THE VIDEOGRAPHER: Off the record at 24 1358. 25 (Recess from 1:58 p.m. to 2:09 p.m.) Page 116
1 fuel to reduce CO2 emissions, you've got to come up 2 with a low CO2 fuel. So that's telling me right 3 there -- and a POSA would understand -- that if 4 you've got a pre-reformer and HTER, the only way 5 you're going to get fuel reduction is with CO2 6 mission decreases is to use a fuel with less -- that 7 would produce less CO2 when burned. And they talk 8 about that second slide on Page 9 -- or they present 9 it in a picture, right? I can use the old cliché "a 10 picture is a thousand words" when I wrote in my 11 report about what a -- how a POSA would interpret 12 these slides. 13 Q. Okay. Looking at either of these, frankly, 14 the fuel is going to this unlabeled box. 15 Do you know what that box is? 16 A. Yes. 17 Q. What is that box? 18 A. It's a furnace. 19 Q. How do you know it's a furnace? 20 A. Because they are mixing fuel and a stream 21 containing oxygen, and they do the same thing in the 22 lower identical box with an X in it. They take air, 23 compress it, they take fuel -- and it's a mixing 24 point. It's not just blending two streams, right -- 25 and they combust -- that's a furnace. They Page 115	1 THE VIDEOGRAPHER: Back on the record 2 at 1409. Please proceed. 3 Q. (BY MR. COLLARD) Dr. Ritter, I want to 4 confirm with you, what is syngas? What's your 5 definition of syngas? 6 A. It stands for synthesis gas. 7 Q. Uh-huh. And what is that? 8 A. In the ideal world, CO and hydrogen as a 9 use, but it's -- usually comes right off one of the 10 reformers or ATR, a mixture of CO, CO2, and hydrogen 11 with other components that might be in the stream. 12 But the principal components that define syngas is 13 carbon monoxide, carbon dioxide, and hydrogen. 14 Q. As little carbon monoxide as you can get, 15 right? 16 A. Pardon? 17 Q. As little carbon monoxide as you can get? 18 A. It depends on the application downstream. 19 Q. Okay. What about if I were to say ammonia 20 syngas? Does that have meaning to you? 21 A. No, except they -- it's going to come from 22 the same source, and that's -- your statement, as 23 little CO as possible, to make ammonia, it's a 24 reaction between hydrogen and nitrogen. CO 25 poisons -- carbon monoxide poisons the catalyst. Page 117

1 Q. Right. 2 A. So there you want your syngas -- you have 3 to clean up your syngas off a reformer and have a 4 really pretty pure hydrogen stream, whatever you want 5 to call that purity, to make ammonia. 6 Q. So what I'm hearing is that syngas 7 generally means hydrogen with some CO and CO2, but 8 there may be some changes into those proportions 9 depending on the application of the syngas. 10 Is that fair? 11 A. Yes, and how it's made. 12 Q. Okay. So before we move on, I did want 13 to -- I have one last thing on Page 9 in the slide 14 with the diagram of Exhibit 5, which is also Exhibit 15 1006, which is also the IFA 2007 slide deck. It does 16 say there "ammonia syngas." 17 Do you see that on the right? 18 A. Yes. 19 Q. Okay. So what is that referring to when 20 you see it there, that ammonia syngas? 21 A. I will give a broader definition. 22 Synthesis gas. It's going to make something -- 23 you're going to synthesize something with this gas, 24 if you will. That would be primarily hydrogen with 25 low levels of other components. So, yeah, there's -- Page 118	1 2007? 2 A. If they are making ammonia, it would have 3 or require very similar properties. 4 Q. Let's look at Paragraph 2 on the next page. 5 A. Oh, this is an application. Yeah, it's -- 6 it's an application, so the paragraphs are numbered. 7 Q. Yeah, they are. Isn't that nice? 8 A. Yeah, yeah. 9 Q. They should keep that. 10 In Paragraph 2, it says "The 11 specification and claims which follow the term 12 synthesis gas is intended to refer to a gas 13 containing predominantly CO and H2, which is intended 14 to be used to manufacture liquid hydrocarbons." 15 Then it says "Unless it's apparent 16 from the context, this term is not intended to refer 17 to a gas used to manufacture ammonia." 18 So do you see -- you read along with 19 me? 20 A. Yes. 21 Q. So in your report, you discuss combining 22 the -- some aspects of the IFA 2007 process in the 23 slides with some of the things that are discussed in 24 Price. 25 Do you -- did you account for the fact Page 120
1 Q. So the composition of the synthesis gas 2 depends on the synthesis that you're contemplating? 3 A. Yes. In most circles, industrial circles, 4 you know, syngas is, you know, hydrogen because they 5 will make methanol and some other chemicals. But 6 it's a synthesis gas, yes. In general, you're going 7 to make something with it. You're going to 8 synthesize something. You're going to feed it to a 9 reactor. 10 Q. That's fine. My question is a little 11 shorter. And I think you answered it, but I just 12 want to be -- again, I'm just trying to make a clear 13 record. 14 Does the composition of the synthesis 15 gas depend on the synthesis that you are 16 contemplating making? 17 A. Yes, and how it was made. 18 (Exhibit 8 marked) 19 Q. (BY MR. COLLARD) Thank you. 20 So if the IFA 2007 is using syngas for 21 ammonia, do you know if the Price reference which 22 I've handed you as Exhibit 8 -- it's also marked 23 Exhibit 1011 in the IPR. 24 Do you know if Price uses syngas the 25 same -- contemplates the same use of syngas as IFA Page 119	1 that they have different definitions of syngas? One 2 is -- says, you know, we're focused on ammonia 3 syngas, and the other says we're focused on syngas to 4 manufacture hydrocarbons. 5 A. I didn't have to. 6 Q. Why not? 7 A. A POSA would have understood exactly what 8 we just discussed about what someone wants to call a 9 syngas. It's a very vague term. A POSA would 10 understand prior to the priority date of the '168 11 patent, syngas to some people might be a little 12 different than syngas other people. 13 My first response to you was it's 14 known in the industry to be CO and hydrogen, but then 15 it's broader. No, it's CO, CO2, and hydrogen. And 16 then you have Nielsen labeling it ammonia synthesis 17 gas, and notice it says "ammonia syngas." So it's a 18 word in front of syngas. So it's very specific. 19 And anybody -- any POSA would know 20 ammonia syngas would be hydrogen. So it's just 21 synthesis gas. It's a very vague term. 22 Q. It's ammonia syngas -- could it also 23 already have the nitrogen in it pre-synthesis? Would 24 you still call that ammonia syngas? 25 A. How's it already going to have the nitrogen Page 121

1 in it? 2 Q. Well, at some point to create ammonia, you 3 have to add nitrogen to the hydrogen, right? 4 A. That is correct. 5 Q. So when you've added nitrogen to the 6 hydrogen so you have now a gas that is as purely as 7 possible hydrogen and nitrogen in the correct ratio 8 but there has not yet been a reaction to create 9 ammonia, is that gas called ammonia syngas in your 10 experience? 11 A. It's a blended gas stream that's intended 12 to synthesize ammonia from it. So there would be 13 nothing vague about calling it ammonia syngas. A 14 POSA would know that it's hydrogen and nitrogen. 15 Q. So ammonia syngas could be hydrogen and 16 nitrogen. Ammonia syngas could also be hydrogen that 17 is going to somewhere down the line be used to 18 create -- combine with nitrogen used to create 19 ammonia. 20 Those are both acceptable ways to 21 refer to ammonia syngas? 22 A. Yes. It's just a gas -- a POSA would 23 understand that that's a gas that's going to be used 24 in one form or another to synthesize ammonia. Syngas 25 is a short-term for synthesis gas, which means Page 122	1 stream, right? 2 A. Using a hydrogen extraction system as a 3 separator. 4 Q. Okay. 5 A. That's not a mixing point or -- so there 6 would be a box. 7 Q. Okay. 8 A. One stream in, two streams out. One stream 9 in is the synthesis gas. Two streams out are the 10 streams they are talking about divided into 11 hydrogen-rich and hydrogen-poor stream. 12 Q. Okay. 13 A. In a physical process if you have a stream 14 that's coming and it's just -- hits a T in the line, 15 part of it goes left, part of it goes right in a 16 pipe. 17 Q. Uh-huh. 18 A. It's absolutely impossible for those 19 streams to not have the same composition. There's no 20 separator. There's no device indicated in something 21 like that. That's just a normal stream. Half the 22 water goes to Cincinnati, half the water goes to 23 Chicago. Same water. It's just a physical split 24 coming off whatever device that streams comes off. 25 It's impossible for those compositions not to be the Page 124
1 reactants. 2 Q. You state in your report -- it's 3 Paragraph 70. You can look at it if you want to. 4 A. Which paragraph? 5 Q. 70. 6 A. 70? 7 Q. Yeah. You say that "The specification of 8 the '168 patent describes deliberately allocating a 9 part of the process flow to the fuel fraction, the 10 fuel fraction being directly separated from the 11 process flow and having the same composition." And 12 you say "This reflects the unremarkable concept that 13 splitting a stream results in streams with the same 14 composition." 15 So you say that that is unremarkable; 16 but sometimes when streams are split, they are very 17 different in composition, right? 18 A. No. 19 Q. Okay. Let's look back at Price in the 20 abstract. It says "Synthesis gas exiting a reforming 21 section of the hydrocarbon synthesis process is sent 22 to a hydrogen extraction unit where it's divided into 23 a hydrogen-rich stream and a hydrogen-poor stream." 24 So in that case, they have split the 25 stream into a hydrogen-rich and a hydrogen-poor Page 123	1 same. 2 Q. So did you -- when you were looking to 3 combine Price with other references, did you take 4 into account the fact that Price is using a separator 5 to have two different streams -- different 6 composition streams -- compared to the fact that the 7 '168 patent requires just a regular T with the same 8 composition after splitting the streams? 9 A. I think the word "split" -- Price used the 10 word "split." They are using the word -- do they use 11 the word split? 12 Q. They use the word "divided." 13 A. Divided, split. I would have taken that 14 into account. That's not a physical split of the 15 stream. That's like going into a PSA system and 16 producing a hydrogen-rich and hydrogen-poor stream. 17 Q. Did you put all of your opinions in your 18 report? 19 A. Yes, I did. 20 Q. Have you formed any new opinions since you 21 submitted your report that are not in your report? 22 A. Not that I know of. 23 Q. All right. Let's look at -- how do you 24 pronounce the reference -- how do you pronounce that? 25 A. We pronounce it's a few different ways. Page 125

1 Lately, we've been using Rytter. 2 Q. You really have? 3 A. Yeah. It was Rytter for a while, I think, 4 but I think it's Rytter. 5 Q. I was going to go with Rytter. 6 A. Rytter. 7 MR. TANALOV: I'm pretty sure it's 8 Rytter. 9 Q. (BY MR. COLLARD) I'll use Rytter. 10 A. Rytter would be fine. 11 Q. You understand why I'm concerned. 12 A. Yeah. It can be very confusing. 13 Q. Let's use Rytter. I'll try my best. 14 MR. PHILLIPS: For purpose of the 15 court reporter, it's R-Y-T-T-E-R. 16 (Discussion off the record) 17 A. That might be very confusing. Rytter is 18 fine. 19 MR. PHILLIPS: Is this 9? 20 MR. COLLARD: I think so, yes. 21 (Exhibit 9 marked) 22 Q. (BY MR. COLLARD) Based on all of that 23 discussion we had on the record that we probably 24 should have had off the record, are you familiar with 25 Exhibit 9, which is also marked Exhibit 1008, which Page 126	1 A. No. 2 Q. (BY MR. COLLARD) Why not? 3 A. I consider it an economic choice. 4 Q. What's the difference? 5 A. They wouldn't use the word -- a POSA -- 6 when I say "POSA," I mean someone who would 7 understand this technology before the priority date. 8 Q. POSA is fine with me. 9 A. I hate to keep saying the same thing over 10 and over. 11 A POSA would understand that design 12 choice is something to do with the process flow 13 sheet, right? But before you get to that, you would 14 have to look at what you want to make and how you're 15 going to make money off that. So whether you want to 16 make ammonia, methanol. 17 But all of these processes, everything 18 I've reviewed and cited, all these -- these patents 19 as prior art all have the same front end. They all 20 make a mixture of CO, CO2, and hydrogen for a variety 21 of uses. Ammonia happens to be one of them. 22 Methanol happens to be one of them. Rytter talks 23 about oxygenates, like methanol, you know, things 24 with more oxygen in them. And at that point, you 25 decide what's economical. The front end might not Page 128
1 is the Rytter patent? 2 A. I am. 3 Q. Great. Did you review this as a part of 4 preparing your report in this matter? 5 A. Yes. 6 Q. And did you review it as a part of your 7 prep for this deposition? 8 A. Yes. 9 Q. All right. So is Rytter a process for 10 ammonia synthesis? 11 A. Yes. 12 Q. All right. Where in the figure -- and 13 there's only one figure -- is the ammonia 14 synthesized? 15 A. It's not in the figure. It's in "other 16 uses" in the figure. 17 Q. Other uses? 18 Okay. What about in the claims of 19 Rytter, where does it talk about ammonia synthesis? 20 A. I don't see it in the claims. I believe 21 it's in the specification. 22 Q. Okay. Would you consider it a design 23 choice to design a system to generate methanol versus 24 a system to generate ammonia? 25 MR. PHILLIPS: Objection to form. Page 127	1 change that much, but what you do with what comes off 2 your natural gas products from a reformer, ATR, POX 3 system would change your flow sheet accordingly. You 4 have to decide that up front. 5 Q. So those changes to the flow sheet you just 6 described, are those design changes? 7 A. They would be major, major changes. So it 8 would be -- you would be designing a different flow 9 sheet with different unit operations embedded in it, 10 depending on what you want to make. 11 Q. The thing that you are saying would be 12 major, major changes is if you're switching between a 13 reformer, an ATR, a POX system? That's what you 14 mean? Those are the major changes? 15 A. Not at all. 16 Q. No? When you said they are major, major 17 changes, what -- what are you referring to? 18 A. You may need a Fischer-Tropsch reactor as 19 opposed to -- to make liquid hydrocarbons as opposed 20 to -- or hydrocarbons as opposed to an ammonia 21 synthesis reactor to make ammonia. 22 Q. I was with you until the end, and then now 23 I feel a little confused about trying to understand 24 what you consider -- do you consider changes to the 25 economic choices to be major decisions? Is that what Page 129

1 you were referring to? 2 A. Up front, a company has to decide how they 3 want to make money with technology that they have in 4 hand. 5 Q. Uh-huh. 6 A. So I made a couple points, one of them that 7 for all these chemicals we've been talking about, 8 they all start with some kind of steam methane 9 reforming or autothermal reforming to make hydrogen, 10 CO, and CO2. What you do with that hydrogen, CO, and 11 CO2 will make changes to your flow sheet depending on 12 the chemicals you would like to synthesize. Ammonia 13 happens to be one of them. 14 So the separation units, the shift -- 15 the shift unit's probably going to be there. That's 16 part of it, but it depends. It depends on what 17 you're going to make. 18 Q. All right. You understand that the '168 19 patent at issue is concerned with reducing carbon 20 emissions from the ammonia process, right? 21 A. Carbon emissions from -- 22 Q. The ammonia synthesis process. 23 A. Yes. 24 Q. And Rytter is about the cogeneration of 25 methanol and electrical power. At least that's the Page 130	1 Q. Yeah. 2 A. It's a station -- without trying to use the 3 same words -- in general, a heat-generating station 4 is an apparatus or unit operation you would use to 5 heat a stream -- 6 Q. Is it -- 7 A. -- and then use that stream for something 8 else. So it's -- so in 7, it's really a steam 9 generator, and it's actually a furnace and steam 10 generation system in Box 7. They are feeding 11 hydrogen and air to that unit. 12 Q. That -- how do you know it's a furnace? 13 A. Because they are feeding a fuel and air and 14 what comes out is steam -- steam generator -- and 15 electric power. So there's got to be a furnace in 16 there someplace. 17 Q. Okay. 18 A. And the dashed line which goes to 6, right, 19 comes around, goes to 3, and then finds its way to 1, 20 that's energy. That's heat that's being supplied to 21 these other units. 22 Q. How do you know that that -- 23 A. It says it somewhere in the specification. 24 Q. -- is energy? 25 A. And a POSA would know that. It has to Page 132
1 title. 2 Do methanol creation processes have 3 the same carbon reduction concern as ammonia 4 synthesis processes? 5 A. To go strictly to methanol, they end up 6 using the -- the CO2 that comes off the reformer -- 7 Q. So fair -- 8 A. -- to make methanol, but that's one case. 9 But all of these processes burn fuel. 10 Q. I understand. 11 But is it fair to say that there is 12 less of a concern about carbon reduction in a 13 methanol process because you can use CO2 in the -- in 14 the methanol, in the finished product? 15 A. I don't know if I would say it's less of a 16 concern. It depends how big your methanol plant is. 17 And you still are burning, for example, natural gas 18 in Box 1, and that stack gas is going to have a lot 19 of CO2 in it. 20 Q. Okay. So let's talk a little bit about the 21 figure in the claims. The claims of Rytter talk 22 about -- I think it's a heat-generating station. 23 What's a heat-generating station, if 24 you know? It's the very last part of Claim 1. 25 A. Last part of Claim 1? Page 131	1 be -- it's a heat-generating station and, you know, 2 these devices need heat. 3 Q. So it's referred to as -- 7 is not referred 4 to as a furnace. It's not referred to even as a 5 heat-generating station. I know that that's the 6 language in the claims; but in the spec, Box 7 is 7 referred to as a hydrogen power station. 8 Does that affect your answer at all, 9 that it is a hydrogen power station? Do you still 10 think that Box 7 is a furnace? 11 A. I know Box 7 contains a furnace. There has 12 to be a furnace in there. It's generating steam. 13 It's also generating electric power. 14 Q. So it could be a turbine, right? 15 A. Yeah, it could be a turbine. So it's 16 several things, but they are combusting -- there's 17 definitely a fired heater in there combusting to 18 generate steam and electric power. 19 Q. Do you think the engine in your car is a 20 furnace? 21 A. I use it to keep warm, so it generates 22 heat. 23 Q. So you do? It meets your definition of a 24 furnace? 25 A. I think we went through this, but a POSA Page 133

1 would know there's combustion going on in Box 7. 2 Q. Can you answer my question, please? 3 A. There's combustion going on in my engine, 4 and a car generates heat. It can function as a 5 furnace. 6 Q. So where is the split in the figure of the 7 fuel and the process fractions? 8 A. In Rytter's unlabeled figure number -- it 9 doesn't have a number. That's the only figure, 10 right? 11 Q. Yeah. Figure -- no figure. 12 A. This -- the split is portrayed in a strange 13 way in this schematic, but it's there. 14 Q. Okay. Where is it? 15 A. The three -- the two hydrogen streams and 16 other uses are all hydrogen streams, as a POSA would 17 understand it after reading this patent with the same 18 composition, that are split into a fraction for 19 synthesizing methanol, split as a fraction to 20 generate steam and electric power, and actually split 21 as a third fraction to generate other uses. And I 22 think one of those is ammonia, if I'm not mistaken. 23 So Box 6 is a separator. It's 24 separating CO2 and hydrogen into a CO2-rich stream 25 and a hydrogen-rich stream. A POSA would know a Page 134	1 to feed a furnace for pre-heating a charge of an 2 autothermal reformer, does it? 3 A. I believe that's correct. It does not. 4 Well, let me rephrase that. As I already said it 5 once -- and this is such an obscure figure. The heat 6 generated in 7 is being used to heat -- Item 1, I 7 think, is a -- it's a pre-heater or -- Item 1 is a 8 pre-reformer. Natural gas going in -- it doesn't 9 show it in the figure. If you read the specification 10 on Column 5 -- in Column 5 -- 37-ish, that 11 paragraph -- in the plant, and that's being 12 pre-heated -- that's what those arrows are 13 indicating -- with heat generated in the furnace from 14 the hydrogen stream which is depleted in CO2. So 15 it's got several uses in Box 7: steam, electric 16 power, and they are transferring heat, rightly so, 17 into Box 3 and Box 1 and Box 6. 18 Q. Where does it describe that those arrows 19 are heat? 20 A. In Paragraph -- Column 6, Line 16, "Energy 21 from the hydrogen power station (7) may be used in 22 the air separator (3), the separator (6) for 23 separation of hydrogen and carbon dioxide, and for 24 the compression of carbon dioxide from the separator 25 (6)." Page 136
1 separator has one input and two outputs, especially 2 CO2 separators. You can only have one input and two 3 outputs. Scrubber, PSA system, membrane system. You 4 have feed and two products. Hydrogen is necessarily 5 split into three streams in this prior art, all 6 having the same composition. 7 Q. And -- 8 A. And they even say that in Claim 1, Line -- 9 starting at Line 10 going to Line -- well, 13. 10 Q. Rytter doesn't show using a fuel fraction 11 to feed a furnace for pre-heating the charge of an 12 autothermal reformer, does it? 13 A. A POSA would understand Rytter shows a 14 deplete -- a fuel depleted in CO2 and in hydrogen 15 being used in a furnace to generate steam -- so a 16 steam generator -- as part of the use in Box 7. 17 Q. Sorry. Not my question. 18 You know the difference between a 19 steam generator and autothermal reformer? 20 A. Oh, you said autothermal reformer. I heard 21 what I wanted to hear. 22 Q. Fair enough. Let me go back and ask it 23 again. 24 A. Ask it again, please. Thank you. 25 Q. Rytter does not show using a fuel fraction Page 135	1 Q. That does not say that heat from 7 is 2 heating 1? 3 A. Is heating 1? 4 Q. That's what you just testified, right? You 5 said you think that heat from 7 is heating 1? 6 A. No, but a picture says a thousand words. 7 I've got the arrow -- I've got the heat coming from 8 7, going into 3, coming out of 3, going into 1 with 9 an arrow. 10 Q. I don't even know why you think that's 11 heat. Why do you even think that's heat? 12 A. Because it's a dotted line, and they say it 13 right there. They just left off 1, just like they 14 left off steam going into Box 1. Hence, it's a 15 pre-reformer. They provide steam, natural gas and 16 heat, energy -- they say it -- and what comes out of 17 1? Primarily methane with a little CO2. Natural gas 18 has all the CO2 removed. So -- and why are they 19 putting steam in 1? It's a pre-reformer. 20 Q. Okay. Fine. It does say that steam -- gas 21 and steam are fed into 1, but where does it say that 22 heat -- that this line is heat from 7 going into 1? 23 I don't -- does it say that anywhere in Rytter? 24 A. A POSA would understand, reading where I 25 just read, which is Column 6, that energy is being Page 137

1 supplied to these boxes. And there's another dashed 2 line -- it's a dashed line that's distinctly 3 different than the solid lines which are process gas 4 streams. It's also going into 8. And they don't 5 mention 8 there either, but I believe 8 is the 6 compressor. They do mention the CO2 compression of 7 carbon dioxide from the separator (6). So they are 8 supplying heat there, and I would have to find -- I 9 believe 8 is -- compression plant (8). 10 So a POSA would understand that is the 11 energy stream, and it's being supplied from 7 to 6 to 12 8 to 3 and to 1. I admit poorly-drawn, but that's 13 what a POSA would understand, that that arrow is 14 going through 3 and into 1. And they say 1, this is 15 also supplied with energy. Where is that energy 16 coming from? It's coming from 7. "For example, by 17 heating the feed" -- so this is all by heating the 18 feed "from the pre-treatment plant (1) 19 substantially" -- 20 (Reporter clarification.) 21 A. "By heating the feed." Then it said "from 22 the pre-treatment plant (1), substantially a methane 23 stream comprising some CO2 is withdrawn which is 24 passed to a reformer (2). This is preferably an 25 autothermal reformer." Page 138	1 The things that are labeled that are 2 coming out of Box Number 7 are steam and electric 3 power, correct? 4 A. Those that are labeled, yes. 5 Q. Okay. And the type of dotted line that -- 6 that you're pointing to that sort of comes sort of 7 off of the top of 7 is the same type of dotted line 8 as the lines used for steam and electric power, 9 right? But you're saying it represents not steam and 10 not power, but a line for heat. 11 Is that your testimony? 12 A. No. And thank you for clarifying this. 13 All the dotted lines are energy or heat -- all of 14 them, including those for steam and electric power. 15 That is -- what did they call 7? 16 Q. Hydrogen power station. 17 A. Hydrogen power station. So it's generating 18 power through heat, and that heat is being 19 transferred to a steam generator, an electric power 20 turbine, and then all the boxes we've talked about. 21 Initially I was thinking 7 is this 22 black box that had everything in it. It does not. 23 Those dots are heat. It's a power station that 24 literally is just providing heat for one, two, three, 25 four, five, six different processes or unit Page 140
1 Q. (BY MR. COLLARD) Okay. I understand 2 you're pointing to your interpretation of the figure. 3 Is there anything in the specification 4 that -- that says that heat from 7 is being used to 5 heat 1? 6 MR. PHILLIPS: Objection to form. 7 Asked and answered. 8 A. It might take me an hour. I can see if I 9 can find it. But I think a POSA would understand 10 it's very clear -- I'll say it again. The picture 11 says a thousand words. A POSA would know how to 12 interpret and read the schematic. We read 13 schematics. That's what we do. That's what POSAs 14 do. I'm reading the schematic. The specification 15 tells me I'm supplying energy to these devices. It 16 doesn't label 8, which is the compressor -- which is 17 heat, by the way -- and it says it supplies it to 1. 18 That energy, according to this schematic, is coming 19 from 7. So yes, it is feeding a pre-reformer. 20 Q. (BY MR. COLLARD) So looking at the figure, 21 the things coming out of 7 that are labeled are steam 22 and electric power, right? 23 A. And then I have an arrow that -- 24 Q. Sorry. Please answer my question before 25 you provide more context. Page 139	1 operations, if you will. 2 Q. Okay. Other places, steam is not labeled 3 with the dotted line. 4 A. I didn't hear that. Other places steam 5 is -- 6 Q. -- is not labeled with the dotted line. 7 A. No, that's not steam coming out. That's my 8 point. That's energy coming out in the form of heat 9 to go into a steam generator they are not showing 10 because those lines are dotted. I agree. The line 11 at the bottom is steam. That's true steam coming 12 into the shift reactor, all right? That's true steam 13 coming into the autothermal reformer in 2. 14 That is not steam coming out of 7 15 because it's a dotted line. It's just energy that is 16 going to be subsequently used to generate steam in a 17 steam generator, which would be another heat 18 exchanger they are not showing. You have water going 19 in one side, hot air -- hot gas going to the other 20 side. 21 The same thing with electric power. 22 That's going to go to a turbine of some sort. These 23 are just heat sources. 24 Q. Okay. I appreciate that this is your 25 interpretation of these dotted lines, but this is not Page 141

1 described in the specification. 2 This is you interpreting this figure? 3 A. I would disagree with that. 4 Q. Okay. 5 A. I think they are very clear about a 6 hydrogen power station which generates heat, and that 7 heat is being used -- and they talk about energy. 8 Energy and heat, synonymous. 9 Q. Energy and heat are synonymous? 10 A. Yeah, yeah. 11 Q. Okay. Is that how you -- 12 A. Energy is transferred. Heat is not. But 13 unfortunately, undergraduate students like them -- 14 use them the same and it's used the same. But if 15 there's heat transfer, there's energy transfer. Let 16 me put it that way. 17 Q. Okay. But respectfully, when you're 18 designing a plant, if you say, "I need heat for this 19 particular piece of equipment," that's a lot 20 different than saying, "I need energy for this 21 particular piece of equipment," isn't it? 22 A. No. 23 Q. Because temperature is -- if you need heat, 24 you need to get to some certain temperature. If you 25 need energy, you need, you know, to create power for Page 142	1 MR. COLLARD: Let's take a break 2 because I think we need to take a break for Shauna. 3 THE VIDEOGRAPHER: Off the record, 4 1456. 5 (Recess from 2:56 p.m. to 3:08 p.m.) 6 THE VIDEOGRAPHER: Back on the record 7 at 1508. Please proceed. 8 (Exhibit 10 marked) 9 Q. (BY MR. COLLARD) I have handed you 10 Exhibit 10, which is -- happens to also be 11 Exhibit 1010 to the IPR. It's the Fjellhaug patent. 12 Did you review this in preparing your 13 report? 14 A. Yes, I did. 15 Q. Did you review it in preparing for this 16 deposition? 17 A. Yes. 18 Q. What is an air-driven reactor? 19 A. It's a reactor that uses air to provide -- 20 as one of the reactants. 21 Q. How is it different than an oxygen-enriched 22 reactor? 23 A. Airs as a standalone -- well, I have a 24 problem with the term "oxygen-enriched," but we'll 25 probably get to that. Page 144
1 it. It may or may not need to be hotter or colder. 2 A. In the field of chemical engineering when 3 you talk about heat sources, energy and heat are 4 synonymous. 5 What you're talking about is you can 6 get energy into a system -- for example, you know, a 7 chipmunk running in a little turbine wheel to 8 generate -- 9 Q. Well, I'm not -- 10 A. I'm just saying that would generate -- you 11 could generate energy from that. 12 Q. I might go with plugging it into the wall, 13 but you can go with the chipmunk. 14 A. You know, what is it called? They're cute. 15 Anyway, heat and energy are used a 16 lot, but it's in the context of requiring heat for 17 something, then you see that interchange. You'll see 18 heat transfer and energy transfer all the time 19 referring to that. 20 I do agree, like, energy can be in 21 different forms besides heat, but heat is energy. 22 Q. Okay. 23 A. Is all energy heat? No. But heat is 24 energy. 25 Q. I understand. Page 143	1 Oxygen enrichment, in my mind as a 2 POSA would see it, doesn't always -- isn't always 3 based just on composition. It's the amount of moles 4 or mass of oxygen that's fed to a reactor, which 5 depends on pressure and temperature. That's my issue 6 with oxygen enrichment. 7 Q. Well, for a person who is not a chemist, 8 saying that it's got a certain proportion of moles -- 9 A. Just use mass. Just use mass. 10 Q. Well, I'm going to use percentage. 11 Is that the same as saying it's over 12 21 percent oxygen? Air is 21 percent oxygen, right? 13 A. Right. 14 Q. So if it's oxygen-enriched, that means it's 15 more than 21 percent oxygen, right? 16 A. When it's coming out of an air separation 17 unit, that's a term that's used. I just told you 18 I -- I have a problem with that term because that's 19 what's coming out of an air separation unit prior to 20 going into a reformer. 21 Q. Let's stop talking in the abstract, and 22 let's look at what Fjellhaug says about it. 23 In Column 26 Fjellhaug, it says 24 "Contrary" -- this is -- sorry -- at Line 16. 25 "Contrary to what was taught by the above Japanese Page 145

1 patent application, it was found that the ATR should 2 be an air-driven reactor (i.e., not an oxygen-driven 3 reactor)." 4 Do you see that? 5 A. Yes, I remember that statement. 6 Q. All right. So would you agree that 7 Fjellhaug teaches away from using an oxygen-driven 8 reactor and prefers using an air-driven reactor? 9 MR. PHILLIPS: Objection to form. 10 A. I would not agree with that, no. 11 Q. (BY MR. COLLARD) Why? 12 A. Because he takes exhaust gas that has 13 oxygen in it and mixes it with the air and -- as a 14 potential oxygen source for the ATR or reformer 15 system. 16 Q. Okay. Does that increase the percentage 17 of -- does using that exhaust gas increase the 18 percentage of oxygen in the air that is driving that 19 ATR? 20 MR. PHILLIPS: Objection to form. 21 A. On a percentage basis when you mix air with 22 a stream with less oxygen in it, the percentage of 23 oxygen coming out is less; but the absolute moles, 24 like we got to earlier, is more. So I'm actually 25 feeding more oxygen to my reactor. Page 146	1 You used the ordinary and customary 2 meaning of terms when you interpreted the '168 3 patent, right? 4 A. Yes. 5 Q. That's what you told me earlier? 6 A. Yes. 7 Q. Okay. 8 A. And in view of a POSA. 9 Q. Yes. Can you tell me here in the '168 10 patent when it uses the term "oxygen-enriched" that 11 it would encompass using air that has less than 12 21 percent oxygen and that would count that -- that 13 would include -- you know, oxygen-enriched as the 14 '168 patent uses it would include air that has lower 15 than atmospheric oxygen? 16 A. A POSA would understand that a reactor 17 needs a certain amount of feedstock, not a percentage 18 amount. That's why it's so misleading. If you have 19 one oxygen source, the only way -- one oxygen source, 20 the only way to get more moles into your reactor 21 is -- of oxygen is to have a separator up front that 22 takes air and enriches it. Yes, it comes out with a 23 higher mole fraction, volume fraction, percentage of 24 oxygen, which necessarily implies it's more moles of 25 oxygen going into the reactor. Page 148
1 And when you do balances in chemical 2 engineering, when you see a box and you're running a 3 reaction, you never see -- never see percentages 4 because they are so misleading because they are 5 pressure- and temperature-dependent. You see PAL 6 moles per hour entering, PAL moles per hour leaving 7 or pounds per hour entering, pounds leaving. 8 So in a sense -- I think Fjellhaug is 9 using air because it's cheaper. Well, then why would 10 they recycle an oxygen source back to their reformer, 11 right? It's free. Yet they are getting more product 12 gas because they're feeding more absolute oxygen. 13 If you only have one source of 14 oxygen -- oxygen-enriched air necessarily provides 15 more moles of oxygen to a reactor, but I can get that 16 by blending air with a dilute stream in oxygen. I 17 necessarily absolutely have more moles going to my 18 reactor. 19 Q. (BY MR. COLLARD) I understand now that you 20 are trying to say that somehow combining air with 21 oxygen-deficient exhaust creates oxygen enrichment 22 because there's more absolute moles going into the 23 testimony. That's what your testimony is? 24 A. Yes. 25 Q. I understand now. Page 147	1 I can get that same effect by blending 2 air with a dilute stream. I have more moles going 3 in. If you would like me to do a mass balance and 4 show you the difference between a percentage, which 5 means nothing because gases are temperature- and 6 pressure-dependent -- it's all about the moles. 7 Q. I understand your theory, but it's not what 8 the -- 9 A. It's not a theory. 10 Q. It is a theory as far as this case is 11 concerned. 12 A. No. It's fundamental understanding in -- 13 in chemical engineering. Reactors are based on 14 moles, not percentage of a gas. You can put it in 15 terms of percent, but we don't because you can't do 16 anything with it. 17 Q. But they did in the '168 patent. 18 A. Because they have -- 19 Q. Please look at the '168 patent, sir. 20 A. It's because they have a single source of 21 oxygen. 22 Q. That's -- that's not my question. 23 The '168 patent, Column 3, Line 36 -- 24 when the '168 patent talks about oxygen-enriched air, 25 it says that it preferably contains at least Page 149

1 50 percent oxygen by volume and more preferably at 2 least 90 percent oxygen by volume and even more 3 preferably at least 95 percent. 4 You would agree that on a percentage 5 basis in Fjellhaug, if you're combining 6 oxygen-deficient exhaust gas and atmospheric air, 7 that the percentage of oxygen by volume is lower than 8 the atmospheric level of 21 percent and far lower 9 than 50, 90, or 95? 10 A. I already said that. 11 Q. You agree with that? 12 A. I said you get a less percentage, but you 13 get more moles. 14 (Simultaneous cross-talk.) 15 (Reporter clarification.) 16 A. A POSA would understand the only reason 17 you're doing this is to get more moles or grams fed 18 to the reactor, and this is one way of achieving 19 that. 20 Q. (BY MR. COLLARD) Okay. But that's not 21 what the '168 patent requires? 22 A. Because it only has one oxygen source. 23 That's the only way to get more moles, is to use -- 24 to enrich that oxygen by spending ammonia on an 25 oxygen-enrichment system like a PSA system or a Page 150	1 Q. Okay. So this is -- and I'm not trying to 2 re-litigate the furnace/turbine issue, but it's 3 pointing to a turbine here? 4 A. It's using fuel in a turbine, yes, a gas 5 turbine. 6 Q. Okay. And that's what you're -- and that's 7 what you're pointing to as the furnace? Whether it's 8 the furnace in the turbine or the turbine is a 9 furnace, that -- that's what you're pointing to? 10 A. Yes. 11 Q. All right. So I want to try to figure this 12 out together, so wish us luck. But the need for that 13 furnace, based on the figure and the patent, seems to 14 come -- be labeled Line 17. 15 Do you see that, and do you agree with 16 that? 17 A. Yes, I do. Yes. 18 Q. Okay. So would you agree that the process 19 gas -- the process fraction coming off of Feed 17 is 20 labeled as 38? 21 A. Pardon me? Is what? 22 Q. Labeled as 38. 23 A. It's labeled as 38, 41, and 39. This is 24 another -- another multiple split off the same 25 Line 17. Page 152
1 membrane system or cryogenic system. 2 Q. Okay. 3 A. Those are the three. 4 Q. All right. Does Fjellhaug disclose a 5 furnace in Figure 2? 6 A. I'm looking at Figure 2. It's my report. 7 Q. That's fine. Do you mind just telling me 8 what page you're on or what paragraph you're on? 9 A. Page 77, 111. 111 paragraph. 10 Q. Thank you. It's -- it's fine to look at it 11 there, but I just wanted to be sure we're looking at 12 the same thing. 13 So does Figure 2 disclose a furnace? 14 A. Okay. 15 Q. It's really fine, Dr. Ritter. I don't care 16 what figure you look at. 17 A. My patent -- I can't look at both, so I 18 need the patent. 19 Q. That's fine. 20 A. I wanted to look -- yes, that's -- I wanted 21 to be clear about it. 22 Q. Okay. Where -- which part of Figure 2? 23 A. 24 is a combined cycle turbine that's being 24 fed some of the CO2-depleted hydrogen fuel. And as we 25 discussed, that turbine has a furnace in it. Page 151	1 Q. And then maybe it's also staying on 17. So 2 it's really in four directions. 3 Is that fair? It's 17 down to 24, 41, 4 38, and 39? 5 A. Yeah. I guess it stays at 17 like you 6 said, yes. Yes, that -- that's where the split is 7 occurring, in four places, I guess. One, two -- 8 three places. It's split because it doesn't have to 9 split to go down to the turbine, right? It's just 10 taking a corner. 11 Q. Right. Yep. Okay. We're on the same 12 page. 13 A. Actually, 41 -- another poorly-drawn 14 figure. 41 is the retentate coming off a membrane 15 unit, and it's going back into 17. So they don't 16 have an arrow on it. Horrible. But I know that's a 17 membrane unit. We have -- every separator has got a 18 feed going in, 38. Yeah, 42 coming out. You have 41 19 coming out. So -- 20 Q. So there should be a little arrow on 41 21 back to 17? 22 A. Yes. 23 Q. Okay. 24 A. Definitely. A POSA would understand that 25 from a membrane unit, yes. Page 153

1 Q. Do you know it says that here in Column 5? 2 It says "Recycle through Line 41 to Feed 17." So 3 there we go. Okay. We're making progress. 4 A. I'm going to put an arrow on my -- 5 Q. I put an arrow on mine. 6 Okay. So the -- when that first split 7 happens and 17 is split into 38 and 39 -- I'm sorry. 8 Are you back on the figure? 9 A. I'm back here, yes. 10 Q. Okay. So 17 splits off into 38 and 39. At 11 that moment, they are all the same composition, 12 right? 13 A. Absolutely, yes. 14 Q. Okay. But when 41 comes back into 17 15 before it goes into the turbine, it becomes a 16 different composition because 41 coming out of the 17 separator has a different composition, correct? 18 A. Correct, but only below that intersection 19 point. 20 Q. That place we just drew our arrow? 21 A. Yeah. It's only below that. That's the 22 blending, and it's going south. 23 Q. Okay. 24 A. It doesn't go north. That should be 25 labeled -- if I was drawing this, that would be a new Page 154	1 how -- what this is showing and how it's described in 2 the specification? 3 A. Correct. But, you know, at the split -- 4 the original split of 17 going to 38 and some going 5 up to 39 and some going down to 24, those -- yeah, 6 those multi-splits all have the same composition and 7 then it changes after 41 blends in and 39 blends in. 8 Q. Because what happens in 40 is a separator, 9 so that is not the same composition coming out of 41 10 and 42 on those lines? 11 A. Correct. 12 Q. One's hydrogen-heavy and one's 13 nitrogen-heavy? 14 A. Correct. 15 Q. Give me a second. Literally that was the 16 part I was most nervous about talking through with 17 you. 18 MR. PHILLIPS: You did good. 19 MR. COLLARD: Thank you. 20 THE WITNESS: You're going to know a 21 lot about chemical engineering when you leave here. 22 MR. COLLARD: How is this going to go? 23 MR. PHILLIPS: Honorary degree. 24 MR. COLLARD: Can we go off the record 25 for a second? I'm just going to get reorganized Page 156
1 stream number because it's a different composition. 2 Q. Okay. So it's a different composition of 3 what's going into 24 than what was previously in that 4 line when it was first labeled as 17? So it's 7A or 5 something like that we could call it? 6 A. Yes. 7 Q. Okay. And 40 -- when 17 turns into Stream 8 38 and is fed into Separation Unit 40, that is -- 9 then supplies hydrogen to Line 39. So whatever's 10 going into 43 is also now a different composition 11 than what was in 17, right, because after the 12 separator, it gets apparently additional hydrogen? 13 A. Additional hydrogen. That membrane unit is 14 separating and putting more hydrogen for synthesizing 15 something. Yes, it's a different composition now to 16 the right, not to the left, right, as you understand 17 it. 18 Q. Okay. And the -- we didn't say what the 19 thing is that's coming out of 41, but it's nitrogen, 20 right? 21 A. They say nitrogen, yeah. 22 Q. Okay. 23 A. I saw that. 24 Q. So how I've described this diagram and 25 we've added one arrow, you and I don't disagree about Page 155	1 here. 2 THE VIDEOGRAPHER: Off the record, 3 1533. 4 (Recess from 3:33 p.m. to 3:35 p.m.) 5 THE VIDEOGRAPHER: Back on the record 6 at 1535. Please proceed. 7 Q. (BY MR. COLLARD) All right. A couple more 8 on Fjellhaug while it's fresh in our minds. 9 Does Fjellhaug disclose one or more 10 furnaces for pre-heating the charge of an autothermal 11 reformer? 12 A. I don't believe so, no. 13 Q. Okay. Does Fjellhaug disclose one or more 14 furnaces for pre-heating the charge of the natural 15 gas desulfurization section? 16 A. I believe the only furnace is in the cogen 17 combined cycle turbine. 18 Q. So not -- 19 A. So "no" to your question. 20 Q. Thank you. 21 All right. I want to talk to you -- a 22 phrase that's come up a couple times today -- I'm 23 done with Fjellhaug for the moment -- about design 24 choices and just make sure that we're clear on the 25 record because it's a phrase you used quite a bit in Page 157

1 your report. 2 So can you tell me, you know, in your 3 experience, what do you consider to be a design 4 choice? 5 A. Choosing to be between, of course, two 6 different designs. It could be two different 7 processes. It could be two different temperatures, 8 pressures, compositions, flow rates where -- more so 9 where ranges can exist rather than -- there's 10 discreet design choices, A or B, or there's 11 continuous range design choices with constraints on 12 the end or constraints -- temperatures would have 13 constraints, pressures would. Compositions would be 14 limited to zero to a hundred percent. So -- 15 Q. When a POSA is designing an ammonia 16 synthesis system, are they going to have to make 17 design choices? 18 A. Yes. 19 Q. Are they going to have to make a lot of 20 design choices? 21 MR. PHILLIPS: Objection to form. 22 A. That depends. 23 Q. (BY MR. COLLARD) What's it depend on? 24 A. How many -- was it an ammonia synthesis 25 plant? Page 158	1 you may have called it an economic choice. You just 2 have to make a certain amount of product, and you 3 have to figure out how to do it. 4 Is that -- are you comfortable with 5 that phrasing, or would you call it something else? 6 A. I'm comfortable with that because you're 7 not -- you're not redesigning the process. You're 8 not -- hopefully not changing anything because any 9 change is going to cost you money or may affect 10 downstream processes, right? So you're just scaling 11 it up, so everything pretty much stays the same. And 12 that's well-known by a POSA. That's well-known in 13 chemical engineering circles, I would -- I would 14 think. 15 Q. You raised another point I want to talk 16 about where you said one change could impact things, 17 you know, up or down the stream. 18 Is that true for design choices? If 19 you make a certain design choice, it might have 20 impacts up or down the stream of the process? 21 A. I'll clarify that. Yes, but most of 22 these -- the only time it will affect upstream -- say 23 you have a unit in the middle of a flow sheet and you 24 change something -- change a temperature, pressure, 25 composition, feedstock species. That will affect Page 160
1 Q. Yeah. 2 A. How many chemical plants this POSA may have 3 designed in their career. 4 Q. Why does the number of plants -- why does 5 that impact how many design choices they would need 6 to make? 7 A. If a technology is off the shelf -- it's a 8 colloquial phrase or a phrase that most people know 9 what it means -- it's been around for a while and, 10 you know, maybe they have to scale it up or scale it 11 down. But temperatures, pressures, compositions of 12 all the streams going in would typically not change 13 and then the outputs wouldn't change, right, so maybe 14 you -- right? 15 So in that case, they don't have to 16 make a lot of design choice except maybe to scale it 17 up, which is -- that's not a design choice. That's 18 just -- you're not choosing -- you've got an 19 application. You want -- I need a bigger process 20 because we've got a process to make more ammonia, 21 right? So I don't see that as a design choice. 22 Q. We talked about maybe things in that 23 category before. Is that something -- the amount of 24 ammonia you need to make or product you need to make, 25 would you consider that -- that's sort of -- I think Page 159	1 downstream processes, and they may have to be changed 2 accordingly to get the same product that you've been 3 getting. 4 It will affect upstream only if 5 there's recycle upstream -- or downstream recycled 6 back to a process upstream, including the one that 7 the changes were made. You see what I mean? There's 8 a feedback loop. If not, it only -- that 9 perturbation flows downstream, right? 10 Yes, if you make changes, it's going 11 to affect -- and you may have to make further changes 12 in the process. 13 Q. Do you think it's a challenge to design a 14 process -- a synthesis process as economically 15 optimal as possible while reducing energy consumption 16 to a minimum? 17 A. It's always a challenge to design the most 18 energy efficient process you can. Whoever wins at 19 that makes more money compared to their competitors, 20 right? So that's always a challenge, and it's been a 21 challenge, as a POSA would understand, for many 22 decades now, right? Energy efficiency, energy 23 integration. I think we saw that in the Rytter 24 patent. A lot of energy integration in that patent. 25 Q. Is it possible to make a series of design Page 161

1 choices that would be novel and haven't been done 2 before? 3 MR. PHILLIPS: Object to the form. 4 A. I think it's very challenging to make a 5 series of design choices over broad ranges -- I think 6 a POSA would see it as being challenging with the 7 expectation that they are going to have a process 8 that gives them the product they want downstream 9 without huge ramifications. Going from zero to a 10 hundred percent, that's a big difference when maybe 11 one of those compositions works -- one -- without 12 changing everything else. That's what I mean. You 13 don't want to change stuff. So maybe one works. 14 Q. (BY MR. COLLARD) So we've looked quite a 15 bit -- and you've read the '168 patent in your prep 16 for this deposition, right? Or maybe if you haven't 17 read it, you've looked at it closely while you 18 prepared? 19 A. I've read it many times. 20 Q. Okay. I didn't want to hold you to, you 21 know, front cover to the back cover, but you -- 22 you've looked at it in preparation. 23 You're familiar with there are a 24 number of claims in this patent where they give some 25 ranges for the fuel fraction, Claims 3 and 4, for Page 162	1 going to pay for that. You're going to pay for that 2 because that's less -- less ammonia you're going to 3 be able to make, right? 4 Q. Uh-huh. 5 A. So you're going to pay for that, you know. 6 So that's -- might be an economic penalty. So this 7 one is -- is quite flexible as a fuel fraction; but, 8 you know, if you use too much of that fuel and you 9 still have to produce so much ammonia, you're going 10 to need more feedstock. You're going to need more 11 natural gas -- not to burn, but to process through 12 your reformers. 13 You might not be able to do that with 14 an existing system. You may be bottlenecked. The 15 reformer can't handle it. You know, when we design 16 processes, we -- usually you design them to run 17 95 percent of capacity or some number, right? You 18 don't want to oversize them. Maybe you can turn it 19 down, but you generally can't turn them up because 20 you're out there to make money, right? You want -- 21 you want to make money out of a process using as 22 small a process as possible while processing as much 23 feedstock as possible, right, so it makes it small. 24 So, yeah, a lot of things would change 25 if you've got a fuel fraction going from 1 to Page 164
1 example. 2 Are you familiar with that? 3 A. Yes. 4 Q. Okay. Do you have an understanding of why 5 those ranges were included in the '168 patent claims? 6 A. Generally, I believe -- and a POSA would 7 believe -- ranges are included in patent claims if 8 they are actually allowed to make the claim broader 9 so it's harder -- more difficult to invalidate. 10 Q. Do you think that the ranges solve any 11 stated problems or have any purpose other than making 12 the claims broader? 13 A. This is the fuel fraction you're 14 specifically talking about? 15 Q. Uh-huh. Yes. 16 A. It's a depleted CO2 fuel, so the more you 17 use, the less CO2 you're going to produce, right? 18 This is fuel. So it's being combusted in a furnace, 19 and the larger the fuel fraction that you take from 20 your process after all that processing, right -- you 21 made a hydrogen stream with the reformer, you did the 22 shift reaction, you do the CO2 removal system, and 23 you split the stream, use part for fuel, part for 24 synthesis. The larger the fuel fraction, the less 25 CO2 you're going to pollute the air with, but you're Page 163	1 40 percent, if you will, in Claims 3 or 4. A lot of 2 things could change. 3 Q. So I appreciate that. I think what I want 4 to try to clarify is do you agree that the '168 5 patent, when it offers these ranges, does talk about 6 the purpose for using a high fuel fraction and what 7 problems that might solve? 8 Do you agree with that? 9 A. I think it mentions it somewhere. 10 Q. Yeah. And a high fuel fraction would make 11 lower CO2 emissions? 12 A. And I mentioned that. 13 Q. And you think that's stated in the '168 14 patent somewhere? 15 A. Well, that's the whole point of burning 16 CO2-depleted fuel that you made by reforming. 17 Q. Okay. 18 A. But there's -- a POSA would understand 19 there's nothing new there. 20 Q. Do you think that using the CO2-depleted 21 syngas for all or substantially all of the fuel in 22 the furnaces used for the process is a change from 23 anything that you've seen in the prior art? 24 A. All of the syngas made from the reformer? 25 Like a hundred percent as fuel? Page 165

1 Q. I'm sorry. No, no. I'm saying sort of the 2 other way, that the furnace gets all of its fuel from 3 the fuel fraction. It's not a supplement to the 4 hydrocarbon fuel. It's getting all of its fuel or 5 substantially all of its fuel from the fuel fraction. 6 A. I think they proposed both. 7 Q. I know, but I'm saying is that something 8 you've seen in the prior art? 9 A. It's been a long day. I don't recall, but 10 a POSA would certainly understand that you could use 11 all or nothing as a fuel -- in other words, a POSA 12 would clearly understand whether I have to supplement 13 the fuel because I don't want to burn so much of my 14 expensive hydrogen product or whether I have excess 15 fuel -- and I know '168 talks about that -- which I 16 can potentially sell elsewhere. Like, I've made more 17 fuel than I need, and I have enough for my synthesis 18 also. 19 So there's both -- a POSA would know 20 there's -- you know, you can go any direction with 21 that, and that's -- there's an optimization there, 22 obviously. It's like a design choice. 23 Q. Okay. A POSA would know that you can turn 24 the dial from high as it will go to as low as it will 25 go? Page 166	1 We didn't see any references today 2 that suggested that all of the fuel for the furnaces 3 would be CO2-depleted syngas, did we? 4 A. Well, I think Fjellhaug uses -- from the 5 split, it uses -- 6 Q. No, because the separator in Fjellhaug -- 7 A. Oh, it takes the separator line, yeah. 8 Please allow me to glance through my flow sheets. 9 Q. Sure. 10 A. IFA doesn't talk about splits. I mean, it 11 shows it, but no numbers. So we don't know. I would 12 say Ritter -- Rytter shows that they use all of the 13 fuel from their CO2 separator in the furnace, what 14 fraction they take, because the other uses of the 15 hydrogen -- one is for methanol, and I think other 16 uses is for other chemical synthesis. 17 Q. But the fuel for the furnace is also using 18 the methanol that shows on that image coming into the 19 left side of 17? 20 A. I would have to check to see if they state 21 then whether that's an option or not. 22 Q. But the arrow shows it, right? 23 A. The arrow shows it. I agree. 24 Q. All right. 25 A. But it could be zero. I mean, it could be Page 168
1 A. Within reason, right. 2 Q. Right. 3 A. There's going to be constraints. 4 Q. So the sentence I'm going to point you to 5 is in Column 3, Line 44. "The CO2-depleted synthesis 6 gas preferably forms all or substantially all the 7 fuel of the furnaces used for the process." 8 And we can limit it to the prior art 9 we've talked about today. Do any of those references 10 suggest fueling the furnaces using only or 11 substantially only CO2-depleted synthesis gas? 12 A. I would have to look through all of them, 13 but the word "substantially" opens the door that they 14 are not using all of it. 15 Q. Okay. Let's take them -- sorry. You 16 finish. 17 A. And, you know, like, the IFA shows blending 18 the hydrogen fuel with natural gas, but they don't 19 talk about those ratios. They do talk about a 20 25 percent reduction in the use of natural gas, and 21 that would correspond with certain fractions of the 22 fuel being used for their purpose, what they were 23 doing. 24 Q. I understand. So I'm going to ask it 25 again, though, with "all." Page 167	1 zero. We don't know. 2 Q. Could be zero. 3 I don't -- no, strike that. I want to 4 talk about your combination of some of these 5 references. 6 You talk about combining, for example, 7 the 2007 IFA and the Rytter processes in some cases, 8 and you say -- you're welcome to look at it. It's in 9 Paragraph 245 of your report -- that they both 10 disclose processes with substantial overlap. And so, 11 they could be modified by applying process steps in 12 one to another that discloses overlapping steps. 13 So does -- you know, 2007 IFA, would 14 you say it discloses a complete process? 15 MR. PHILLIPS: Objection to form. 16 A. A complete process to do what? 17 Q. (BY MR. COLLARD) Synthesize ammonia. 18 A. It shows a complete process through the 19 production of a gas that can make the ammonia. So 20 it's a complete process. The format, it shows how to 21 make gas that's appropriate for ammonia. 22 Q. Okay. 23 A. This is the ammonia section. 24 Q. A complete front-end process? 25 A. So it's -- it's complete. Page 169

1 Q. Would you say that Rytter disclose a 2 complete front-end process? I think that one's for 3 the generation of methanol, but -- 4 A. Was it Rytter? 5 Q. Rytter, yeah. 6 A. Rytter. Complete enough for a POSA to 7 understand that you can make methanol and you have 8 all the uses of hydrogen they mention. You can make 9 ammonia. So these are -- all these patents are about 10 the front end of the ammonia process -- 11 Q. Yeah. 12 A. -- which is making a gas containing 13 hydrogen, CO, and CO2 for various applications. 14 Q. I understand. 15 I think my question is -- you know, we 16 were talking about design choices and economic 17 choices. Don't you have to be particularly careful 18 if you're looking at two complete processes about 19 saying, "Oh, I'm going to take this step from over 20 here and I'm going to use it in this other process"? 21 It's not plug and play when you have two complete 22 processes, is it? 23 MR. PHILLIPS: Objection to form. 24 A. At the time of these patents and prior to 25 the priority date with the Casale patent, '168, a Page 170	1 they could possibly change in their patent if they 2 are allowed to, and I don't know any of them -- I 3 think that's what "secondary considerations" is meant 4 there. 5 Q. Did you -- what did you do, if anything, to 6 try to determine whether there were any secondary 7 considerations of non-obviousness in this case? 8 A. I didn't because none were presented to me. 9 I think my -- because if they were presented to me, I 10 would have had to consider them and most likely write 11 a declaration on them to present my opinions, right? 12 That's what I'm saying here. I didn't have to. 13 Q. Do you -- can you name what some secondary 14 considerations of non-obviousness might be or could 15 be if they existed here? 16 MR. PHILLIPS: Objection. Calls for a 17 legal conclusion. 18 A. I don't want to sit here and try to help 19 Casale improve their process because a non-obvious 20 secondary consideration might be patentable. I don't 21 know. I mean -- 22 Q. (BY MR. COLLARD) Sir, do you know what a 23 secondary consideration of non-obviousness is? 24 A. I mean, I see this says sort of a legal 25 statement. They were not presented to me, so I did Page 172
1 POSA would know that they could -- this stuff is so 2 well-known and so well-understood -- it's been around 3 for decades. Process simulators like Aspen Tech 4 could readily interchange unit operations, which is 5 basically combining two ideas from two different 6 references with -- especially if the references had a 7 similar theme in mind, motivated to do it, right? 8 Low CO2 output from their furnaces, from their 9 process in general, is the black box. And because 10 they are so well-known, they have a reasonable 11 expectation that it would work. 12 Q. (BY MR. COLLARD) Okay. 13 A. I mean, that's -- you know, and companies 14 sit -- design engineers sit at their desk and do that 15 all day long, right? It's -- technology today has 16 made that -- even from, oh, early 2000s, late 1990s, 17 process simulators really have taken off. 18 Q. I want to look at -- towards the end of 19 your report, Paragraph 337. 20 Are you there? 21 A. I read it. 22 Q. Do you know what secondary considerations 23 of non-obviousness are? 24 A. I believe that's when the patent owner 25 might want to go back and look at other things that Page 171	1 not have to declare anything or make any expressed 2 opinions on them. So maybe my definition is wrong. 3 Enlighten me. 4 Q. The deposition is about finding out what 5 you know, so I am trying to understand. And 6 respectfully, it doesn't sound like you know what 7 they are; is that correct? 8 A. I gave you my definition. I'll stick with 9 it. I might be wrong. That's okay. 10 Q. Okay. 11 A. This is a legal -- legal term. So I was 12 asked to find prior art in view of a POSA before -- 13 and present my opinions on that prior art, and that's 14 what I've done. This is part of the legal stuff and, 15 as I stated, I wasn't presented any, so I didn't have 16 to deal with it. 17 Q. Fine. Is making syngas -- we talked about 18 this a little bit before. 19 Is it -- it's an expensive thing to 20 do, right, to make syngas, especially to use it as 21 fuel, right? 22 MR. PHILLIPS: Objection to form. 23 A. Hydrogen out of the -- that's what my 24 reports were about, by the way, that are published 25 papers. Page 173

1 Of the top six chemicals produced in 2 the world, maybe United States, hydrogen is at the 3 top. And if you take -- I think it was six -- the 4 next five chemicals -- olefin, paraffins, BTEX, 5 butene, toluene, xylene -- these are made in large 6 volumes. Some -- the cost of those next five 7 chemicals in line that are the next five most 8 expensive take that cost, multiply it by 10, and 9 that's how much it is -- how expensive it is to make 10 hydrogen. So the answer to your question is yes, 11 it's extremely expensive. 12 Q. (BY MR. COLLARD) Is it more expensive to 13 use hydrogen as fuel than natural gas, methane? 14 A. It would depend on your incentive to use 15 hydrogen as a fuel instead of natural gas or methane. 16 If you want to reduce CO2 emissions -- 17 Q. Well, maybe I'll say it this way. And I 18 don't know what unit you want to use. Mole for mole, 19 is hydrogen more -- maybe moles are bad here, but is 20 hydrogen more expensive than methane? 21 A. From a fuel point of view? 22 Q. Yeah. 23 A. Hydrogen -- rough numbers, I think it's 24 about -- hydrogen gives -- when you burn -- you want 25 the heat. That's the whole point, right? Page 174	1 Q. As price per mole, it was never near the 2 price of hydrogen as a fuel, right? 3 A. I don't know. 4 Q. You don't know? 5 A. No. Methane got really expensive at some 6 point. Natural gas got really expensive. It's a 7 mix. 8 Q. Fine. We maybe touched on this, but I just 9 want to make the record clear. 10 You would agree that the chemical 11 industry and the chemical synthesis industry has been 12 focusing on CO2 emissions for years, correct? 13 MR. PHILLIPS: Objection to form. 14 A. Yes. Been focused on it for decades. 15 MR. COLLARD: All right. Let's go off 16 the record. And you guys can stay or go. I may be 17 done, but I just need to look through my notes. 18 THE VIDEOGRAPHER: Off the record at 19 1610. 20 (Recess from 4:10 p.m. to 4:18 p.m.) 21 THE VIDEOGRAPHER: Back on the record 22 at 1618. Please proceed. 23 MR. COLLARD: Dr. Ritter, thank you. 24 I don't have any further questions. 25 MR. PHILLIPS: We don't have any Page 176
1 Q. Uh-huh. 2 A. You're using it as a fuel, and you're 3 trying to heat something. So methane -- the 4 combustion energy with oxygen, methane plus oxygen, 5 goes to CO2 and H2O. It's about 900 Btus per mole, 6 whatever the units are. 900 is energy per mole of 7 methane burned. Hydrogen is about 300. So you need 8 to burn more hydrogen to get the equivalent Btus. 9 Q. Is there an "and" coming? And is hydrogen 10 more expensive per mole than methane? 11 A. Nothing is dirt cheap. Yes. Right now, 12 methane is -- in view of a POSA, methane -- the cost 13 of methane has varied. So we've got to go back at 14 least 2017, right, almost 10 years, a decade. The 15 prices for methane fluctuate all over the place. At 16 some points, it was quite expensive, and companies 17 actually tried to go after cheaper feedstocks, like 18 naphthas and things like that because they couldn't 19 afford to burn methane. So I -- now it doesn't 20 matter, right? It was in view of what a POSA 21 would -- would know. 22 So I would literally have to review 23 the -- it's a commodity chemical -- the price of 24 methane prior to 2017 to give you a fair answer on 25 that. Page 175	1 questions at this time. 2 THE VIDEOGRAPHER: That concludes 3 today's deposition. Off the record at 1618. 4 (Whereupon the deposition was adjourned.) 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 Page 177

1 UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE PATENT TRIAL AND APPEAL BOARD DIVISION 2 3 TOPSOE, INC., Petitioner) vs.) CASE NO. IPR2025-01454 4) PATENT 11,286,168 CASALE S.A.) 5 6 REPORTER'S CERTIFICATE 7 ORAL VIDEOTAPED DEPOSITION OF JAMES RITTER, Ph.D. 8 April 30, 2026 9 10 I, Shauna Foreman, Certified Shorthand Reporter 11 in and for the State of Texas, hereby certify to the 12 following: 13 That the witness, James Ritter, Ph.D., was duly 14 sworn by the officer and that the transcript of the 15 oral deposition is a true record of the testimony 16 given by the witness; 17 That the original deposition was delivered 18 to Case Collard. 19 That a copy of this certificate was served on 20 all parties and/or the witness shown herein on 21 May 1, 2026. 22 I further certify that pursuant to FRCP Rule 23 30(f)(1), the signature of the deponent: 24 <u> X </u> was requested by the deponent or a party 25 before the completion of the deposition and that the Page 178	1 COUNTY OF HARRIS) 2 STATE OF TEXAS) 3 I hereby certify that the witness was notified 4 on May 1, 2026 that the witness has 30 days (or 5 _____ days, per agreement of counsel) after being 6 notified by the officer that the transcript is available 7 for review by the witness and if there are changes in 8 the form or substance to be made, then the witness shall 9 sign a statement reciting such changes and the reasons 10 given by the witness for making them; 11 That the witness' signature was/was not 12 returned as of _____, 2026. 13 Subscribed and sworn to on this the _____ 14 day of _____, 2026. 15 16 17 <i>Shauna Foreman</i> 18 SHAUNA FOREMAN, CSR Texas CSR 3786 Expiration: 10/31/2027 Veritext Legal Solutions 300 Throckmorton Street Suite 1600 Fort Worth, Texas 76102 Tel. (817)336-3042 Firm No. 571 19 20 21 22 23 24 25 Page 180
1 signature is to be before any notary public and returned 2 within 30 days (or _____ days, per agreement of counsel) 3 from date of receipt of the transcript. If returned, the 4 attached Changes and Signature page contains any changes 5 and the reasons therefor; 6 _____ was not requested by the deponent or a 7 party before the completion of the deposition; 8 I further certify that I am neither counsel for, 9 related to, nor employed by any parties or attorneys 10 in the action in which this testimony is taken, and 11 further that I am not financially or otherwise interested 12 in the outcome of this action. 13 Certified to by me on this the 1st day 14 of May, 2026. 15 16 <i>Shauna Foreman</i> 17 SHAUNA FOREMAN, CSR Texas CSR 3786 Expiration: 10/31/2027 Veritext Legal Solutions 300 Throckmorton Street Suite 1600 Fort Worth, Texas 76102 Tel. (817)336-3042 Firm No. 571 18 19 20 21 22 23 24 25 Page 179	1 Jeffrey J Phillips, Esq. 2 Jphillips@spencerfane.com 3 May 1, 2026 4 RE: Topsoe Inc. v. Casale SA 5 4/30/2026, James Ritter , Ph.D. (#8039106) 6 The above-referenced transcript is available for 7 review. 8 Within the applicable timeframe, the witness should 9 read the testimony to verify its accuracy. If there are 10 any changes, the witness should note those with the 11 reason, on the attached Errata Sheet. 12 The witness should sign the Acknowledgment of 13 Deponent and Errata and return to the deposing attorney. 14 Copies should be sent to all counsel, and to Veritext at 15 Calendar-CO@Veritext.com. 16 Return completed errata within 30 days from 17 receipt of testimony. 18 If the witness fails to do so within the time 19 allotted, the transcript may be used as if signed. 20 21 22 Yours, 23 Veritext Legal Solutions 24 25 Page 181

1 Topsoe Inc. v. Casale SA 2 James Ritter , Ph.D. (#8039106) 3 ERRATA SHEET 4 PAGE____ LINE____ CHANGE____ 5 _____ 6 REASON_____ 7 PAGE____ LINE____ CHANGE____ 8 _____ 9 REASON_____ 10 PAGE____ LINE____ CHANGE____ 11 _____ 12 REASON_____ 13 PAGE____ LINE____ CHANGE____ 14 _____ 15 REASON_____ 16 PAGE____ LINE____ CHANGE____ 17 _____ 18 REASON_____ 19 PAGE____ LINE____ CHANGE____ 20 _____ 21 REASON_____ 22 _____ 23 _____ 24 James Ritter , Ph.D. Date 25 Page 182	
1 Topsoe Inc. v. Casale SA 2 James Ritter , Ph.D. (#8039106) 3 ACKNOWLEDGEMENT OF DEPONENT 4 I, James Ritter , Ph.D., do hereby declare that I 5 have read the foregoing transcript, I have made any 6 corrections, additions, or changes I deemed necessary as 7 noted above to be appended hereto, and that the same is 8 a true, correct and complete transcript of the testimony 9 given by me. 10 _____ 11 _____ 12 James Ritter , Ph.D. Date 13 *If notary is required 14 SUBSCRIBED AND SWORN TO BEFORE ME THIS 15 _____ DAY OF _____, 20____. 16 _____ 17 _____ 18 _____ 19 NOTARY PUBLIC 20 _____ 21 _____ 22 _____ 23 _____ 24 _____ 25 Page 183	

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Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate. The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

DISCLAIMER: THE FOREGOING FEDERAL PROCEDURE RULES ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY.

THE ABOVE RULES ARE CURRENT AS OF APRIL 1, 2019. PLEASE REFER TO THE APPLICABLE FEDERAL RULES OF CIVIL PROCEDURE FOR UP-TO-DATE INFORMATION.

VERITEXT LEGAL SOLUTIONS

COMPANY CERTIFICATE AND DISCLOSURE STATEMENT

Veritext Legal Solutions represents that the foregoing transcript is a true, correct and complete transcript of the colloquies, questions and answers as submitted by the court reporter. Veritext Legal Solutions further represents that the attached exhibits, if any, are true, correct and complete documents as submitted by the court reporter and/or attorneys in relation to this deposition and that the documents were processed in accordance with our litigation support and production standards.

Veritext Legal Solutions is committed to maintaining the confidentiality of client and witness information, in accordance with the regulations promulgated under the Health Insurance Portability and Accountability Act (HIPAA), as amended with respect to protected health information and the Gramm-Leach-Bliley Act, as amended, with respect to Personally Identifiable Information (PII). Physical transcripts and exhibits are managed under strict facility and personnel access controls. Electronic files of documents are stored in encrypted form and are transmitted in an encrypted

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