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UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

Before The Honorable MaryJoan McNamara
Administrative Law Judge
INVESTIGATION NO. 337-TA-1044

* * * * *

IN THE MATTER OF :
:
:
CERTAIN GRAPHICS SYSTEMS, COMPONENTS :
THEREOF, AND CONSUMER PRODUCTS :
CONTAINING THE SAME, :
* * * * *

AUDIO-VISUAL DEPOSITION OF LAURENT LEFEBVRE, a
witness called on behalf of the Respondents, LG
Electronics, Inc., LG Electronics U.S.A., Inc. and LG
Electronics MobileComm U.S.A., Inc. pursuant to 19
C.F.R. 210.27 and 210.28 and Rule 3.4.1 (Order No. 2),
before Lisa McDonald Valdario, (CSR #130093), a
Registered Professional Reporter, Certified Realtime
Reporter, and Notary Public in and for the
Commonwealth of Massachusetts, at the Offices of
Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.,
One Financial Center, 38th Floor, Boston,
Massachusetts 02111, on Wednesday, June 28, 2017,
commencing at 9:00 a.m.

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ALSO PRESENT: Marissa Demonte, video operator

1 I N D E X
 2 WITNESS DIRECT CROSS REDIRECT RECROSS
 3 LAURENT LEFEBVRE
 4 BY MR. ELENGOLD 6

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*** EXHIBITS SENT TO VERITEXT FOR DISTRIBUTION ***

P R O C E E D I N G S

1
2 VIDEO OPERATOR: Good morning. We are now
3 recording and on the record. My name is Marissa
4 Demonte representing Veritext Mid Atlantic Region.
5 The date today is June 28, 2017. The time is 9:00
6 a.m. This deposition is being held in the Office
7 of Mintz, Levin located at One Financial Center,
8 Boston, Massachusetts.

9 This deposition is being taken In the Matter
10 of: Certain Graphics Systems Components Thereof,
11 and Consumer Products Containing the Same, filed
12 with the United States Trade Commission.

13 The name of the witness is Laurent Lefebvre.
14 At this time, the attorneys will identify
15 themselves and the parties they represent, after
16 which our court reporter, Lisa Valdario, will
17 swear in the witness and we can proceed.

18 MR. ELEGOLD: Scott Elengold with Fish &
19 Richardson on behalf of the LG Respondents.

20 MR. LOWERY: Justin Lowery with McGuire
21 Woods on behalf of the MediaTek and Sigma
22 Respondents.

23 MR. RENAUD: Michael Renaud on behalf of the
24 Complainants, Advanced Micro Devices Inc. and ATI
25 Technologies along with Adam Rizk, both of Mintz,

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1 Levin.

2 LAURENT LEFEBVRE

3 A witness called for examination, having been
4 duly sworn, testified as follows:

5 DIRECT EXAMINATION

6 BY MR. ELENGOLD:

7 Q Good morning, Mr. Lefebvre.

8 A Good morning.

9 Q Could you please state your full name for the
10 record.

11 A Laurent Lefebvre.

12 Q And I'll try my best to get that name correct
13 today as we go, sir. What is your current home
14 address?

15 A My current home address is

16

17 Q Mr. Lefebvre, what is your current employment?

18 A I am currently employed by ATI, a subsidiary of
19 AMD, as a hardware fellow.

20 Q What is a hardware fellow?

21 A It is a title we give to engineers at AMD.

22 Q What is your current responsibilities in your
23 employment?

24 A Currently, my responsibilities are to configure
25 and plan the future products of AMD, and also

1 scope the performance area and power that said
2 products would use.

3 Q What types of products do you work with?

4 A I work on GPUs, which are graphics processers,
5 APUs, which are integrated graphics processers on
6 SOCs, as well as scope -- SCBUs, semi-custom
7 business unit products to be embedded in various
8 customer products.

9 MR. RENAUD: I'm going to designate the
10 transcript as highly confidential under the
11 protective order and I would just say to Laurent,
12 just go a little bit slower.

13 Q Have you ever been deposed before, Mr. Lefebvre?

14 A Yes, I have been deposed twice.

15 Q Do you remember approximately when each of those
16 depositions were taken?

17 A I remember the most recent deposition was taken in
18 December of last year, and the one before occurred
19 some time before that, but I don't exactly recall
20 when.

21 Q What was the subject matter of your December 2016
22 deposition?

23 A If memory serves, it was about the unified shader
24 patent and some specifications on the R400
25 products, as well as my previous deposition.

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1 Q What was the subject matter of your previous
2 deposition?

3 MR. RENAUD: Objection.

4 A So my memory is more fuzzy on that one, but it was
5 also on some form of unified shader patent. I
6 think it did include another patent which was more
7 directed to the sequencer itself, and my testimony
8 was also part of that deposition, and again,
9 various specifications of the R400 product.

10 Q Have you ever testified at a trial before?

11 A No, I have not.

12 Q And are you represented by counsel here today, Mr.
13 Lefebvre?

14 MR. ELEGOLD: Objection.

15 A I am represented by counsel today, yes.

16 Q So I know you've been deposed twice now, but I
17 just wanted to go over a couple ground rules with
18 you if that's okay. Do you understand that you've
19 sworn to provide truthful and complete responses
20 to my questions today as if you were in a court of
21 law?

22 A Yes, I understand.

23 Q Are you aware of any reasons why you cannot give
24 truthful and complete testimony today?

25 A No, I'm not aware of any reason.

1 Q As we're going through the day, please ask for any
2 clarification you have with regard to my question,
3 and if you answer it, I'll assume you understand
4 it. Is that okay?

5 A That is okay.

6 Q And if at any time you need to take a break, don't
7 hesitate to ask. If there is a question pending,
8 I'll ask that you try to answer the question to
9 the best of your ability, but if you need a break
10 at any time, please just let me know.

11 A I will.

12 Q And finally, please try your best to answer my
13 questions audibly as we go through the day just so
14 the court reporter can get a clean record to your
15 responses to my questions.

16 A I understand.

17 Q Earlier, when we were talking about the products
18 that you're currently working with, you mentioned
19 I believe GPUs, APUs and SOC, is that correct?

20 A That's what I remember my answer was, yes, but we
21 can go through the transcript if you want.

22 Q I'm just trying to bring you back to there so I
23 can ask a follow-up question if that's okay.

24 A That is okay.

25 Q And really what I would like to ask you is what is

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1 the difference between each of those three types
2 of products?

3 MR. RENAUD: Objection.

4 A Can we restate the three types of products so I
5 get my answer as clear as possible?

6 Q Why don't we take them one at a time. What is
7 GPU?

8 A Okay. So the GPU acronym stands for graphics
9 processing unit. This is typically a distinct
10 device that you put into a computer that is
11 responsible for performing graphics on the
12 computer, that is generating images that you see
13 on your computer.

14 Q What is an APU?

15 A APU is an internal acronym at AMD we use that
16 stands for accelerated processing unit. It's
17 similar to a GPU, but the main difference is that
18 all of the components of the computer are
19 integrated on a single chip; that is, the CPU and
20 the GPU are integrated on a single chip, which is
21 why we call it an APU versus a GPU.

22 Q So GPU is dedicated to graphics processing, is
23 that right?

24 MR. RENAUD: Objection.

25 A A GPU is a piece of hardware that performs

1 graphics that does not contain a CPU.

2 Q What is an SOC?

3 A An SOC is the fabric, if you will, that allows us
4 to integrate multiple IPs on a single chip. The
5 acronym stands for system on chip, so it's the
6 fabric that allows to connect and integrate
7 everything on a single piece of silicon.

8 Q Does an SOC contain a GPU?

9 A SOC stands for system on a chip. It can contain
10 whatever you want it to contain.

11 Q Can an APU contain a GPU?

12 MR. RENAUD: Objection.

13 A An APU and a GPU are different products, so an APU
14 can contain graphics processing, a graphics core,
15 but it doesn't have to have all the capabilities
16 of a discrete GPU.

17 Q Are they different chips, an APU and a GPU?

18 A Can you define what you mean by chip? Do you mean
19 different pieces of silicon?

20 Q Yes.

21 A So yes, they would be specific different pieces of
22 silicon.

23 Q And an SOC would be a different piece of silicon
24 or a different chip too?

25 A An SOC is really the process by which we generate

1 an APU, so it can be used by an APU, but it can
2 also be another piece of silicon if you want it to
3 be.

4 Q And approximately how much of your current time is
5 spent working on graphics?

6 A Can you define what you mean by graphics? It's a
7 pretty generic term.

8 Q Sure. Why don't we come back to that, and first
9 let me ask you a couple questions about today.

10 So when did you find out you were going to
11 be deposed today?

12 A So again, I'm speaking from memory here so excuse
13 if my dates are not exact. I remember late 2016
14 or early 2017 receiving a call from Adam.

15 MR. RENAUD: And you can -- instruct you not
16 to provide any content of the call.

17 THE WITNESS: Sure.

18 A And that made me aware of this pending litigation,
19 and then I met with counsel several times since
20 that date.

21 Q Do you have an understanding of what this case is
22 about?

23 MR. RENAUD: Objection. You may answer so
24 long as you don't reveal any attorney/client
25 communications.

1 A I understand it's some kind of litigation between
2 third parties and AMD.

3 Q Do you understand what kind of litigation?

4 MR. RENAUD: Same instruction. You may
5 answer so long as you do not reveal any
6 attorney/client communications.

7 A So I am not an attorney so I don't exactly know
8 what the complaints or litigation is all about. I
9 know that the R400 is part of that.

10 Q Approximately when was your first discussion with
11 counsel about this investigation?

12 A I think I already answered that question
13 previously. You can go back to the log, I said I
14 believe around January -- late 2016 to early 2017.

15 Q Do you remember any, with any more detail
16 approximately when it occurred?

17 MR. RENAUD: Objection.

18 A No, I do not. I'm sorry.

19 Q When was the first time that you met with counsel
20 regarding this investigation?

21 A By meeting, you mean in person, or what do you
22 mean by meeting?

23 Q Earlier you said you met with counsel several
24 times. Do you recall that?

25 A Okay. So I'm assuming you meant, you mean met in

1 person.

2 Q Do you recall saying you met with counsel several
3 times earlier?

4 A I do, yes.

5 Q What did you mean by that?

6 A So I meant taking calls and also meeting in
7 person. So which one of the two?

8 Q So after your first call with, I believe you said
9 it was Mr. Rizk, when was your next communication
10 with counsel regarding this investigation?

11 A Again, I'm speaking from memory. It is fairly
12 fuzzy, but I recall another instance of a call and
13 then a meeting in person in Montreal.

14 Q Do you recall who you spoke with on your second
15 call?

16 A From memory, I believe Mr. Rizk was present on the
17 call. I don't recall who else was on these calls.

18 Q Do you recall if there were other people on the
19 call?

20 A There were at least another person from AMD but I
21 don't remember more.

22 Q Do you remember who that other person was from
23 AMD?

24 A Yeah, that person was Pam Horn.

25 Q Who is Pam Horn?

1 A My understanding is she works for the legal team
2 for AMD.

3 Q Do you know if Pam Horn is an attorney?

4 A I do not know, no.

5 Q Without getting into specifics, what generally was
6 the subject matter of your call?

7 MR. RENAUD: Instruction not to answer.

8 A I'm going to follow my counsel and not answer that
9 question.

10 Q Approximately, when was your first meeting with
11 counsel in Montreal?

12 A It was some time in spring because it wasn't cold
13 anymore, but I don't remember the specific dates.

14 Q Do you recall who you met with?

15 A I met with Mr. Rizk and one of his colleagues that
16 I don't remember the name.

17 Q Anyone else?

18 A No, not in that meeting.

19 Q Where did you meet?

20 A We met at the Hilton Hotel in Laval, which is
21 north of Montreal.

22 Q Approximately how long did you meet for?

23 A If I remember correctly, that was about, I would
24 say three-quarters of a day.

25 Q Did you talk to anyone at AMD that day?

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1 A You mean if I talked to anyone at AMD that day of
2 the meeting or --

3 Q Yes.

4 A And by -- you know, let me rephrase correctly to
5 make sure I understand your question. Did I talk
6 to anyone at AMD that I was going to a meeting, or
7 about the content of the meeting, or talk to
8 anyone at AMD during that day?

9 Q Let's take all of those. So first, did you talk
10 to anyone at AMD about the content of the meeting?

11 A Not that I remember, no.

12 Q Did you talk to anyone from AMD at the meeting?

13 A I was the sole person of AMD present at the
14 meeting.

15 Q Did you call anyone at AMD during the meeting?

16 A During the meeting itself, no, I did not talk to
17 anyone at AMD.

18 Q When was your next conversation with counsel
19 regarding this investigation?

20 A My next -- again, if I recall correctly, my next
21 verbal conversation with counsel was here in
22 Boston.

23 Q When was that?

24 A That was, started Monday morning up until today.

25 MR. ELEGOLD: I ask the court reporter to

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1 please mark Exhibit 1.

2 (Document marked Exhibit 1 for
3 identification.)

4 Q Mr. Lefebvre, have you seen Exhibit 1 before?

5 A I believe I've seen this piece of paper or
6 collection of piece of paper in a bigger document
7 before, yes.

8 Q Do you know what Exhibit 1 is?

9 A It reads: Respondents' Notice of Deposition of
10 Laurent Lefebvre, so.

11 Q Do you understand that you are noticed to be
12 deposed today in your personal capacity?

13 MR. RENAUD: Objection.

14 A Yes, I do understand that.

15 MR. ELEGOLD: And I'm going to ask the
16 court reporter to please mark Exhibit 2.

17 (Document marked Exhibit 2 for
18 identification.)

19 Q Mr. Lefebvre, have you seen Exhibit 2 before?

20 A I have seen a document that looks very much like
21 this. It was not exactly in the same form, but it
22 contains the same number of items than this
23 document.

24 Q Do you know what Exhibit 2 is?

25 A Again, it reads: Respondents' First Notice of

1 Deposition to Complainants Advanced Micro Devices
2 Inc. and ATI Technologies, ULC.

3 Q Do you understand that you have been designated by
4 complainants AMD and ATI to testify today on their
5 behalf for certain topics?

6 A Yes, I understand that.

7 Q And Mr. Lefebvre, if you'll refer in that document
8 in front you in Exhibit 2, my understanding is
9 that you have been identified for topics one,
10 seven, eight, nine, 17, 18, 33, and 86; with
11 respect to two of the patents in this litigation,
12 and those two patents both have you listed as a
13 named inventor. We generally refer to them as the
14 Morein patents because he is the first listed
15 inventor.

16 Do you understand the two patents I'm
17 referring to if I say the Morein patents at issue
18 in this investigation?

19 A For the sake of precision, I would like you to
20 refer to them by number so I can tell which patent
21 exactly you're talking about, but I generally am
22 aware of the field, yes.

23 Q Okay. And do you understand that you've been
24 designated for those topics for the two patents
25 for which you're a named inventor to testify today

1 on behalf of AMD and ATI?

2 MR. RENAUD: Objection, and you may answer,
3 but I'm just going to insert in the record that
4 all of those subjects are subject to objections
5 that have been made in writing, but sorry, please
6 answer the question.

7 A Yes. I can testify to the facts related to those
8 patents with the understanding I'm not an attorney
9 so I can't really go, you know, beyond my
10 knowledge.

11 Q You're prepared to testify today though on those
12 topics we just identified.

13 A Yes.

14 MR. RENAUD: Same objection. He's prepared
15 subject to the objections.

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

17 A Okay.

18 MR. RENAUD: And you may answer that
19 question without revealing any attorney/client
20 communications.

21 THE WITNESS: Yes.

22 A So I met with counsel in person, like I said
23 before, once in Montreal and then here in Boston
24 extensively for two days prior to this deposition,
25 and I reviewed a wealth of specifications, as well

1 as my prior depositions, my prior testimonies. I
2 browsed through the patents, I had discussion with
3 AMD representatives, and reviewed some
4 presentations and the various elements that were
5 Exhibits in my previous depositions.

6 Q Let's try and take those one at a time.

7 What documents did you review during your
8 meeting in Montreal?

9 A In Montreal, I don't recall reviewing any
10 particular documents. We had more discussions
11 about the subject that I was about to be deposed
12 on, but I don't recall reviewing particular
13 documents per se.

14 Q What documents did you review during your
15 preparation here in Boston?

16 A I'm going to give you the best list I can tell
17 with the understanding it's probably not going to
18 be exhaustive because there was a wealth of
19 documents, and so like I said before, we could go
20 back to the log, but they involve my depositions,
21 my testimonies and various Exhibits, and
22 presentations that were held on the AMD Perforce
23 server, P E R F O R C E.

24 Q Starting with the specifications, what
25 specifications did you review?

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1 A Again, speaking from memory here, I recall
2 reviewing at least the sequencer specification of
3 the R400 chip versions 0.4 and version 2.0. And I
4 believe for that particular deposition, the
5 specification that I reviewed, that was it.

6 Q Those were the only two specifications you've
7 reviewed in preparation for your deposition today,
8 is that correct?

9 A These are the depositions I recall being reviewed.
10 So I know for sure I reviewed those. I may have
11 reviewed other documents. There was a big binder.
12 At least those.

13 Q You said you reviewed your depositions. Is that
14 referring to the two depositions we discussed
15 earlier?

16 MR. RENAUD: Objection.

17 A Yes, that is referring to the two depositions that
18 I did before, yes.

19 Q And you reviewed both transcripts this week?

20 MR. RENAUD: Objection.

21 A I read both transcripts, yes.

22 Q You said you reviewed testimony. What testimony
23 did you review to prepare for today's deposition?

24 A So as best I recall again, and if you have the
25 documents we can look at them, there were

1 testimonies that were made on how the R400
2 implemented the unified, the various unified
3 shader patent, and those are at least the
4 testimonies that I've been reviewing that were
5 part of the big binder of documents.

6 Q What is a unified shader?

7 MR. RENAUD: Objection.

8 A Can you be more precise about what you mean? Are
9 you talking about the unified shader in the R400
10 project?

11 Q You just mentioned how the R400 implemented the
12 unified shader patent, right? Do you recall that?

13 MR. RENAUD: Objection.

14 A Can you give me back my answer exactly?

15 Q Why don't I just ask again.

16 A Okay.

17 Q Did the R400 implement the unified shader patents
18 that you referred to?

19 MR. RENAUD: Objection.

20 A So again, I'm not an attorney so I can't talk how
21 the patent and everything interlocks, but the R400
22 product had a unified shader, yes.

23 Q What was the unified shader in the R400?

24 A So the particular unified shader that the R400
25 implemented was a shader that was able to operate

1 on pixels and vertices using the same piece of
2 hardware.

3 Q Is there a name for that piece of hardware?

4 A We call it the unified shader, but you know, with
5 the understanding this is just one definition of
6 the term in that particular product.

7 Q Did you work on the unified shader in the R400?

8 A In the R400, I was the main architect for the
9 sequencer, which is effectively the block that
10 allows -- one of the block that allows the unified
11 shader to operate. It is the block that sequences
12 the instructions and makes various decisions about
13 how the work is split between pixels and vertices,
14 and so in that respect, and many discussions I had
15 with the lead architects, Steve Morein and Andy
16 Gruber, yes, I worked on the unified shader.

17 Q Is the sequencer a part of the unified shader?

18 A I did not get that question. Can you restate,
19 please?

20 Q Sure. Is the sequencer a part of the unified
21 shader?

22 A The sequencer is a block of the R400 that is
23 inside the unified shader that allows the shaders
24 or the programs to operate, and makes decision
25 about the workload balance between pixels and

1 vertices.

2 Q You mentioned reviewing some Exhibits this week.
3 Were you referring to the Deposition Exhibits from
4 your prior depositions?

5 MR. RENAUD: Objection.

6 A Yes, I meant -- I was referring to some of the
7 Exhibits of my previous depositions.

8 Q What presentations did you review to prepare for
9 your deposition?

10 A While I don't recall the specifics, some of the
11 presentations I reviewed were part of the Exhibits
12 of my previous depositions, and I also reviewed
13 other presentations to refresh my memory and
14 prepare me to testify on behalf of AMD on certain
15 topics.

16 Q Do you recall any details regarding any
17 presentations you reviewed to prepare for today?

18 MR. RENAUD: Objection.

19 A So I mean, I recall two specific presentations
20 that were new, at least not part of the Exhibits
21 before, that related about what Netlist 3 was in
22 terms of the R400 product and how that particular
23 netlist was ported on a hardware simulator named
24 IKOS.

25 Q Do you recall the author of that presentation?

1 A No, I do not.

2 Q Were you already personally familiar with that
3 presentation before your review?

4 A I must admit, I did not remember it. It was a
5 long time ago. I might have been familiar with it
6 way back when, but when it was re-presented to me,
7 it was new. It did not ring any bells, put it
8 that way.

9 Q Do you recall the date of that presentation?

10 A As I stated before, there were two presentations I
11 believe, and they were, one of them was in January
12 and the other one, February. I don't recall the
13 particular year unfortunately, but I'm sure if you
14 can -- these were produced, so if you can find
15 them, I can review them with you and can give you
16 more definition as to the date.

17 Q How do you know they were produced?

18 A Because counsel told me that they were produced.

19 MR. RENAUD: While that answer is fine, I
20 remind you, Laurent, any conversations with
21 counsel are off limits. Saying what was produced,
22 if you know it, I'll allow, but just be careful.
23 Okay.

24 THE WITNESS: Yes, sir.

25 Q Did both presentations relate to the netlist for

1 the R400?

2 A Again, you have the documents so we can review
3 them and I can give you more details. I'm talking
4 from memory. I recall one presentation was about
5 telling what Netlist 3 was, and the other
6 presentation was saying how that list was used or
7 when it was ported to IKOS.

8 Q Any other presentation you recall reviewing?

9 A Again, do you mean new presentations or
10 presentations that were part of the previous
11 Exhibits?

12 Q Both. Any presentations that you recall reviewing
13 in preparation for your deposition today.

14 A So there was a presentation in, at least in my
15 previous testimony about the one tri, triangle,
16 that was part of the Exhibits that I recall, and
17 there was some slides about the AMD's roles and
18 responsibilities of various people in the R400
19 project.

20 Again, I'm talking from memory. You can
21 bring up the slides and we can look at them. This
22 is a non-exhaustive list of the presentations that
23 I recall.

24 Q Any new presentations other than those two netlist
25 presentations that you recall reviewing in

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1 preparation for your deposition today?

2 A There were a wealth of PDF documents -- not PDF,
3 power points presentations on the table that I
4 looked at, but I don't recall the specifics on
5 them unfortunately. So I know there were more,
6 but --

7 Q Did you review the patents in preparation for your
8 deposition today?

9 MR. RENAUD: Objection.

10 A Yeah, we can go back to the record again. I think
11 I stated that before, yes, I did browse through
12 two patents in preparation for this deposition.

13 Q Do you recall any details about those two patents
14 you reviewed?

15 A They were both unified shader patents on which I
16 was listed as an inventor, and they had numbers on
17 them distincting them but, you know, if you bring
18 them up, I'm sure I can tell you which ones and
19 confirm that they were the patents I reviewed.

20 Q Did you review any other documents that we haven't
21 discussed in preparation for your deposition
22 today?

23 A Like I said, there were a wealth of documents that
24 I reviewed. I recall one of them was the IKOS
25 User Manual. I recall it because it was very

1 thick. And there might be more. Like I said, it
2 was a lot of documents that were browsed through.

3 Q Did you speak with any AMD or ATI people to
4 prepare for your deposition today?

5 A I recall having phone calls with a few people from
6 AMD. Yes.

7 Q Who did you speak with from AMD?

8 A I remember David Christie and a few other people
9 that I don't remember the names of. They are not
10 the -- I mean, I understand that they were
11 gathering information on behalf of AMD, and
12 documents, but I don't recall the specific names.
13 They are not people I work with very often.

14 Q The only person you remember speaking with in
15 preparation for your deposition today at AMD is
16 David Christie, is that correct?

17 MR. RENAUD: Objection.

18 A Yes, and but Pam Horn was also on the call. I
19 mean she always is typically.

20 Q Who is David Christie?

21 A My understanding is that he is a hardware engineer
22 that works for AMD legal teams to help accumulate
23 documents and reviews them for litigation purposes
24 and whatnot. I don't exactly know what he is
25 doing in that role though.

1 Q Why did you talk with David Christie to prepare
2 for your deposition today?

3 MR. RENAUD: Instruct you not to answer that
4 question if it can't be answered without revealing
5 attorney/client communications.

6 A Yeah, I don't think I can answer that question
7 directly.

8 Q Is Mr. Christie an attorney?

9 A He is, I believe he is an engineer. Not an
10 attorney.

11 Q Did you speak with him on the instruction of
12 counsel?

13 MR. RENAUD: Instruct you not to answer that
14 question.

15 A I can't answer that question.

16 MR. ELEGOLD: Why do you believe that his
17 discussion with Mr. Christie is privileged?

18 MR. RENAUD: Because it is. Attorney/client
19 communication. I was on the phone with him. I'm
20 not going to pry into that. If you want to take a
21 break and talk about it, we can.

22 MR. ELEGOLD: Okay.

23 MR. RENAUD: I'm also happy to ask the
24 witness to go back and find out who the other AMD
25 people are that he spoke with so you can get them

1 by name, but my memory is there are some
2 non-attorneys that were part of the conversations.

3 MR. ELEGOLD: I think for now, in
4 interest -- as you wanted to get through the day
5 quickly, it's fine if you want to take break and
6 do more sort of work on prep, but I think it might
7 be faster for us to go forward with the
8 deposition. But that's up to you.

9 MR. RENAUD: That's fine. Let's go forward.

10 Q Who else was on the call with Mr. Christie?

11 A Again speaking from memory, I believe for that
12 particular call, it was just Mr. Christie and Pam
13 Horn.

14 Q How many times did you speak with Mr. Christie to
15 prepare for your deposition today?

16 A I recall only that one phone call. There might
17 have been emails between that I don't remember.

18 Q Is there anyone else that you recall speaking with
19 to prepare for your deposition today?

20 A Well, if by "else" you mean other than the ones
21 that I named you, yes. I mean, there were, like I
22 said, other parties on the phone call. I don't
23 remember them by name but they were there.

24 Q Was there always an attorney on the line whenever
25 you spoke with people, or Miss Horn?

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1 A Either on the line or in the room, yes, because I
2 had these conversations from my counsel's office,
3 so --

4 Q In the last two days?

5 A In the last two days, yes.

6 Q Was your conversation with Mr. Christie in the
7 last two days?

8 A Yes, it was.

9 Q Other than the documents reviewed, you reviewed,
10 and your call with David Christie, is there
11 anything else you did to prepare for your
12 deposition today?

13 MR. RENAUD: Objection.

14 A I personally searched the Perforce database for
15 evidence of what Netlist 3 was, and you know, like
16 I said before, read documents, and I had another
17 call with other parties of AMD, like I already
18 stated, but that's the extent of what I remember.

19 Q Was that a single other call with other people at
20 AMD that you're referring to?

21 A Yes. That's what I remember, single other call.

22 Q When did you search the Perforce database?

23 A I did it in the last two days.

24 Q Why did you search the Perforce database to
25 prepare for your deposition?

1 MR. RENAUD: Objection. You may answer that
2 to the extent you do not reveal any
3 attorney/client communication.

4 A Yeah, we can go back to the log again. I think I
5 answered that question already. It was to find
6 evidence of what Netlist 3 was, if I recall
7 correctly.

8 Q What is Netlist 3?

9 A So a netlist is a list of synthesis files, which
10 are the output of synthesis, so they're basically
11 a list of gate level files that implement a
12 hardware device.

13 Q What do you mean by "implement a hardware device"?

14 A I mean, it's the source file that is used to
15 generate silicon. So either the input of an FPGA
16 simulator or the input to the PD team to generate
17 a chip, a silicon device.

18 Q So did you say FPGA simulator?

19 A FPGA.

20 Q What is an FPGA simulator?

21 A So FPGA is an acronym, and I know it's present in
22 the IKOS User Manual, so we can go look there to
23 remind myself what the letters actually mean, but
24 it is a system of programmable gates that you can
25 program by pushing a netlist to it, to implement

1 any hardware device that would fit on the number
2 of gates that the hardware simulator supports.

3 Q Is that the same as a tapeout?

4 A A tapeout is a separate process that enables the
5 creation of a silicon piece. So they're similar
6 but different at the same time.

7 Q How are they different?

8 A So a tapeout is really a manufacturing step where
9 we send the design to silicon manufacturers,
10 versus a netlist, which is the information in a
11 tapeout would be what we use to initiate or
12 program, if you will, an FPGA simulator.

13 Q And an FPGA simulator allows you to simulate how
14 the hardware would function?

15 A Yes. So basically, an FPGA simulator is a way to
16 build a prototype of a given hardware device.

17 Q Does it simulate a prototype or does it actually
18 build a chip?

19 MR. RENAUD: Objection.

20 A So an FPGA device is a programmable hardware
21 device. So in that sense, once a netlist or
22 design is pushed onto that, it becomes that
23 device. It has limitation as to how fast it can
24 operate, but effectively, it is the device.

25 Q So when you say an FPGA simulator, just so I'm

1 clear, is that a computer program or is that a
2 hardware device?

3 A So an FPGA simulator is a hardware device. It's a
4 big programmable hardware device which you can use
5 to simulate another product that, you know, would
6 become a chip in the end. It's a way to a means
7 to get a prototype early of the device that you
8 want to build.

9 Q What is the PD team?

10 A PD stands for physical device, so it's the team
11 that takes a netlist, or takes the output of
12 synthesis, and place and routes them in order to
13 make a floor plan of a chip that is going to be
14 built.

15 Q Is there a name for that floor plan once the PD
16 team has completed its work?

17 A Well, I believe a floor plan is a floor plan. I
18 mean, once everything is complete and done, I
19 believe the technical term is, we have a GDS
20 database, and that's what is used to do a tapeout.

21 Q So when the PD team is done, that's -- the result
22 of their work is what would go to a tapeout, is
23 that correct?

24 A Yes. The result of the work of the PD team would
25 result in a tapeout, yes.

1 Q And the PD team gets a netlist to start their
2 work?

3 A The PD team gets a netlist to start their work,
4 yes.

5 Q And at the same time, that netlist is also used
6 with an FPGA simulator, is that right?

7 A Yes. So that same netlist that can be used by the
8 PD team can also be compiled or sent to an FPGA
9 simulator to establish a prototype of the chip.

10 Q And is that for testing that you would do that at
11 the same time you're doing the tapeout?

12 A Yes. Well, it is for testing, and it also is
13 used, as best I can tell -- and remember, it was a
14 long time ago, so forgive me for inaccuracies here
15 -- to bring up the software stack, the driver,
16 because it's a much more convenient machine to use
17 to run more extensive complete applications than
18 what you can run on an RTL simulator.

19 Q Other than the conversations we've discussed and
20 the documents we've discussed, is there anything
21 else that you did to prepare for your deposition
22 today?

23 A Not that I recall.

24 Q Do you know what patent prosecution history is?

25 A I am vaguely familiar with the term but I don't

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1 know the details of it. Again, I'm not a lawyer,
2 so I mean it's not something I looked at very
3 much, no.

4 MR. RENAUD: I'll object as being outside
5 the scope, and I'm not sure, Mr. Elengold, how you
6 want to handle the personal versus the Rule
7 30(b)(6). We can live with having them kind of be
8 back and forth and not having a rigid line, but
9 I'll just state for the record that any questions
10 directed to file histories I believe are outside
11 the scope of the subject matters that he's being
12 asked to testify on, but so please proceed.

13 Q Sure I was just laying a foundation for a
14 question, which is, did you review any prosecution
15 histories in preparation for your deposition
16 today?

17 A Not that I recall.

18 Q About how much time did you spend total on your
19 preparation for your deposition?

20 A I believe this question was already answered.
21 Like I said before, three-quarters of a day,
22 personal meeting in Montreal, some phone
23 conversations, and then full two days here in
24 Boston. That's what I remember.

25 Q By full days, do you mean nine to five?

1 A For the first one, probably nine to six. The
2 second one, somewhere more around nine to seven or
3 eight. So pretty long days.

4 Q Were there any employees or documents that you
5 planned on reviewing but didn't before coming to
6 be deposed today?

7 MR. RENAUD: You may answer that yes or no.

8 A No.

9 Q Do you feel you're the most qualified person at
10 AMD to testify on their behalf for the corporate
11 topics you're discussing today?

12 MR. RENAUD: Objection.

13 A I believe I qualified and I prepared adequately to
14 testify today, yes.

15 Q Are you being paid for your testimony today?

16 MR. RENAUD: Objection.

17 A I am paid my normal salary by AMD.

18 Q Do you get any additional compensation for
19 testifying?

20 MR. RENAUD: Objection.

21 A No, I did not.

22 Q Does AMD have any policies regarding employee
23 participation in litigation?

24 MR. RENAUD: Objection. You may answer that
25 yes or no.

1 A I don't know.

2 Q For this investigation, did you personally search
3 for any documents in your files?

4 MR. RENAUD: Objection.

5 A So my understanding is that a team of people at
6 AMD did that investigation. That investigation
7 included my files, and like I stated before, I did
8 a Perforce search of documents yesterday and the
9 day before.

10 Q Prior to those two searches in the last two days,
11 did you personally do any work collecting
12 documents for this investigation?

13 MR. RENAUD: Objection.

14 A No. I did not, but like I said, I had the
15 understanding a team at AMD did that work, and
16 that work included my documents.

17 Q Did you discuss your deposition today with anyone
18 other than counsel?

19 MR. RENAUD: Objection.

20 A I did not discuss the contents of my deposition
21 but, you know, at least my manager, Mike Mentor is
22 aware that I'm doing depositions today because I
23 had to get away from work for these days, so.

24 Q And where is your work currently located?

25 A I officially report to the Markham office of ATI,

1 and I mostly work from my home in Montreal, or I'm
2 actually in Mascouche to be exact, and my manager
3 is Mike Mentor from the Orlando office, so.

4 Q All over.

5 A Pretty much.

6 Q What is the relationship between ATI and AMD?

7 A My understanding, and again, talking from memory
8 and I don't have all the specifics, is that AMD
9 acquired ATI some time ago.

10 Q But you're an ATI employee, is that correct?

11 A So I was not. At the time of the AMD acquired
12 ATI, I was actually a contractor working for ATI
13 but working in my own name effectively. So I was
14 working for but not as an employee.

15 Q What about right now?

16 A So right now, I am again speaking from memory and
17 this is a lot of -- I understand that I'm an
18 employee of AMD but through what they call ATI
19 Technologies ULC, which is the Toronto office.

20 Q Do you have a formal employment agreement, like a
21 written agreement?

22 A A formal -- I don't know what you mean by that.

23 Q Do you have a written employment agreement?

24 A A written employment agreement. I'm just -- I
25 don't know. I'm just a normal employee, so full

1 time. Is that what you mean by this question?

2 Q I don't know. I don't know if you have a written
3 employment agreement or not. I'm just trying
4 to -- you said you -- I understand you're an
5 employee of AMD but through ATI, and I'm trying to
6 understand what that means. Who actually is your
7 employer?

8 A Okay. So because I'm Canadian, to simplify tax
9 matters and everything, I'm paid through the
10 Toronto office, and so my paychecks and my actual
11 employer is the Markham office, which I understand
12 is ATI ULC because that's what it says on my
13 paychecks and tax records and what not. That's
14 pretty much the extent of what I know about this.
15 I don't know what relationship is, but as far as I
16 know, I work for AMD but it goes through this.

17 MR. RENAUD: And all of the answers
18 regarding corporate structure or purported
19 corporate structure are obviously outside the
20 scope of the designation, although you're free
21 pursue them.

22 MR. ELENGOLD: Yeah, that's fine.

23 Q Your personal employment is not something you need
24 to be designated for right now. I was just trying
25 to understand who your employer is.

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1 MR. RENAUD: Yeah, and that corporate
2 structure relationships, I think there is a
3 witness coming up on that because I understand
4 that might be an area of inquiry.

5 Q Yeah, I don't know if that's true or not, but
6 again, this is just limited to your employment
7 right now.

8 MR. RENAUD: Thank you.

9 Q Can you please describe for me your education
10 since high school.

11 MR. RENAUD: Objection.

12 Q Where did you go to college?

13 A I went to the Ecole Polytechnique de Montreal
14 where I got an electronic engineering degree, and
15 I followed that immediately with a master's in
16 computer graphics from the University of Montreal.

17 Q When did you get your initial engineering degree?

18 A If memory serves, that would have been June 1998.

19 Q When did you get your master's in computer
20 graphics?

21 A That would have been somewhere in the summer of
22 2000. Can't be exact on the date because it
23 involves, you know, giving the thesis and having
24 it reviewed and whatnot.

25 Q What was the subject matter of your thesis?

1 A If I remember correctly, it was about the analysis
2 of and synthesis of textures through photograph
3 trying to get a procedural model for those.

4 Q Do you have any other degrees?

5 MR. RENAUD: Objection.

6 A I have a high school degree and primary school
7 diploma, but to my knowledge, that's it.

8 Q That's it.

9 Did you attend any other schools after
10 receiving your master's degree?

11 A No, I did not. I went to conferences and such but
12 not schools, that I remember.

13 Q Where did you first work after obtaining your
14 master's degree?

15 MR. RENAUD: Objection.

16 A I started working for ATI Technologies, the Boston
17 office. Or actually, to be more accurate, the
18 Marlborough office at the time.

19 Q What was your initial title at ATI?

20 MR. RENAUD: Objection.

21 A If I recall correctly, it was something like
22 engineering level one.

23 Q What were your initial job responsibilities?

24 A So again, thinking, talking from memory, 17 years
25 ago, it was, the very first thing I did was to

1 work on something loosely related to my master's,
2 was to try to do pearl and noise on hardware, then
3 I moved to the scan converter of the R400. All of
4 these topics were related to the R400 project by
5 the way. And then I started working on the actual
6 sequencer of the R400.

7 Q When did you join ATI?

8 MR. RENAUD: Objection.

9 A If memory serves, it would have been around
10 September of 2000. So right after my master's or
11 thereabouts.

12 Q And you said you initially started working on the
13 R400, is that correct?

14 A That is correct, yes.

15 Q What is the R400?

16 A The R400 is a GPU that ATI was working on at the
17 time, their newest GPU.

18 Q When did you start working on the scan converter
19 for the R400?

20 A That would have been maybe a few months after I
21 started with ATI. I'm somewhat fuzzy on the
22 transition between the pieces of work, but it was
23 fairly soon after I started working at ATI.

24 Q Approximately how many people were working on the
25 R400 at that time?

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1 MR. RENAUD: Objection.

2 A You mean as I started working for ATI, right at
3 the beginning of my employment?

4 Q Sure. Yeah.

5 A As I recall, again it's a long time ago, that was
6 a fairly small team then. You know, maybe a few
7 architects and myself. So something like 10, 15
8 people at the beginning.

9 Q Is there a difference between an architect and an
10 engineer at ATI?

11 A An engineer is a job title or job rank, if you
12 will. An architect means what you are doing. So
13 it specifies what the engineer is doing. It has
14 no real relationship with your rank within the
15 company.

16 Q What does an architect do?

17 A So my best understanding is that, and again at the
18 time, for the R400, an architect was responsible
19 to develop the specifications for the block that
20 he owned or the system that he owned, as well as
21 developing a model, which we call the C sim or
22 emulator, that would serve as a reference to the
23 designers.

24 Q What is a block?

25 A A graphics chip is composed of subsystems or

1 sub-functionalities, and we call those blocks.

2 Q What blocks make up a graphics chip generally?

3 A So I'm going to answer here in the scope of the
4 R400 to, you know, constrain the problem. So for
5 example, in the R400, and we could go to the spec
6 if you really want me to give you the exhaustive
7 list of blocks, I'm talking from memory, I
8 remember there has to be a CP, which is a command
9 processor first block; then some kind of vertex
10 block, which you call the VGT; the PA, which is
11 a primitive assembly; the scan converter, which is
12 the SC, then the shader, which in the R400 case
13 was a unified pixel and vertex shader. And then
14 you have some texture blocks or texture cache,
15 some form of memory controller and memory
16 connection, and render back ends, which are, you
17 know, the color and the depth blocks.

18 Q And each block is implemented in separate
19 hardware, is that correct?

20 A What do you mean by "separate hardware"?

21 Q What is the distinction between the different
22 blocks?

23 A The blocks allow parallelism in the development of
24 a GPU. They define boundaries, and so they define
25 like a functional entity, if you will, of the chip

1 and they're surrounded by interfaces with strict
2 protocols that define the need to communicate with
3 the other blocks. And the sum of all blocks make
4 up the GPU, or whatever you want to call, you
5 know, whatever chip or device you're trying build.

6 Q Will those functional boundaries be physical
7 boundaries on the final chip?

8 MR. RENAUD: Objection.

9 A I don't understand what you mean by physical
10 boundaries.

11 Q You said there is input and outputs for each of
12 the blocks, correct?

13 A Yes, there are interfaces for the blocks, which
14 could -- or wires, but that is just, you know. A
15 block is a logical structure. It's not, each
16 block is not going to be a different chip, if this
17 what you're asking.

18 Q No, what I'm asking is whether it will be a
19 different section of the chip.

20 A Different section of the chip. So again, a block
21 is a logical entity. Once you put it in silicon,
22 it can be intermingled with other blocks as the PD
23 team sees fit. It doesn't mean that if you have a
24 block, a logical block on RTL that you use for
25 development, that it's going to be its own little

1 bubble in the silicon. It can be intermixed,
2 depending on the various constraints that you have
3 when you're placing and routing the chip.

4 Q And that's what the PD team does, is that correct?

5 A Yes, that is correct.

6 Q The PD team actually figures out how all of the
7 different logical blocks or functional blocks will
8 interface together on silicon?

9 A No. The interface connections between the various
10 blocks are defined by the designers and the
11 architects in RTL and in the spec. So that's
12 fixed by the code. How these are placed on the
13 actual silicon device, that's what the PD team
14 does.

15 Q Is that a hard process?

16 A It depends on the complexity of each block.
17 Obviously the more cells you have to place, the
18 more complex it can be.

19 Q What is RTL?

20 A I'm talking from memory here, and I always get
21 this acronym wrong, I think it stands for
22 registered transfer layer, but that's the source
23 code of the synthesis tool that generates the
24 netlist.

25 Q You mentioned C sim; is that the code that's used

1 with C sim?

2 A What do you mean by "the code that's used with C
3 sim"?

4 Q You just said the RTL is the source code that's
5 used, right? Earlier? Is that correct?

6 A Yes. I said that it was the source -- that is the
7 source used by the synthesis tool to generate
8 gates. The C sim, as I refer to it, is the C code
9 which is C plus plus, it's a program, that serves
10 as a reference model to compare this RTL structure
11 against a golden model so to make sure that it
12 performs the right operation.

13 Q What is a golden model?

14 A I guess it depends, in the scope, I mean in AMD
15 and in the R400 project, for example, the golden
16 model is, you know, what is used to generate
17 pictures on the screen with the program that is
18 supposed to emulate the chip, and to make sure
19 that outputs the pictures we expect it to output.
20 It's a reference model if you will.

21 Q It's a simulator or -- I'm sorry, strike that.

22 It's a simulated model programmed in C, is
23 that correct, or C plus plus?

24 A Yes. It's a behavioral model of the chip we want
25 to build that serves as a reference.

1 MR. ELEGOLD: We've been going to about an
2 hour. Would you like to take a break?

3 MR. RENAUD: You know, in order to make the
4 day work, while I think later we'll need shorter
5 windows, maybe we go another 15 or so, if
6 everyone's comfortable with that?

7 MR. ELEGOLD: That's fine.

8 MR. RENAUD: But thank you for asking.

9 Q What is the process that was used to design and
10 implement the R400 into the netlist, starting from
11 I guess the C model?

12 A Okay. So let me rephrase the question, make sure
13 I understand correctly. What you are asking is,
14 the way AMD conceived or built the R400 chip from
15 start to finish, in a general sense, is that what
16 you're asking?

17 Q Yeah, was the R400 ever built?

18 MR. RENAUD: Objection.

19 A The R400 was prototyped on the IKOS box, yes.

20 Q What is IKOS?

21 A It's the name and/or the company, I don't
22 remember, of the FPGA device.

23 Q So yes, can you please describe for me the way AMD
24 or ATI conceived of the R400 chip from start to
25 finish.

1 A Okay.

2 So the process for the R400 was to start
3 with a system level specification, which describes
4 the various interactions expected between each of
5 the blocks of the chip as described before. And
6 then you have another tier of work that goes into
7 the creation of these block level specification
8 which describes in more detail what each block is
9 supposed to do.

10 Then typically, you have the creation of the
11 C model, which is the reference model that we
12 described before, and at that time, the
13 development or the RTL starts. We typically do
14 the validation from the block level up, whenever
15 we can, so try to start small and then grow. And
16 at some point later when the RTL is mature enough,
17 we start generating netlists which we give to a PD
18 team so they can start working on the place and
19 route, and at this point, there is a loop between
20 PD and the RTL to close timing and fix issues, and
21 once that loop completes, in the middle of that
22 loop you can have a prototype being done to
23 shortcut the process and have your software team
24 starting working on the device, and the very end
25 of the loop is where the tapeout takes place to

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1 initiate manufacturing of the silicon device.

2 Q You mentioned doing the validation at the block
3 level. Is that done on the C model or the RTL?

4 A Okay, some blocks, not all of them, have what we
5 call a block level test bench. And typically,
6 what this does is it's a closed environment around
7 the block that stimulates the block with inputs
8 and gets the output of the block, and then what we
9 do is we use the gold model or the C sim to
10 compare the outputs of the RTL against those we
11 get from the C sim.

12 Q How do you know that the outputs from the C
13 simulator are correct?

14 A So you'll know that for sure. The C sim, the way
15 we validate it is to use it to generate the final
16 pictures that we're expecting, and so the
17 assumption there is if you get the final picture
18 correct, then the interfaces in between will also
19 be correct. However, you know, as you run this
20 process, it's possible that you're going to get
21 mismatches between the RTL and the C sim and
22 sometimes, you know, the C sim is wrong and so you
23 just work on it until they agree, and you keep the
24 final image correct.

25 Q So you mentioned you started your work originally

1 on -- I'm probably going to get this wrong, but --
2 I'm sorry, just to make sure I don't mess up
3 the -- I think you said pearl and noise, is that
4 correct?

5 A Yes, that's what I said.

6 Q What is pearl and noise?

7 A Pearl and noise is a specific continuous noise
8 function that is used typically to introduce or
9 simulate natural environments, or like turbulence
10 or such. So if you want to do a cloud, cloud
11 doesn't have a very definite form, and so some
12 kind of noise needs to be introduced to create the
13 randomness.

14 So pearl and noise is a procedural manner to
15 generate said turbulence so that you can then
16 introduce it into graphic models.

17 Q Was your work on pearl and noise at a
18 specification level or were you already working in
19 C and/or RTL?

20 A It's been a long, long time, but I believe I did
21 both, a model of the pearl and noise on C, as well
22 as specifications of what it would have been. So
23 both. Again, kind of an architect role on it too.

24 Q What about RTL?

25 MR. RENAUD: Objection.

1 A At AMD, we tried not to have the same person that
2 defines the architecture and writes the C model
3 also writes the RTL, for the obvious reason that
4 if you have one person doing that, if he does an
5 error on one, he's likely to do the error on the
6 other. So we try to have the architect do the C
7 sim and another person under the direction write
8 the RTL, so that you have more chances of finding
9 errors and issues.

10 Q You said your next role I believe was with the
11 scan converter, is that correct?

12 A Yes, that is correct.

13 Q What is a scan converter?

14 MR. RENAUD: Objection.

15 A The scan converter in the R400 is the hardware
16 block that takes triangles or primitives and
17 rasterizes them. So it creates pixels or
18 identifies which pixels on the screen would belong
19 to that primitive, whether it's a triangle or some
20 other primitive. That's what we call scan
21 converting.

22 Q Were you an architect for the scan converter?

23 A I worked on the scan converter in both the
24 specification and the C sim. I don't know if I
25 was given, you know, formally the architect title,

1 but I think you can assume that it was very close
2 to that, yes.

3 Q Did you write any RTL for the scan converter?

4 A No, I did not, for the same reasons stated before.

5 Q Are you experienced with reading and writing RTL?

6 A I had RTL classes as part of my formation. I can
7 read RTL. I can debug RTL. I can read waves, but
8 I did not write any RTL, I mean any significant
9 portions of RTL in my career.

10 Q And not for the R400?

11 MR. RENAUD: Objection.

12 A And for the R400, you know, as best as I remember
13 again, I mean, I may have written here bits and
14 pieces and small fixes in RTL, but I did not
15 create modules from scratch, no.

16 Q At what point did you switch from working on the
17 scan converter to working on a different block?

18 A So as best I recall, it was around September 2001,
19 and the reason I recall that, it was I supposed to
20 go to Orlando to give the scan converter design to
21 the Orlando team so that I could focus on the
22 sequencer. So I know because of the events that
23 occurred, that the transition occurred somewhere
24 around that date. Not before, let's put it that
25 way.

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1 Q Was the scan converter block completed at that
2 point?

3 A No, it was not, and that's the reasons why we had
4 to travel to Orlando to give that work to them so
5 they can complete it while I would focus on other
6 blocks.

7 Q And you mentioned you were going to focus on the
8 sequencer block next, is that correct?

9 A That is my recollection, yes.

10 Q Why were you switching to the sequencer?

11 MR. RENAUD: Objection.

12 A So when we started doing the R400 project, we
13 thought of reusing some of the concept of the
14 sequencer that was used in the R300, but the
15 unified shader between vertex and pixel shaders of
16 the R400, made the process complex, and so the
17 workload assumed by the sequencer became too big
18 to be handled by, you know, one engineer already
19 assigned to another block. I believe that, if I
20 recall correctly again, that's one of the reasons
21 why this occurred.

22 Q What is the R300?

23 A The R300 is another GPU that was done by ATI, so
24 it's the predecessor, if you will, to the R400
25 which was a good part mostly done by the time, or

1 at least in development by the time I switched
2 over to the sequencer work.

3 Q What do you mean by "in development"?

4 A Well, as you may or may not know, the graphics
5 processers are not done in one day, so takes an
6 extensive time to build a GPU, and so what I mean
7 by "in development," I mean it was in that
8 development period.

9 Q The R300 was still in development is what you're
10 saying, is that right?

11 A At the time I switched to the R400 sequencer, yes,
12 I believe that was the case, but talking from
13 memory. Again, I'm sure we can find public
14 records or what not to put the dates on the
15 calendar, but that is my recollection.

16 Q Did the R300 ever get commercialized?

17 MR. RENAUD: Objection.

18 A Yes, I believe it did.

19 Q What was the name of the commercial chip?

20 A I am very bad with commercial names. I have no
21 idea. I only know the internal names. Even today
22 actually, so. I'm terrible with these. They have
23 these weirdest nomenclatures.

24 Q What public records would you look at to determine
25 when the R300 was finished with development?

1 A It's a good question. I think I would rely on the
2 product names and then also try to find internal
3 documents within AMD that ties these product names
4 to the internal project names.

5 Q But you do believe the R300 was put into a
6 commercial graphics chip, is that correct?

7 A Yes, that is my recollection.

8 Q Did the R300 project, just by name I'm guessing,
9 precede the R400 project into development?

10 MR. RENAUD: Objection.

11 A Yes, that's my understanding.

12 Q Do you know approximately when the R300 finished
13 development?

14 A I don't recall. I mean, it wasn't done by the
15 same team that I was working on. It's a
16 completely different program, different team. I
17 know it was before 400 and after R200, but where
18 exactly, it's just too far away.

19 Q So you don't know when it went into manufacturing?

20 MR. RENAUD: Objection.

21 A I do not recall that information, no.

22 Q What were the differences between the R300 and the
23 R400?

24 MR. RENAUD: Objection.

25 A So I haven't prepped or anything on the R300.

1 It's been a long time ago. But my understanding
2 is that that product was more typical in the sense
3 that it had a more normal or natural flow of
4 graphics processing than the R400. It did not
5 have, for example, a unified pixel and a vertex
6 shader.

7 Q It had separate vertex and pixel shaders?

8 MR. RENAUD: Objection.

9 A Again, not having fully prepped for that, and
10 knowing the intimate details of the R400, can only
11 talk from memory, but this is why I remember, yes,
12 it had a different vertex and a different pixel
13 shader.

14 Q Is that what you mean by a typical product at the
15 time, having separate vertex and pixel shaders?

16 MR. RENAUD: Objection.

17 A This is my recollection of what a natural GPU at
18 the time was, yes.

19 MR. RENAUD: Let me just state for the
20 record that the R300 is outside the scope, and I'd
21 remind Laurent to be careful when he's answering,
22 because I think the prior answer you said you
23 hadn't been prepped on the R400. I think you
24 meant the R300.

25 THE WITNESS: R300, sorry, yes.

1 MR. RENAUD: So, and I don't want to provide
2 testimony for the witness, but he is prepared
3 exhaustively on the R400.

4 MR. ELENGOLD: I think you are providing
5 testimony for the witness, so it's fine. Let's
6 have him answer the questions, and if he feels
7 like something is outside of the scope, you're
8 welcome to make a scope objection.

9 MR. RENAUD: My problem is, if you're going
10 to move between the 300 and the 400 --

11 MR. ELENGOLD: I'm not moving. I asked him
12 what the differences were.

13 MR. RENAUD: Hang on. Let me just state my
14 piece. You're going to ask whatever you want
15 obviously. I just want to make sure the record is
16 clean; the 300 is outside the scope, the 400 is
17 inside scope. And just go slow so you can pay
18 attention to what he's asking and what the answers
19 are, okay?

20 MR. ELENGOLD: Why don't we take a break.

21 MR. RENAUD: That's fine by me.

22 VIDEO OPERATOR: The time is 10:30 a.m.
23 This concludes tape one. We are off record.

24 (Recess taken.)

25 VIDEO OPERATOR: The time is 10:48 a.m.

1 This is the beginning of tape 2. We're back on
2 the record.

3 Q Mr. Lefebvre, before the break we were talking
4 about the unified shader and the R400, do you
5 recall that?

6 A I recall conversations about the R400 unified
7 shared, yes. I mean, if you want to talk about
8 specifics, we can pull back my previous answers
9 and discuss about them.

10 Q What is a shader?

11 MR. RENAUD: Objection.

12 A In the context of the R400, a shader is the block
13 that runs the pixel in all the vertex programs.

14 Q What is a pixel program?

15 A So again, in the context of the R400, the R400 is
16 what we call the programmable device, so you can
17 start running small programs on the pixels that
18 the chip generates to perform effects. This is
19 what I referred to as a program, these small,
20 well, programs, shaders; programmable pieces of a
21 GPU.

22 Q Is a program in that context a set of
23 instructions?

24 A In the R400 was a set of ALU, control flow and
25 memory operations of some kind.

1 Q What is an ALU operation?

2 A An ALU operation in the R400 context is an
3 arithmetic operation. Can be anything you want;
4 an add, subtract, multiply, any kind of an
5 arithmetic operation.

6 Q Were there logical operations that were supported
7 in the R400?

8 A If you give me the specification, I can answer
9 decisively, but my memory, according to my memory,
10 yes, there were logical operations in the R400
11 supported.

12 Q By the ALU.

13 MR. RENAUD: Objection.

14 A If memory serves, it was more done by what we call
15 the scalar unit.

16 Q What is a scalar unit?

17 A So the scalar unit is the unit that does anything
18 that the ALU unit could not do; so more involved
19 functions like exponentials, and you know, bit
20 manipulation and logical operations of sort. And
21 typically, not all the time, scalar operations
22 apply to a whole vector of elements versus ALU
23 operations that operate on a specific thread
24 within that vector of elements.

25 Q When you say scalar, is that scalar with an A or

1 scalar with an E at the end? Actually, strike
2 that. Can you spell scalar in this context,
3 please?

4 A To me, that would be S C A L A R.

5 Q When you say "to me," have you seen it both ways
6 before?

7 MR. RENAUD: Objection.

8 A I vaguely remember having seen it both ways, but
9 English is my second language and I get some words
10 wrong, and so I'm not your best reference in the
11 English literature.

12 Q So you say scalar operations apply to a vector
13 versus ALU operations on a specific thread; are
14 you just talking about the number of either
15 vertices or pixels that are getting affected by
16 the operation?

17 A The R400 is operating on -- typically, a single
18 instruction applies to multiple elements, and so
19 when I say a vector, I mean -- I'm representing
20 the elements on which each thread or sub element
21 of that vector can have different data, but then
22 the instruction is the same for all of them.

23 Q And for a scalar operation, the data would be the
24 same for all of them?

25 A Yes. For the scalar operation, my understanding

1 is that you would be operating on a single bit of
2 element, and then applying that result on the
3 whole vector. You can use this, for example, for
4 control flow operations of some sort.

5 Q Was the scalar processor separate from the ALU's?

6 MR. RENAUD: Objection.

7 A In the R400, there was separate piece of hardware
8 that was doing the scalar processing, but they
9 don't have to be in different blocks. I mean,
10 they can even have -- they can be or they can
11 be -- there can be some overlap between the ALU
12 and the scalar. The main distinction is that the
13 scalar is doing other kinds of operations than the
14 ALU processor can be doing. And typically,
15 applies to the whole vector.

16 Q Are the scalar and ALU part of the same unified
17 shader?

18 MR. RENAUD: Objection.

19 A In the scope of the R400, they are both pieces of
20 the unified shader, but one can envision any kind
21 of implementation.

22 Q In the R400, are they part of the same processor?

23 A Can you define what you mean by processor?

24 Q Well, let me rephrase that then. What is a
25 processor in the context of the R400?

1 MR. RENAUD: Objection.

2 A Processer. Yeah, you have -- I mean, if you give
3 me the specification -- I don't recall exactly
4 what this word was used for in the R400
5 specification itself, but talking from memory, a
6 processer to me would mean the collection of ALU's
7 that perform arithmetic operations.

8 Q Does that include the scalar?

9 MR. RENAUD: Objection.

10 A Again, I'm not seeing the specs and it's been a
11 long time, but thinking from memory, yes, it would
12 include -- it could include scalar operations as
13 well.

14 Q What is a control flow operation?

15 MR. RENAUD: Objection.

16 A Control flow operation is an operation that
17 prevents the executions of -- conditionally,
18 prevents the execution of some instructions in the
19 shader. It can be a loop, an if then else
20 condition.

21 Q Is a branch a control flow operation?

22 A Yes. Branch is typically the operation you use to
23 implement an if then else condition.

24 Q In the R400, where were the control flow
25 operations executed?

1 MR. RENAUD: Objection.

2 A Again, it would be helpful if I had the spec over
3 me, but best I recall, the operations were
4 executed by the sequencer itself.

5 Q What spec would be helpful?

6 A Any kind of R400 sequencer spec would be fine with
7 version two.

8 Q This is part of the sequencer logic?

9 MR. RENAUD: Objection.

10 A Can you say what do you mean by this?

11 Q Sure. Our discussion right now about the three
12 different types of operations that you identified,
13 is that part of the sequencer logic in the R400
14 and that's why the sequencer specification would
15 have the information?

16 A So the scalar processor -- well the scalar unit,
17 the L unit, they're in the SP, the shader pipe.
18 The sequencer controls the control flow operations
19 mostly, especially those that are applying to the
20 whole vector. The reason why I'm asking for a
21 sequencer spec is that I don't remember at what
22 level and at what point we implemented a possible
23 data dependent control flow instructions.

24 Q I will try and find that spec for you in a little
25 bit. Just to follow-up on the last one, what is a

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1 memory operation?

2 A A memory operation in the R400 scope is any kind
3 of operation that involves writing to or reading
4 to memory devices, D rams or system memory.

5 Q What's the difference between D rams or system
6 memory?

7 MR. RENAUD: Objection.

8 A D ram are the memories that we typically put on a
9 board along with a GPU or an APU, and the system
10 memory is the memory that can also be accessed by
11 the CPU.

12 Q When you say "put on a board," do you mean put on
13 a chip?

14 A No. Typically when you have a GPU or a discrete
15 graphics chip, the chip sits on a PCB board, which
16 is then inserted into a PCI controller, so what I
17 mean by board is the physical support that the
18 chip is applied to.

19 Q Is there any memory on the chip?

20 MR. RENAUD: Objection.

21 A There are integrated memories on the R400 device,
22 yes.

23 Q Are those D rams?

24 MR. RENAUD: Objection.

25 A Those are not what I would qualify -- well,

1 they're not the ones that pertain to what I
2 described as the memory operations. When I was
3 talking about memory operations, I was really
4 talking about the memories that are outside the
5 chip on the board.

6 Q And what in the R400 is responsible for processing
7 those types of memory operations?

8 A That's an ambiguous question. I would like you to
9 be more precise. I don't understand what you mean
10 by processing.

11 Q How is a memory operation performed in the R400?

12 A Do you mean in the context of the shader of the
13 R400 or -- because there is many blocks on the
14 R400 device and some of these blocks have memory
15 connections. So what are you asking about?

16 Q In the context of the shader of the R400, how are
17 memory operations performed?

18 A Okay. The R400 shader contains options to, or
19 instructions that allows either a pixel or a
20 vertex shader to read data from memory, and so
21 these instructions would be issued by the
22 sequencer and executed by the SB to read the
23 source GPRs, and then they could go through what
24 we call the texture unit and then to the memory
25 controller, and eventually the memory system.

1 Q Okay. There was a lot there so I'm going to ask
2 you some follow-up questions.

3 What is the difference between instructions
4 and operations?

5 MR. RENAUD: Objection.

6 A An instruction is the control that is in the
7 program that tells the hardware how to -- what to
8 fetch and how to fetch it, and the operation,
9 again in my own definition and in the R400, is how
10 this instruction gets executed on the hardware,
11 the steps.

12 Q What is the role of the sequencer with regard to
13 instruction execution?

14 MR. RENAUD: Objection.

15 A So in the R400, the sequencer had the role to
16 choose which instructions would be executed next
17 between pixels and vertices because of the unified
18 nature of the shader as well as the ordering of
19 the instruction within each shader type.

20 Q Does shader type refer to vertex and pixel?

21 A When I say "shader type" in the R400, I refer to
22 pixels and vertices, yes.

23 Q Are there any other kinds of shader types with
24 regard to the R400?

25 A At the time, those were the only two types that I

1 remember.

2 Q How did the sequencer order the instructions?

3 A What is your question? Can you repeat the
4 question, please.

5 (Question read back.)

6 A The instruction order per type is defined by the
7 program itself which is written by the programmer,
8 and the sequencer has to follow that order. So it
9 then forces that order per shader type, but it
10 also gets to pick where to apply the machine
11 between vertex and pixels, and that, that can be
12 done many different ways.

13 Q What different ways are you referring to?

14 A So in the R400 again, remember we have a shader
15 that is able to operate both pixels and vertices,
16 and so depending on the workload that a chip gets,
17 you can do more pixel work and less vertex work,
18 or vice versa, or have a mix of the two types.
19 That's what I mean by any type.

20 Q Did the sequencer order which instruction will get
21 executed within each shader type?

22 A I think I already answered that question. I said
23 that the execution was fixed by the programmer,
24 and the sequencer is enforcing the instruction
25 order within each shader type.

1 Q So the sequencer can only handle one instruction
2 set per shader type at a time, is that correct?

3 MR. RENAUD: Objection.

4 A I am not clear on your question. I don't
5 understand what you're asking.

6 Q I think what you said was that the sequencer did
7 not have any responsibilities with regard to
8 determining which instruction was next within,
9 say, the possible set of pixel instructions. Is
10 that correct?

11 MR. RENAUD: Objection.

12 A So in the R400, you can have, potentially, several
13 pixel vectors all at once in a shader. Within a
14 pixel vector, you have to use the ordering as
15 instructed by the program, but you can choose to
16 execute the next instruction of any of the pixel
17 vectors that are on the system.

18 Q And is the sequencer responsible for that
19 decision?

20 MR. RENAUD: Objection.

21 A The R400 sequencer is responsible for making that
22 decision, and the decision of whether or not it
23 wants to execute a vertex or a pixel execution,
24 yes.

25 Q You said that within each, let's say pixel vector,

1 the sequence of instructions is determined by the
2 programmer, is that correct?

3 A It -- within -- so again, I answered that already,
4 so we could go back to the answer, but my
5 recollection is that for one pixel wave, yes, you
6 have to execute the program as it's specified by
7 the shader.

8 Q Does the sequencer have any role with regard to
9 enforcing that the instructions are executed in
10 the correct order with regard to timing?

11 MR. RENAUD: Objection.

12 A What do you mean by "timing"?

13 Q For example, if one instruction had a dependency
14 on another instruction, is it the sequencer that's
15 responsible for determining that the first
16 instruction is done executing before the next
17 instruction begins?

18 MR. RENAUD: Objection.

19 A The R400 sequencer had that capability, yes.
20 Although I could envision a hardware device where
21 its responsibility is enforced by the compiler or
22 software.

23 Q The compiler could put some sort of instructions
24 in that require waiting, is that what you're
25 saying?

1 MR. RENAUD: Objection.

2 A The -- there are many ways to enforce this. The
3 R400 had specific controls to allow for that, and
4 those were enforced by the R400 sequencer.

5 MR. ELENGOLD: I ask the court reporter to
6 please mark Exhibit 3.

7 (Document marked Exhibit 3 for
8 identification.)

9 MR. ELENGOLD: I'll note for the record that
10 Exhibit 3 is Bates labeled AMD1044_175470 through
11 175485.

12 Q Mr. Lefebvre, have you seen Exhibit 3 before?

13 A Yes. This is the R400, or this looks to be like
14 it is the R400 Architecture Proposal version one
15 by Steve Morein. I just want to say that my
16 versions are underscore 0175470 and not underscore
17 17, so I don't know if it makes any difference to
18 you, but I have a zero.

19 Q Mine are the same. So yeah, that will be part of
20 the actual record. Sometimes I'm leaving out
21 zeros when I say the number, but that's fine.
22 Just so we're clear for the record, it's
23 underscore 0175470 through 485.

24 When was the first time you saw Exhibit 3?

25 A I don't recall the exact date at which I saw this

1 proposal. I mean, must have been around the
2 creation date. I remember having discussions with
3 Steve about this particular spec, but as to
4 exactly when I first saw this, I don't recall the
5 specifics.

6 Q Who is Steve?

7 A Steve Morein is or was an architect at ATI and is
8 also the author of the spec as stated here on the
9 first page.

10 Q What was the purpose of the R400 Architecture
11 Proposal?

12 A I believe the purpose is stated on the page and
13 I'm going to read, "This is a proposal for the
14 overall architecture of the R400. It's just a
15 proposal and nothing is decided yet." So it's to
16 initiate discussions about the R400 project.

17 Q Do you know when this document was created?

18 A I don't have memories as to when it was created,
19 but it states an originate date of 2000-11-13.
20 And I have no reason to believe those are wrong.

21 Q And you started working on the R400 you said in
22 September of 2000, is that correct?

23 A I said that I started working on pearl and noise,
24 which you know, we were investigating for the
25 R400, yes, around that timeframe.

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1 Q So do you know when the first discussions around
2 the R400 began at ATI?

3 A Discussion about what part, I mean, of the R400?
4 Like I said, the R400 is a very broad subject. So
5 are you asking specifically about what part?

6 As a whole?

7 Q I mean, do you know when the first planning for
8 the R400 started at ATI?

9 A I don't remember exactly when it occurred, but you
10 know, given I was working, at the very least I was
11 working on the FC prior to September 11, 2001, and
12 this dates from November 13, 2000. That must have
13 been in this vicinity.

14 Q Around November of 2000?

15 A Around November 13, 2000, yeah.

16 Q Was this the first document to your knowledge that
17 described the R400 architecture?

18 MR. RENAUD: Objection.

19 A I recall having seen diagrams from Steve. I don't
20 know if you call them documents. This is one of
21 the documents that describes the R400. Whether
22 it's the first one or not, I don't recall exactly.

23 Q Are there others from the same time period?

24 A There might have been. I don't recall them if
25 there were.

1 Q Do you know if ATI searched for those documents
2 for this investigation?

3 MR. RENAUD: Objection.

4 A I know that a team of people searched for it, but
5 I also know that this time period, we were using a
6 separate source revision control than Perforce,
7 which made the search much harder for that time
8 period because of it being antiquated and not
9 available.

10 Q When did Perforce start being used?

11 A I don't remember exactly but, you know, we could
12 go back to the logs, and obviously, the first
13 submissions to the depot would point as to a
14 pretty good idea of when the date was established,
15 effectively.

16 Q So you're not sure whether there were or were not
17 other documents in this time period regarding the
18 R400 architecture, is that right?

19 MR. RENAUD: Objection.

20 A Like I said, I recall at least diagrams from
21 Steve. There's definitely this one. Whether or
22 not there are others available, I don't know.

23 Q Do you recall any others?

24 A Well, I was working on the pearl and noise, so you
25 know, I have every reason to believe there would

1 be a pearl and noise specification somewhere, as
2 well as some time later, a scan converter
3 specification in my name, and so forth. But as to
4 when exactly, I don't know.

5 Q So going back to the Architecture Proposal which
6 is Exhibit 3, is this a document that you reviewed
7 in your preparation for your deposition?

8 A I don't recall specifically reviewing this
9 document for this particular deposition, but I did
10 review it many times over, as it was part of my
11 two previous depositions as you can see by Exhibit
12 5 on 12/9/16.

13 Q At the time of the Architecture Proposal that's
14 Exhibit 3, had you already discussed with
15 Mr. Morein the idea of using a unified shader in
16 the R400?

17 MR. RENAUD: Objection.

18 A So you mean at the time of the spec was published
19 did I --

20 Q At the time of November 2000, had you already
21 discussed with Mr. Morein the idea of using a
22 unified shader in the R400?

23 A I know I had discussions with Steve Morein on the
24 subject matter. When exactly these occurred
25 versus this particular specification, I don't

1 remember. I mean, I did discuss this before in my
2 previous testimonies and deposition. We could go
3 grab the records, but that's my recollection. I
4 had discussions with Steve.

5 Q Whose idea was it to combine the vertex and pixel
6 shaders into a unified shader?

7 MR. RENAUD: Objection.

8 A So Steve came up, as best I can understand, came
9 up with the original concept, but both myself and
10 Andy Gruber all worked on blocks and issues and
11 systems within that unified shader, so as such,
12 it's a collective effort, I would say.

13 Q Are you referring to the patented invention now,
14 the patents, or are you talking about the idea of
15 putting a unified shader into the R400?

16 MR. RENAUD: Objection.

17 Q Strike that. You said, just so it's clear for the
18 record, you said Andy -- sorry, what was his last
19 name?

20 A So there were two Andys, Andi Skende and Andy
21 Gruber. Or Andy Gruber also goes by Andrew
22 Gruber, and Skende is Andi with an I.

23 Q So Exhibit 3, which is in front you, discusses the
24 idea of using a unified shader for vertex and
25 pixel operations in the R400, is that correct?

1 MR. RENAUD: Objection.

2 A Well, the spec actually calls for, and I quote on
3 page 6 of 16, that "the most ambitious feature in
4 this design is the 'truly unified pipe': a single
5 programmable pipeline is used for 2D, video, 3D
6 vertex, and 3D pixel," so it would apply more than
7 just pixels and vertices, but inclusive of, yes.

8 Q So the idea at the time ,in November of 2000 ,was
9 to unify 2D, video, 3D vertex, and 3D pixel
10 operations into a single shader, is that correct?

11 MR. RENAUD: Objection.

12 A According to the spec, yes, it was the original
13 concept.

14 Q And did you just say that prior to Mr. Morein
15 putting together this document, you, Mr. Skende --
16 is it Mr. Skende or Mrs. Skende?

17 A Mr. Skende.

18 Q Mr. Skende, Mr. Gruber, and Mr. Morein all
19 collectively talked about that idea, is that
20 correct?

21 MR. RENAUD: Objection.

22 A I didn't say that prior to the spec. I said I
23 remember collectively working on the unified
24 shader. I don't know exactly when all these
25 occurred versus through the creation of this spec.

1 Q Do you know who first suggested the idea of
2 combining vertex and pixel operations into a
3 single shader?

4 MR. RENAUD: Objection.

5 A Like I previously stated in my prior depositions,
6 I believe I said that I thought that Steve Morein
7 came up with the original idea, or the original
8 concept, and then we worked collectively to
9 further the idea into a design.

10 Q Do you recall having contributed to this document,
11 the R400 Architecture Proposal that's Exhibit 3?

12 MR. RENAUD: Objection.

13 A Can you define what you mean by "contributed"?
14 You mean typing words into the spec or do you mean
15 having --

16 Q Did you write any parts of Exhibit 3?

17 A I don't recall writing personally any part of
18 Exhibit 3, no.

19 Q When did you first start working with Mr. Skende
20 on the R400?

21 MR. RENAUD: Objection.

22 A So best I can recall, Mr. Skende was working on
23 the R200 at the very, very onset of my beginning
24 to work at ATI. And again, if I recall correctly,
25 and I'm talking from very, very long time memory,

1 the interactions really started in earnest when we
2 were developing the sequencer and the shader pipe
3 for the unified shader, so would have been
4 somewhere around the September 2001 timeframe.

5 Q What is the R200?

6 A The R200 is the chip that preceded the R300 in
7 nomenclature and was developed by the, in part by
8 the Orlando -- not the Orlando office -- well, the
9 Orlando office, yes, but also the Marlborough
10 office, which I was part of.

11 Q Was the R200 ever manufactured into a chip?

12 A Yes, my recollection is that it was, yes.

13 Q Do you recall the name of that chip?

14 A I don't recall the name. I know the internal
15 project name was Chaplain, and probably was called
16 something like Radeon, but like I said, I'm
17 terrible with marketing names. We never use them
18 in engineering.

19 Q When did you first start working with Mr. Gruber?

20 A Can you refine the question please because
21 Mr. Andy Gruber was my manager right from the
22 onset, so --

23 Q When did you start working on the R400 with
24 Mr. Gruber?

25 A On the R -- I mean I've been always working on the

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1 R400 project, so Andy Gruber was my manager and
2 engaged in technical discussions right from the
3 beginning on the various topics that were assigned
4 to me, so as far as I know, I've been working with
5 Mr. Gruber for the whole time that I was employed
6 in the Boston office.

7 Q September 2000?

8 MR. RENAUD: Objection.

9 A From my initial employment day, yeah; September
10 2000 to, until I moved back to Montreal.

11 Q What was Mr. Gruber's title at the time you worked
12 with him on the unified shader?

13 A I believe I already answered that question in a
14 previous deposition, so you must already know the
15 answer to that, but I don't recall what his title
16 was. I didn't recall it then, I don't recall it
17 now.

18 Q What was Mr. Skende's title when you worked with
19 him on the unified shader?

20 MR. RENAUD: Objection.

21 A Some kind of engineer. Again, I don't recall
22 exactly.

23 Q Do you recall Mr. Morein's title when you worked
24 with him on the unified shader?

25 MR. RENAUD: Objection.

1 A No, not directly either. Again, these are all
2 questions that I'm pretty sure I answered
3 previously in depositions.

4 Q You understand this is a different case from your
5 prior depositions, correct?

6 A I do understand, and you have every right to ask
7 your questions, but I also understand you have all
8 that documentation, so it is available to you and
9 they are the exact same questions. As far as I
10 remember.

11 Q Is all of your prior testimony, do you believe,
12 correct as you sit here today?

13 MR. RENAUD: Objection.

14 A So as I read through them, I found a few typos and
15 filed a errata sheet for both, and could not find
16 other discrepancies as best as I can tell, but if
17 you want to bring them up and discuss them, I'm
18 more than welcome to comment on them if you want
19 to.

20 Q To your point, it seems rather than walk through
21 some of the stuff you believe you already
22 answered, do you still stand behind all of your
23 prior deposition testimony as being accurate and
24 correct?

25 MR. RENAUD: Objection.

1 A I could not find any inaccuracies in my previous
2 testimonies other than those noted in the errata
3 sheets.

4 Q And did you review them earlier this week?

5 MR. RENAUD: Objection.

6 A I did read through both of my depositions earlier
7 this week, yes.

8 MR. ELENGOLD: I'll ask the court reporter
9 to please mark Exhibit 4.

10 (Document marked Exhibit 4 for
11 identification.)

12 MR. ELENGOLD: I'll note for the record that
13 Exhibit 4, the first page is Bates labeled
14 AMD1044_0012459 through 12617.

15 Q Mr. Lefebvre, have you seen Exhibit 4 before?

16 A Yes. This appears to be my deposition that I did
17 in Montreal. It's missing the errata sheet
18 though.

19 Q This is the deposition, the first deposition you
20 referred to earlier that appears to have occurred
21 in November of 2015, is that correct?

22 MR. RENAUD: Objection.

23 A Yes. And at the time, I did not remember the date
24 but looks to be right. Again, it is missing the
25 errata sheet that was filed late.

1 MR. ELEGOLD: I'm not aware of us having
2 received a copy of the errata sheet, so I'll just
3 note for counsel that if you guys have that and
4 want to make sure that's produced, that would be
5 helpful.

6 MR. RENAUD: Okay.

7 Q So other than the errata sheet, is this a complete
8 and accurate copy of your testimony from November
9 2015?

10 A Yes. This looks to be.

11 Q You were under oath during this deposition, is
12 that correct?

13 A Yes, I was under oath during the deposition.

14 Q Is there anything, sitting here now, other than
15 the errata sheet, that you wish to correct from
16 your prior deposition transcript?

17 MR. RENAUD: Objection.

18 A You want me to reread it in light of everything
19 that we discussed today? I can do so now, I
20 mean --

21 Q That's up to you. You know, I know you said you
22 just reviewed it and that, you know, it appeared
23 to me that you were expressing a lot of
24 frustration with getting asked questions that you
25 felt like you had previously answered, so I'm

1 offering you an opportunity to say that you
2 believe that this deposition transcript is still
3 true and accurate with regard to your answers. Is
4 that the case? Is this deposition transcript true
5 and accurate to your knowledge?

6 MR. RENAUD: Objection.

7 A To the best of my knowledge. I mean, there could
8 be dates here and there that I got wrong or
9 anything, but the generic sense when I read
10 through it yesterday -- it was yesterday, it was
11 not just now -- looked to be accurate. Yeah.

12 MR. ELEGOLD: I'll ask the court reporter
13 to please mark Exhibit 5.

14 (Document marked Exhibit 5 for
15 identification.)

16 Q Before we turn to Exhibit 5, one more question for
17 you, Mr. Lefebvre, what was the subject matter of
18 your deposition in Exhibit 4?

19 MR. RENAUD: Objection.

20 A Well, the first date -- the first page, sorry,
21 states that this was related to case
22 IPR-2015-00325, Patent 7,742,053 B2; Case
23 IPR-2015-00326, Patent 6,897,871, and Case
24 IPR-2015-00330, Patent 7,327,369 B2. So I don't
25 know.

1 Q You just read the case caption, correct?

2 A Yes.

3 Q Do you recall what the subject matter was of the
4 deposition -- or strike that. Do you recall why
5 you were deposed in that case?

6 MR. RENAUD: Objection.

7 A I recall talking in this deposition about the R400
8 sequencer and multi-threaded patent which was --
9 and also the unified shader patent, but
10 specifically, what was the purpose, I don't recall
11 exactly.

12 Q When you say the "unified shader patent," is that
13 your understanding of the same family of patents
14 that's at issue in this investigation?

15 MR. RENAUD: Objection.

16 A So my recollection is one of these patents, yes,
17 was from that family.

18 Q Turning now to Exhibit 5, which is Bates stamped
19 AMD1044_0175035 through 175187.

20 Mr. Lefebvre, have you seen Exhibit 5
21 before?

22 A Yes, I have seen this Exhibit before.

23 Q What is Exhibit 5?

24 A This is the videotape deposition that I did on
25 December 9, 2016.

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1 Q Do you recall the subject matter of that
2 deposition?

3 MR. RENAUD: Objection.

4 A So I recall some, again, some subjects that were
5 discussed in this deposition, and they included
6 the '871 unified shader patent, as well as you can
7 see from the Exhibits, several specifications from
8 the R400 and some presentation program reviews.

9 Q Did you review this deposition yesterday in your
10 preparations?

11 A Yes, I read through this deposition.

12 Q Do you believe your testimony in this deposition
13 to still be true and accurate?

14 MR. RENAUD: Objection.

15 A I didn't find any inaccuracies that I'm aware of.
16 I mean, doesn't mean that there aren't any, but I
17 couldn't find them while reading through these.

18 Q Is there anything you wish to correct in Exhibits
19 4 or 5 for this deposition?

20 A Not that I know of, but you know, if you want to
21 point me to specifics, which I'm sure we'll do, we
22 can discuss them. I don't know anything wrong
23 offhand right now with these depositions.

24 MR. RENAUD: And just to clarify the record,
25 counsel, I believe there is an errata sheet.

1 A There is also an errata sheet.

2 MR. RENAUD: We're going to confirm it's
3 either been produced or produce it.

4 MR. ELEGOLD: That would be great. Thank
5 you.

6 Q So, you know, just to make sure the record is
7 clear then on that point, so other than the two
8 errata sheets, is there anything in Exhibits 4 and
9 Exhibit 5 that you wish to correct today for this
10 deposition?

11 A Again, I'm human, but from reading through those,
12 they sound correct. So they sounded correct when
13 I read through them.

14 MR. ELEGOLD: I'll ask the court reporter
15 to please mark Exhibit 6.

16 (document marked Exhibit 6 for
17 identification.)

18 MR. ELEGOLD: For the record, Exhibit 6 is
19 Bates stamped AMD1044_0011617 through 11682.

20 Q Mr. Lefebvre, have you seen Exhibit 6 before?

21 A Yes, I have seen Exhibit 6 before.

22 Q What is Exhibit 6?

23 A This is, and I quote "Declaration of Inventor
24 Laurent Lefebvre Regarding the Invention Date of
25 U.S. Patent 6897871.

1 Q Did you author Exhibit 6?

2 A I prepared Exhibit 6 with the help of counsel,
3 yes.

4 Q Who wrote Exhibit 6?

5 MR. RENAUD: Objection.

6 A Exhibit 6 was written by counsel upon my
7 instructions and guidance.

8 Q And not your counsel here today, but prior counsel
9 you worked with, is that correct?

10 A Yes. This is what I remember, correct.

11 Q Why did you work with counsel to prepare the
12 declaration in Exhibit 6?

13 MR. RENAUD: And I'll instruct you not to
14 answer if that calls for revealing any
15 attorney/client communication.

16 A My understanding is that this declaration was
17 created to establish a date of invention, or of
18 creation, if you will, of the R400.

19 Q Do you mean a date of invention of creation for
20 the patent at issue that's on the front page, or
21 for the R400?

22 MR. RENAUD: Objection.

23 A I meant establish an earlier date than the patent
24 was issued.

25 Q An earlier date for what?

1 MR. RENAUD: Objection.

2 A An earlier date for the creation or, you know --
3 to show that we had a product prior to having
4 filed the patent.

5 Q A product that you believe practices the patent?

6 MR. RENAUD: Objection.

7 A I am not a lawyer so I can't really exactly
8 understand what practice means in terms of the
9 law, but my understanding is that yes, to show
10 that we had a product that was working and was
11 performing the operations of a unified shader
12 prior to the date of the patent being issued, or
13 at least show that the work started well before
14 the patent issuance date.

15 Q Did you review this declaration that is Exhibit 6
16 in your preparation for today's deposition?

17 MR. RENAUD: Objection.

18 A Yes, I browsed through this deposition for
19 preparing to this deposition.

20 Q Was that yesterday?

21 A I don't remember if it was yesterday or the day
22 before, but it was in between these two dates.

23 Q This declaration, like your depositions, was sworn
24 under oath, is that correct?

25 MR. RENAUD: Objection.

1 A This is correct. I mean, there is my electronic
2 signature here on the last page. I have no reason
3 to believe it's wrong.

4 Q Do you still believe that the statements you made
5 in your declaration are true and accurate?

6 MR. RENAUD: Objection.

7 A At best I can recall, yes. I mean, I did not see
8 any inaccuracies as I browsed through this
9 document for preparing to this deposition.

10 Q Is there anything you wish to correct in this
11 document?

12 A No. Not that I know of.

13 Q So I'll ask you to turn to paragraph 6, please, on
14 page 3. And do you see where it says in the
15 second sentence, "We collectively conceived of the
16 graphics-processing system claimed in the '871
17 patent no later than early 2002, while working on
18 the R400"?

19 A Yes. I see.

20 Q What did you mean by that statement?

21 A So again, the specific wording is not mine. It
22 was written by counsel, but reading this, to me it
23 means that the -- we conceived or we made a
24 product called the R400, and it was operating to
25 perform pixel and vertex functions, no later than

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1 early 2002.

2 Q What did you mean by the graphics-processing
3 system claimed in the '871 patent?

4 MR. RENAUD: Objection.

5 A So again, these are not my words. They're the
6 words of my counsel, but the graphics-processing
7 system is the graphics core of a GPU. So the
8 whole graphics infrastructure.

9 Q And did you intend to offer testimony regarding
10 when you conceived of the actual claimed system in
11 the patent, or were you trying to just refer to
12 the R400 in your statement?

13 MR. RENAUD: Objection.

14 Q You can strike that.

15 And I know I'm going to ask you some general
16 question, but I wanted to have these documents in
17 front you, so please feel free to reference them
18 if you would like to as we go through the day
19 since I know you mentioned that you wanted to
20 ensure your accuracy across the documents so --

21 A I appreciate that.

22 Q Is that helpful to have those in front you now?

23 A Yes. I will, as, if I remember more, refer to
24 these documents.

25 Q So now -- and I'll tell you, looking at your

1 declaration on page 4, you said, "The R400
2 includes a unified shader -- the R400 includes a
3 unified shader that performs both pixel operations
4 and vertex operations," do you see that?

5 A Yes, I see in this proposal, the R400 includes a
6 unified shader that performs both pixel
7 operations and vertex operations. That's what's
8 written here.

9 Q What are pixel operations?

10 A Pixel operations in the R400 context would mean
11 pixel shader operations in my opinion; the
12 instruction that you execute in a pixel shader,
13 the programmable section of the pixel pipeline.

14 Q Does that determine pixel color?

15 MR. RENAUD: Objection.

16 A That is part of the process that determines pixels
17 colors, yes, in the R400.

18 Q What are the other purposes of pixel operations
19 other than color?

20 A I don't have the R400 sequencer specifications, so
21 I don't recall exactly, but one of the other
22 operations that I know is feasible in a pixel
23 shader is what we call a kill operation, which
24 would just plain remove a pixel from being
25 generated. So this is one other example of an

1 operation that you can do in a pixel shader that
2 does not affect color.

3 Q Any others?

4 A Offhand, not that I can remember from the pixel
5 shader side, no.

6 Q What is a vertex operation?

7 MR. RENAUD: Objection.

8 A In the R400 context, and assuming by "vertex
9 operation" you mean vertex shader operation, that
10 would be the instructions executed on the vertex
11 shader.

12 Q What types of operations are instructed on --
13 sorry, strike that.

14 What types of operations are executed on a
15 vertex shader?

16 MR. RENAUD: Objection.

17 A On the R400, the vertex shader supported, I
18 believe -- again, you give me the R400 sequencer
19 specification I can be more precise, but my
20 recollection is that it allowed for memory fetch
21 operations as well as scalar operations, ALU
22 operations, and control flow.

23 Q What were the benefits of using a unified shader
24 in the R400?

25 A Okay, so that's one I know I answered already.

1 Q Do you know of any as you sit here today or do you
2 need to look at your prior testimony?

3 MR. RENAUD: Objection.

4 A I can give you my recollection of what I recall in
5 my testimony, but I can guarantee it's going to
6 match word for word. I have a pretty good idea of
7 what was said, so if that's satisfactory to you.

8 Q Yeah. So as a general rule, as we go through, I
9 wanted you to have these available since you asked
10 frequently about your prior testimony, but you
11 know, let me ask this: Do you plan to offer any
12 testimony at the hearing in this investigation?

13 MR. RENAUD: Objection.

14 A I don't know. I mean, that's not my call or
15 anything.

16 Q Right. So for those purposes, when I ask you
17 questions, you know, if there is anything you can
18 think of as you sit here today, I would like you
19 to try to answer the questions today, and if you
20 need to refer back to prior testimony, then you're
21 welcome to say that you need to look it up because
22 you don't recall.

23 A Okay.

24 Q Okay. So as you sit here today, do you know, were
25 there any benefits to using a unified shader in

1 the R400?

2 A Okay. The benefits of the R400 unified shader are
3 two fold. The first one is that it is an area
4 reduction benefit by which you can only have one
5 shader instead of two. So it's by definition
6 smaller.

7 The second benefit is that it can operate on
8 both pixels and vertices dynamically and assign
9 the shader to either or both pixels and vertices
10 depending on the workload, and the third benefit
11 is that having only one shader core to validate,
12 it simplifies the validation purposes.

13 Q By "validation," you mean testing for
14 commercialization?

15 A By validation, I mean testing, yes.

16 Q What kind of validation is done to make sure that
17 GPU works successfully?

18 MR. RENAUD: Objection.

19 A Do you mean the classes of verification? I am
20 not -- this is a pretty broad question. I want to
21 make sure that I answer it very directly.

22 Q That's fine.

23 A So what are you concerned about?

24 Q Well, you mentioned that validation is a benefit
25 of using unified shared, correct?

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1 A I said that the -- one of the benefits of having a
2 pixel and vertex shader unification like in the
3 R400 is that you only have one shader core, thus
4 it reduces the amount of verification that is
5 needed because you don't have to test two separate
6 pieces of hardware.

7 Q Is that a lot of work, the testing process?

8 MR. RENAUD: Objection.

9 A I would say that the verification of a chip is
10 substantial work, yes.

11 Q What's involved in that verification?

12 A When we had to validate the R400 design, we had to
13 basically verify all of the features of the chip,
14 as well as the general operation of the device,
15 and what makes it hard in silicon design is the
16 fact that until you have a prototype of the chip
17 on the FPGA or something, the simulation
18 infrastructure that we have to use is very slow,
19 and so that makes it for a very long period of
20 time to walk through all the sub-features required
21 by commercial product.

22 Q Is that the C simulator you're referring to that's
23 much slower?

24 A No. The C plus plus model, which I am assuming is
25 what you're referring to by the C sim, like

1 discussed before, is relatively,
2 relatively-speaking, fast.

3 The RTL simulation itself, when you run the
4 RTL code, then you're trying to compare it with
5 the golden C simulator. That is the thing that
6 takes a lot of time.

7 Q Is it -- does it take a lot of time because you're
8 fixing errors in the RTL, or does it take a lot of
9 time because it's just slow to run tests?

10 MR. RENAUD: Objection.

11 A It takes a lot of time because it's just very slow
12 to run anything. I mean, for example, you can't
13 imagine running a few frames of a game on an RTL
14 simulator. It just -- it would take months.

15 Q And the FPGA simulator lets you run those tests
16 faster?

17 MR. RENAUD: Objection.

18 A Yes, the FPGA device, hardware device lets you run
19 tests much, much faster.

20 Q Why is that?

21 A In part, because it is a hardware device, so it's
22 not an emulation of the system. It is the system
23 in some hardware form and it can run the system --
24 it doesn't have to emulate the system. It just,
25 you know, runs as if it was a chip just at a much

1 reduced clock speed that you would be able to
2 operate the silicon at.

3 Q I'm a little confused about what you said because
4 I think earlier you said that it is emulating what
5 the chip will look like, but now you said it's not
6 an emulation, it's not an emulation of the graphic
7 system, but it is a emulation of the chip, is that
8 correct?

9 MR. RENAUD: Objection.

10 A So the FPGA device is a hardware device that can
11 be configured any way you want. So you can push a
12 netlist on it, and effectively, it becomes that
13 device. The gates are configured in the same way
14 as you would have on an actual silicon piece that
15 would you commercialize.

16 Q It's programmed to act like what the gates will
17 look like when they're actually created in
18 silicon, is that right?

19 A So I am not an expert on the actual IKOS device
20 itself, but my understanding is FPGAs are gates,
21 and what you can do is connect them any way you
22 want. And so by pushing a netlist on them, you
23 connect them in the same way they would be
24 connected as on the actual silicon device. So in
25 all essence, it becomes that device, but it's not

1 something obviously you can commercialize because
2 it's very expensive, it's very big.

3 Q And so in order to do that, it's already been laid
4 out at that point, like the F -- I'm sorry, I keep
5 getting the -- P --

6 A FPGA.

7 Q No, no, I'm sorry, the team we were talking about
8 earlier.

9 A PD.

10 Q The PD team. So it's already been laid out in
11 order to see how all those interconnections will
12 work by the PD team?

13 MR. RENAUD: Objection.

14 A Not being on the IKOS, you know, team, I don't
15 have the, in great details exactly how that
16 process works, and AMD can bring in the experts if
17 you want more details on that. We have some
18 people, but I don't know to what extent it needs
19 to be floor plan to be able to operate on the
20 FPGA.

21 Q Did you -- sorry, go ahead.

22 A It starts from the same netlist, that is what I
23 was wanting to say.

24 Q Did you work on the netlist?

25 MR. RENAUD: Objection.

1 A Can you define what you mean by "work on the
2 netlist"? I mean --

3 Q Did you have any responsibilities with regard to
4 creation of the netlist?

5 MR. RENAUD: Objection.

6 A The creation of the netlist is an automated
7 process by which we call synthesis. It takes in
8 the RTL and, you know, outputs the netlist. So
9 that would have been the responsibility of the RTL
10 designer, but effectively, it's our design, so I'm
11 not directly connected to the netlist, but in a
12 sense, I've worked on the netlist. I mean --

13 Q Your specification results in a netlist.

14 MR. RENAUD: Objection.

15 A The work that I've done in specifying the R400
16 sequencer, as well as the models that we created,
17 the C sim model to validate the RTL, they all turn
18 into eventually the netlist because they are used
19 to generate that netlist, indirectly.

20 Q Some of this is new because I don't think you
21 described the FPGA simulator in your declaration,
22 is that correct?

23 MR. RENAUD: Objection.

24 A That is correct. I don't think that I described
25 these in my previous declarations because I was

1 not aware at the time that we did FPGA
2 simulations, or I did not recall at the time that
3 we did FPGA simulation, or FPGA prototyping would
4 be a better word, on the R400. I mean, it is
5 common practice, but again, it's been so long, I
6 was not aware when exactly we started doing that
7 process.

8 Q And when did you start looking into that?

9 MR. RENAUD: Objection.

10 A The legal -- I mean not the legal team, but the
11 team at AMD that collected the document brought to
12 me evidence that the IKOS machine was used in the
13 R400 project.

14 MR. RENAUD: I don't want you to give any
15 communications with that team, but you can
16 continue your answer.

17 THE WITNESS: Yes, sir.

18 A And so those were the two presentations that I
19 divulged before that, you know, describe the
20 netlist, what they were, and the progress on IKOS,
21 and so that is when I got aware of the IKOS
22 prototyping effort.

23 Q When was that?

24 A These documents were disclosed to me over the last
25 two days.

1 Q And were they disclosed to you by counsel or
2 someone from AMD?

3 MR. RENAUD: You can answer that with either
4 of those answers, counsel or AMD.

5 A Counsel.

6 Q Were you involved in any work with the FPGA
7 system?

8 MR. RENAUD: Objection.

9 A Again, in the R400 it's the same thing. I was not
10 directly involved into the work of pushing the
11 netlist on the FPGA prototype, but I was involved
12 in the design of the R400, so indirectly, you
13 know, you can involve me with any given step of
14 the way, but I did not directly work on the IKOS
15 machine, no.

16 Q Who did?

17 A So during the break, I browsed through some
18 documents we had, and at least there was a person
19 named Colin Stuart that was named in the logs, and
20 by the way, he is the one that I spoke on the
21 phone with for preparation.

22 There was another name, but unfortunately, I
23 lost it again. But it's in --

24 MR. RENAUD: I can tell you what that name
25 is if it's helpful.

1 MR. ELEGOLD: That's okay. Let's let him
2 testify.

3 A I forgot about it. I knew the names coming in but
4 then we discussed things.

5 Q Did you talk to your counsel about the substance
6 of your deposition during the break? Just a yes
7 or no question.

8 A No.

9 Q You reviewed these documents on your own?

10 MR. RENAUD: You can answer that yes or no.

11 A Yes.

12 Q What documents did you review during the break?

13 A There was an IKOS log file document that listed
14 all the interactions and steps involving IKOS. I
15 mean, it's probably not an all inclusive document,
16 but at the very least, it had a few names and
17 information that were helpful into establishing
18 the IKOS work.

19 Q What do you mean by "establishing the IKOS work"?

20 A I mean which netlist was ported to the IKOS and
21 when that netlist was pushed on the IKOS machine.

22 Q Is a netlist tied to a version of RTL?

23 MR. RENAUD: Objection.

24 A Okay. This is a tricky answer. A netlist is a
25 collection of synthesis files, and the collection

1 of synthesis and/or verilog files can come from
2 different change lists. So you can tie a netlist
3 to the list of synthesis files, and through that,
4 establish a range of dates for which the RTL was
5 used to generate the netlist.

6 Q Okay. What you're referring to with the FPGA
7 system, when did that occur, the first time the
8 R400 was put into the IKOS machine?

9 A So there is a presentation, like I said, that is
10 dated February of 2003, if memory serves, that
11 states that by that time, according to the
12 presentation again, it said that the IKOS work was
13 progressing rapidly or quickly, I don't exactly
14 remember, I'm paraphrasing, but so you could say
15 that no later than that date, the work had been
16 done on the IKOS machine prototype.

17 Q And it started before that date because it was
18 progressing?

19 MR. RENAUD: Objection.

20 A State again, please.

21 Q You're saying it started before February 2003,
22 correct?

23 MR. RENAUD: Objection.

24 A I'm saying that the netlist was on the IKOS
25 machine prototype no later than that date because

1 that presentation states that the work was
2 progressing well on IKOS, which infers that the
3 netlist was present and it's actually working
4 rapidly.

5 Q So what kind of work was being done?

6 MR. RENAUD: Objection.

7 A So as best I can tell from the presentations, and
8 the various documents that I've seen, and this is
9 fairly new information so I'm sure you have more
10 questioning and they can provide more substance to
11 that matter, the work that was done at the time
12 was at the very least registered reads and writes,
13 and there was another topic too that was stated in
14 that presentation. So if you bring it up, we can
15 just look at it and I can point you to it exactly.

16 Q Registered read writes. Anything else you know of
17 that was being done at the time with respect to
18 IKOS work?

19 A There is a -- so like I said, there is another
20 topic that escapes my memory. And also, some
21 other presentations that I saw in both these
22 actually depositions, the program reviews, they
23 talk about IKOS with software, so those would be
24 dates of establishment of when the driver was
25 expected to run on the IKOS prototype.

1 Q What is the driver?

2 A For the R400 GPU, in order to connect an
3 application which is, you know, a game or anything
4 to the hardware system, the application goes
5 through what we call an API which defines the
6 operations that the application can perform, but
7 that API defines broadly what applications can do,
8 and has to be vendor independent so that
9 applications can work on any graphics device.

10 What sits under that API is a driver which
11 is a software piece of code that interprets the
12 API commands and translates them to hardware
13 commands.

14 Q So do you know when the driver first ran on the
15 FPGA system?

16 MR. RENAUD: Objection.

17 A From what I could gather at this point, I
18 couldn't -- I don't have a conclusive date. I
19 mean I see, like I said, see some projection dates
20 in these program reviews. This is all very fresh.
21 Like I said, I'm sure if you want to dig into that
22 more, AMD can provide more information, but at
23 this point I cannot give you any dates.

24 Q And is all your information regarding the IKOS
25 system from the documents you've reviewed in the

1 past two days?

2 MR. RENAUD: Objection.

3 MR. ELEGOLD: Sorry, strike that.

4 Q Is all your knowledge regarding the IKOS system in
5 the R400 from the documents you've reviewed in the
6 past two days?

7 MR. RENAUD: Objection.

8 A I would say most of my knowledge, you know, as I
9 stated, there are some indications in the program
10 reviews about some IKOS dates in there which I
11 didn't pay attention to before, but the
12 information was there. So to be fair, it was
13 there, not to a great extent though.

14 Q Is all your knowledge regarding the IKOS system
15 from documents that you have reviewed, or do you
16 have any personal recollections regarding any of
17 the IKOS testing?

18 MR. RENAUD: Objection.

19 A No, not having worked directly on the IKOS
20 prototype device, I don't have any personal
21 recollection of such.

22 Q Did you talk to anyone about the FPGA system in
23 the IKOS testing?

24 A One of the phone calls that we had yesterday or
25 the day before, I don't remember, was about that

1 topic, yes.

2 Q Who did you talk to?

3 A That Colin Stuart, and that other person which my
4 counsel can give you the name to. It's also in
5 that, in the documents so --

6 Q Who is Colin Stuart?

7 A Colin Stuart, as I understand it, is a manager; at
8 least at the time, he was managing the IKOS
9 effort.

10 Q Is Mr. Stuart still at AMD or ATI?

11 A To the best of my knowledge, since I talked to him
12 yesterday or the day before, yes.

13 Q So he was still when you talked to him?

14 A Yes.

15 Q Do you know Mr. Stuart's current position?

16 A No. Unfortunately not, but I can find that out if
17 you want to.

18 Q How long did you talk to Mr. Stuart for?

19 A My recollection was in the vicinity of half an
20 hour to 45 minutes.

21 Q What did you learn with regard to the FPGA system
22 and the IKOS testing from Mr. Stuart?

23 A Mostly the timelines and what was on the IKOS
24 machine at the time. That kind of information.

25 Q What timelines did you learn?

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1 A So again, I don't recall the specifics, but
2 Mr. Stuart is named into file log and that file
3 log that the dates of the entries, and so while I
4 don't remember the exact dates and stuff, I could
5 tell, you know, what was going on, and that file
6 log also was stating which netlist -- because each
7 netlist has a number -- was used for IKOS.

8 So you know, we just had the opportunity to
9 discuss that and make sure we were aligned.

10 Q What do you mean? What do you mean aligned?

11 A Aligned on the, that the data that I was seeing in
12 the log was consistent with his memory because,
13 you know, he was much more hands-on than I would
14 have been on the IKOS machine.

15 Q So what timelines do you recall learning from
16 Mr. Stuart?

17 A I mean corroborating evidence that the work on
18 IKOS was, you know, at least done to some extent
19 prior to that presentation.

20 Q February 2000?

21 A February 2000, yeah, making sure the presentation
22 and the logs were consistent.

23 So I wouldn't say that I learned any new
24 dates from the discussion. It was more to, as
25 best as we could, make sure that everything was

1 connected because again, this is a long, long time
2 ago, a lot of people left the company, so you
3 know, due diligence as much as we could.

4 Q So you asked Mr. Stuart if he remembered the log
5 entries that had his name in them, is that
6 correct?

7 A Yes, I did.

8 Q Did he remember them?

9 A No, he didn't from my discussion with him.

10 Q As far as what was on the machine, you said you
11 also discussed that with Mr. Stuart; what did he
12 tell you was on the machine?

13 A Not much more than what was in the log because
14 unfortunately, he did not remember much from that
15 era, it was too long ago. So we just tried to
16 discuss with him the various evidence we had and
17 best we could piece the puzzle together, but I
18 don't remember any loud insight he has, he had,
19 sorry, over the IKOS prototyping effort.

20 Q Were you able to, with Mr. Stuart in your
21 discussions, identify exactly which RTL versions
22 would have been involved in what was on the
23 machine?

24 MR. RENAUD: Objection.

25 A No, and actually, that was the subject of the

1 second phone discussion that I had with
2 Mr. Christie to try to establish that link, and we
3 ran out of time, but my understanding is that he
4 is continuing on that endeavor, and there is a lot
5 of information on the Perforce server. It's
6 sometimes poorly labeled, so I tried to gather as
7 much as I could within the time constraints.

8 Q But as of right now, you're still not sure what
9 RTL went into the netlist that went into the IKOS
10 machine, is that correct?

11 MR. RENAUD: Objection.

12 A So what I can tell you is because the netlist was
13 created according to the presentations no later
14 than February 2003, it would have been a version
15 of the RTL prior to that date. I cannot give you
16 the specifics, but you have to have the RTL prior
17 to have the netlist, and so it has to be a
18 collection of these RTL files, and it has to be
19 before that date.

20 And also, typically -- and this is like from
21 more recent. I'm going to talk to you from the
22 recent ways we do it at AMD. Typically now we try
23 to freeze and branch the RTL into a branch a month
24 before the netlist so it's stable.

25 So I don't remember if it was the practice

1 back then, but, you know, that should give you --
2 those are the guidelines I can provide.

3 Q You're not aware of any frozen set of RTL that
4 represents what was put on the IKOS machine,
5 correct?

6 MR. RENAUD: Objection.

7 A So I am aware of Netlist 3, and that there is
8 evidence that these files are -- eventually came
9 from a branch, and so the question is, yes, there
10 is evidence of freezing the RTL. What we could
11 not assess yet is what RTL files were pulled into
12 that branch and eventually pushed onto the Netlist
13 3. That's the part what we're missing right now.

14 Q Why do you refer to it as Netlist 3? Was there a
15 Netlist 2?

16 A There is evidence on the Perforce server of many
17 netlist numbers; some poorly named, some well
18 named, but the reason why I'm referring to Netlist
19 3 is that this is a number that we could find that
20 is consistent across netlist generation and
21 documentation and presentation, so that we can
22 establish a link on what went on when, where.

23 Q When was the first netlist created?

24 MR. RENAUD: Objection.

25 A I don't recall directly, but I believe it's in one

1 of the executive presentation calendar that are
2 parts of the Exhibits that were already discussed.
3 I don't know that there was a question to that
4 regard. I don't exactly recall. And if you want
5 me to dig through I could look at it, but I know
6 this information is at least in part in these
7 calendar slides.

8 Q Do you have an idea of when the first netlist is
9 generally created out of RTL in a project?

10 MR. RENAUD: Objection.

11 A The R400, I mean we try to do it as soon as the
12 RTL is stable enough.

13 Like I said, I mean, these dates are readily
14 available in the documentations that you have and
15 that we discussed. So if you want us to look at
16 that calendar, we can. I don't recall the
17 specific dates.

18 Q Do you know when the RTL was stable for the R400?

19 MR. RENAUD: Objection.

20 A Yeah, I also don't recall the specifics on that.

21 Q What does it mean for the RTL to be stable?

22 MR. RENAUD: Objection.

23 A My definition of stable, which might be different
24 than other people's, is that it is when, when you
25 start a project, there are going to be a lot of

1 changes as designers implement new features, and
2 so that process eventually stabilizes, and the
3 code -- basically, once you have one tri test
4 passing, which is the test that can run both
5 vertex and pixels through the shader and the whole
6 chip, we have a way to guarantee that any new RTL
7 changes will not break the database.

8 Typically, that milestone is the time where
9 the RTL starts to get stable and you can start
10 doing PD efforts and prototyping and all that
11 because you have a way to test every submission of
12 RTL.

13 Q Did you say first triangle test, or one triangle
14 test?

15 A Yeah. I mean, can you --

16 Q For the reporter I wanted to -- I don't know that
17 the reporter got it, that's why I'm asking you
18 what you said.

19 MR. RENAUD: Do you want to read the
20 question and the answer back?

21 A Yeah, why don't you do that.

22 Q Well, let me ask you this: Can you recall a
23 second ago saying that the RTL code is stable once
24 a test is passed?

25 MR. RENAUD: Objection.

1 A So I said that the RTL code gets stable when --
2 and I don't remember if I called it first tri or
3 one tri, but there is this one test which is a
4 single triangle that we tried to run first, and
5 that establishes proof of life, and once that test
6 gets working, we keep it working, and we make sure
7 that all the designers have to run it after they
8 make any change to make sure they did not break
9 anything. And so, you know, I think in this --
10 where is it.

11 Q Are you looking at your declaration?

12 A I am looking at Exhibit No. 6, page 30, where you
13 have an example of that first triangle. And in
14 this particular declaration, it is labeled that,
15 for the successful first triangle. This is what I
16 am referring to.

17 Q Just make sure I heard you correctly and the court
18 reporter got it too. First triangle, not first
19 try? Or does it mean the same thing?

20 A First tri is a contraction of first triangle. So
21 when we -- when I said first tri, I meant first
22 triangle, and it's just a contraction.

23 Q Which is fine, but you understand, just for
24 purposes of the records, that's why I'm asking you
25 to clarify to make sure your testimony is

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1 accurate.

2 A Okay.

3 Q So earlier you were referring to the first
4 triangle test that's on page 30 of Exhibit 6, is
5 that right?

6 A That is correct. Yes.

7 Q And what type of work is done on the RTL after
8 it's stable?

9 A So the first triangle test establishes what we
10 call a proof of life, meaning that the hardware
11 can operate from top to bottom on what it's
12 supposed to do, but as you can imagine, to have a
13 commercial product, you need to test all the sub
14 features and, you know, various instructions and
15 what not that might not be needed for first
16 triangle.

17 So from that point on, all the work that
18 goes through is really to verify and complete all
19 the sub feature work to make sure you have a
20 commercial product, and there's also performance
21 testing that comes along after that point.

22 Q How is performance testing done on the RTL?

23 MR. RENAUD: Objection.

24 A So on the R400 project, what we have is the set of
25 tests, and we measure the number of clocks it

1 takes to process, you know, a triangle, two
2 triangles, 10 triangles and what not, and knowing
3 the through-put that the chip is capable of, let's
4 say that the chip can do four pixels per clock,
5 I'm making up a configuration, then we make sure
6 that if you have a triangle that is 10,000 pixels,
7 then the chip does not take more than 10,000
8 divided by four, that kind of performance testing.

9 Q And is that kind of testing done on an IKOS
10 machine, or is it done on the C sim, or is it done
11 on, I think you said VCS simulator for the RTL?

12 MR. RENAUD: Objection.

13 A What we did for the R400, that type of testing on
14 that project occurred on the VCS simulator because
15 this is representation of the hardware. It did
16 not occur on the IKOS machine as far as I know,
17 which was more used for software bringing up
18 purposes, and it can also -- it cannot really
19 occur on the C sim because the C sim is a
20 functional model. It doesn't have a good
21 understanding of the clocks.

22 Q Okay. Let's go off the record.

23 VIDEO OPERATOR: The time is 12:27 p.m.

24 This concludes tape two. Off the record.

25 (Lunch recess taken.)

1 VIDEO OPERATOR: The time is 1:11 p.m. This
2 is the beginning of tape three. We are back on
3 the record.

4 A Before you ask a question, do you want me to go on
5 the record? I went downstairs and did find the
6 name of the person that I talked to over the phone
7 for the IKOS, and his name is Ron White, and both
8 he and Colin Stuart are SMTS's. You asked me for
9 their titles so I went and looked it up.

10 Q What's SMTS?

11 A SMTS is senior member of technical staff.

12 Q Do they work for AMD or ATI?

13 A They now work for AMD and they are employed by the
14 Toronto office, so they must have -- their work
15 employment is probably through ATI Technologies
16 ULC as well.

17 Q And you mentioned Mr. Christie as well earlier?

18 A David Christie, yeah.

19 That was the other conversation I had.

20 Q And those are the only three people you've talked
21 to, to prepare for today, is that correct?

22 A Along with Pam Horn, but yes, this is my
23 recollection, correct.

24 Q Earlier there were some people you couldn't
25 remember their names. I just want to make sure

1 we're done with the sort of list of people you
2 can't remember. So are those the three people
3 that you spoke with, other than counsel and Pam
4 Horn, to prepare for your deposition today?

5 A As best as I can remember, this is correct.

6 Q Okay. And during the break, your counsel located
7 some errata sheets I presume from you, is that
8 correct, with regard to your prior depositions?

9 A Yes, I did provide two errata sheets for my
10 previous two depositions.

11 Q And so I believe they were just Bates stamped and
12 produced right now, so to put them into the
13 record, we will mark them as Exhibit 7 and
14 Exhibit 8.

15 (Documents marked Exhibit 7 and Exhibit 8
16 for identification.)

17 MR. ELENGOLD: For purposes of the record,
18 Exhibit 7 is Bates stamped AMD1044_0252730 through
19 733, and Exhibit No. 8 is Bates stamped
20 AMD1044_0252728 through 729.

21 Q Starting with Exhibit 7, Mr. Lefebvre, have you
22 seen this before?

23 A Yes.

24 Q What is Exhibit 7?

25 A As best I can tell, this is the errata list that I

1 provided after my first deposition on November 13,
2 2015.

3 Q And did you just provide this to your counsel
4 during the lunch break?

5 A I signed and provided that errata to the counsel
6 that did the -- that helped me with this
7 testimony, but counsel came with -- I don't know
8 who gave them to him.

9 Q So putting aside that you gave this to your
10 counsel in that case back in 2015, did you just
11 provide it to your counsel in this case during the
12 lunch break?

13 A No. I did not.

14 Q Okay. Other than this errata sheet for your
15 deposition, which I believe, and let me make sure
16 I get it clear for the record, is Exhibit 4, other
17 than this errata sheet, are there any other
18 corrections or changes you would want to make to
19 Exhibit 4 to make it complete and accurate
20 testimony?

21 A Not that I'm aware of.

22 Q Okay. And what is Exhibit -- sorry, strike that.
23 Mr. Lefebvre, have you seen Exhibit 8 before?

24 A Yes.

25 Q What is Exhibit 8?

1 A Best I can tell, this is the errata sheet for the
2 deposition that I did on December 9, 2016.

3 Q And did you just provide this errata sheet to your
4 counsel that's sitting here today during the lunch
5 break?

6 A No, I did not.

7 Q Other than the errata sheet in Exhibit 8, are
8 there any other changes, corrections or additions
9 to your testimony in Exhibit 5 that you would want
10 to make in order to make it a complete, true and
11 accurate set of testimony?

12 A Not that I'm aware of.

13 Q Okay. And before the break for lunch, we were
14 talking about the first triangle test. Do you
15 recall that?

16 A Yes. Let me bring back the relevant document to
17 make sure.

18 Okay. I brought back Exhibit 6 and I'm now
19 at page 30.

20 Q Is the first triangle test an industry standard
21 test for graphics processing?

22 MR. RENAUD: Objection.

23 A I can't speak about the industry. I mean I've
24 only been employed through AMD, but I can tell you
25 that this is a very standard process at AMD, and

1 even to this day we still do it. That is still
2 the test we use. I mean, obviously, we changed it
3 slightly to adapt to the newer chips which need
4 more pixel, but still the same concept.

5 Q What's involved in the first triangle test from an
6 actual emulation perspective?

7 A Can you refine what you mean by emulation?

8 Q Sure.

9 A You talking about the C sim or the RTL?

10 Q Which is the first triangle test performed on, the
11 C sim or the RTL?

12 A Okay. So in R400 and other chips that I worked
13 on, this test is first performed on the C sim to
14 bring up the reference model to a level to which
15 it is able to support the RTL development, and
16 then we run the test on both the RTL and VCS and
17 the C sim, compare the output image to make sure
18 they match.

19 Q Is the first triangle test also run on the IKOS
20 machine?

21 A Nothing precludes it from being run. I don't know
22 if it was run, but certainly, if it can work on
23 the RTL, it should also work on the IKOS machine.

24 Q But it's not part of the standard. I believe you
25 suggested it was sort of the standard procedure

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1 every time a change is made with regard to the
2 RTL; is that true, to then run the first triangle
3 test again?

4 MR. RENAUD: Objection.

5 A So it is standard procedures for the developers
6 and the architects to run this test prior to
7 making any changes to the RTL; however, the thing
8 that is being applied to the IKOS prototype is a
9 netlist, and that doesn't get refreshed on every
10 change list. It only gets refreshed at fixed
11 periods.

12 Q How many netlists were there for the R400?

13 MR. RENAUD: Objection.

14 A At least three, given that we have a netlist
15 number three. There is evidence that there were
16 more, but I can't tell you conclusively how many
17 iterations that project went through so --

18 Q Approximately how many? Earlier you mentioned
19 there were a bunch that didn't have correct
20 naming, and some that did have correct naming?
21 Are we talking dozens, hundreds?

22 MR. RENAUD: Objection.

23 A I've seen evidence of up to, you know, maybe eight
24 or nine but without deeper search, I can't give
25 you a better answer than that.

1 Q Am I correct that it's not standard procedure to
2 run the first triangle test every time there is a
3 new netlist?

4 A So given that we run the one triangle test on the
5 VCS emulator, which is the RTL, the netlist is a
6 reflection of that. So if the one triangle test
7 work on the RTL simulation, then we have a tool
8 that performs an equivalence test between the
9 netlist and the RTL. It's not truly needed to run
10 the one triangle test on the netlist because they
11 are the same and it works on the RTL.

12 Q If the netlist matches with the frozen set of RTL,
13 correct?

14 MR. RENAUD: Objection.

15 A That is the correct assumption, yes.

16 Q Otherwise, you wouldn't know for sure whether it
17 would work.

18 MR. RENAUD: Objection.

19 A I don't know how the netlist would not match to
20 the RTL, but you know, when we freeze the RTL, it
21 is typical policy to make sure that the frozen set
22 of RTL files work as intended on RTL, and that
23 would be the first test that would be run, so.

24 Q Right. I believe earlier you said that Netlist 3
25 at least was made up of portions of different sets

1 of RTL over time, correct?

2 A Correct. So the -- we are -- the process is that
3 we freeze files block by block into a branch, and
4 every time new sets of code is ported to that
5 branch, regressions are being run, and at least
6 this test is being run.

7 So while it is fair to say that a netlist is
8 a collection of multiple sets of RTL, I have every
9 reason to believe that whatever set was used was
10 regressed against at least this test and
11 potentially many more.

12 Q Do you know that for sure?

13 MR. RENAUD: Objection.

14 A It has been so long ago I can't conclusively say,
15 but this is general policy so I have no reason to
16 believe it not to be.

17 Q Do you know of any documents to show that it was
18 performed?

19 A It could have been in the program reviews that you
20 have documents for. I'm not a hundred percent
21 positive. Most of these regression results
22 unfortunately are usually kept on servers and not
23 in a Perforce depot, so some of the information is
24 probably lost.

25 MR. ELEGOLD: I'm going to ask the court

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1 reporter to please mark Exhibit 9.

2 (Document marked Exhibit 9 for
3 identification.)

4 MR. ELENGOLD: For the record, Exhibit 9 is
5 Bates labeled AMD1044_0175191 through 196.

6 Q Mr. Lefebvre, have you seen Exhibit 9 before?

7 A Yes, I have.

8 Q What is Exhibit 9?

9 A This is a presentation by Peter Pellerite that
10 occurred on August 30, 2002, and I am reading from
11 the presentation to say that, that is called the
12 R400 August Program Review, which also
13 incidentally happened to be an Exhibit for my
14 previous depositions.

15 Q Is this the program review you were just referring
16 to?

17 A This is one of such presentations, yes.

18 Q Do you know if there's others that exist?

19 A Yes, there are others that exist.

20 Q What other program review summaries are you aware
21 of for the R400?

22 A I don't recall the specifics but I know, I mean at
23 least in the preparation there were several other
24 program reviews, and these program reviews are
25 typically held at regular time intervals. This

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1 one is August. I'm expecting there's going to be
2 others earlier, later.

3 Q Do you recall any that you've looked at that -- in
4 preparing for today's deposition, other than the
5 August?

6 A I recall reviewing other presentations, yes, where
7 probably would have been a later one because the
8 actual column on page Bates number AMD1044_0175196
9 had a more complete actual description.

10 Q Is the IKOS emulation start what you were
11 referring to with regard to the FPGA and IKOS
12 machine?

13 MR. RENAUD: Objection.

14 A The IKOS simulation start is, yes, the process by
15 which we are starting prototyping, if you will,
16 the netlist on the IKOS machine.

17 Q And when, to your knowledge, do you know when that
18 occurred, that prototyping or emulation occurred?

19 A Like I said before, there's a very similar program
20 review presentation that has a lot more actual
21 dates, and that would state the record properly.
22 I think, if my memory serves, that it occurred
23 slightly after the plan date, but you know, we can
24 find for sure because that information is readily
25 available.

1 Q But you don't know yourself?

2 MR. RENAUD: Objection.

3 Q You're just saying you have to look at a document
4 to tell you, is that correct?

5 A I said I don't remember. Correct.

6 Q What does "begin early block delivery" mean?

7 A Begin early block delivery?

8 Q It's right under "IKOS emulation start."

9 A Yeah. I believe this has to deal with initial
10 efforts to deliver blocks to physical design, so
11 through the PD team, so they can start as early as
12 possible the floor plan effort, so that when they
13 get the later blocks, they can focus their effort
14 on those.

15 Q Then what is an IKOS emulation with software?

16 A This is exactly the topic that we broached on a
17 little bit earlier where I said the hardware
18 emulator would be running with the software
19 infrastructure. This is what this line refers to.

20 Q The RTL freeze/Final Netlist, what does that step
21 represent?

22 A In the R400, as with many other silicon devices,
23 at some point you have to freeze the design in
24 order to submit the GDS or the netlist to the
25 manufacturing process. So this date is the date

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1 by which we were intending to freeze the design
2 completely for fabrication.

3 Q What is "base layers tapeout"?

4 A Silicon chip contains several layers. The first
5 layer is the silicon layer in which the gates are
6 etched in, and then it follows by several metal
7 layers, which are the wires that connect the gates
8 together.

9 So that base layer tapeout is taping out
10 that baseline, the first layer of where the gates
11 are etched, and then the metal layers are the
12 subsequent layers that you lie on top of that base
13 layer to establish the connections.

14 Q What is the "First Samples for Engineering" step?

15 A This, again, in the R400 concept is when we expect
16 to get the first chips back from the manufacturer.

17 Q How many samples are usually returned for
18 engineering purposes?

19 MR. RENAUD: Objection.

20 A I don't recall the number specifically for the
21 R400, but you know, for product like we would do
22 today, we just do a few wafers, which would be, I
23 don't know, around a thousand chips or so. I
24 mean, that vicinity. We're not talking millions
25 of parts. It's really a small number of parts.

1 Q Then what occurs between the first Samples of
2 Engineering and the A12 Tapeout?

3 A So the samples are going to go to the software
4 team for what the process we call bring-up, which
5 is, you know, starting to run applications on the
6 chip. Sometimes you have issues and, you know,
7 small problems that you have to reconnect the
8 gates differently. This is what we call an ECO or
9 an A12. It's just a -- so A12 means it's -- a
10 metal mask is just released. So you don't change
11 the base layer, just one of the metal layers,
12 which is a much faster turnaround time to fix any
13 possible issues that one might have encountered in
14 one application.

15 Q And then is that same sort of thing done with the
16 A12 samples for engineering, are they then also
17 tested for minor or other problems?

18 A So in this R400 concept, the A12 Samples for
19 Engineering is really -- so we were -- this
20 program was planning for one -- was expecting or
21 planning for one metal layer in the schedule, and
22 so this is just testing again to make sure the
23 chip works before the production is, you know,
24 enlarged to millions and millions of parts, at
25 which point you can't fix anything anymore.

1 Q So far in this program schedule, did the R400
2 program make it before it was ended?

3 MR. RENAUD: Objection.

4 Q I remember the -- my memory recalls that the R400
5 was never really taped out because at some point
6 in time, this transitioned into the Xenos program.
7 So I believe it ended in between IKOS simulation
8 and RTL freeze. It didn't make any more progress
9 than that.

10 Q What is the Xenos program?

11 A The Xenos program is a program that ATI initiated
12 with Microsoft to provide the graphics core for
13 the X box 360 console.

14 Q Do you know if the R400 ever started the tapeout
15 process?

16 MR. RENAUD: Objection.

17 A To the best of on my knowledge, and the documents
18 I've reviewed, I could not see any evidence that
19 it ever did start the tapeout process.

20 Q At what point did you stop working on the R400
21 program?

22 MR. RENAUD: Objection.

23 A That's another question I already answered in my
24 previous depositions, but my memory is fairly
25 vague on this because the transition for my block

1 was very transparent. It's really the same kind
2 of product. So I don't exactly recall when I
3 stopped working on one and started working on the
4 other because they're one, one and the same kind
5 of blur in my memory.

6 Q Is it approximately fall 2002, based on these
7 dates?

8 A These dates are stating, like, the back end
9 blocks, the back end efforts, or the PD efforts
10 which I'm not really involved in. I can't tell
11 from this when the front end designers and
12 architect would have transitioned from one program
13 to the other. I mean --

14 Q So it could have been before August 2002, is that
15 right?

16 A Could have been before August -- so August 2002,
17 that was the first synthesis date, is that the
18 point you're referring to or?

19 Q Well, that's when this is from, right?

20 The program schedule is dated August 2002, I
21 believe --

22 A So --

23 Q -- according to your testimony?

24 A So at the time of this presentation, because
25 people were still, you know, inactive, this is the

1 first synthesis, so it's still undergoing active
2 RTL development. So I have every belief that at
3 that time, I probably would still have been
4 involved in the R400 program itself. Maybe the
5 Xenos program also started, but there would still
6 be work on the R400 at that time.

7 Q Was there overlap between the R400 program and the
8 Xenos program?

9 A To the best of my memory, yes, there was, and so
10 that's why it contributed to making it even more
11 of a blur.

12 Q What kind of overlap?

13 A So at AMD, we use Perforce server and
14 depositories, so the depositories are directories,
15 and you can integrate files from one depot to the
16 other. Typically, a depository has the name of a
17 given project, and so you can start working on the
18 Xenos program and then start back integrating
19 changes as you see fit to the R400 and back and
20 forth. It's like, it kind to working with two
21 different directories.

22 Q Are you talking about changes to specifications,
23 or changes to C code, or changes to RTL, or all of
24 the above?

25 A Any kind of changes can be back integrated, but

1 any binary files -- like unfortunately, our
2 specifications are binary because they're Word
3 documents. These -- you can copy them from one
4 depot to the next, but you cannot integrate them.
5 And by "integrate," I mean when you have code, the
6 Perforce tool itself is intelligent enough to find
7 exactly what change between the two files and
8 merge them into one file, where you can't do that
9 with binary files.

10 Q Does that work for both C code and for RTL code,
11 in Perforce?

12 A Yes, it does. It works with anything that is not
13 binary.

14 Q What is the difference between the R400 program
15 and the Xenos program?

16 A The R400 program was meant to be a PC GPU, meant
17 to operate on Windows; whereas, the Xenos program
18 is, was meant to be a console program. So a
19 specific piece of silicon delivered to a customer
20 with some specific features potentially to be used
21 in a console.

22 Q Why didn't it have an R500 or R600 name?

23 A The Xenos program you mean?

24 Q Yes.

25 A At AMD, we tried to distinguish the semi-custom

1 programs versus the GPUs so that people know what
2 they are working on. Typically, the -- our names,
3 at the time, we reserved for our GPU line of
4 products, our PC products, whereas, whenever you
5 had a -- an SCBU program, or a dedicated piece of
6 silicon for, dedicated for a specific customer, it
7 would have a program name to obfuscate also who
8 the customer might have been.

9 Q Xenos was specifically being designed for
10 Microsoft, is that right?

11 MR. RENAUD: Objection.

12 A The Xenos chip was specifically designed for
13 Microsoft, but the RTL, at least during the
14 overlap, was -- at least a portion of the RTL for
15 the graphics core existed on both the R400 and
16 Xenos program, as was very similar if not the same
17 in some respect.

18 MR. RENAUD: Just so the record is clear,
19 the Xenos subject matter, you're testifying in
20 your personal capacity.

21 MR. ELENGOLD: Okay.

22 So this witness is only testifying on the
23 R400 on behalf of AMD and ATI.

24 MR. RENAUD: No, he's testifying consistent
25 with the subjects, but I don't believe the Xenos

1 is within to the scope of the subject matters. Do
2 you have a different point of view on that?

3 MR. ELEGOLD: I don't know. That's why I'm
4 trying to clarify your objection --

5 (Court reporter interruption of overlapping colloquy)

6 MR. ELEGOLD: -- trying to understand where
7 you're trying to draw the line with your objection
8 so I make sure it's clear for the record.

9 MR. RENAUD: My memory is, the Xenos is
10 outside the scope, but I would be happy to go back
11 and take a second look at it during a break.

12 MR. ELEGOLD: It's up to you.

13 Q For now, we're going to treat this testimony as
14 personal testimony, just for yourself, as far as
15 your recollection regarding Xenos.

16 So I think the last question -- I'm sorry, I
17 think we got a little derailed there, was just
18 regarding whether or not this was specifically
19 designed for Microsoft, and I believe you said the
20 chip was specifically designed for Microsoft, is
21 that correct?

22 A So if I remember correctly my statement, I said
23 that the Xenos chip itself was a product
24 specifically designed for Microsoft, but then a
25 lot of the graphics blocks and infrastructures, at

1 least during the time of the overlap, were the
2 same or very similar between the R400 and the
3 Xenos program.

4 Q Was the Xenos chip a graphics chip?

5 MR. RENAUD: Objection.

6 A The Xenos chip was a dedicated graphics chip. It
7 was not a PC product, but it was able to perform
8 graphics functions.

9 Q It wasn't an APU or an SOC.

10 MR. RENAUD: Objection.

11 A I mean, I believe, I believe at the time it was a
12 graphics processor, stand-alone graphics
13 processor, but it's kind of fuzzy. I only worked
14 on the graphics subsection of it, so I don't even
15 remember if we made it an APU or not.

16 Q What is the period of overlap you're referring to
17 for the R400 and the Xenos chip?

18 A So we should really go back down -- I don't know
19 if it's readily available or not, but in Perforce,
20 we have all the dates. So I remember it being an
21 overlap because I remember when I was searching
22 for, you know, documents, that there were
23 integrations back and forth between R400 and
24 Xenos. I can't really tell you how long that
25 period of overlap took, but I know there was some

1 overlap.

2 Q And at some point, everyone stopped working on the
3 R400 program and either were working on Xenos or
4 other projects at ATI, is that correct?

5 A So at some point, yeah, the R400 program got
6 cancelled, and so everyone who was working on R400
7 at the time transitioned to Xenos and possibly
8 some other program. I mean -- but --

9 Q Did everybody transition to Xenos, is that
10 correct?

11 A Are you asking me --

12 MR. RENAUD: Objection.

13 A -- everyone at AMD transitioned?

14 Q Well, I think you just said, at some point
15 everyone stopped working on the R400 program and
16 were either working on Xenos and possibly other
17 projects at ATI. I just wanted to make sure I
18 understood your testimony for both of us to make
19 sure it's accurate.

20 So was everyone that was working on R400
21 project when it was cancelled, transitioned to the
22 Xenos program?

23 A Yeah, when I meant everyone, I didn't mean
24 everyone at ATI because there were another team
25 working on the R300. That team never worked on

1 the R400 or the Xenos program.

2 But once we transitioned to the Xenos
3 program, and the project got, the R400 project got
4 cancelled, I can't say for sure if everyone that
5 was working on the R400 transitioned to the Xenos
6 program, but my recollection is that at least most
7 of the people transitioned over.

8 Q Was there an R500 program?

9 A Again, to the best of my recollection, the R500
10 program was a derivative from the R300, so the
11 team that was working on the R500 was actually the
12 R300 team.

13 Q What was the next computer chip -- sorry, strike
14 that. What was the next general purpose computer
15 chip program to follow the R400?

16 MR. RENAUD: Objection.

17 A So to the best of my knowledge, that would have
18 been the R600, also known as Pele.

19 Q P E L E?

20 A Like the football person, yes. P E L E, yes.

21 I think it has an accent, but let's not get
22 picky.

23 Q Approximately, when did the R600 program start?

24 A I really don't recall. I mean after the R500 and
25 then the Xenos program, and there could also be,

1 have been overlap because I'm sure some
2 integration occurred.

3 Q That was going to be my next question, is whether
4 the Xenos program overlapped with the R600 to your
5 knowledge.

6 A It may have. You know, again, we can check the
7 Perforce log. I think that would really be the
8 conclusive proof of, if any overlap occurred, and
9 what kind of data bled from one project to the
10 next, but I can't answer these questions from
11 memory. It's just too far back.

12 Q Do you know what blocks reported from the R400
13 program to the Xenos program?

14 A To the best of my knowledge, again speaking from
15 memory here, it was pretty much all the blocks
16 except the render back ends, which are the blocks
17 that take the output of the pixel shader. And the
18 reason for that was that the Xenos program had a
19 dedicated memory on board for the frame buffer
20 which necessitated custom-made render back ends.

21 Q What is the output of the pixel shader that goes
22 into the render back end?

23 MR. RENAUD: Objection.

24 A So in most cases, the output of the pixel shader
25 is the color elements that you want each pixel to

1 have. We now have capabilities to also export the
2 Z values and what not. I don't recall, and again
3 I can look it up in the specification if you give
4 them to me, but there can be more than just a
5 color, but it is at least the color information.

6 Q What's a Z value?

7 A As you render primitives into 3D space, the Z
8 value is the third coordinate, if you will, that
9 will say if a triangle is on top of one another or
10 not. So it's used to compute occlusions between
11 primitives.

12 Q And you said the Xenos chip had a dedicated memory
13 for the frame buffer, is that correct?

14 MR. RENAUD: Objection.

15 A So as best I can recall, again, the Xenos had a
16 big onboard memory to use as the frame buffer, and
17 the RBs were directly connected to that memory,
18 and as such, did not need a cache because they did
19 not need to hide the latency going to actual
20 system memory and what not, could operate directly
21 from that dedicated memory, and that's why they
22 needed to be custom made.

23 Q So it didn't need a cache because the memory was
24 on board, is that right?

25 A The Xenos program did not need a cache because it

1 did not need to amplify or hide the latency
2 because the memory was on board, super low
3 latency, and very high bandwidth, so you could
4 operate right off that memory instead of having to
5 use a cache to amplify the internal traffic versus
6 the external traffic to memory.

7 Q What's the difference between a cache and a
8 memory?

9 MR. RENAUD: Objection.

10 A A cache -- and again, this is my definition of the
11 term -- is a structure that is very often used in
12 GPUs to amplify the bandwidth by storing temporal
13 data that is also in memory, so that if multiple
14 blocks or customer of the chip want to access the
15 same data, it's going to be able to provide that
16 data to all of these customers without having to
17 go to the main memory to retrieve it all the time.

18 Q So it's a way to access the memory? Temporarily
19 store certain things closer for faster access?

20 A Again, it is a way to amplify the memory bandwidth
21 so to satisfy more customer than the bandwidth
22 provided by a memory device would be allowed to
23 provide.

24 So let's say you need, you know, 10
25 gigabytes of bandwidth to provide a task, and your

1 memory is only five gigabytes because of the bus
2 width and so forth, you need a cache to amplify
3 that so that in most cases, the clients that need
4 10 gigabytes of bandwidth can operate inside the
5 chip without having to always use the small narrow
6 bus going to system memory or D rams onboard.

7 Q Are there any other differences between the R400
8 and the Xenos chip that you recall?

9 A Without going into specifics that I can't divulge
10 because of customer relationships, I mean
11 proprietary information from Microsoft, the only
12 other difference that I can remember is that Xenos
13 had a slightly different configuration than the
14 R400 program.

15 Q So we're under a protective order in this case
16 which keeps things confidential, so I believe you
17 can speak freely to the extent that you want to
18 testify to this issue on behalf of AMD or ATI.

19 MR. RENAUD: We may need to take a break on
20 that. Let me just see if I can solve it quickly,
21 counsel.

22 Is this something, Laurent, that you think
23 you need specific permission from Microsoft to
24 disclose that we don't have?

25 A So this subject matter came up in one of my

1 previous testimonies and we had this issue where I
2 would -- I was not able to divulge Microsoft
3 proprietary information, and so we can read the
4 transcript. I mean, I sent most of the
5 information in that. I mean, it's really just a
6 configuration difference between the two chips,
7 and last time I could not tell you what the Xenos
8 configuration was because of these protective, or
9 I don't know how you call them in English. I
10 can't tell you how many pixels the Xenos can
11 process per clock, but I can tell you, it is a
12 different number than on the R400, but my
13 understanding is everything else is the same.

14 Q How much additional work was done on the Xenos
15 chip from when the integration started from the
16 R400 into the Xenos chip becoming commercialized?

17 A How much work?

18 Q Let me rephrase that. How much time did it take
19 to make the Xenos chip into a customer-ready chip?

20 MR. RENAUD: Objection.

21 Q From when the R400 program was ported over.

22 A Is your question pertaining to the Xenos chip as a
23 whole or on the shader section?

24 Q Let's start with the Xenos chip as a whole.

25 A So on the Xenos chip as a whole, like I said, most

1 of the work had to deal with the render back ends
2 which were brand new pieces of hardware. I don't
3 recall exactly how long they took, but that was
4 the bulk of the effort. Everything else kind of
5 followed right through.

6 Q Were any changes required to the other hardware
7 blocks?

8 MR. RENAUD: Objection.

9 A Because the configuration was different, we had to
10 tweak a few parameters, but I don't recall the
11 extent of any of the changes, but you know, I can
12 tell you that the two chips are very similar, and
13 the only main difference that I can remember,
14 again, is the render back ends and then the
15 configuration to change a number of pixels.

16 Q So you're not sure of any other differences that
17 might exist? That's not something you prepared
18 for, for today's deposition?

19 MR. RENAUD: Objection.

20 A I did not prepare, you know, or review the Xenos
21 program extensively. So no, I'm not -- I don't
22 remember any other changes.

23 Q Did you review any Xenos documents in preparing
24 for today's deposition?

25 MR. RENAUD: Objection. Let me make one

1 clarification just because I refreshed my memory.
2 Xenos is outside the scope for any domestic
3 industry stuff, but to the extent it's within the
4 reduction of practice, it would be within the
5 scope, so.

6 MR. ELEGOLD: I don't think it is. Well, I
7 don't know, you said it's not, so I don't want to
8 put words in your mouth.

9 MR. RENAUD: But I just looked at a record
10 here that says the scope objection was to the
11 extent it was related to domestic industry since
12 we're not relying on it, but that to the extent it
13 was related to reduction of practice, it is. So
14 whether that makes sense to you or not, I just
15 wanted to make sure I wasn't leaving you
16 ambiguous.

17 So the questions about the Xenos, to the
18 extent they reflect the reduction of the practice,
19 he will be the designee, but he's not going to be
20 a designee as to domestic industry use.

21 MR. ELEGOLD: Okay. So all of our
22 questions then with respect to Xenos, and then we
23 might have to go back, I apologize, now to revisit
24 those if you are being designated, questions with
25 respect to Xenos to the extent it's relevant to

1 production or not reduction to practice --

2 MR. RENAUD: He will be the designee.

3 MR. ELEGOLD: -- you're saying he is
4 designated, right?

5 MR. RENAUD: And apologies for the
6 ambiguity.

7 Sorry. Do you want to read the question
8 back?

9 MR. ELEGOLD: No, I can ask the question.
10 Thank you.

11 Q Did you review any Xenos documents in preparing
12 for your deposition today?

13 A I recall there was this source code computer that
14 counsel had, and there were some files of Xenos on
15 there. I browsed through them. That's the extent
16 of it.

17 Q Do you know when the Xenos program passed the
18 first triangle test for the first time?

19 A I don't recall that information. I mean we can --
20 if you have Xenos specific documents with you, we
21 can review them, but unfortunately, I don't know.

22 Q Do you know if it passed it?

23 MR. RENAUD: Objection.

24 A So the Xenos was made into a commercial program,
25 and so it's in millions of consoles, or was at

1 least, so yes, I have a very good feeling that it
2 passed it.

3 Q Do you know when the Xenos chip went into IKOS
4 emulation?

5 A No, I do not know.

6 Q Do you know if it did?

7 A No, I don't.

8 Q Do you know when the tapeout was for the IKOS
9 chip?

10 A There is no tapeout.

11 Q Sorry, strike that. I apologize. I said it
12 wrong. Do you know when the tapeout was for the
13 Xenos chip?

14 A Okay. Again, having not reviewed anything, I can
15 talk from memory. I recall it vaguely being
16 around 2004, but this is very vague.

17 Q Do you know when the first products were delivered
18 to customers for the Xenos chip?

19 A No, I don't recall any specific dates, no.

20 Q So turning back to the first triangle test that we
21 were discussing earlier, which you're free to
22 reference either the presentation in Exhibit 9 or
23 your declaration, which I believe is Exhibit 6,
24 how was the first triangle test performed?

25 A On the R400, you mean how this test is being run?

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1 Q I assume it's the same for all of the programs
2 since you said it's sort of part of standard for
3 ATI.

4 A Okay. Yes. So the base process by which we run
5 functional test on hardware at AMD, and at the
6 time on the R400, was that we create, like, a low
7 level API which allows us to write small C
8 programs that describe the test and what it's
9 supposed to do, and by such, energize the hardware
10 in a similar manner of which it would have been
11 stimulated by the driver.

12 I know, you know, again, upon my review to
13 prepare for this deposition, that in the source
14 computer, there is the source code for such a
15 test, which we can walk through so you can get
16 appreciation of exactly what is being driven to
17 the hardware, but effectively, it is a small C
18 program that describes what you want the test to
19 do.

20 Q Is it a static image of the triangle? Is it a
21 single picture?

22 A In this particular case, it is a single picture of
23 a triangle, yes. The test is render, triangle,
24 and terminate. Finish.

25 Q I believe in your declaration, you said it's a

1 Gouraud shaded triangle, is that correct?

2 MR. RENAUD: Objection.

3 A It is a Gouraud shaded triangle, yes.

4 Q I thought maybe counsel was objecting to my
5 pronunciation on that one.

6 What is Gouraud shading?

7 A So a Gouraud shaded triangle is a triangle that
8 has three different colors for each of the
9 vertices of the triangle. So in this case, if you
10 had a color picture for this triangle, one of the
11 vertex, which is one of the extremities of the
12 triangle, would be blue, the other one would be
13 red, and the third one would be green, and then
14 the inside of the triangle varies slowly from one
15 color to the next, and it is to ensure that the
16 interpolation structure that determines the color
17 for each of the pixels within the triangle is
18 working effectively.

19 Q Is it just one set of vertices that are used for
20 the test?

21 A For this test because it was one triangle, it is,
22 yes. It's three vertices and one primitive, which
23 we call the triangle.

24 Q And how many pixels are used?

25 A If your picture was better, we could count them,

1 but the pixels in this case are the big squares
2 that you see here. It's not a very big triangle.

3 Q The picture is a little better here. This is how
4 it gets produced to us, so I apologize.

5 A It is hard to see, especially at the top, but you
6 can see these big squares are the pixels, so I
7 mean, there are one, two, three, four, five, six,
8 seven, eight, nine, 10, 11; 11 by 11 divided by
9 two.

10 Q So to draw the triangle in the triangle test, you
11 would make sure all the vertices shaded correctly,
12 and then you would rasterize the pixels and make
13 sure the pixels are shaded correctly, is that
14 correct?

15 MR. RENAUD: Objection.

16 A So the way the API works is that the test sends
17 the three vertices and the connectivity
18 information, say, by this vertex connected to this
19 one and to this one to form the triangle. The
20 hardware does the rest.

21 So the hardware makes sure that the vertices
22 are first passed through the shader, operates the
23 right positions, as well as the attributes, which
24 are the color in this case, and then subsequently
25 runs the pixel shader on those attributes.

1 Q Okay. We'll come back to that. I wanted to turn
2 to talking about the R400 specification that
3 you've been mentioning. I don't know, would you
4 like to take a short break now before we
5 transition topics?

6 MR. RENAUD: My thought is maybe we go
7 another 15 or 20, if that's comfortable for you.
8 I think it ensures that we'll keep tracking toward
9 getting a full seven hours.

10 A I'm fine. We can do another 15, 20. I'll let you
11 know if it changes.

12 Q Okay. Thank you. Give us as much warning as we
13 can and we'll wrap it up.

14 So earlier you mentioned, a couple times I
15 believe, sequencer specification, is that correct?

16 A I believe I did, yes.

17 MR. ELENGOLD: I'd ask the court reporter
18 mark Exhibit 10.

19 (Document marked Exhibit 10 for
20 identification.)

21 Q Mr. Lefebvre, have you seen Exhibit 10 before?

22 A Yes, I have seen it. This appears to be the R400
23 Specification Version 0.4.

24 Q Is this the R400 Sequencer Specification you were
25 referring to earlier?

1 A In fact, I was hoping to get Version 2.0, which
2 had the control flow structures, to answer any of
3 your questions about the control flow, but this is
4 one version of the sequencer, yes.

5 Q I think I have that one too and I'll bring that
6 out next, but I wanted to ask you a couple
7 questions about this first.

8 So do you remember approximately the date of
9 when this document was completed in the current
10 form that it is in Exhibit 10?

11 MR. RENAUD: Objection.

12 A So the date, I have no reason to believe that it
13 would be wrong. This document, by myself, if you
14 look at the revision changes on page 3 of 20, or
15 Bates number AMD1044_0175218, it's dated by
16 myself, or what appears to be me, on August 24,
17 2001.

18 Q Do you recall making that entry in this document?

19 A I don't recall directly having made that entry,
20 but I have no reason to believe that it's
21 incorrect. I mean --

22 Q Do you know why the Edit Date on the document says
23 September 4, 2015?

24 A I don't know why, but I can tell you that these
25 fields up there are usually automatic fields, and

1 so this Edit Date is going to be changed whenever
2 anyone opens the document to read it or what not.

3 So I suspect somebody read this document and
4 either formatted it to include, you know, revision
5 change control which wasn't there before or not.
6 I can only assume that's what it is.

7 Q Is that the same for the date in the bottom
8 right-hand corner on the front of Exhibit 10, that
9 that auto updates, to your knowledge?

10 A Yeah, it looks like that could also have been
11 automatically generated.

12 Q Because it says September 4, 2015.

13 A Yeah, it matches, but yeah, so.

14 Q But you're not sure, with regard to this general
15 structure of the document, whether or not the edit
16 date, and the bottom right corner date, auto
17 update or not?

18 MR. RENAUD: Objection.

19 A It looks like a new entry because it's not
20 stricken like the other text, but conclusively to
21 say to you, whether or not this actually was typed
22 in or was auto generated -- we could -- if I had
23 the electronic version of it, we could check in
24 the electronic version if this is an automated
25 field or not. From a paper, I can't tell you

1 conclusively.

2 Q You don't know how those dates got there, is that
3 right?

4 MR. RENAUD: Objection.

5 A Well, I told you that I know that these dates here
6 on page 3 of 20 are typed in. So these are typed
7 in by the author, which just happens to be me. So
8 I'm confident in these. How these on the first
9 page got changed or not, yeah, I don't remember
10 exactly what form we used at the time.

11 Q Did you create Exhibit 10?

12 MR. RENAUD: Objection.

13 A By "create," you mean did I write this
14 specification?

15 Q Did you write Exhibit 10?

16 A I am the author, at least according to this
17 document, of this specification, and this is also
18 my recollection, yes.

19 Q Did anyone make edits to Exhibit 10 other than
20 you, to your knowledge, other than the date field
21 we're talking about?

22 MR. RENAUD: Objection.

23 A According to this log, which is on, again, page 3
24 of this Exhibit, I'm the sole contributor to this
25 specification.

1 Q Did ATI have a policy regarding logging in the
2 Revision Change section of specifications at the
3 time that you edited Exhibit 10?

4 MR. RENAUD: Objection.

5 A I think AMD has a relatively loose policy on that.
6 It's the responsibility of the author to make the
7 entries. However, I will say that once the
8 document is in Perforce, the Perforce server
9 itself records the dates and the name of each and
10 every person that interacts, writes any document,
11 and so if you have the Perforce change list
12 revisions for this file, it would be much more
13 tangible and accurate than anything that would be
14 present here.

15 Q Does the Perforce log file identify each change
16 that was made within the document?

17 MR. RENAUD: Objection.

18 A In the case of a binary file, it does not because
19 it's just -- it cannot, you know, do the merge and
20 the comparison. But it's going to maintain all of
21 the versions of every single file that was
22 submitted to the depot, so having all the changes,
23 you can manually do the comparisons, and for all
24 of the source check-ins, C plus plus, or RTL, the
25 Perforce does make the record.

1 Q So the management of the dates and the revision
2 changes is left to the authors and may not be a
3 hundred percent accurate, but the Perforce logs
4 you believe are always maintained to be accurate,
5 is that correct?

6 MR. RENAUD: Objection.

7 A That is my understanding, yes.

8 Q Do you know approximately the date of Exhibit 10?

9 A Well, like stated before, this is dated on the
10 page 3 by myself as of August 24, 2001. No reason
11 to believe it not to be accurate.

12 Q Is that because you, every time you made a change
13 to a document, put a note in the Revision Change
14 log?

15 MR. RENAUD: Objection.

16 A It is because I personally, whenever I change a
17 revision number on the first page, try to put a
18 revision change list in the Revision Changes. So
19 I know I have not been a hundred percent accurate,
20 and I could have made changes to this document
21 without changing the rev number, but if I change
22 the rev number, again, it's my recollection and my
23 work practice, I would make an entry in the
24 Revision Change.

25 Q So this could have some changes that occurred

1 after August 24, 2001 in this document, but any of
2 those changes would have occurred prior to you
3 creating Version .5, is that correct?

4 MR. RENAUD: Objection.

5 A That is a possibility, yes, and if we go to the
6 Perforce log, we can say conclusively whether it
7 is the case here or not.

8 Q Why did you create this document that's Exhibit
9 10?

10 A This document is the architecture document that is
11 meant to describe the way the sequencer is
12 supposed to operate in the R400 unified pixel and
13 vertex shader.

14 Q Whose idea was it to put a sequencer in the R400
15 shader?

16 A Everyone, at least of the architecture team, knew
17 that a sequencer was needed because you need,
18 maybe not the name sequencer, but you need a
19 module that controls the operation of the shader,
20 and so, you know, I can't tell you -- I don't know
21 that anyone had an idea to put a sequencer in the
22 R400. The idea is how to make it work in that
23 context.

24 Q Was the R400 the first ATI program to use a
25 sequencer in a shader?

1 MR. RENAUD: Objection.

2 A To my knowledge, the R300 had a pixel shader
3 sequencer, meaning the sequencer was only
4 operative on the pixel shader side of things, and
5 this is, to my knowledge, the first time ATI
6 created a sequencer that able to operate on either
7 or both pixels or vertices.

8 Q Do you know when the R300 sequencer was created?

9 MR. RENAUD: Objection.

10 A So your question is when it was created?

11 Q Do you know when?

12 A No, I don't know the date, I mean, and I recalled
13 it being named into the overview, and so I just
14 went to read back through it to see if there was
15 any date, but there's no date. It just states
16 that the sequencer is based on the R300 design,
17 where we used it as a baseline and then modified
18 it in order to operate in a unified vertex and
19 pixel shader environment.

20 Q Is that a true statement, that the R400 sequencer
21 is based on the R300 sequencer?

22 MR. RENAUD: Objection.

23 A This is what page 4 of 20 of this specification is
24 stating. I mean, it is to the best of my
25 knowledge, we use some concepts of the R300. We

1 use the clause concepts. But the R400 sequencer
2 is still significantly different than the R300
3 sequencer. It has to deal with the two types of
4 elements, which the R300 did not have to deal
5 with, and I also know we upgraded it to have more
6 clauses or more flexibility.

7 Q What are clauses?

8 A If you refer to the figure which is not named on
9 page 5, or Bates number AMD1044_0175220, you have
10 a Top Level Diagram of the Version 0.4 sequencer.
11 The clauses are effectively the trips between the
12 various reservation stations. So the more clause
13 you have, the more opportunities you have to do
14 what we call dependent fetches, which is go to
15 memory, fetch an element, do some ALU map on them,
16 and then do another fetch based on that, so forth.

17 Q Can each clause support one instruction?

18 MR. RENAUD: Objection.

19 A Each clause supports a number of instructions, but
20 they have to be all of the same type; so either
21 all textures or all ALU. Whenever you had to
22 transition from an ALU to a texture or fetch
23 operation, you had to go to a new clause.

24 Q What is the purpose of supporting ALU clauses and
25 eight texture clauses?

1 A Like I just stated, it's to support what we call
2 dependent fetches. So let's say in the first
3 texture clause, you go to memory, you fetch a
4 number, and you want to operate on that number on
5 the ALU clause, and then use that number as an
6 address to the next memory fetch you want to do.
7 Having eight levels of clauses allows you to have
8 eight levels of indirections. That gives you the
9 opportunity to read memory, operate on it, and go
10 back to memory and back and forth.

11 Q Why do you need eight levels, or I'm sorry, strike
12 that.

13 What is a level of indirection?

14 MR. RENAUD: Objection.

15 A So a level of indirection, at least in the R400
16 concept, is a dependent fetch; like I said, a
17 fetch to memory, an operation on the ALU, and then
18 another fetch that is dependent on the result from
19 the first fetch. That is one level of
20 indirection.

21 So eight fetches gives you seven levels of
22 indirections effectively.

23 Q So looking at the diagram you were just referring
24 to on Bates 175220, what is the first block, the
25 vertex/pixel vector arbitrator used for?

1 A So this block is meant to represent -- and by the
2 way, in these specs, I would say that whenever you
3 see arbitrator, you can treat it as arbiter. It's
4 a remnant of my being French. And so this is the
5 block that the sequencer is operating on to decide
6 what is the next piece of data elements allowed
7 into the shader; is it going to pick a group of
8 vertices or a group of pixels?

9 Q And whose idea was it for -- sorry, strike that.
10 Who came up with the idea to design the design of
11 the pixel/vertex arbitrator that was used in the
12 sequencer?

13 MR. RENAUD: Objection.

14 A Best as I can remember, that part was something we
15 needed and, you know, the details I came up with
16 effectively.

17 Q What did you come up with?

18 A On this version of the 0.4, I came up with this
19 idea of having an input block that would decide
20 between the two, and it went into various
21 gyrations of the rules that we could put in that
22 block, and in order to give you details about
23 that, you know, I would need to go and check the
24 code because I don't remember exactly what kind of
25 code we had in place at the time of this

1 specification.

2 Q With regard to your coming about, just sort of the
3 control structure here, on Bates number 175227,
4 there is a section heading: 1.3 Control Graph.

5 Do you see that?

6 A Yes, I see that picture.

7 Q What does that picture show?

8 A This picture, best I can tell, and again, this is
9 a long time ago, it's the exploded view of all the
10 various communication buses between the sequencer
11 and the other units of the unified shader.

12 Q What does IS stand for?

13 A IS stands for instruction store. This is where
14 the instructions that the shader -- the sequencer,
15 sorry, is to execute for either pixels or
16 vertices.

17 Q That's where they're stored, in the instruction
18 store?

19 MR. RENAUD: Objection.

20 A That is where they are stored in the R400 program.

21 Q A what does SEQ stand for?

22 A SEQ is the acronym for the sequencer.

23 Q What is CST?

24 A CST in the R400 project stands for the constant,
25 or the constant buffer. That's where the values

1 that are the same across a whole vector of pixels
2 or vertices are stored.

3 Q What kind of values are stored in the constant
4 store -- sorry, strike that. What kind of values
5 would be the same across a series of vectors or
6 pixels that would be stored in the constant store?

7 A So I'm going to give you one use-cases for this.
8 It's by, not a long shot, the only use-case, but
9 one of the use-case for this is so that software
10 or the driver can use the same shader and apply it
11 to two different conditions.

12 So you can use a constant to direct your
13 control flow and skip over whole segments of code
14 by just having one bit change in the constant, so
15 that allows you to use the same shader and have
16 completely different behaviors without having to
17 resend over a whole new program to the GPU.

18 Q So it gains additional efficiencies during the
19 execution?

20 MR. RENAUD: Objection.

21 Q Is that right?

22 A It's a gain of CPU power because you don't have to
23 recompile all the time. It's a control that the
24 driver likes to have so that it can be more
25 nimble. It doesn't have to be. You can have a

1 sequencer without a constant store if you want it,
2 but it's a nice tool in your tool box.

3 Q Could you have a sequencer without an instruction
4 store?

5 MR. RENAUD: Objection.

6 A You can have a sequencer without an instruction
7 store, yes.

8 Q How would that work?

9 MR. RENAUD: Objection.

10 A The way I would envision this to work is to have a
11 sequencer coupled to system memory and it fetching
12 the instructions as needed.

13 Q So it would be slow but it would work?

14 MR. RENAUD: Objection.

15 A It can be as fast as you want it to be because if
16 you imagine instead, you have an instruction
17 cache, then you can make it very fast and very
18 flexible. It's a more complex design than having
19 a buffer, an instruction store.

20 Q You could do a cache instead of a store, would be
21 one way to do it?

22 MR. RENAUD: Objection.

23 A So like I said before, you can do a cache, you can
24 do nothing at all and couple it to memory, you can
25 do a store. There are many ways one can do it.

1 Q Could you have a sequencer without the
2 vertex/pixel vector arbitrator block?

3 MR. RENAUD: Objection.

4 A Can you be more precise in your question because
5 sequencer generically is very generic, so what is
6 the scope of your question?

7 Q Sure, as far as I understand your R400 sequencer,
8 the components included vertex/pixel vector
9 arbitrator, and instruction store, and a constant
10 store based on our discussion so far of this
11 specification. Is that right?

12 A So the R400 sequencer included all of these
13 modules, yes. You don't have to have all of these
14 modules to have a unified shader. It's just an
15 implementation of, and it just happened to have
16 these blocks.

17 Q Are any of these necessary to have a unified
18 shader?

19 MR. RENAUD: Objection.

20 A One could envision having a unified shader with,
21 you know, for example, an instruction store
22 dedicated to vertices, and instruction store
23 dedicated to pixels, and then just shared
24 resources on the GPRs which are the SPs. You can
25 do any level of unification that you want. This

1 is just one example, one implementation.

2 Q You mean the sequencer is just one implementation,
3 or this implementation of the sequencer is one
4 implementation?

5 MR. RENAUD: Objection.

6 A The implementation here of the sequencer is the
7 sequencer we used in the R400, and the R400 itself
8 as a program is an implementation of what we call
9 a unified shader.

10 Q What I'm trying to understand is what parts are
11 necessary for, you know -- so strike that.

12 You understand that AMD and ATI are
13 contending that there is an invention of a
14 specific kind of unified shader that's embodied in
15 your patent, is that correct?

16 MR. RENAUD: Objection.

17 A So I understand that there is contention, and
18 again, I'm not a lawyer, so there is contention
19 about the specifics of the unified shader. All I
20 can tell you is from a technical point of view, I
21 can tell you what can and cannot be a unified
22 shader, and so all I've said so far, I believe, is
23 that this particular R400 sequencer, and the R400
24 as a whole, is an implementation of the unified
25 shader. It does not preclude other kinds of

1 designs.

2 Q And to that point, what I'm trying to understand
3 is what is required in order to build a unified
4 shader of what you claim you invented?

5 MR. RENAUD: Objection.

6 A Unified shader means unification of some degree,
7 and so I think at a minimum, to have a unified
8 shader, you would need to have unification of the
9 most expensive part of the shader, which is the
10 GPRs and the ALUs. The rest is not, not
11 necessary. You can build it with or without it,
12 but you would lose most of the benefits of the
13 unified shader if you did not have a unified ALU
14 coupled with GPRs.

15 Q What are GPRs?

16 A The GPRs are the general purpose registers. These
17 are the small embedded memories that serve as
18 source and destinations for ALU operations or
19 fetches. They're the stored -- the data, the
20 intermediate data as you run your shader.

21 Q Why are they called general purpose registers?

22 A Because they can store any data you want. They're
23 generic memories that you can use as source or
24 destination and they store any information you
25 want to store.

1 Q So unification of GPRs and ALUs, you believe, is
2 all that's required in order to have the unified
3 shader that you believe was invented and as part
4 of the R400 project, is that right?

5 MR. RENAUD: Objection.

6 A I believe that in order to get benefits great
7 enough to go to the burden of unifying everything
8 and, you know, have the area and savings, that is,
9 you know, the one piece you need to have.
10 Obviously, the more you add on top of that, the
11 more you can maximize your savings, but you know,
12 they're not strictly necessary.

13 MR. RENAUD: Good time for a break, counsel?

14 MR. ELEGOLD: Sure, let's take a break. Go
15 off the record.

16 VIDEO OPERATOR: The time is 2:31 p.m. This
17 is the end of tape 3. We are off the record.

18 (Off the record.)

19 VIDEO OPERATOR: The time is 12:51 p.m.
20 This is the beginning of tape four. We are back
21 on the record.

22 Q Mr. Lefebvre, before the break we were talking
23 about Exhibit 10. Do you recall that?

24 A Yes.

25 Q And I'd like to turn to page 175232 which at the

1 top says: 13. Examples of program executions.

2 What is this section of the document used for?

3 A This section of the spec, as best I can tell, in
4 the R400 is meant to provide an example of an
5 execution of a vertex shader program so that the
6 designer can refer to it and understand with an
7 example the kind of steps expected to be run when
8 we are running an exemplary program on vertices.

9 Q Okay. In step 2 -- you see step 2? What does
10 that say?

11 A Step 2 reads as follows, "SEQ arbitrates between
12 the Pixel FIFO and the Vertex FIFO - basically the
13 Vertex FIFO always has a priority. At this point,
14 the vector is removed from the Vertex FIFO; the
15 arbiter is not going to select a vector to be
16 transformed if the parameter cache is full unless
17 the pipe has nothing else to do (i.e. no pixels
18 are in the pixel fifo)."

19 Q And is that the operation of the pixel/vertex
20 arbiter block we were talking about earlier?

21 MR. RENAUD: Objection.

22 Q That's on page 220.

23 A You mean the R400 vertex/pixel arbiter --
24 arbitrator?

25 Q We can use the terms interchangeably, that's fine.

1 So yes. Yes, that's exactly. Is that the
2 operation of that block?

3 MR. RENAUD: Objection.

4 A So in this R400 example, it would appear to be
5 that the policy was to pick vertices; if there
6 were space enough for vertices, else, picks
7 pixels.

8 Q When you say "example," is that because the actual
9 functioning of the arbiter hadn't been determined
10 at the time of August 21, 2001 when you -- sorry,
11 August 24, 2001 when you last think you edited
12 this document?

13 MR. RENAUD: Objection.

14 A So this document states, and again, I quote,
15 "Basically, the Vertex FIFO always has priority."
16 That seems to infer that the arbitration rule or
17 threshold was decided at that date, and it was
18 decided that the vertices would have priority over
19 pixels.

20 Q Do you recall when that rule was decided?

21 MR. RENAUD: Objection.

22 A I don't recall the specific dates, but from the
23 date of the specification, that would have been,
24 you know, making sure I'm stating the correct
25 date, before or on August 24, 2001.

1 Q And is that how the arbitration occurred in the
2 R400 as it progressed through revisions leading to
3 the RTL?

4 MR. RENAUD: Objection.

5 A I don't recall the specifics of the arbitration
6 rule in the R400 program. Like I said, there are
7 multiple, multiple revisions of the SQ source
8 code, and the input arbiter is one of the such
9 source codes. So this likely was the initial
10 rule. Whether or not it stuck to be the one rule
11 after, you know, at the end of the program, I
12 don't recall.

13 Q Do you know what the rule was in the RTL?

14 MR. RENAUD: Objection.

15 A I don't recall what it was, or whether or not
16 there was RTL at the time of the specification or
17 not, but again, this is something we can easily go
18 look at if you're interested into that. It is in
19 the source code, and all the revisions are tied so
20 we can see any change that occurred.

21 Q Who was in charge of determining what arbitration
22 scheme to use for the sequencer?

23 MR. RENAUD: Objection.

24 A I believe as the architect, I would be the one
25 providing the initial assessment as to what I

1 thought the policy ought to be, and it could have
2 been a concerted effort between all the
3 architects, but you know, at some point, if you
4 run a test and you realize it doesn't work as
5 intended or anything, we could have changed it
6 based on the results of that test too.

7 Q Do you know if there is any reason why you chose
8 at this time to have vertex get priority?

9 MR. RENAUD: Objection.

10 A So I can't speak about what I may or may have not
11 thought of at the time. I can give you an answer
12 based on my current knowledge of graphics, if
13 that's satisfactory in reading that document.

14 Q Okay. So you're not sure at the time why this was
15 vertex. Based on your current knowledge, why
16 would one prefer vertex as being the priority for
17 arbitration?

18 MR. RENAUD: Objection.

19 A So what you want to do most of the time, unless
20 you have the design that is very different, and
21 that I don't know the intrinsics is, you don't
22 want to have a bubble of latency between your
23 vertex and pixel stages because that would infer
24 slower performance because you have to wait.

25 So basically, in the R400, we wanted to

1 always make sure that the parameter cache, which
2 is the storage for the attributes of the vertex
3 shader, was always full or as full as possible,
4 enabling the pixel flow to be as continuous as
5 possible, and in that sense, have as good
6 performance as possible.

7 Q Because vertices always have to get processed
8 before pixels?

9 MR. RENAUD: Objection.

10 A In the R400 program, yes, that was the case. The
11 vertices, since they are the input to the pixel
12 flow, they had to be processed before the pixels.

13 Q When you say "in the R400 program," is that not
14 the case for graphics processing in general, that
15 you do your vertices before you do your pixels?

16 MR. RENAUD: Objection.

17 Q Sorry, strike that. Is it not the case in
18 graphics processing in general that you shade your
19 vertices before you shade your pixels?

20 MR. RENAUD: Objection.

21 A It is my understanding that in all the AMD
22 products, that is the way we are doing it, and in
23 some other products that I'm aware of in the
24 literature, that is also the case, but I can't
25 talk to everything that I may or may not know. I

1 mean, that is, in my opinion, a generic way of
2 doing things, but if someone finds a way to do it
3 otherwise.

4 Q Do you know of a way to do it otherwise?

5 MR. RENAUD: Objection.

6 A No. I basically cannot think of another way of
7 doing it. That's the way I would have done it,
8 vertices first.

9 MR. ELEGOLD: Going to ask the court
10 reporter to please mark Exhibit 11.

11 (Document marked Exhibit 11 for
12 identification.)

13 Q Mr. Lefebvre, have you seen Exhibit 11 before?

14 A I don't think I've seen this Exhibit, no.

15 Q Do you know what Exhibit 11 is?

16 MR. RENAUD: Objection.

17 A It reads, and I quote: The Complainants Notice of
18 Patent Priority Dates, In the Matter of Certain
19 Graphics Systems, Component Thereof, and Consumer
20 Products Containing the Same.

21 Q I'm going to ask you to turn to page 2 and look at
22 Section C. Can you read the title of Section c of
23 this document?

24 A U.S. Patent No. 8,760,454.

25 Q Mr. Lefebvre, are you familiar with that patent

1 number?

2 A I have seen this patent number in the past. I
3 believe this is one of the unified shader patents.

4 Q Do you understand you've been designated to
5 testify today about the conception and reduction
6 to practice regarding the patent 8,760,454?

7 MR. RENAUD: Objection.

8 A Yes.

9 Q If I call that the '454 patent moving forward,
10 will you understand what I'm referring to? Is
11 that okay?

12 A Yes. It would be even better if you had it so
13 that, you know, we would know what exactly you're
14 talking about.

15 Q I do have it. Do you not know what I'm talking
16 about right now?

17 MR. RENAUD: Objection.

18 A I know it's one of the unified shader patent, but
19 exactly what -- which one it was, I mean, I can't
20 remember these patents by numbers only.

21 Q Okay. Sure. Can you look at Section D, please.
22 Can you read section D.

23 A The title?

24 Q Yes.

25 A U.S. Patent No. 9,582,846.

1 Q Do you know what that patent number is?

2 MR. RENAUD: Objection.

3 A '846. Yeah. I think that's another one of these
4 unified shader patents.

5 Q Do you know if you've been designated to testify
6 today on complainants' behalf for conception and
7 reduction to practice regarding that 9,582,846
8 patent?

9 A So the assignment for the -- sorry, the first
10 notice of deposition says that I am assigned to
11 testify on the reduction to practice to any
12 alleged acts of diligence in reduction of practice
13 of each of the asserted claims and asserted
14 patents. However, not being a lawyer, I don't
15 exactly remember which patents were asserted and
16 which were not.

17 Q Okay, I'll ask the court reporter to please mark
18 Exhibit 12.

19 ('454 Patent marked Exhibit 12 for
20 identification.)

21 Q Mr. Lefebvre, have you seen Exhibit 12 before?

22 While you're looking, I'll note for the
23 record, it is AMD1044_0000165 through 176.

24 And I'm sorry, Mr. Lefebvre, have you seen
25 Exhibit 12 before?

1 A Yes, I have.

2 Q What is Exhibit 12?

3 A This is the Graphics Processing Architecture
4 Employing a Unified Shader patent, and I quote:
5 Patent No. 8,760,454 B2.

6 Q And that's the patent we were just discussing with
7 regard to Section C of Exhibit 11, is that
8 correct?

9 A Well, the text says on Exhibit C that it's
10 8,760,454. This one is 454 B2, so without being a
11 lawyer, I don't know if there's any difference
12 between the two, but there seems to be at least
13 two letters of mismatch.

14 Q Okay. Well, let's presume for the moment that the
15 B2 is not important, and this is the patent I'll
16 represent to you that was produced, as you see at
17 the bottom, by AMD, as being a certified true copy
18 of the patent, according to the front.

19 So with that clarification, do you
20 understand this to be your patent that is listed
21 in Section C of Exhibit 11?

22 A Yes. This is a patent for which I am one of the
23 named inventors.

24 Q And do you understand that you're here today to
25 testify on complainants' behalf about Exhibit 12,

1 this patent?

2 A Yes, my understanding is that I've been designated
3 to testify about the facts pertaining to this
4 patent.

5 Q Going forward, are you comfortable now if we refer
6 to this as the '454 patent?

7 A Yes, I am comfortable.

8 MR. ELENGOLD: I will ask the court reporter
9 to please mark Exhibit 13.

10 (Document marked Exhibit 13 for
11 identification.)

12 MR. ELENGOLD: For the record, Exhibit 13 is
13 AMD1044_0000177 through 195.

14 Q Mr. Lefebvre, have you seen Exhibit 13 before?

15 A Yes.

16 Q What is Exhibit 13?

17 A Exhibit 13 is or appears to be U.S. Patent
18 9,582,846 B2, title: Graphics Processing
19 Architecture Employing a Unified Shader, for which
20 I am a named inventor.

21 Oh, wait a minute. There is a typo in my
22 town name, but.

23 Q So other than that, which I don't know how that
24 got there, but does this otherwise appear to be
25 correct with regards to the patent that we were

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1 discussing earlier that's identified in Section D
2 of Exhibit 11?

3 A Section B?

4 Q D.

5 A D. Yes. With the same caveat as before, that it
6 has a B2 at the end, which this Section D does
7 not.

8 Q If we refer to this as the '846 patent going
9 forward, is that okay with you?

10 A That is okay with me, yes.

11 Q Okay. So turning back now to Exhibit 11, if you
12 look at Section C, can you read the first full
13 sentence on page 3 in that, beginning with, "The
14 Asserted claims."

15 A "The asserted claims of the '454 Patent were
16 conceived at least as early as August 24, 2001."

17 Q Mr. Lefebvre, do you understand that to be AMD and
18 ATI's contention in this case?

19 MR. RENAUD: Objection.

20 A I am not a lawyer, so I don't even -- I can't
21 interpret contention for you. I can read the
22 English, and it says, "asserted claims of the '454
23 Patent," which appears to be this one, and "were
24 conceived at least as early as August 24, 2001."

25 Q Do you agree with that statement?

1 MR. RENAUD: Objection.

2 A Agreeing with that statement in the sense of the
3 law would mean interpreting the word "conceived,"
4 which I'm not an attorney. I'm an engineer. I
5 can talk to the facts, and talk to the R400 and
6 what it did at that date or did not do.

7 Q What did the R400 do as of that date?

8 MR. RENAUD: Objection.

9 A So in order to answer that conclusively, I guess I
10 need to refer to some documentation because my
11 memory is not clear enough to exactly pinpoint the
12 single date in time. So let me see if this
13 information is present.

14 There is a lot of paper here.

15 MR. RENAUD: And for purposes of scope, I
16 believe that the parties agreed that contention
17 based deposition topics under Rule 30(b)(6) were
18 withdrawn, so to the extent that this question is
19 intended to go beyond the scope, it would be my
20 understanding it's outside the scope, but he can
21 obviously proceed in his personal capacity.

22 MR. ELEGOLD: Okay. So you believe the
23 question, "What did the R400 do as of that date,"
24 is outside of the scope?

25 MR. RENAUD: I believe that your entry

1 point, which was about the contentions of this
2 document, are outside the scope on a question by
3 question --

4 MR. ELENGOLD: So you're objecting to the
5 prior questions.

6 MR. RENAUD: That's right. On a question by
7 question basis, I think facts related to any
8 contentions are fair game, although he may know
9 one way or another whether they support or don't
10 support contentions.

11 MR. ELENGOLD: Are you objecting to the
12 question, "What did the R400 do as of August 24,
13 2001"?

14 MR. RENAUD: To the extent you're relating
15 it to the contentions, I am. To the extent it's
16 standing alone, I'm not.

17 A Okay. So the August 24, 2001 is a date that is
18 after the date of this specification here, Exhibit
19 10, that says -- well, actually, it's the date of
20 that specification. So if by "conception," you
21 mean writing the specification of the sequencer
22 that describes how the R400 unified shader works,
23 then yes, I agree with this statement.

24 Q So I think my question was, just so we're clear
25 for the record, because I'm not sure you answered

1 my question at all, my question said, "What did
2 the R400 do as of August 24, 2001."

3 MR. RENAUD: Objection.

4 A Okay. I don't recall what the actual R400 did at
5 that time. The one thing that I can point to is
6 the fact that the specification, which I wrote,
7 was available on that date and described the
8 functioning of the sequencer or -- of the R400.

9 Q Do you know if that specification by itself
10 supports conception of the claims of the '454
11 patent on August 24, 2001?

12 MR. RENAUD: Objection.

13 A I am not a patent attorney, again. I don't have
14 any law background. I can attest to the facts,
15 and the facts are that the specification existed
16 at that date according to the entries in the file.

17 Q Are you aware of any facts other than that
18 document to support conception of your unified
19 shader invention on August 24, 2001?

20 MR. RENAUD: Objection.

21 A I am aware of at least that other specification,
22 which is Exhibit 3, that you gave me, that is the
23 proposal for the R400 architecture that is also
24 dated well ahead of the August 24, 2001 date. So
25 that would be another proof or fact behind the

1 fact that this chip or this idea was conceived on
2 or before that date.

3 Q Anything else?

4 A Sure. We can go to the Perforce server again and
5 do a search of the files that existed then. I
6 must have written some portion of the C simulator
7 which described the R400 functions. That would be
8 another thing we can look at.

9 Q Do you know if that exists? Have you reviewed
10 that code to see if it exists?

11 A I know that I reviewed the Perforce submission as
12 part of doing this Declaration, which has a
13 calendar, and so if we look at this calendar and
14 pinpoint August 24, unless it goes all the way
15 down -- yes, I think it does.

16 So by August 24, 2001, the only entry in
17 this calendar on page 33 is the sequencer
18 specification, and from that point on, there is a
19 list of code and changes that occurred that showed
20 that we worked on the R400 project from that point
21 on.

22 MR. RENAUD: Just so the record is clear,
23 all of the documents that he's referring to
24 regarding Perforce have been either produced or
25 made available to respondents.

1 MR. ELEGOLD: When you say "made
2 available," I'm not sure what you're referring to.

3 MR. RENAUD: The source code is on a source
4 code computer.

5 MR. ELEGOLD: Yeah, and the documents have
6 been produced?

7 MR. RENAUD: Yes.

8 Q So I believe you discussed this August 24th date
9 in your Declaration as well. Do you recall that?

10 MR. RENAUD: Objection.

11 Q I'll direct you to page 8.

12 MR. RENAUD: Can you just state the Exhibit
13 number because there are multiple declarations in
14 the case?

15 MR. ELEGOLD: I think there is only one
16 that we're using today, but it is Exhibit 6.

17 MR. RENAUD: Thank you.

18 A Yes. So in this Declaration -- sorry, making sure
19 I get the words right. I did describe that the
20 Version 0.4 of the R400 Sequencer Specification
21 was dated on August 24, 2001.

22 And furthermore, to qualify our previous
23 discussions, it says here that this date was
24 corroborated by the Perforce log. So I think it
25 is a true and accurate date because you had some

1 contention to the day before, you said it could be
2 this or after. This can conclusively prove that
3 it is actually this date and not another one.

4 Q The documents that are cited in your Declaration
5 prove that?

6 A The fact that the log entry meant that, when I did
7 this Declaration, and I do remember reviewing the
8 calendar events against the Perforce logs, so I'm
9 confident that this is a true and accurate date,
10 and it came from the Perforce log and not only the
11 written version on page 3 of Exhibit 10.

12 Q And the purpose of your Declaration was to
13 similarly establish a conception date and to a
14 reduction of practice date with regard to the
15 prior proceeding, is that correct?

16 MR. RENAUD: Objection.

17 A Can you rephrase your question? I got confused.

18 Q Sure. When you put together this Declaration, it
19 was to try to talk about your work on the R400
20 with regard to the unified shader patents,
21 correct?

22 MR. RENAUD: Objection.

23 A I believe this Declaration that I did was to show
24 work on the R400 project and when each of the
25 elements occurred. I mean, it is obviously, the

1 R400 is an implementation of the patent, so by
2 extension, it is loosely related to the patent,
3 but this is really more a collection of facts
4 about the R400.

5 Q So beyond the facts that you gathered for your
6 Declaration that you submitted on this topic, are
7 there any other facts you're aware of today
8 regarding the R400 that support your August 24,
9 2001 conception date?

10 MR. RENAUD: Objection.

11 A I mean, again, on the Perforce server, I mean, we
12 can check again and re-corroborate, and that will
13 point to that date I'm very confident, but you
14 have, like, both the written date on the spec as
15 well as an automated lead generated date on
16 Perforce. I don't know what else would be needed
17 to prove the date on the specific specification of
18 the R400 Sequencer.

19 Q So more broadly, are there any facts regarding the
20 work on the R400 that you're aware of today beyond
21 those that you discussed in your Declaration?

22 MR. RENAUD: Objection.

23 A In my declaration here, I am not talking at all
24 about the IKOS prototype effort. So this is one
25 case that is not recorded in this Declaration and

1 has been done by AMD. I'm only human. I mean,
2 there's probably more things, but I can't offhand
3 think of anything else.

4 Q And that's the IKOS system we talked about with
5 regard to Exhibit 9?

6 MR. RENAUD: Objection.

7 Q Is that correct?

8 A Yes. This is the similar -- this is the same
9 IKOS, and we did touch on this subject when this
10 Exhibit was brought up.

11 Q Are there any other facts you're aware of beyond
12 those in your Declaration and the IKOS device
13 regarding the R400?

14 MR. RENAUD: Objection.

15 A Can you describe, like, what facts --

16 Q Sure.

17 A -- you want me to, because this is a very, very
18 broad subject on a very broad --

19 Q You told me earlier that you're here to testify
20 about facts related to topics including conception
21 and reduction to practice, is that correct?

22 A Yes, that is correct.

23 Q Beyond the facts that you put into your written
24 testimony and what we've discussed regarding the
25 IKOS device, are there any other facts that you're

1 aware of to support those topics?

2 A I see.

3 MR. RENAUD: Objection.

4 A No, as of today, there are no other facts that I
5 can remember being aware of.

6 Q For conception and for reduction to practice.

7 A Again, I'm not an attorney. I don't know what
8 conception, reduction to practice means. I can
9 speak about the dates of the R400, and timeline,
10 and the specifications. If this was your
11 question, then yeah.

12 Q Okay. Turning back to Exhibit 11.

13 A Yes.

14 Q Staying in the same paragraph we were in, the
15 third full sentence begins, "The asserted claims
16 of the '454 patent were actually also reduced to
17 practice," do you see that sentence?

18 A The asserted claims. Yeah, so you're referring to
19 page 3, line five?

20 Q Yes.

21 A Okay, "Asserted claims of the '454 Patent were
22 also actually reduced to practice, in the form of
23 physical embodiments, at least as early as April
24 20, 2003 and June 26, 2003." Yes, I see those
25 lines.

1 Q What happened with regard to the R400 project on
2 April 20, 2003?

3 MR. RENAUD: Objection.

4 A I don't recall this exact date. It might be the
5 date on which the -- there was some evidence of
6 IKOS implementation, but let me check the calendar
7 to see if this date is present in the calendar to
8 refresh my memory.

9 April 28, 2003.

10 So I see some check-ins on that date from
11 the calendar, I don't know, some RTL check-ins and
12 a test. I don't know why that date got picked up
13 in this notice here, but, you know -- "form of
14 physical embodiment."

15 I don't quite understand the physical
16 embodiment nomenclature, if you will. But so I
17 don't know.

18 Q What happened with regard to the R400 program on
19 June 26, 2003?

20 MR. RENAUD: Objection.

21 A June 26, 2003. Again, from the calendar there
22 were some check-ins to the Perforce depot. And
23 the first synthesis of the R400, at least
24 according to Exhibit 9, page AMD1044_0175196 said
25 that the first synthesis occurred on, I guess it

1 is August 3, 2003, or on or before August 3, 2003.
2 Other than that, I can't really remember or tell
3 from the documentation that you have here in front
4 of me what actually occurred on that date. I
5 don't recall.

6 Q For the R400 program, what activities were
7 occurring between August 24, 2001 and the third
8 quarter of 2002?

9 MR. RENAUD: Objection.

10 A Can you restate the question, please.

11 (Question read back.)

12 A August 24. So that's initial.

13 And the third quarter of?

14 Q 2002.

15 MR. RENAUD: Objection.

16 A And by "third quarter," you mean up until what,
17 August? September? What do you mean by third
18 quarter?

19 Q Let's go with July.

20 A July.

21 Q What was occurring with regard to the R400 program
22 between August 24, 2001 and July 2002?

23 MR. ELENGOLD: Objection.

24 A Again, I am referring to my Declaration, which is
25 Exhibit No. 6, calendar, Diligence Calendar. On

1 page AMD1044_0011651, shows that on August 24, the
2 sequencer specification was created or at least
3 checked in, and I believe this was Version 0.4,
4 which was Exhibit No. 10.

5 After that, I can see that on pretty much
6 every day that was not a weekend day, there were
7 work and things checked in into the various
8 directories of Perforce on a day-to-day basis, and
9 all the way until July 2002.

10 So I can tell you that work was occurring
11 everyday by a large party of people, which are
12 listed again on the same Exhibit, page
13 AMD1044_0011641; we can see that there was
14 substantial group of people and making a
15 substantial amount of changes to the R400 program.

16 Q Were all of these people working on the unified
17 shader?

18 MR. RENAUD: Objection.

19 A In the R400 timeframe, the sequencer, because it
20 was at the center of the chip, was one of the
21 blocks that did not have a block level test bench,
22 meaning it could not be tested in isolation from
23 the other blocks.

24 As such, in order to make forward progress
25 on the sequencer, we needed what we call the GC

1 environment, which is the graphics core; that is,
2 all the blocks of the graphics domain to be
3 working and energizing. And so all of these
4 persons are all, as far as I can tell, and again,
5 a lot of them left AMD, but at the time were all
6 graphics designers or graphics architects; might
7 not have directly worked on the unified shader
8 blocks per se, but all their work was relevant to
9 the unified shader because of the reason that in
10 order to enable testing of the unified shader, and
11 the sequencer and the SP, we needed the whole
12 graphics core block to be working.

13 Q So is it true then that the sequencer was never
14 tested until November 2003?

15 MR. RENAUD: Objection.

16 A I fail to understand why you're making that
17 comment.

18 Q Well, your Diligence Calendar shows work occurring
19 on R400 through November 2003, is that correct,
20 and that's on page 175547.

21 A 175. Which date did you say, sorry?

22 Q November 2003. So is it correct that your
23 Diligence Calendar that you put into your
24 Declaration shows work occurring on the R400 until
25 November 2003?

1 MR. RENAUD: Objection.

2 A This Diligence Calendar shows that there is work,
3 yes, occurring on either the tests infrastructure,
4 which are used to test the sequencer or the
5 emulator or the RTL. But it doesn't mean that the
6 SQ, or the sequencer, the R400 Sequencer, was not
7 tested before then. It means that the testing or
8 the, you know, the work progressed all the way to
9 that November 20th date.

10 Q When was the sequencer first tested?

11 A So you can say that effectively the sequencer --
12 and again, it depends on your definition of
13 "tested." Can you refine exactly what you mean by
14 tested?

15 Q Well, you just said there was no block level test
16 bench, so everything affected the sequencer
17 because it couldn't be tested until the other
18 people did their work, is that correct?

19 MR. RENAUD: Objection.

20 A I did say there was no sequencer test bench, and
21 thus by definition, the sequencer was affected by
22 the other blocks. That is correct.

23 So for example, if one of the other blocks
24 were to break or stop working, this would affect
25 temporarily at least the sequencer because the

1 test would be broken momentarily. It doesn't mean
2 that the sequencer was not tested and, you know,
3 in fact of the matter is, if you find that a given
4 change to another block broke the graphics core
5 test bench, you could just revert that locally on
6 your machine so that work can continue on the
7 sequencer on the R400.

8 Q And those kinds of changes were occurring at least
9 through November, 2003, is that correct?

10 MR. RENAUD: Objection.

11 A From this calendar of event, I can't really tell
12 you what kind of changes occurred. We would need
13 to go to the Perforce depot and look at each and
14 every change and see what was modified.

15 This just says that some work occurred all
16 the way up until November 20, 2003. And this
17 Exhibit here, which is Exhibit No. 9, shows that
18 by August 30 of 2002, the single triangle test was
19 working on the sequencer, and this was a GC test
20 bench, which is the same test bench that we are
21 referring to here.

22 Q And additional problems were getting fixed until
23 November 2003, is that correct?

24 A Additional issues, or problems or, you know, new
25 features requested by Microsoft or whatnot, were

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1 being addressed all the way up to November 20,
2 2003.

3 Q And why do you say "being addressed" by Microsoft?
4 Is the calendar not specific to the R400 program?

5 A The calendar is specific to the R400 program.
6 However, as I stated before, the R400 is a PC
7 graphics processor. As such, it is affected by
8 any changes that Microsoft does to the API and,
9 you know, one clear change that occurred for us
10 was, the release of an API called Direct Text 9
11 caused us to have to redesign the sequencer and is
12 one of the main reasons why we had to move from
13 the simpler version of a sequencer that was doing
14 the unified shader on the -- as described on the
15 August 14 specification onto a more evolved
16 sequencer that was supporting unlimited clauses in
17 order to obey new Microsoft API restrictions.

18 Q When did you start working on that new sequencer,
19 do you recall?

20 MR. RENAUD: Objection.

21 A That would have been, and I quote here in my
22 Declaration, Exhibit No. 6, page AMD1044_0011636,
23 Sequencer Specification Version 2.0, April 19,
24 2002. So given that this specification was
25 checked in on that date, I would have worked on

1 the Sequencer Version 2.5 at least on or before
2 that date.

3 Q Were there any revisions to the sequencer
4 specification after 2.0?

5 A Yes, there were. In fact, if you refer to again
6 Exhibit 6, page AMD1044_0011679, you're going to
7 see a table there that lists a collection, and I
8 don't think if it's an exhaustive list of all the
9 specifications ever released, but you can clearly
10 see that beyond 2.0, we went to 2.1, and then all
11 the way to revision number 2.11, all of which I
12 believe were provided as part of this written
13 testimony as Exhibits.

14 Q Do you know if the 2.11 sequencer specification
15 was the last version of the specification?

16 MR. RENAUD: Objection.

17 A I do not recall that information, no.

18 Q When did you stop working on the R400 sequencer?

19 A Again, the work for me from the R400 to Xenos
20 transition was seeming -- I mean, it was very
21 fluid, and so I don't really remember how and when
22 I transitioned to Xenos, and how and when
23 documents got imported over.

24 The fact of the matter is the Xenos program,
25 as far as the sequencer and the unified shader is

1 concerned, is the R400 program, and such, you
2 know, it was just one big continuous for me.

3 Q So the R400 sequencer could have continued
4 changing even after version 2.11 was complete, is
5 that right?

6 MR. RENAUD: Objection.

7 A So it could. What it could also mean is by that
8 time the R400 program got cancelled and we started
9 working on the specification in the Xenos depot,
10 but like I said, to me it's just a location for a
11 file, and so I would have continued working on the
12 sequencer, almost as if it was the R400 because
13 they were so similar.

14 Q Was the sequencer always getting modified up until
15 when Xenos chip was netlisted for production?

16 MR. RENAUD: Objection.

17 A So while I know a lot about what's inside Xenos
18 because it's the same design for me as the R400,
19 I'm not as familiar with the Xenos dates, and so I
20 don't know and remember how this would line up
21 with my work on the R400, or my work on Xenos per
22 se.

23 Q Was the R400 sequencer constantly being changed
24 until the end of the R400 program?

25 MR. RENAUD: Objection.

1 A I can tell you. Let me look at the calendar
2 again. So the R400 -- so the calendar is not
3 precise enough because the -- the R400 sequencer
4 would have been under Arch, which is, if you look
5 at AMD -- sorry, Exhibit 6, page AMD1044_011651,
6 the Arch -- sorry, I'm going to give you time to
7 go to it.

8 All right. The Arch category as noted here
9 is the architecture folder history which contains
10 more than just the sequencer. So any day here
11 where you see "Arch" in the calendar could mean
12 that there was a sequencer change, and we could
13 map that, again using the Perforce server, can
14 tell you exactly when the last revision of the
15 R400 sequencer specification got checked in. I
16 just don't have this information readily
17 available.

18 Q Is that what would have been in the Arch folder?

19 A Yes, it would have been an Arch change, so for
20 example here, the last Arch change that I see in
21 this calendar occurred on Monday, October 6, 2003,
22 unless I missed an entry.

23 Q So outside of what we've discussed with regard to
24 the calendar in your Declaration, which is Exhibit
25 6, are there any other activities you're aware of

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1 that were going on with regard to the R400 program
2 from August 2001 to July, 2002?

3 MR. RENAUD: Objection.

4 A Again, there was this IKOS activity, which is the
5 hardware prototype, which was, you know, at least
6 planned, and if you give me another presentation
7 which has more complete dates, we could get a
8 better refine date on this, but it was at least
9 planned to be occurring around 11, October 11 of
10 2002.

11 Q And you think that took place before July 2002?

12 A Sorry, so July 2000 -- no, of course. Well, I
13 mean, it was planned to be. Whether or not, you
14 know, things got started on that machine before
15 that, you know, I would have to --

16 Q That's the IKOS emulation start you're talking
17 about that's in Exhibit 9?

18 A Yes. That is it.

19 Q So if that emulation had started before the
20 August 30, 2002 presentation, do you think it
21 would have said it in the presentation?

22 MR. RENAUD: Objection.

23 A So this is saying whether or not we were -- so
24 effectively, my understanding of this IKOS
25 emulation start line is that we would have been

1 successful into porting a netlist on the IKOS
2 server. It doesn't mean that tries before did not
3 occur. I can't know that conclusively, and there
4 could be evidence on the Perforce server or
5 elsewhere of that effort before the date that we
6 discussed.

7 Q So you believe the IKOS emulation start means a
8 successful emulation on the IKOS machine on that
9 day.

10 MR. RENAUD: Objection.

11 A I mean a successful implementation of the netlist
12 on the IKOS hardware.

13 Q That day. To be a start, that would be a
14 successful implementation, not the start of trying
15 to get a successful implementation.

16 A Can you define to me what you mean by
17 implementation? I mean --

18 Q I believe that's what you -- the word you used so
19 I'm sorry if I didn't -- for the IKOS emulation
20 start, whatever it is that is involved with on the
21 IKOS device testing the netlist, it's not the
22 start of that testing. You believe this start is
23 the successful date, is that right?

24 MR. RENAUD: Objection.

25 A I believe the date here is the date on which we

1 were able to push the netlist on the IKOS machine.
2 Once a netlist is on the IKOS machine, you can
3 start trying to run things on it.

4 Q Is that the IKOS emulation with software date,
5 when you start running things on it?

6 MR. RENAUD: Objection.

7 A No. The IKOS emulation with software, in my
8 opinion, refers to trying to use the IKOS hardware
9 with the driver versus trying to energize it
10 manually, if you will, with simple tests.

11 Q Okay. So other than what's identified in Exhibit
12 9 and the calendar in your Declaration, what other
13 activities are you aware of that were going on
14 with regard to the R400 program from August 2001
15 to July of 2002?

16 MR. RENAUD: Objection.

17 A That is the extent of what I remember.

18 Q Other than your Declaration, Exhibit 6, and
19 Exhibit 9, what activities are you aware of that
20 occurred from July 2002 to April 2003 with regard
21 to the R400 program?

22 MR. RENAUD: Objection.

23 A I mean there's a bunch of other presentations that
24 we have as Exhibit that I've seen. Without seeing
25 them again to refresh my memory, I can't really

1 remember of any other activities offhand.

2 Q What about from April 2003 until November 2003,
3 what activities are you aware of that were
4 occurring with regard to the R400 program?

5 MR. RENAUD: Objection.

6 A April 2003. April 2003 to?

7 Q November 2003.

8 A November 2003. Okay.

9 Other than the work described here, I mean,
10 of all the change list that occurred in the R400
11 depot, I can't think of anything else offhand.

12 Q When you say the work described here, you're
13 referring to the work identified in your calendar
14 in Exhibit 6?

15 A Sorry, yes, I am referring to Exhibit 6, page
16 AMD1044_0011671 to AMD1044_0011678.

17 MR. RENAUD: Counsel, this might be a good
18 time for a break. We've been going about an hour.

19 MR. ELEGOLD: It's up to you if you want to
20 break. I thought you wanted to try and power
21 through.

22 MR. RENAUD: I do, but I can tell the
23 witness is tired and I'm getting tired, so I
24 thought a break might make sense.

25 MR. ELEGOLD: Okay. Let's go off the

1 record.

2 VIDEO OPERATOR: The time is 3:49. We're
3 off the record.

4 (Recess taken.)

5 VIDEO OPERATOR: The time is 4:20 p.m. This
6 is tape five. We're back on the record.

7 MR. RENAUD: Counsel, during the break, we
8 called in to AMD to clarify some issues that were
9 asked during the deposition on a subject matter,
10 so the witness has some additional information to
11 supply regarding one or more of your questions.

12 MR. ELEGOLD: Yeah, so it's up to you, if
13 you want to, you know -- it's late in the day, and
14 I don't want to have this go another four hours,
15 but we can, if you want to introduce new
16 information now or if you want to redirect him or
17 however you'd like.

18 MR. RENAUD: I'm not redirecting him. You
19 were asking questions about what the complement of
20 knowledge was of the company. He is an individual
21 trying to represent a company and --

22 MR. ELEGOLD: He's still getting knowledge
23 is what you're saying.

24 MR. RENAUD: Yeah, he is.

25 A Okay, so basically --

1 Q Just let me ask questions. We'll go from there.

2 A Okay.

3 Q Earlier you mentioned that you identified during
4 the first break, that the individual you talked to
5 is Ron White, do you recall that?

6 A One of the persons I talked to was Ron White, yes.

7 Q You identified him as the name you couldn't
8 remember earlier, right?

9 A That's correct, yes.

10 Q And then Mr. White, you said was an SMTS, is that
11 right?

12 A That is what the AMD People Finder Repository
13 says.

14 Q And what is his role at AMD?

15 A My understanding is that he's part of the product
16 team. That's what his record says. I don't know
17 what he does in that role on top of that, and I
18 saw his name on the, on R400 IKOS status list, if
19 you will, which means that he was involved in the
20 IKOS support in some respect for the R400 program.

21 Q And what information did Mr. White give you
22 regarding your investigation?

23 A Well, again, it was trying to assert that the
24 presentations that we had on the topic of the
25 hardware IKOS simulation were coherent with his

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1 memory of the activities that occurred on the IKOS
2 hardware machine, same as we'd done with my other
3 colleague, which his name escapes me again.
4 Colin? Colin Stuart. Sorry.

5 Q Was there any other additional information you
6 learned from Mr. White other than what we've
7 already discussed today regarding the IKOS
8 machine?

9 A Well, regarding the IKOS machine and otherwise,
10 because this is all tied to the same subject, I
11 did review, re-review actually, a number of
12 documents that were in the room, the break room we
13 had.

14 Q With Mr. White?

15 A No, not with Mr. White. But I did review them
16 with -- on a call with Pam Horn and Dave Christie
17 to see exactly the amount of information AMD
18 provided as far as the --

19 Q Just to be clear --

20 MR. RENAUD: Let him finish.

21 Q -- this is at Mr. White's suggestion?

22 MR. RENAUD: Let him finish the answer.
23 Finish your answer, sir.

24 MR. ELEGOLD: No, it's okay. I --

25 MR. RENAUD: You're not going to interrupt

1 his answer.

2 MR. ELEGOLD: I'm not intending to
3 interrupt. I just want to make sure he understood
4 my question. I don't have to strike his answer,
5 but --

6 A Your question pertained to the IKOS program, and
7 the IKOS program as I understand --

8 Q What you learned from Mr. White with regards to
9 the IKOS program.

10 MR. RENAUD: Are you going to let him
11 answer?

12 A I learned from Mr. White -- we tried to record
13 from Mr. White the amount of recollection he had
14 on the IKOS program. What I'm trying to tell you
15 is that on that subject matter, which is the whole
16 implementation of the R400 on a hardware machine,
17 looking at the other documentation that was
18 present in the room, I saw that there was a bunch
19 of document that were likely not in the Exhibit 6
20 agenda because they were in directories that were
21 not covered by this particular investigation, and
22 they were, you know, provided, as I understand, by
23 Pam Horn in AMD, and Dave Christie, to you to
24 describe the amount of work that went in, into the
25 IKOS server, as well as other activities of AMD

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1 during that timeframe, and these include, like,
2 extensive Perforce logs as I understand, and
3 extensive presentations that are not covered in
4 this detailed agenda that only covers a subsection
5 of the directories of the Perforce server and not
6 the whole database.

7 And furthermore, I also saw some other Xenos
8 presentations that were laying on the table, and
9 that reminded myself that this is, although not --
10 also, sorry, not covered by Exhibit No. 6, and I
11 understand, because it was on the table down
12 there, that it was provided as information to you
13 guys.

14 So there is a wealth of document that are
15 available that show work that are not covered by
16 the scope of this particular agenda which is
17 definitely inclusive -- well, not inclusive, but
18 it's -- all the work here is included in the
19 document, but this is not exhaustive as to the
20 amount of information that AMD has on the work
21 that went in.

22 Q The documents you're referring to, did you review
23 them yesterday?

24 A They were on the table all day but, you know,
25 honestly, the table is covered with documents so

1 we reviewed them briefly. I remember seeing the
2 Perforce log, don't remember going through it, but
3 since you kept asking questions about, in
4 particular, this agenda, then I decided to go
5 ahead and talk to Pam to see if it really was the
6 extent of what we presented, and then she said to
7 me, no, I mean, there's more to it than that, and
8 she pointed me back to the log.

9 So when I started looking at the log in more
10 details, I realized that this is not the complete
11 list. There is way, way more than that, and you
12 know, just forgot about it when I was talking
13 about this.

14 Q Did you review the documents on Monday?

15 A Which -- I mean --

16 Q The documents you're referring to, did you review
17 them on Monday?

18 A The document, the Perforce log was on the table.
19 I glanced at it but, you know, I didn't pay
20 attention as to exactly what directories were
21 described in the whole Perforce log, and so I
22 didn't pay attention to the content itself of the
23 logs, and didn't realize how extensive it was
24 compared to the logs that are described here in
25 this Exhibit.

1 Q So you reviewed them Monday, yesterday, and today,
2 is that correct, these Perforce logs that you're
3 talking about?

4 MR. RENAUD: Objection.

5 A So the logs were on the table. I saw them. I did
6 not, you know, go through them one by one on
7 Monday and Tuesday. I did go and look at them
8 today after I talked to Pam because, you know, she
9 reminded me we have all these logs, and so you
10 make sure that you explain to them that this is
11 more than just what you did on the sequencer.
12 There's all of the MAS, so they are not just the
13 sequencer and the SP. All of the presentations
14 that we provided are not in these directories that
15 you have in your Declaration because some of them
16 are on servers, and she told me -- and Dave
17 actually told me that we also provided, you know,
18 tests, and test descriptions, and test logs, which
19 would also not be on the, on these particular
20 directories in Perforce.

21 Q When did you talk to Pam Horn?

22 A I just did during the break with Dave Christie as
23 well.

24 Q How long did you talk for?

25 A If memory serves, about 10 minutes or so. 10

1 minutes with Pam, maybe six minutes with Dave
2 Christie because he joined in after she had her --
3 she called him basically to complement her
4 answers.

5 Q Was it your idea to call Pam Horn during the
6 break?

7 A So it was after I sought wealth of document on the
8 table and realized that I was not talking here on
9 my behalf but on behalf of AMD, that I decided to
10 go forward and make sure that I was covering
11 everything because this particular declaration is
12 somewhat -- well, it's exhaustive, but it only
13 pertains to the sequencer, which is not the whole
14 R400, so I wanted to make sure that, because I'm
15 not talking in my name, I got all the bases
16 covered.

17 Q Was it your idea to call Pam Horn during the
18 break?

19 A Well, I mean, again, I was looking at the
20 specification, and so that was my idea to look
21 more and then find more, but the actual idea of
22 calling came from counsel.

23 Q Which counsel?

24 A The present counsel.

25 Q Do you know their names?

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1 A Well, I mean the counsel Adam Rizk and --

2 Q So Adam and Michael suggested that you call Pam,
3 is that correct?

4 A Well, they called her and put her on the line,
5 yeah, but --

6 Q So they just called her.

7 A They opened the line to Pam, is all they did.

8 Q Did you ask Pam questions?

9 A Yes.

10 Q What was the first question you asked Pam?

11 A I asked Pam to tell me if the Perforce log on the
12 table that was sitting next to me was part of the
13 evidence that was sent to the counsel team and if
14 there were more, because I was concerned that, you
15 know, there was not enough information here to
16 cover everything or every activity that occurred
17 at the AMD. I'm only human. I can only know so
18 much.

19 Q What was the name of the Perforce log?

20 A That Perforce log did not have a name. It's just
21 a thick book of paper with all of the Perforce
22 entries in both the Xenos repository and the R400
23 repository. It's just a big stack of paper with a
24 big paper binder attached to it.

25 Q Did you ask Pam any other questions?

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1 A I said -- well, I asked her about the other
2 evidence produced, and then she offered to call
3 Dave Christie, which is the person that actually
4 did the data collection, I understand, on AMD's
5 behalf, and he pointed me to the other evidence
6 and, you know, for that matter, on the IKOS
7 server, he just offered me during the phone call
8 that he found a netlist that was pushed on IKOS
9 and that was containing the whole graphics core
10 that was dating around April of 2003. So that is
11 new information that he just gave me on that phone
12 call.

13 Q Just 20 minutes ago you learned that there was a
14 netlist that was pushed on IKOS in April 2003, and
15 that that netlist had been found, is that correct?

16 A Like I said before, I talked to Dave Christie
17 yesterday to initiate, like, a search for the
18 netlist, and so I guess he went ahead and did that
19 over the last -- I mean yesterday, and some of it
20 today, and so because he was on the phone with me,
21 he just offered to say okay, well, by the way, I
22 found this new piece of evidence, and I'm telling
23 you now so you can say it or not.

24 Q Was that netlist the first netlist that was used
25 with the IKOS emulator in April 2003?

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1 A I don't know if it's the first netlist because he
2 told me that he found a netlist called 4 point
3 something, and the IKOS log that is on the table
4 down here was referring to Netlist 3. So there
5 might be -- it might not be the very first netlist
6 that got pushed onto the IKOS hardware emulator.

7 Q Is Netlist 3 the list that he located today?

8 A No, like I said, the netlist he told me he located
9 today was called Netlist 4.

10 Q Netlist 4?

11 A And he told me it was dated around May of 2003,
12 and he told me he found a bunch more, but I don't
13 remember all the names and I don't want to mislead
14 you in any way, so please, that -- there is at
15 least one more, and there's probably a couple
16 more.

17 Q Did you ask any other questions of Pam or David?

18 A Let me think. I asked the -- what kind of -- so
19 the Perforce log, what directories in Perforce it
20 was covering, the thick book that was on the
21 table; that's when I realized there was a mismatch
22 between that and the dates here, and after that,
23 the presentations that were submitted, the test
24 logs that were submitted, the name and the MAS
25 specifications and which ones, and they told me

1 they submitted pretty much every MAS, architecture
2 MAS of the R400 and Xenos, and also, some
3 Microsoft presentations were apparently submitted.

4 And I'm sure there's much, much more, but if
5 you want me to describe them to you, I mean, we
6 would have to put them here on the table to look
7 at them.

8 Q What Microsoft presentations are you referring to?

9 A There was at least one presentation sitting in the
10 middle of the table that was -- that had a title
11 called: Xenos, so I assumed it was a Microsoft
12 presentation.

13 Q To Microsoft or from Microsoft?

14 A This was on an ATI template with Xenos, so I am
15 assuming it was a presentation from ATI to
16 Microsoft about the status of Xenos. It was a
17 program review presentation, and there were also a
18 few more presentations sitting on that table too.

19 Q When was the first discussion with Microsoft
20 regarding the Xenos chip?

21 A I can't tell without, you know, looking at the
22 documents.

23 Q Is there a document that shows the first time
24 anyone from AMD discussed with Microsoft the Xenos
25 chip?

1 A I'm sure there will be some kind of document that
2 show the communications, and from those documents,
3 we can infer which was the first, you know,
4 discussion to Microsoft, but I can't remember all
5 of these dates on all this wealth of documents.

6 If you want to talk about these, I mean, just
7 bring the documents on the table and we can sort
8 them and look which one is the first one.

9 Q Do you know if the first discussion of the Xenos
10 chip between Microsoft and ATI has been produced
11 in this case?

12 A I don't know if the first one got produced or not,
13 but I know that from discussions with Dave and
14 from the document I saw, that presentations were
15 disclosed, and so you know, I can't say
16 conclusively from those presentations whether or
17 not the first presentation would have been here or
18 not, but there were a wealth of presentations, and
19 some of these presentations were to Microsoft.

20 Q Did you do any investigation as to when the first
21 offer of the Xenos chip to Microsoft was?

22 A Can you rephrase the question, please.

23 Q Sure.

24 A When you say "first" --

25 Q In preparing for your deposition, did you do any

1 investigation into the first communications
2 between ATI and Microsoft regarding the Xenos
3 chip?

4 MR. RENAUD: Objection.

5 A So I did not personally do this but, you know,
6 again, I am very aware that documents exist out
7 there, and I'm sure that between the Perforce log
8 and all the presentations that exist, if you put
9 them on the table, we could look at them, and I am
10 knowledgeable about -- sorry, knowledgeable enough
11 to figure it out and, you know, discuss it with
12 you.

13 Q Do you know when the first offer of the R400 was
14 made to Microsoft?

15 A I don't know if the R400 ever was offered to
16 Microsoft or not. I mean, again, if you want to
17 discuss these topics, we have a wealth of
18 documents, a lot of presentations. I'm sure we
19 can find it. It's just, you know, it was all
20 submitted apparently, according to Pam and Dave
21 Christie. So put it on the table and we can look
22 at it and discuss the facts.

23 Q You understand you were designated today to talk
24 about certain topics, correct?

25 A Yes.

1 MR. RENAUD: Objection.

2 A But you know, I'm only human. There's like, like
3 I said, the table downstairs is covered, literally
4 covered with documents. There is like thick books
5 and papers of presentations and logs and whatnot.
6 So I can talk about any of these if you bring them
7 on the table so I can look at them. I can't talk
8 to them from memory.

9 Q Any other questions you asked Pam or David through
10 your call today?

11 A Not that I recall, no. It was really about trying
12 to figure out what, you know, what was disclosed
13 by AMD to make sure I was not misrepresenting the
14 amount of information and the amount of work that
15 went in to, you know, the development of both the
16 R400 and Xenos, and you know, the only conclusion
17 so far is, this is not exhaustive and there's way
18 more than just this Exhibit 6.

19 Q I believe you testified earlier that other than
20 that, and Exhibit 9 and the IKOS work, the IKOS
21 emulator work that's discussed in Exhibit 9 --
22 sorry, let's strike that.

23 Other than the work described in Exhibit 9
24 which includes the planned IKOS emulator work, and
25 your Exhibit 6, is there any other work of which

1 you're now aware of regarding the R400 based on
2 your discussion with Pam and David?

3 MR. RENAUD: Objection.

4 A Yes, like I said, there is a ton of documentation
5 that I -- I mean, there's a ton more presentations
6 like this that are on this declaration that are
7 available, and apparently were submitted, which we
8 can discuss. There is the test logs, which would
9 not be on the Perforce server because they're
10 just, you know, logs, and apparently those were
11 submitted as well, as well as the tests, and we
12 discussed before the source machine, the source
13 code machine. So there was also code published on
14 that machine that can be reviewed to see the
15 amount of work that went in the RTL.

16 You can see the difference, you know,
17 between the two file revisions at different states
18 to see how much work went in. There's MAS
19 specifications. There's the Perforce log of the
20 whole depot which, you know, includes all the
21 change that went into that depot and not just the
22 Sequencer and Arch subdirectory.

23 Q In addition to the first triangle test that we
24 discussed earlier, what other tests were conducted
25 on the R400?

1 MR. RENAUD: Objection.

2 A So there is like a lot of unit level testing that
3 was done on the R400. I mean hundreds and
4 hundreds of tests. My understanding is also that
5 this got produced, the test name, test
6 subdirectories. I've seen them on the code
7 machine when I reviewed the code machine
8 yesterday. So we can look at that. I mean
9 there's just a lot of them.

10 And also, I know that on the -- sorry, the
11 web server that apparently Joe Cox provided,
12 that's another nugget that Pam gave me, that was
13 provided, and that included the regression results
14 and summaries of these tests at some dates and
15 time, and apparently, that also got submitted,
16 according to Pam and Dave, so we could look at
17 that as well.

18 Q Is it still your opinion that the graphics system
19 of the R400 was functionally complete when it
20 passed the first triangle test?

21 MR. RENAUD: Objection.

22 A Can you define what you mean by "functionally
23 complete"?

24 Q Did it work?

25 MR. RENAUD: Objection.

1 A I believe it -- I mean, the purpose of the shader,
2 the unified shader, unified pixel and vertex
3 shader is to process pixels and vertices, and so I
4 think that the one triangle, admittedly, it --
5 sorry, it is a fairly simple test, but it shows
6 that the shader is able to process both vertex and
7 pixels, and as such, it shows that it can work in
8 the simplest form. It doesn't mean that all the
9 corner cases are, you know, figured out and
10 everything, but to me, the test passes, the test
11 worked. The hardware generates a picture, the
12 right picture.

13 Q Can you please turn to Exhibit 12.

14 A Yes. I am on Exhibit 12.

15 Q Do you know what a patent claim is?

16 MR. RENAUD: Objection.

17 A Pardon me, can you repeat?

18 Q Do you know what a patent claim is?

19 A I know where to find the patent claims. I know
20 how to read them in English. I can't really
21 interpret them in the sense of the law because,
22 you know, I'm not equipped to really tell you what
23 they mean in the sense of the law.

24 Q Were you involved in drafting the claims of the
25 '454 patent?

1 A The way I recall it working at AMD is what we
2 filed, what we call an IDF, which is Invention
3 Disclosure Form to the attorneys, or an attorney
4 in that particular case, and we describe and work
5 with the attorney to describe the machine, in that
6 case, the R400, and then the claims are -- were
7 worded by the attorney retained to write this
8 patent, and that's my understanding on how it
9 went.

10 Q Do you have an opinion on whether or not the R400
11 uses claim 2 of the '454 patent?

12 MR. RENAUD: Objection.

13 A So not being an attorney, I don't have an opinion
14 on the claims per se. I can't break down the
15 product down to a set of claims. I have not done
16 the regression, the, you know, the study to see
17 what exists and what not. What I can tell you is
18 I believe the R400 and the unified shader in that
19 R400 are implementing in the general sense what is
20 described in this patent, yes.

21 Q Can you look at Figure 4A please on page 171.
22 Have you looked at this figure before?

23 A Yes, I have looked at this figure. This is a
24 figure in the patent, so having read the patent,
25 I've seen this figure before, yes.

1 Q Does this figure look like an accurate
2 representation of the R400 to your knowledge?

3 MR. RENAUD: Objection.

4 A This figure looks like, yeah, an implementation of
5 the R400 that we had.

6 Q When you say "an implementation of the R400," what
7 do you mean?

8 MR. RENAUD: Objection.

9 A I mean, first, this picture is very high level, so
10 it's hard to really map it directly to the R400
11 hardware device, and I know that we went back and
12 forth as to whether or not to include the texture
13 vertex cache on the R400. So I don't remember in
14 the end, if the product had such a device or not,
15 but generally speaking, it looks like it, you
16 know, maps to some degree to the R400 product.

17 Q Why do you say "to some degree"?

18 A Because like I said, this is a very high level
19 picture and so -- and I'm also working from
20 memory, so if you want to go into the details and
21 go and compare the R400 product, we could just go
22 and look at the verilog code and make sure that
23 the connections are accurate, and the modules that
24 are listed here exist or not, and so forth and so
25 on.

1 Q Have you done that?

2 A I have not done that personally, but you know, put
3 the code on and we can do it right now.

4 Q Has anyone at AMD to your knowledge compared the
5 RTL code of the R400 to the Figures of the '454
6 patent?

7 MR. RENAUD: Objection.

8 A So I know the code got produced. I don't know if
9 anyone at AMD did or did not do it. I mean, I
10 know there is a lot of evidence that was produced,
11 and somewhere in there, there is probably a
12 mapping of that nature. It's just -- you know,
13 again, I can't, I can't remember, if you don't put
14 the -- it's too far away. You have to put some
15 documents in front of me for me to conclusively
16 say one way or another.

17 Q What about Figure 5. Can you turn to Figure 5,
18 please. It's on page 172. Does Figure 5 look
19 like an accurate representation of the R400
20 architecture?

21 MR. RENAUD: Objection.

22 A By "R400 architecture," what do you mean exactly?
23 Can you refine your question?

24 Q Sure. Do you remember any documents that referred
25 to the R400 architecture that we looked at

1 earlier?

2 Q And you don't have to look. I'm asking if you
3 remembered, but I'm taking it you don't, so let me
4 ask it a different way. Looking at Figure 5, does
5 Figure 5 look like the R400?

6 A Figure 5 looks like, yes, something we would have
7 implemented in a similar fashion from the R400. I
8 mean, assuming the GPRs would be block 92, and
9 then the sequencer would be block 99, it looks,
10 you know, fairly familiar as to what the R400
11 unified shader would have looked like.

12 Q Why do you say that block 99 looks like the
13 sequencer?

14 A Well, for one, it contains the instructions store
15 in the constant, which is where these things are
16 located in the R400, and for two, in the
17 specifications, column 4, line 52, it states, "The
18 sequencer 99 includes constants block 91 and
19 instructions store 98," so.

20 Q Anything else?

21 A Anything else about what?

22 Q Why you say block 99 looks like the sequencer.
23 Any other reason?

24 A Well, I mean, it's connected to the SP, or the ALU
25 unit by line 94. And I can go and read the spec

1 to give you more. The constants block 91 contains
2 the transformation matrices used in conjunction
3 with vertex manipulation operations. Those are
4 all the, you know, operations that would have
5 occurred on the sequencer. "Instruction store 98
6 contains the necessary instructions that are
7 executed by the processor 96."

8 So you know, the whole paragraph here
9 describes it in some detail.

10 Q So turning back to claim 2, having now looked at
11 the figures and the specification, do you know
12 whether the R400 practices claim 2 of the '454
13 patent?

14 MR. RENAUD: Objection.

15 A Again, I mean, claims are patent verbiage for me,
16 and I'm not equipped to discuss the claims. I'm
17 not an attorney. I can tell you again that this
18 patent, like the Exhibit 12, the patent '454, is
19 based on the R400 design, and as such, I think the
20 R400 is an implementation of this patent.

21 But further than that, I mean, can't really
22 tell you.

23 Q So you don't have an opinion with respect to
24 whether the R400 practices any claims of the '454
25 patent, is that correct?

1 MR. RENAUD: Objection.

2 A I just said that the R400 chip or graphics core is
3 an implementation or is a hardware implementation
4 of the patent. I mean, how it maps to the claim
5 and which, I'm not equipped to answer that
6 question.

7 Q So no, you don't have an opinion whether the R400
8 practices the claims of the '454 patent, is that
9 correct?

10 A I have said that I am not equipped to answer that
11 question. I did not say yes or no.

12 Q You don't have an opinion.

13 A I said that I'm not equipped, I don't have the
14 right knowledge, right background. I haven't
15 worked through all the claims and worked through
16 all the litigation to understand that question and
17 answer it in any way.

18 Q Do you know what a processor unit is?

19 MR. RENAUD: Objection.

20 A In the scope of the R400, as it is described, I
21 believe, one of these specs, I believe it is
22 described in some amount of details in one of the
23 specs that were given, but I don't have it in
24 front of me. If you ask me in the scope of the
25 R400 -- what was the question?

1 Q Processor unit?

2 A Processor unit would then be one of what we call
3 the shader pipeline.

4 Q What's a shader pipeline?

5 MR. RENAUD: Objection.

6 A R400 shader pipeline is, according to Steve's
7 specs here, which is Exhibit 3, page
8 AMD1044_0175479, is -- sorry. That's not what I
9 was looking for. So it is a -- it says the shader
10 pipeline operates -- on page, sorry, 1044_0175478
11 is the module that operates on vectors of 16 --
12 "vector of four 2 by 2 pixel footprints. A total
13 of 16 pixels," in the case of pixel, "for vertex
14 processing," and I continue reading from the spec.
15 "Each of the pixels is replaced by a vertex." So
16 it is, you know, the block that performs the ALU
17 operations, if you will, on vertices or pixels.

18 Q Do you know, outside of Exhibit 3, what a shader
19 pipeline is?

20 MR. RENAUD: Objection.

21 A If I know outside --

22 Q Well, let me -- I asked you what a shader pipeline
23 is, and you had to refer to a document. Does that
24 mean you don't know what a shader pipeline is with
25 respect to the R400 without referring to a

1 document?

2 MR. RENAUD: Objection.

3 A No. The reason why I referred to this
4 specification is to try to be precise in my answer
5 in terminology. My understanding is, in the R400,
6 in the pipeline, and the chip in general, the
7 shader is the part that executes the ALU
8 instructions.

9 Q So the shader is inside of the shader pipeline; is
10 that what you're trying to say in that
11 distinction?

12 MR. RENAUD: Objection.

13 A In the R400, the shader pipeline contains the ALU
14 modules and it is the block that executes the ALU
15 operation.

16 Q The shader pipeline is the block, is that what
17 you're saying?

18 A The shader pipeline, or I mean, in one -- it's
19 terminology, but the shader pipeline can be seen
20 as a block, yes. That includes the GPRs and the
21 ALU units.

22 Q Are shader pipeline and the shader synonymous for
23 purposes of the R400 documents?

24 MR. RENAUD: Objection.

25 A So again, in the scope of the R400, I believe I've

1 said before that shader is the program that you
2 run on your vertex or pixel shaders, and the
3 shader pipeline is the block that operates on the
4 ALU instructions.

5 Q Is the sequencer inside of the shader pipeline?

6 MR. RENAUD: Objection.

7 A The sequencer is inside the shader complex, I
8 would call it, so but it's outside of the shader
9 pipeline. So if you go to Exhibit 10, the
10 Sequencer Specification, there is a picture on
11 page 11 that shows the shader pipe, and so you can
12 see that the docs states, "the grey area
13 represents blocks," and I read, "that are
14 replicated four times per shader pipe."

15 So this is what I would refer to as the
16 shader pipe, and you can see that from that
17 picture, the sequencer is just sitting next to it
18 and ordering instructions into the shader pipe.

19 Q And this started with us discussing where the
20 processor unit was in the R400, do you recall
21 that?

22 A Correct. And started with the fact that, you
23 know, we don't really use the term processor unit
24 in the R400. So I was trying to map that word on
25 our terminology to better understand your

1 question, which was not very clear to me.

2 Q And were you able to identify the processor unit
3 in the R400?

4 MR. RENAUD: Objection.

5 A So to me, I think the processor unit in the R400
6 design -- and again, it's not directly tied in the
7 specification that I'm seeing -- would be the
8 shader pipeline, which is this block on the left
9 side of the picture.

10 Q Can you please look at Exhibit 13. And Exhibit 13
11 do you recall is the '846 patent?

12 A Yes.

13 Q Have you reviewed the claims of the '846 patent?

14 A As stated, I read the patent, so I read the claims
15 as well, yes.

16 Q Do you have an opinion on whether the R400
17 practices the claims of the '846 patent?

18 MR. RENAUD: Objection.

19 A Again, I am not an attorney. I am not equipped to
20 answer how and when and why the R400 maps to any
21 of the claims. Again, my answer is the same. The
22 R400 is an implementation of this patent. As
23 such, it is, you know, implementing the patent
24 from a high level.

25 Q Was the R400 a graphics processor?

1 MR. RENAUD: Objection.

2 A The R400 is a GPU, or was a GPU, so it's a
3 graphics processor, but it's not -- I mean, it's a
4 graphics engine. It's not limited to a GPU. This
5 graphics processor can be used in APUs, and in
6 fact, it's being used in the Xenos program, which
7 is a specialized piece of silicon as well, and
8 those are all the same product, as far as I'm
9 concerned, the same entity of graphics, if you
10 will.

11 Q So the 400 can be used in a variety of different
12 kinds of chips.

13 MR. RENAUD: Objection.

14 A I'm saying -- the 400 -- the R400 is a project
15 name. The graphics core inside the 400 can be
16 applied to, could be applied to any kind of other
17 chips, whether it is an APU, or semi-custom unit,
18 or any kind of device that uses graphics in any
19 way.

20 Q Is there a unified shader in the R400?

21 MR. RENAUD: Objection.

22 A In the R400, there is what we like to call a pixel
23 and vertex unified shader, which is a unified
24 shader that shares the load or shares the work
25 between pixels and vertices.

1 Q And we talked about that a lot earlier with regard
2 to the sequencer specification, correct?

3 MR. RENAUD: Objection.

4 Q And other R400 documents that we discussed.

5 MR. RENAUD: Objection.

6 A So restate the question, please?

7 Q Sure. Strike that.

8 Is there a arbiter circuit in the R400?

9 A There are multiple arbiter circuits in the R400.
10 Some of them are in the unified shader
11 pixel/vertex of the R400, and I'm sure there's
12 many others elsewhere.

13 Q So the pixel/vertex arbiter is in the unified
14 shader in the R400?

15 MR. RENAUD: Objection.

16 A The pixel/vertex shader input arbiter is in the
17 R400 design. Correct. That's the way we
18 implemented it.

19 Q And that was what you worked on inside the
20 sequencer, is that correct?

21 MR. RENAUD: Objection.

22 A I worked on the R400 sequencer as a whole, not
23 only the input arbiter, and I defined the way the
24 sequencer was supposed to be working as a whole.
25 This is just a subsection of the R400 sequencer.

1 Q The arbiter is the subsection of the R400
2 sequencer, correct?

3 A I missed the beginning of your question.

4 Q I'm sorry. The pixel/vertex arbiter, you just
5 said is a subset of the sequencer, is that
6 correct?

7 A The pixel or vertex input arbiter is a sub-block
8 of the sequencer, of the R400 sequencer as we
9 implemented it, yes.

10 Q And I believe in your Declaration, which is
11 Exhibit 6, you identified some RTL with regard to
12 the sequencer on page 31. Do you recall that?

13 A Can you remind me the page number, please.

14 Q 31, or 0011649.

15 A Okay. Yes, so according to this, to my
16 Declaration, it says that it is an example of the
17 RTL code that arbitrates between vertices and
18 pixels. And, but I do not recall effectively if
19 this, and we could again look at the RTL code, to
20 make sure if it was indeed the input arbiter or
21 some other arbiter inside the sequencer further
22 down.

23 Q You mean this code we're looking at right here?

24 MR. RENAUD: Objection.

25 A Let me check the -- do you have the Exhibit with

1 the whole code files so that I can look at it,
2 because without context it's hard to say whether
3 or not if it's the input arbiter or some other
4 arbiter.

5 Q How many arbiters in the sequencer were
6 responsible for arbitrating between vertex and
7 pixel?

8 MR. RENAUD: Objection.

9 A In the -- well, are you referring -- what version
10 of the sequencer are you referring to when you ask
11 that question?

12 Q Did it change across versions of the sequencer?

13 MR. RENAUD: Objection.

14 A The arbitration points changed slightly. I think
15 the concepts stayed the same, but in order for me
16 to give you an accurate answer, I would like to
17 phrase it in terms of a specific version of the
18 sequencer. Is it 0.4 that you want to address?

19 Q Do you know which version this RTL code came from?

20 MR. RENAUD: Objection.

21 A This here says that the RTL code file in question
22 is on page 63 of the Declaration, the SQ thread
23 arbiter, which would indicate to me that this is
24 not the input sequencer. This is some kind of
25 other arbiter further down in the RTL that chooses

1 between pixels and vertices as the sequencer is
2 trying to execute instructions, either pixel or
3 vertex instruction, of something already loaded
4 into the shader core.

5 Q And that's why you said in your Declaration that
6 this is just one example in the RTL code, is that
7 correct, on page 30?

8 A I believe that -- I can't remember exactly what I
9 was thinking at the time. But reading that now,
10 yes, I mean, I can -- like I said, I know of at
11 least three arbitration points in the sequencer,
12 and this is one of them, and in this particular
13 case, this is the thread arbiter which is inside
14 the sequencer, not the input.

15 Q Is the thread arbiter, the arbiter on the side
16 that we were looking at earlier with regard to the
17 .4 spec? I believe you said there was, inside the
18 sequencer there is -- and I'm referring now to
19 page 175220 of Exhibit 10, which is a top level
20 diagram. Earlier you said the vertex/pixel vector
21 arbitrator was the first step inside the sequencer
22 and that there were two additional arbitrators
23 that were on the sides of that diagram?

24 MR. RENAUD: Objection.

25 Q Do you recall that?

1 A I don't recall specifically saying that, but I
2 mean this picture here, as well as the picture in
3 Exhibit 6, shows all the various levels of
4 arbitration. So on page 11, you have a more clear
5 picture of the sequencer operation because there
6 is actually two of these pictures as it sets here,
7 one for pixels and vertices, and so there is both
8 an arbitration across all of the clauses as stated
9 here, and then the final level of arbitration, and
10 I read from the Declaration here, SEQ arbitrates
11 between the pixel and vertex FIFO, so those are
12 the kinds of arbiters that I believe, if I
13 remember correctly, are described in -- on page 31
14 of that Declaration.

15 Q I see. So inside the sequencer there is an
16 initial vertex/pixel vector arbitrator which is
17 shown in Exhibit 10, and then there is also
18 arbitrator at the bottom of the sequencer
19 essentially, which is shown on page 11 of Exhibit
20 6. Is that correct?

21 MR. RENAUD: Objection.

22 A These arbiters can be anywhere in the design
23 basically, but yeah, they are steps of
24 arbitration. Effectively, the sequencer must pick
25 one vertex -- one, sorry, one texture winner, and

1 one ALU winner, and in order to do that, it needs,
2 in this particular design, which is .4, pick a
3 winning clause of all of the texture clauses, and
4 a winning clause of all of the ALU clauses, and
5 this is showing the hierarchy of how it could do
6 this, but you know, you could presumably also look
7 at all the texture clauses in parallel, and pick
8 one of them, and that would give you the same
9 winner.

10 Q Was this -- I'm sorry, strike that. Earlier you
11 mentioned the Sequencer Version 2.0, is that
12 correct?

13 A I believe I mentioned it quite a few times, yes.

14 Q Is the Sequencer Version 2.0 the same with regard
15 to this arbitration scheme?

16 MR. RENAUD: Objection.

17 A Sequencer Version 2.0 had -- has the same goal.
18 It has to pick a winner out of the pixels and the
19 vertices for both the ALU and the texture. The
20 arbitration, however, as you can see in
21 Declaration Exhibit 6, page 19, was done in one
22 arbiter, at least according to this diagram, that
23 was looking at the collection of the reservation
24 stations at the time, and picked an ALU and a
25 texture winner amongst the waves that are on the

1 vertex reservation station or the pixel
2 reservation stations. So the end result is the
3 same. The implementation defers slightly.

4 Q What about the Xenos sequencer, does it use the
5 same arbitration scheme?

6 MR. RENAUD: Objection.

7 A So I would love to get the Xenos specifications to
8 confirm. They are available, but my recollection
9 is that they are very similar, yes.

10 MR. ELENGOLD: I will ask the court reporter
11 to please mark Exhibit 14.

12 (Document marked Exhibit 14 for
13 identification.)

14 Q And I'll note for the record that Exhibit 14 is
15 AMD1044_226797 through 226851.

16 Mr. Lefebvre, have you seen Exhibit 14
17 before?

18 A Yes, I have seen Exhibit 14 before.

19 Q What is Exhibit 14?

20 A Exhibit 14 is, and I read, Xenos Sequencer
21 Specification SQ Version 3.0.

22 Q Is this the specification you were referring to a
23 second ago that you said would be helpful to
24 confirm whether the Xenos sequencer used the same
25 arbitration scheme as the R400?

1 A Yes. This is one of the specifications that would
2 be very helpful.

3 Q Did the Xenos chip use the same sequencer
4 arbitration scheme as the R400?

5 A So as you can see, on page 8 of 55, or
6 AMD1044_0226804, you can see the picture here is
7 identical as the picture that, for Sequencer
8 Version 2.0 as stated in Exhibit No. 6, the
9 deposition, so that confirms for me the Xenos
10 sequencer was indeed having a very, very similar
11 arbitration schemes than what was used on Version
12 2.0 of the R400.

13 Q Why do you say that?

14 A Because it matches my recollection, and the two
15 pictures are identical, the pictures that are
16 meant to describe the -- the top level pictures
17 that are meant to describe the various operation
18 points of the Xenos Sequencer and the R400 Version
19 2 Sequencer.

20 Q So based on comparing the two top level diagrams,
21 you can determine whether or not the two
22 sequencers use the same arbitration scheme?

23 MR. RENAUD: Objection.

24 A To give you a much more detailed information, we
25 would need to go and look at the RTL, which I

1 understand you have, and compare them to guarantee
2 that they are identical. I mean, I only have the
3 specifications right now. You're not giving me a
4 whole lot of documents to work with. Obviously,
5 comparing pictures is not sufficient proof that
6 they're identical, but it is my recollection that
7 they are similar, and also, you know, the pictures
8 are also very similar. So I have no reason to
9 believe that they're different.

10 Q Earlier you said the R400 was never taped out, is
11 that correct?

12 MR. RENAUD: Objection.

13 A That is my recollection, that the R400 was never
14 taped out. Again, you know, I'm sure in the
15 wealth of documents you have, we can go and find
16 strong evidence one way or another. But I don't
17 recall it being ever taped out in my personal
18 knowledge.

19 Q Do you think there is a document that says
20 somewhere, this was never taped out?

21 MR. RENAUD: Objection.

22 A I think it would have probably shown somewhere in
23 some logs that the tapeout occurred on the R400,
24 and so there would have been a trace of at least a
25 GDS netlist present somewhere in the Perforce

1 depot or otherwise in the Perforce server of the
2 company.

3 Q Is it hard to tape out from a netlist?

4 MR. RENAUD: Objection.

5 A Can you -- what -- I don't understand.

6 Q Is it a lot of work to complete a tapeout once you
7 have a netlist?

8 A I see.

9 MR. RENAUD: Objection.

10 A In order to do a tapeout from a netlist, you need
11 to have a PD team in place and floor plan the
12 chip.

13 There is work involved definitely, but it
14 is -- I wouldn't say it's easy, but it's like
15 common in silicon devices. That work is no
16 different for GPUs or for any other kinds of
17 access device, so it's common knowledge as to how
18 to take a netlist and make it into a GDS tapeout
19 file.

20 Q Do you know approximately how long it would take
21 to tape out product from a netlist?

22 A What product are you --

23 Q The R400?

24 A The R400. So it again, you have all the Perforce
25 logs so you have all the informations back and

1 forth. I'm sure there's many more presentations
2 like this one, program reviews that would give you
3 insights as to the dates and the process involved.
4 This particular one is kind of stopping short,
5 but --

6 MR. RENAUD: What Exhibit are you referring
7 to?

8 A Sorry, Exhibit 9. Page AMD1044_0175196 can give
9 you an appreciation of the planned time period
10 from RTL freeze, which is effectively your
11 netlist, and the first tapeout, which would be the
12 base layer tapeout. Though, you know, here it's
13 stating, forecasting 12/15. So December 15 of
14 '02, and the tapeout would have occurred around
15 February 14 of '03. So roughly two, two months
16 and a half of work planned.

17 Q At the time you started your work on the R400,
18 were you aware of any other graphics processing
19 systems that used a unified share for both vertex
20 and pixel shader?

21 MR. RENAUD: Objection.

22 A At the time I started working for ATI, I was not
23 aware of any other designs that were using a
24 unified shader being able to operate on pixel and
25 vertex, no.

1 Q When did you first learn of the idea of using a
2 unified shader for both vertex and pixel?

3 MR. RENAUD: Objection.

4 A I stated before, I don't recall the exact date. I
5 know discussion took place between myself Andy
6 Gruber, Andi Skende, and Steve Morein, and there
7 is evidence of the first specification proposal
8 produced by Steve around November 13, 2000 or
9 thereabouts.

10 So again, there's probably a lot more
11 documents that we could dig to refine these dates,
12 but that would have been around these dates that a
13 discussion occurred on the subject.

14 Q What was the first company or person that you were
15 aware of outside of ATI to discuss the idea of
16 having a unified shader for both pixel and vertex
17 shading?

18 MR. RENAUD: Objection.

19 A What do you mean? Can you say what you mean by
20 "discuss"?

21 Q Sure. Are you aware of anyone outside of ATI
22 having had an idea to use a unified shader for
23 both vertex and pixel?

24 A Having ideas. I know, for example, that Qualcomm
25 has a unified shader because they license it from

1 us. I think there is another company too. I am
2 not, you know, going at the literature to try to
3 find which products may or may not have a unified
4 shader, so I don't really know which ones would or
5 would not have one.

6 Q What's the first product you know of that was
7 available commercially in the marketplace that
8 used a unified shader for both pixel and vertex
9 shading?

10 MR. RENAUD: Objection.

11 A First products that I know of is the Xbox 360
12 which was manufactured by Microsoft. Well, the IP
13 was given to Microsoft by AMD, and Microsoft, I
14 understand, actually manufactured the chip.

15 Q Do you know why the R400 program was cancelled?

16 A Again, there is probably a wealth of information
17 that can be derived that is available, and that
18 would be very helpful to refresh my memory.

19 Q Do you know?

20 A I was a junior engineer back then, but I knew
21 there were some problems with the render back end
22 blocks not meeting performance and schedule. And
23 also, a large amount of work was needed to enable
24 the Xenos chip. So I guess at some point a
25 resource call got made and positioned the teams

1 over to the Xenos program to make sure that the
2 customer for which we had a contract with, was
3 satisfied with the product.

4 Q Do you know whether others copied the unified
5 shader idea that you, and Mr. Morein, and Mr.
6 Gruber, and Mr. Skende had back in 2001?

7 MR. RENAUD: Objection.

8 A I have never searched for, you know, any products
9 outside of AMD, so I don't know. And can you
10 define what you mean by "copy"? I mean --

11 Q I mean -- let me come at this a different way then
12 for you.

13 Are you aware of the first public disclosure
14 by ATI of the idea of using a unified shader for
15 graphics processing?

16 A So I am aware that one former employee, Mike
17 Dogget, did a presentation on the R400 unified
18 shader at a conference. Whether or not this was
19 the very first public announcement of the unified
20 shader of the R400, I am not sure, but there is at
21 least that.

22 Q Do you know when that presentation was?

23 A No, I do not, but it's probably -- I know it was
24 delivered to you, so if we want to look at the
25 date, and again, look, put the document in front

1 of me, we'll look at it, we'll confirm.

2 Q Have you ever received any awards or praises for
3 your work that led to the unified shader patents?

4 A Awards? I mean there is -- at AMD there is an
5 inventor award whenever you publish a patent. And
6 that is the extent of what I received as far as
7 this particular patent.

8 Q What is that award?

9 A It changed over the years. I believe it's around
10 a thousand dollars to be spread amongst the
11 inventors.

12 Q Do you still receive that award each time a new
13 patent issues with you listed as the inventor?

14 A I still receive an award. I don't even check what
15 the amount of money is because it's not really
16 relevant to me, but there is still an award for
17 every patent filed by inventors to be, again,
18 amount of money to be spread amongst the
19 inventors.

20 Q Do you receive any other compensation with regards
21 to being an inventor at AMD?

22 A You receive a small flag that you can put on your
23 desk, but that's the extent of the awards that I
24 can think of.

25 Q Does the flag say "Inventor" on it?

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1 A The flag used to say Date and Patent Granted,
2 white flag, and then black flag said Date and
3 Patent Issued. They don't issue the flags
4 anymore, as far as I know.

5 Q Are you a named inventor on any patents other than
6 the unified shader patents?

7 A Yes.

8 Q How many other patents approximately?

9 A Do you count all of the derivatives and -- because
10 for example, this patent, which we -- the initial
11 patent was the '871, then it turned into the
12 486 -- the '846. It turned into another number
13 here, the '454. So what --

14 Q So if we broadly classify all of the ones that
15 share the '871 specification --

16 A As one?

17 Q -- as the unified shader patents, are you a named
18 inventor on any other patents?

19 A Yes. Quite a few of them.

20 Q Have any of them been involved in litigation?

21 A I'm not typically aware, but I can say that at
22 least another one of mine was involved in
23 litigation because I was deposed on it by
24 Mr. Nese. It was the patent -- let me find the
25 actual.

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1 I believe, if my memory serves, I think it
2 was the patent, as stated here on Exhibit 4, page
3 3, the 7,742,053 patent. And I can go into the
4 deposition to make sure and to -- let me just
5 check that actually.

6 Q Any other patents that you know of that you were a
7 named inventor on that have been in litigation
8 other than the '053 patent?

9 MR. RENAUD: Objection.

10 A I only got deposed on that one other patent. I am
11 not -- I don't know if there is any other
12 litigation or otherwise on the other patents that
13 I have been named inventor on.

14 Q When you first talked to Steve Morein about using
15 unified shader in the R400, did you think it was a
16 surprising idea to use a unified shader?

17 MR. RENAUD: Objection.

18 A It was definitely new. I mean, that was the first
19 time that anybody would be trying to do something
20 like that, and actually, even inside AMD it caused
21 a lot of friction as to whether or not it was a
22 good idea or not, at the inception.

23 Q Why?

24 A Because it was so novel and so unusual basically.

25 Q What were the down sides?

1 A So at least one of the issues we had to work with,
2 or make sure that we did not degrade the
3 performance on, was the fetching of the vertices.
4 In the initial inception, if I remember correctly
5 again, and we should definitely bring the specs
6 here so we can look and take a deeper look, I
7 believe the vertices were supposed to be fetching
8 directly from the texture cache size, and there
9 was an issue, a possible issue where the two types
10 of traffic could trash one another, and so we
11 decided to mitigate that by having a separate
12 vertex cache dedicated to vertices to make sure
13 that we had the best chances of having a very good
14 product in the sense of the performing product and
15 a small product.

16 Q How did a vertex cache solve that issue?

17 MR. RENAUD: Objection.

18 A The vertex cache, by having a separate cache for
19 the vertices, prevented any kind of cache
20 trashing, meaning a line from the vertices
21 evicting a line from the pixels, and so mitigated
22 the issue of the two types of traffics colliding
23 into one another going to memory.

24 Q Are there any other problems you ran into with
25 implementing to a unified shader?

1 MR. RENAUD: Objection.

2 A Well, I mean, the R400 is a product, so we ran
3 into all sorts of, you know, possible issues. I
4 can't really recollect them all. Again, you have
5 all the Perforce logs. We can go and look at all
6 the changes. I mean, all of these changes are to
7 address a particular issue or to fix a small
8 problem. I can't -- there definitely were issues,
9 and if it was easy, everyone would do it
10 immediately. I mean --

11 Q Any other substantial issues that you can remember
12 other than the vertex cache?

13 MR. RENAUD: Objection.

14 A No, I don't remember any, you know, substantial
15 issues. I mean most of the -- most of the things
16 we worked on were like small nitpicks and trying
17 to get to the machine to really operate flexibly
18 to the best it could.

19 Q So I know earlier when you came in from the break,
20 we talked afterwards about the call you did with
21 Pam and David. I just wanted to make sure I gave
22 you a chance. Was there anything else you wanted
23 to add to your testimony today with regard to
24 things you've learned during the breaks with your
25 counsel?

1 MR. RENAUD: Objection.

2 A So I mean the things I learned during the break
3 were based on discussions with Pam and Dave
4 Christie, not with counsel. Counsel was in the
5 room, but I did the discussion and I did the
6 learning, and I looked at the specification.

7 Q And I don't mean to cut you off, but I believe
8 earlier your counsel mentioned, when we were
9 talking about your other conversations when Pam
10 and/or David was involved, they were with the
11 legal department and it was at the direction of
12 counsel, is that correct? I just don't want to
13 push you into a place where you're breaching a
14 privilege.

15 MR. RENAUD: Yeah, let's put it simply. I
16 allowed a lot of latitude to explore what was done
17 to collect documents and to enhance his awareness
18 today.

19 MR. ELEGOLD: During the break.

20 MR. RENAUD: During the break, but there are
21 things that both Dave and Pam do that are
22 privileged and confidential. Shouldn't say
23 privileged and confidential. Privileged or work
24 product.

25 In this instance, I made the decision that

1 his inquiries as to the documents that they
2 produced were not privileged and should be the
3 subject matter of the deposition.

4 MR. ELENGOLD: I appreciate all that. Just
5 for purposes of time, that wasn't my question.
6 But just so you understand, when I say counsel,
7 I'm including people within the AMD legal
8 department just so you understand.

9 MR. RENAUD: Oh, I understand now what
10 you're saying. Sorry, go ahead.

11 MR. ELENGOLD: Yeah.

12 Q So you distinguish them from counsel, and I just
13 wanted to make sure for you to understand for
14 purposes of privilege, that I'm not intending to
15 exclude your people in the legal department at AMD
16 from counsel, when I say, you know.

17 A Okay, so --

18 Q So going back again, is there anything you would
19 like to add to your testimony today based on other
20 things that you may have learned?

21 A So like I said, I mean, as a designated witness
22 from AMD, I learned during that break that there
23 was a wealth of documents that was available and,
24 you know, I misrepresented that the only document
25 of relevance was Exhibit 6 which was -- it is a

1 document, and it does provide a view of the
2 Perforce depot, but not an exhaustive view, but I
3 was also made aware by Dave and Pam that there
4 were many more documents submitted that were
5 outside of the Perforce depot, such as the test
6 logs, the test names, the source code -- well,
7 actually, the source code was in the depot, but it
8 got provided in various snaps, presentations which
9 were not in the directories that I described in my
10 Exhibit 6 testimony, as well as all of the IKOS
11 initiative, which is definitely not in that
12 testimony.

13 Q So I believe you've now testified about all those
14 things, correct?

15 A Well, to the extent --

16 Q Is there anything else that we haven't talked
17 about today that you would like to add to
18 supplement your testimony?

19 A There is probably way more, yes. There is a
20 wealth of documents, and I can't remember them
21 all. I mean, if you want to talk about them, I
22 know that there's hundreds and hundreds of
23 documents that were provided. There's also
24 hundreds and hundreds of people at AMD that worked
25 on the R400 project. So --

1 Q Are there any in particular that are still at AMD
2 that you think would be knowledgeable about the
3 subject matter we talked about today?

4 MR. RENAUD: Objection.

5 A You want me to name people that were working?
6 Okay. Sure. I mean, I know of at least Mark
7 Fowler, Mike Mentor, which were senior architects
8 back then. There's a lot of other people, like
9 Randy Ramsey, which is an RTL designer that works
10 in Orlando that still works at AMD. I mean --

11 Q Why did you not talk to those people in preparing
12 for your testimony today?

13 MR. RENAUD: And I'll instruct you not to
14 answer to the extent that reveals an
15 attorney/client communication, but you can
16 otherwise answer.

17 A So I am aware of the specifications and the design
18 of the R400. I know what they are. I am
19 knowledgeable in that respect, and so I personally
20 don't need to talk to Mike Mentor or Mark Fowler
21 about the R400 design, which I know. I needed to
22 talk to Dave Christie and Pam to get an
23 appreciation of the documents that were submitted
24 but, you know --

25 Q Is there anyone else at AMD that you would want to

1 talk to, to get additional information to
2 supplement your testimony today?

3 MR. RENAUD: Objection.

4 A There's hundreds and hundreds of people at AMD
5 that worked on this program, so you know, we can
6 talk to each and every one of them. They would
7 probably have each their own view of what occurred
8 at any of these dates. You know, at this point, I
9 could talk to everyone that was involved and that
10 probably would help me, but in the interest of
11 time, do you really want to do this? I mean --

12 MR. ELEGOLD: Okay. Let's go off the
13 record.

14 MR. RENAUD: Sure.

15 VIDEO OPERATOR: The time is 5:38 p.m.
16 We're off the record.

17 (Off the record.)

18 VIDEO OPERATOR: The time is 5:53 p.m.
19 We're back on the record.

20 Q I'm going to hand the witness Exhibit No. 15.

21 (Document marked Exhibit 15 for
22 identification.)

23 Q Mr. Lefebvre, have you seen this document before?

24 A I don't remember having seen this document before,
25 no.

1 Q Do you know what Exhibit 15 is?

2 A Can you point me to it? I mean where is it --

3 Q Sure, if you look at the title, and if you read
4 the title into the record, that might help.

5 A Yeah, okay. Complainants Advanced Micro Devices,
6 Inc. and ATI Technologies ULC's First Supplemental
7 Responses and Objections to Respondents LG and
8 Vizio's First Set of Joint Interrogatories (Nos.
9 5-8, 12, 18, 34, 49, 51-52, 55, 65-66, 70-71.

10 Q Do you know what that means?

11 A Talks about joint interrogatories, but further
12 than that --

13 Q Do you know what an interrogatory is?

14 A Not really. Can you educate me?

15 Q Sure. You were designated today on topic 86 which
16 is just respondent's -- responses, complainants'
17 responses, so ATI and AMD's responses to discovery
18 requests, written discovery from LG and the other
19 respondents, and so I just wanted to ask you a
20 couple quick questions about this document
21 which -- let's try, if you can turn to page 95,
22 I'm going to ask you to look at Interrogatory
23 number 49.

24 Again, you are only designated, my
25 understanding is, this topic with regard to your

1 other topics; so conception, reduction to
2 practice.

3 A Okay. What part of the --

4 Q Look at Interrogatory number 49, do you see that?

5 A Yes, I see that.

6 Q And you're welcome to read it. But my question is
7 going to be, do you understand Interrogatory
8 number 49 to be asking for the information
9 regarding conception and reduction to practice for
10 the patents that are at issue in this case?

11 A Okay. I read through it.

12 Q Can you look at the response on pages, bottom of
13 page 96 and top of 97 which says, Response No. 49,
14 and then in parentheses (6/5/2017). I think you
15 just said you read that. Do you see that this is
16 the most recent response to Interrogatory number
17 49?

18 A So 6/5, okay. I did not read that paragraph, so
19 can I read that paragraph?

20 Q Absolutely. Response no. 49.

21 A You want me to read it out loud?

22 Q No, you can just read it to yourself.

23 A Okay.

24 Okay. I read through it.

25 Q Okay, do you understand that response to be an

1 accurate reflection of the facts that AMD and ATI
2 have identified with regard to Interrogatory 49?

3 MR. RENAUD: Objection.

4 A I see a lot of text with AMD prefix and numbers,
5 and I don't know what they are, what these
6 involved.

7 Q Sure. Well, just because you were designated on
8 the subject. Do you have any reason to believe
9 that Response no. 49, 6/5/2017 on this document,
10 is not a complete and accurate response from AMD
11 and ATI?

12 MR. RENAUD: Objection.

13 A Well, not knowing who made that comment and what
14 these files are, I don't know if it's accurate or
15 not, or what it contains. I mean.

16 I have a hard time understanding what I can
17 tell you on this.

18 Q So you don't know.

19 A No, I don't know. I don't know. I don't know
20 what these files are, if they're even files and
21 what they represent and -- I don't know.

22 Q Let's look at Interrogatory number 51 on page 98.
23 After you've read that, my question is, do you
24 understand Interrogatory number 51 to be asking
25 for the facts regarding conception and reduction

1 to practice for the patents at issue in this case.
2 A That's what it says, yes. As far as understanding
3 per se what actual, these terms really mean in the
4 sense of the law, again, I'm an engineer, so I can
5 read the text. I see, I see the text on the page,
6 yeah.
7 Q Okay. And then if you look at page 100, you'll
8 see similarly a response, number 51, 6/5/2017, do
9 you see that?
10 A This, okay. This was the response to --
11 Q Interrogatory number 51.
12 A -- the question.
13 Q Yes.
14 A Okay.
15 Q I have the same question as before, do you
16 understand this to be a complete and accurate
17 response from AMD and ATI?
18 A Well, yeah, so from my conversation with Pam and
19 Dave Christie, I understand that there is indeed
20 an investigation going, and people are looking
21 into that subject.
22 Q Okay. And for Interrogatory number 52, which is
23 right below that on page 100, please go ahead and
24 read that, and do you understand that to be asking
25 for additional facts regarding conception and

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1 reduction to practice?

2 A Is there a response you want me to read?

3 Q Well, for my question, do you understand what
4 Interrogatory number 52 generally says, and that
5 it relates to conception and reduction of practice
6 to the patents?

7 A Yeah. "Identify all persons involved in
8 conception, reduction to practice, prosecution of
9 the patent application, preparation of the patent
10 application or any part thereof, custodian," which
11 I don't know what it means, "keeper of the record
12 related to the same, including name, title,
13 current employer, current contact information of
14 persons, descriptions of the dates and the
15 substance of their involvement, and specify who is
16 most knowledgeable regarding the same."

17 Q Okay. Can you turn to page 102 where there is the
18 response to number 52, 6/5/2017.

19 A Yes, I am on that page.

20 Q And you see that response?

21 A Again, big list of AMD numbers and --

22 Q We call those Bates numbers.

23 A Page.

24 Q Yeah, page numbers, that's right, that's what they
25 are.

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1 A Okay.

2 Q Do you understand the Response no. 52 to be
3 accurate and complete?

4 A I can't really comment on, again, on the
5 completeness of all this not knowing what is being
6 discussed here. It's way too summarized for me to
7 provide any kind of opinion.

8 Q And you didn't do any preparation to testify today
9 with regard to those responses, is that correct?

10 A Well, I mean, I prepared for today's testimony as
11 far as the steps or the amount of work that went
12 in on the R400 to prove that it was, you know,
13 diligently working and trying to make a product
14 for a date, and talked about, you know, various
15 people which we discussed; Dave Christie and Pam
16 Horn, and reviewed the Perforce logs, the
17 documents. So this is the, the preparation that I
18 did for this, right.

19 Q I meant specific to these discovery responses, did
20 you do any preparation to testify on those today?

21 A I don't know what these are, so no.

22 Q So if I represent to you that this is the most
23 recent set of discovery responses that we've
24 received from AMD and ATI, which is Exhibit 15, so
25 for Interrogatory number 49, 51 and 52, you have

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1 no reason to doubt that AMD and ATI's responses
2 are wrong, right, or I'm sorry, you have no reason
3 to doubt that they're accurate and correct, right?

4 MR. RENAUD: Objection.

5 A These response -- I mean, I can't tell what these
6 are, so I mean, unless you put in front of me what
7 these documents are, and I can look at them, I
8 can't formulate an opinion either way. I don't
9 know what this is.

10 Q Well, these are the documents that AMD and ATI
11 have represented that that list are relevant to
12 these topics as of today or, you know, until they
13 supplement it again, so as of 6/5/17. My question
14 was, do you understand or do you have any reason
15 to believe that these are incorrect, these
16 responses?

17 MR. RENAUD: Objection.

18 A Well, I mean, if they were provided by AMD, and
19 you know, counsel reviewed them and appended them
20 to this document, I don't have any reason to
21 believe these are not correct and accurate, but I
22 really want to state that I have no idea what
23 these are, so I can't really formulate a personal
24 opinion on this. I mean, I'm relying on AMD and
25 counsel.

1 MR. ELEGOLD: Okay. And so I have no
2 further questions, and sort of per our earlier
3 discussion where I said I would try to keep it to
4 seven hours in light of your need to have an
5 appointment tonight, Mr. Lefebvre, so I understand
6 that and we'll cut it off; although I will say
7 that, you know, with regard to the information
8 that was disclosed, an hour and a half left in the
9 day, on the deposition, that changed your prior
10 testimony, we reserve the right to, once we learn
11 more about that, recall this witness on those
12 subjects, limited to those subjects that changed
13 prior testimony and came up late in the day.

14 MR. RENAUD: All right. Well, we'll
15 certainly take that under advisement. I will say
16 that the witness throughout the day had requested
17 documents to help him answer questions of which
18 there are quite a few, and during the day, it was
19 a few hours in the depo before they were put on
20 the table. You can use that time any way you'd
21 like, but my point of view is you had ample
22 opportunity to question the witness, but we're
23 open to further dialogue about the subject matter,
24 and appreciate you respecting the seven hour limit
25 on the deposition. Thank you for your time.

1 MR. ELEGOLD: Per the parties' agreement,
2 I'm happy to do the seven hours, like I said, but
3 again, just to note, I don't think any of those
4 documents that we went through during the day, to
5 your point, are relevant to this subject of
6 changing testimony late in the day in the
7 deposition.

8 MR. RENAUD: Look, the open-ended questions
9 you were asking about, are there any other
10 documents, does the company have any awareness --

11 MR. ELEGOLD: I think now you're
12 testifying. So I don't think we really need to go
13 through that.

14 MR. RENAUD: I'm just going to say on the
15 record that I think you mischaracterized the
16 change in testimony. There was no change in
17 testimony. Like any other 30(b)(6), the witness
18 has the burden to produce information for an
19 entire corporation, and on more than one occasion
20 during a break, he tried to go complement his
21 earlier testimony on subject matters you asked
22 about for which he said he did not have full
23 awareness, so at the end of the day, if you'd like
24 to talk about additional time with this witness or
25 another witness to manage the issue you've

1 addressed, we're happy to have that conversation.

2 MR. ELEGOLD: Well, that's my question, is
3 I don't know that it's necessary because again, I
4 think we have a complete record based on what has
5 been put in to date. I guess my point again is
6 just that, to the extent that we're trying to keep
7 it to seven hours, I'm just noting for the record
8 that we're doing that, and we're doing that in
9 light of your request and the parties' agreement
10 to do that with individual deponents, but you
11 know, again, I think you're mischaracterizing
12 things quite a bit there, but I appreciate if you
13 want to represent there was no change in
14 testimony, I think that's fine, and I'm happy to,
15 you know, let that go and we both said our piece.

16 MR. RENAUD: Okay. We're happy to take it
17 up off the record. Thank you.

18 VIDEO OPERATOR: The time is 6:08 p.m. This
19 concludes the deposition of Laurent Lefebvre.
20 We're off the record.

21 (Whereupon the deposition concluded at
22 6:08 p.m.)
23
24
25

1 C E R T I F I C A T E
2 COMMONWEALTH OF MASSACHUSETTS
3 MIDDLESEX, SS.
4

5 I, Lisa McDonald Valdario, Registered
6 Professional Reporter and Notary Public, in
7 and for the Commonwealth of Massachusetts, do
8 hereby certify that:

9 LAURENT LEFEBVRE, the witness whose deposition
10 is hereinbefore set forth, was duly sworn by me,
11 that I saw a picture identification for him
12 in the form of his NEXUS government issued ID, and
13 that the foregoing transcript is a true and accurate
14 transcription of my stenotype notes to the
15 best of my knowledge, skill and ability.

16 I further certify that I am not related to
17 any of the parties in this matter by blood or
18 marriage and that I am in no way interested in
19 the outcome of this matter.

20 IN WITNESS WHEREOF, I have hereunto set my
21 hand and notarial seal this 1st day of July,
22 2017.

23 _____
24 Lisa McDonald Valdario, RPR, RMR
25 Notary Public

My commission expires: June 15, 2018

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4 Please read your deposition over
5 carefully and make any necessary corrections.

6 You should state the reason in the
7 appropriate space on the errata sheet for any
8 corrections that are made.

9 After doing so, please sign the errata
10 sheet and date it.

11 You are signing same subject to the
12 changes you have noted on the errata sheet,
13 which will be attached to your deposition.

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16 attorney within thirty (30) days of receipt
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