

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

3 _____
4 DYNAMIC AIR INC.,
5 Petitioner,
6 v.
7 M-I DRILLING FLUIDS UK LTD.,
8 Patent Owner.

9 _____
10 Case IPR2016-00256
11 U.S. Patent No. 6,702,539 B2
12 Case IPR2016-00259
13 U.S. Patent No. 7,544,018 B2
14 Case IPR2016-00260
15 U.S. Patent No. 7,033,124 B2
16 Case IPR2016-00262
17 U.S. Patent No. 7,186,062 B2
18 Case IPR2016-00263
19 U.S. Patent No. 7,186,062 B2
20 Case IPR2016-00264
21 U.S. Patent No. 6,709,217 B2

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23 DEPOSITION OF
24 JOHN W. CARSON, PhD
25 VOLUME I
TUESDAY, AUGUST 9, 2016

26 Taken By Christine K. Herman, RPR, CRR

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The original is in the possession of

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Attorney Rose

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1 THE DEPOSITION OF JOHN W. CARSON, PhD,
2 taken pursuant to Notice of Taking Deposition, taken
3 before Christine K. Herman, RPR, CRR, a Notary Public
4 in and for the County of Anoka, State of Minnesota,
5 taken on the 9th day of August, 2016, at Capella Tower,
6 225 South Sixth Street, Suite 4200, Minneapolis,
7 Minnesota, commencing at approximately 9:00 a.m.

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1 P R O C E E D I N G S

2 Whereupon,

3 JOHN W. CARSON, PhD,

4 a witness in the above-entitled matter,

5 after having been first duly sworn,

6 deposes and says as follows:

7 EXAMINATION

8 BY MR. ROSE:

9 Q Good morning, Dr. Carson.

10 A Good morning, Mr. Rose.

11 Q You understand you're here in connection
12 with several inter parties review matters before the
13 Patent Trial and Appeal Board?

14 A I do.

15 Q And just for the record, those matters are
16 IPR 2016-00256, '259, '260, '263 and '264. Is that
17 all of those? And '262.

18 Dr. Carson, you've had your deposition
19 taken before, correct?

20 A I have.

21 Q Approximately how many times?

22 A Probably 50 or more.

23 Q Okay. So you understand the role of
24 asking questions and -- I'll ask the questions and
25 you give the answers?

1 A Yes.

2 Q Okay. And if I ever ask a question that
3 you don't understand or you didn't hear completely,
4 please let me know. I'll do my best to rephrase it.
5 If you don't say that you don't understand the
6 question or ask me to rephrase it, we'll understand
7 that you understood the question. Fair enough?

8 A Yes.

9 Q If during the day you need any breaks,
10 just let me know. We'll do our best to accommodate
11 you. If there's a question pending, however, I'll
12 need you to answer that question and maybe a
13 follow-up before taking a break, but if you do need
14 a break just let me know, okay?

15 A Yes.

16 Q I'd like to turn first to Exhibit 1035.
17 (Previously Marked Deposition Exhibit
18 Number 1035 introduced to the witness.)

19 Q (BY MR. ROSE) Do you recognize
20 Exhibit 1035 as your curriculum vitae?

21 A This -- Yes. This is my CV as of
22 June 2015.

23 Q Then my next question, which is, is this
24 your most recent CV?

25 A It is my most recent CV; that is, the

1 first page, which is here listed as page number 3.
2 What follows are a list of my publications, and the
3 last publication is dated September/October 2015.
4 There's two or three papers that I've published
5 since that time that are not listed here.

6 Q Okay. Do you have a more recent version
7 of your CV that you could provide?

8 A I do.

9 Q Okay.

10 MR. ROSE: I'd ask that that be provided.

11 Q (BY MR. ROSE) Do you recall what the more
12 recent publications were?

13 A Not off the top of my head, no.

14 Q And all of your undergraduate and
15 postgraduate degrees, I see from your CV, dealt with
16 mechanical engineering; is that correct?

17 A Yes.

18 Q Did they deal with any particular
19 specialty within the field of mechanical
20 engineering?

21 A Yes.

22 Q What particular fields?

23 A My graduate degrees in master of science
24 and PhD from MIT both dealt with the field of
25 elastic-plastic fracture of metals.

1 Q Could you describe briefly what that is?

2 A When a metal, steel or whatever, aluminum,
3 is deformed, if the amount of deformation or stress
4 that is applied to the metal is rather low, then the
5 response is called elastic. Basically the metal
6 returns to its original condition when that stress
7 is relieved. If a greater amount of stress is
8 applied to the material, you exceed what's called
9 the elastic limit, and the material deforms in such
10 a way that it does not return to its original
11 condition when that load or stress is removed, and
12 that's called plastic deformation. So in my
13 master's and PhD work, I investigated the conditions
14 of failure of metals in this regime, where the
15 material starts out with an elastic response and
16 later goes to a plastic response.

17 Q Were any of those studies -- Strike that.
18 Did any of those studies involve the flow
19 of granular solids?

20 A Those specific studies did not, no.

21 Q Okay. And I see that starting in 1970 you
22 began work with Jenike & Johanson. Did I pronounce
23 that correctly?

24 A You did pronounce it correctly, and I did
25 start full time in 1970, but I actually worked for

1 the company in the summer of 1967.

2 Q What did you do there in the summer of
3 1967?

4 A I performed research on the settlement of
5 powders.

6 Q And were you -- Was that after you had
7 received your undergraduate degree?

8 A Yes.

9 Q And then you went back to work in 1970.
10 In what role were you there in 1970?

11 A At the time we were a very small company.
12 We're still small, but not as small as we were then.
13 And I don't recall exactly what my title was. It
14 was probably project engineer or something of that
15 sort.

16 Q Could you describe generally the type of
17 work you did as a project engineer beginning in
18 1970?

19 A The work that I performed at that time
20 consisted of reviewing test results from our
21 laboratory, interacting with clients, either in a
22 site visit or by phone or mail -- that was before
23 the days of e-mail -- and analyzing problems that
24 clients were having or design conditions that they
25 would like to establish, and then taking that test

1 data and their design requirements and coming up
2 with a report with sketches, showing the reasons why
3 they were having problems or how to avoid problems
4 and recommendations thereto.

5 Q You said testing results from your
6 laboratory. What kind of a lab did you have? Was
7 it a unit operations type of lab?

8 A No.

9 Q Could you describe the lab facility?

10 A The lab facility that we had then was --
11 or consisted of what is called a Jenike shear
12 tester. I think at the time we perhaps had only one
13 such device. But this is a device to measure the
14 flow properties of bulk solids. We had associated
15 equipment called a consolidating bench, a heated
16 chamber, compressibility tester, a permeability
17 tester, and then other typical lab equipment, such
18 as ovens and balances and things of that sort.

19 Q You said you tested the flow properties of
20 bulk solids. Could you give me a definition of what
21 you mean by bulk solids?

22 A The term bulk solids is generally
23 recognized to encompass particles of virtually any
24 size or shape, from submicron to mining
25 applications, where particles could be the size of

1 this table. And those particles are handled in bulk
2 form; that is, that the material is put into a
3 container of some size and shape, and then one
4 attempts to remove the particles from that
5 container, as opposed to the other type of so-called
6 material handling, which is unit handling, where
7 with regard to particles, you might put those
8 particles in a container, and then you'd be worried
9 about how to -- or concerned with how to move that
10 container from one point to another. Here the issue
11 is filling and discharging the container.

12 Q And is there a difference between -- well,
13 is there a distinction between bulk solids and bulk
14 granular solids?

15 MR. WERNER: Objection to form.

16 A There is no meaningful distinction. The
17 terms are used interchangeably.

18 Q (BY MR. ROSE) Okay. On your CV you say
19 that you specialize in the storage and flow of bulk
20 granular solids. So that's the same field as you
21 described earlier with particles from submicron to
22 the size of this table?

23 A Yes.

24 Q What is the business of Jenike & Johanson?

25 A Jenike & Johanson is a consulting

1 engineering firm that specializes in the storage,
2 flow and processing of bulk solids.

3 Q So Jenike & Johanson, does it manufacture
4 any products?

5 A We do not have a product line per se. We
6 do sell -- We have in the past sold Jenike shear
7 testers. We have discontinued that for the last 10
8 years or so. We do sell a -- We have an exclusive
9 arrangement with Dr. Dietmar Schulze in Germany to
10 sell the Schulze ring shear tester worldwide, with
11 the exception of Europe, which he controls.

12 For clients that have a need for
13 customized equipment, whether it be screw feeders,
14 pneumatic conveying systems, bins, silos, processing
15 vessels, we have capabilities to engineer such
16 equipment, to design and engineer such equipment,
17 and then either to construct that equipment in
18 house, or more likely, and more often, to work with
19 an outside vendor to have that equipment
20 constructed.

21 Q And other than those instances where
22 Jenike & Johanson provides design and engineering
23 services, and perhaps construction of equipment, the
24 business of Jenike & Johanson is consulting,
25 correct?

1 A Yes. I would say in general that
2 statement is correct. Consulting both in terms of
3 solving problems with existing equipment or
4 designing new equipment to avoid problems.

5 Q How big of an entity is Jenike & Johanson?
6 For example, how many employees?

7 A To answer your question I need to describe
8 the structure of Jenike & Johanson.

9 Q Absolutely.

10 A There is an umbrella organization called
11 Jenike & Johanson Global, Inc. It's a Massachusetts
12 corporation. It's basically a shell that then
13 controls the various subsidiaries. Our U.S.
14 subsidiary is Jenike & Johanson, Incorporated, again
15 a Massachusetts corporation. Our Canadian
16 subsidiary is Jenike & Johanson, Limited, located in
17 Toronto. We have a subsidiary in Chile, which is
18 Jenike & Johanson Chile Limitada. I'm not sure of
19 that last 'cause there are actually two entities in
20 Chile, so Chile Limitada may be -- it's either that
21 or Jenike & Johanson Chile, S.A. I'm not sure
22 exactly the corporate structure there.

23 We have another entity in Brazil going by
24 the name of Jenike & Johanson. And we have an
25 entity in Australia, Jenike & Johanson Australia.

1 Combined, these various subsidiary companies have a
2 total of close to 100 employees.

3 Q And how many employees of the U.S. entity?

4 A The U.S. entity is the largest number of
5 employees. I would estimate around 60 employees
6 U.S.

7 Q And as the president -- Well, strike that.
8 When did you assume the role of president?

9 A January 1985.

10 Q Is that president of the U.S. entity or
11 the entire entity?

12 A I'm president of the U.S. entity, and I
13 believe my role is secretary of the global entity.
14 Secretary and maybe treasurer. I'm not sure.

15 Q What do you do in your role as secretary
16 or treasurer of the global entity?

17 A I am a member of the board of directors of
18 Jenike & Johanson Global, as well as Jenike &
19 Johanson, Inc. In my role as secretary and
20 treasurer of Jenike & Johanson Global, I primarily
21 take notes at board meetings and, obviously, sign
22 any legal documents that require a signature of the
23 secretary.

24 Q And do you have regular interaction with
25 the entities outside the U.S. as your role as either

1 a board member, secretary or treasurer?

2 A I do.

3 Q What are the interactions you have with
4 those other entities outside the U.S.?

5 A There are multiple interactions. We
6 have -- In the case of our operation in Canada and
7 in Chile, we have an individual who is on the board
8 of directors of Jenike & Johanson Global, so I have
9 a close interaction with that individual or those
10 individuals. Beyond that, I have interaction with
11 engineers at these other entities as needed, to
12 either assist them or to request their assistance on
13 projects that they are involved with.

14 Q Does that include interaction with
15 engineers at Jenike & Johanson Brazil?

16 A Yes.

17 Q How often do you interact with those
18 engineers?

19 A I just had one of those engineers in our
20 office for the last three weeks. I was out of the
21 office for two of those three weeks, but I talked
22 with her while she was there. But perhaps once
23 every couple of months, or maybe even monthly, I'll
24 have an e-mail exchange or a phone call with the
25 head of our office in Brazil.

1 Q Has the Jenike & Johanson -- Strike that.
2 Are you familiar with an entity known as
3 Dynamic Air Limitada?

4 A I've heard of that entity, yes.

5 Q Has the Jenike & Johanson entity in Brazil
6 had any interaction or done any business with
7 Dynamic Air Limitada?

8 A Not that I can recall.

9 Q Has Jenike & Johanson conducted any
10 business other than your involvement in this matter
11 with Dynamic Air, Incorporated?

12 A I cannot recall any interaction with them.

13 Q You're not familiar with any consulting
14 services that Jenike & Johanson provided for either
15 Dynamic Air, Incorporated, or Dynamic Air Limitada?

16 A No.

17 Q I see that in your --

18 (Previously Marked Deposition Exhibit
19 Number 1044 introduced to the witness.)

20 Q (BY MR. ROSE) I'm handing you what's been
21 marked previously as Exhibit 1044. Do you recognize
22 this as one of your declarations in the matters for
23 which we are here?

24 A I do.

25 Q And I want to direct you to, starting on

1 page 4, where you list matters in which you've
2 testified in the last four years. Are you there?

3 A Yes.

4 Q And in each of those matters did you
5 provide deposition testimony?

6 A No.

7 Q You know, I worded my question poorly.
8 Why don't we walk through each of them at a time,
9 and you can tell me -- Or strike that.

10 Is it your testimony that you gave
11 deposition testimony in none of those matters?

12 A No.

13 Q Okay. That's what I wanted to clarify.
14 So for the first one, Ulysse Daigle, plaintiff, did
15 you give deposition testimony in that case?

16 A Yes.

17 Q Did you give trial testimony?

18 A No.

19 Q And Falcon Concentrators, Inc., did you
20 give deposition testimony in that one?

21 A Yes.

22 Q And did you give trial testimony?

23 A No.

24 Q In Alfred Palma, LLC, did you give
25 deposition testimony?

1 A I believe I did, yes.

2 Q And did you give trial testimony?

3 A I may have. I don't recall.

4 Q Tharaldson Ethanol Plant, did you give
5 deposition testimony in that one?

6 A No.

7 Q Did you give trial testimony?

8 A Yes. It was an arbitration.

9 Q You testified at the hearing, though?

10 A I did.

11 Q In Illinois River Energy, did you give
12 deposition testimony?

13 A Yes.

14 Q Did you give trial or hearing testimony?

15 A No. There was no trial.

16 Q In ALSTOM Power Systems, did you give
17 deposition testimony?

18 A No.

19 Q Did you give trial or hearing testimony?

20 A Yes.

21 Q In Green Plains Bluffton, did you give
22 deposition testimony?

23 A Yes.

24 Q And trial testimony?

25 A No.

1 Q In Secretary of Labor, in that matter did
2 you give deposition testimony?

3 A Yes.

4 Q And did you give trial or hearing
5 testimony?

6 A No.

7 Q And PhosAgro Asia, in that matter did you
8 give deposition testimony?

9 A No.

10 Q Did you give trial or hearing testimony?

11 A I did.

12 Q And in the last one, Marie Jose Pierre,
13 did you give deposition or trial testimony?

14 A Yes.

15 Q You gave a deposition?

16 A Deposition, yes.

17 Q And trial?

18 A No.

19 Q Did any of these matters that we've just
20 walked through involve patents?

21 A Yes.

22 Q Which ones were patent cases?

23 A The second one, Falcon Concentrators, Inc.

24 Q Any others?

25 A No.

1 Q And that was in the Canadian court; is
2 that right?

3 A Yes.

4 Q Do you know what the outcome of that
5 matter was?

6 A I know the matter was settled before going
7 to trial, but I don't recall any details beyond
8 that.

9 Q Do you recall whether you gave testimony
10 on the side of the patent owner or the nonpatent
11 owner?

12 A The patent owner.

13 Q Okay. And what was the -- we're not
14 getting into anything that might be confidential --
15 the general subject matter of your opinions?

16 A The issue had to do with a device for
17 processing of what are called tailings or refuse
18 material in the minerals application, and the issue
19 had to do as to whether or not there was -- whether
20 or not the configuration of a key component of this
21 device constituted a mass flow condition.

22 Q And you gave opinions on the side of the
23 patent owner; is that right?

24 A That's correct.

25 Q Okay. Did the issue have to do with

1 whether the accused product infringed the patent?

2 A Yes.

3 Q And what conclusion did you reach as to
4 whether the accused product infringed?

5 A As I recall, my conclusion was that there
6 was infringement, that the patent was valid and that
7 there was an infringement.

8 Q So you also gave opinions regarding the
9 validity of the patent?

10 A As I recall, I did, yes.

11 Q You said that the -- one of the issues was
12 whether or not the configuration of a key component
13 of the device constituted a mass flow condition.
14 What did you mean by that, a mass flow condition?

15 A Mass flow is a term that was originated by
16 Dr. Andrew Jenike in the early '60s -- late '50s,
17 early 1960s, and it's generally recognized
18 throughout the world as a condition where, when
19 material is put into a storage vessel of any size or
20 shape, if upon initiating discharge from that
21 storage container or storage vessel all of the
22 material is in motion whenever anything is
23 withdrawn, that is considered to be mass flow.
24 Basically no stagnant regions of material on
25 discharge.

1 Q And in that case did you find that there
2 was a mass flow condition?

3 A Yes.

4 Q How did you determine that?

5 A By considering the properties of the
6 material that was being handled and by the
7 configuration of the vessel itself.

8 Q Did you do any actual testing, or you just
9 determined the properties of the material and the
10 configuration of the vessel?

11 A I did no testing.

12 Q So there's some mathematical formula based
13 on the properties of the material and the
14 configuration of the vessel that enable you to
15 determine mass flow?

16 A Yes.

17 Q Can you describe what that formula is?

18 A This is all -- It's difficult to describe
19 in a few words, but basically I would reference
20 Bulletin 123 from the University of Utah experiment
21 station, authored by Andrew Jenike in the early '60s
22 as, if you will, the Bible of the industry that
23 describes the conditions under which mass flow can
24 develop.

25 Q We may have touched on this before. If I

1 did, I apologize. But can you give me what
2 definition you have for the term granular solids?
3 How would you define that term?

4 A As I testified earlier, Mr. Rose, the term
5 bulk solids, bulk granular solids, bulk material,
6 are, in my mind, all interchangeable terms, but
7 basically consisting of particles of virtually any
8 size or shape that is handled in bulk form.

9 Q And what does the use of the word granular
10 indicate?

11 A It really doesn't add any more. It's a
12 term that's often used, but I think it sometimes
13 gives the impression that the particles are of some
14 size that are smaller than submicron and larger than
15 the size of this table. But, again, to me, it's not
16 a well-defined term, and, in fact, it may actually
17 create a misunderstanding of what we mean by bulk
18 solids. But, again, I don't differentiate between a
19 bulk solid and a bulk granular solid, and I believe
20 that's true of most people in this field.

21 Q And the same thing with the term granular
22 solids?

23 A Yes.

24 Q Okay. So when you say -- just trying to
25 help me understand here -- it could be the size of

1 this table, this table is some 20 feet long. If
2 we're moving a series of these tables down a
3 conveyer belt, is that the conveyance of bulk
4 granular solids?

5 A Yes.

6 Q Okay. And that would be captured by, in
7 your CV, Exhibit 1035, where you say that you
8 specialize in the storage and flow of bulk granular
9 solids?

10 A Yes.

11 Q Now, the testimony you gave in the Falcon
12 Concentrators, Inc. case, I see it was in Canadian
13 court, but that also had to do with a Canadian
14 patent; is that right?

15 A Yes.

16 Q Okay. Have you had any experience, any
17 testimony experience regarding U.S. patents?

18 A Yes.

19 Q Okay. When was that?

20 A I had one this year, and I had two other
21 matters that date back to probably the mid 1970s,
22 late 1970s.

23 Q What was the one that you had this year?

24 A I don't recall the actual caption, but it
25 was somewhere along the lines of SNF Flopan,

1 F-L-O-P-A-N, vs. BASF Corporation.

2 Q Do you know where that case was pending?

3 A It was an IPR case. I was working with an
4 attorney in Houston, so my deposition was taken in
5 Houston. When you say where it was, there or
6 Washington, D.C., I don't know.

7 Q But it was an IPR?

8 A It was an IPR, correct.

9 Q And for which of those two entities did
10 you provide opinions?

11 A BASF.

12 Q Was BASF the patent owner?

13 A Yes.

14 Q And your opinions had to do with the
15 validity of the patent?

16 A That's correct.

17 Q I assume one patent, or more patents?

18 A As I recall, there was just a single
19 patent.

20 Q Would you tell me how long ago that
21 deposition was?

22 A Two or three months ago.

23 Q Does that matter remain pending?

24 A No. In fact, I just received an e-mail
25 last night with a final decision by the IPR that was

1 in favor of my client.

2 Q So the patent was upheld as valid?

3 A It was.

4 Q Do you have any patents of your own?

5 A Yes.

6 Q Can you estimate roughly how many?

7 A One.

8 MR. WERNER: Rough estimate.

9 Q (BY MR. ROSE) And how long ago did you
10 get that patent?

11 A Roughly 20 years ago.

12 Q Can you tell me generally what the subject
13 matter was?

14 A Fluidization segregation tester.

15 Q Was that patent ever involved in
16 litigation?

17 A No.

18 Q And you got that patent while you were at
19 Jenike & Johanson?

20 A Yes.

21 Q Was the validity of that patent ever
22 challenged?

23 A No.

24 Q So just so I'm understanding clearly -- I
25 think I am -- other than the BASF case and the

1 Falcon Concentrators case, you haven't opined in
2 patent litigation, correct?

3 A That's not what I said.

4 Q Okay. Maybe I'm misunderstanding. Are
5 there any other patent cases where you've given
6 opinion testimony other than the BASF and the Falcon
7 Concentrators?

8 A Yes. I've already testified that I had
9 two matters back in the '70s.

10 Q Okay. That's right. I apologize. Other
11 than those, are there any more?

12 A No.

13 Q Roughly what percentage of your work at
14 Jenike & Johanson involves giving opinions in
15 litigation?

16 MR. WERNER: Objection to form.

17 A At the present time, for me personally,
18 it's more than 50 percent. That's an average. It
19 varies, obviously, from month to month, but I would
20 say, over the course of a year, it's somewhere in
21 excess of 50 percent.

22 Q (BY MR. ROSE) Have you ever been engaged
23 by the Carlson Caspers firm?

24 A No. Not prior to this case, obviously.

25 Q Yes. Thank you for clarifying. Have you

1 ever been engaged or performed work for Dynamic Air,
2 Incorporated?

3 A You already asked me that question, and my
4 answer is I don't recall having done so, either
5 personally or by the corporation.

6 Q Have you had any prior dealings or been
7 engaged by Macawber Engineering, Incorporated?

8 A How do you define dealings?

9 Q Well, in your work at Jenike & Johanson do
10 you have any interaction with Macawber Engineering?

11 A I have in the past.

12 Q Could you describe what interactions
13 you've had with Macawber Engineering?

14 A Well, for me personally, I've known Brian
15 Snowdon, who is one of the principals -- in fact,
16 he's the author of these patents. I've known Brian
17 for probably 30 plus years. Maybe 40 years. I
18 recall working with him on a project in Spain. In
19 fact, it's mentioned in the Macawber Coal-Fired
20 Ships exhibit. A project where he and his firm were
21 involved in the pneumatic conveying portion of that
22 project, and I was involved in the equipment
23 upstream of the pneumatic conveying, so I interacted
24 with Brian, and that goes back some years. I'm not
25 sure who else. But certainly I recall working with

1 Brian on that. Beyond that and meeting Brian and
2 others at trade shows and conferences, I don't have
3 any specific recollection.

4 Q Have you done any work for Macawber
5 Engineering in your role at Jenike & Johanson?

6 A I don't recall any, no.

7 Q You had mentioned a project that you had
8 worked on with Brian Snowdon. He was involved in
9 the pneumatic conveying portion of the project, and
10 you were involved in the equipment upstream. Could
11 you describe what you meant by that?

12 A As described in the Macawber Coal Ship
13 exhibit, this project involved designing a ship that
14 would not only transport coal but would also take
15 some of that coal and put it into a combustor and be
16 the source of steam for powering the ship. So what
17 we were looking at is the design of the bunkers, the
18 hoppers, the feeding devices, to reliably discharge
19 the coal into the downstream equipment, which in
20 this case was a Macawber Denseveyor.

21 Q So the work regarding the Macawber
22 Denseveyor, is that the work that Brian Snowdon was
23 doing?

24 A Yes.

25 Q Okay. And then you were working on the --

1 was it the work involving the bunkers, the hoppers
2 and the feeding devices?

3 A That's correct.

4 Q Okay. How long ago was that project?

5 A The early '80s. Maybe even the late
6 1970s. It was quite a while ago.

7 Q At that time did Brian Snowden have more
8 experience with the pneumatic conveying than you
9 did?

10 A I would say yes.

11 Q So that's why he was working on the
12 Macawber Denseveyor portion of the project?

13 MR. WERNER: Objection to form. Calls for
14 speculation.

15 A No. I wouldn't say that at all.

16 Q (BY MR. ROSE) Do you know why he was
17 working on that portion of the project and you were
18 not?

19 A Macawber was -- and subsequent companies
20 that have taken over Macawber -- a supplier of
21 pneumatic conveying equipment, so it was appropriate
22 that the client make a decision as to who that
23 supplier would be and then work with them for
24 their -- for the supply of that particular
25 equipment. My role was the upstream equipment,

1 where it was more of a design of the vessel issue,
2 and, therefore, using my expertise and that of my
3 firm to design the upstream equipment so that the
4 material would reliably feed into this commercial
5 equipment that Macawber was supplying.

6 Q Turning back to your declaration,
7 Exhibit 1044, on page 4, the heading Roman III is
8 Compensation and Prior Testimony. And under that
9 you list the testimony of the cases we've already
10 discussed. Do you identify in there how much you
11 were being compensated for your testimony in this
12 case?

13 A No. This was a typo. I should have
14 removed that.

15 Q How much are you being compensated for
16 your testimony in this case?

17 A 350 an hour and \$3,000 a day for
18 testimony.

19 Q Is that paid directly to you, or does that
20 go to Jenike & Johanson?

21 A The latter.

22 Q How did you first come to be involved in
23 this case?

24 A I received a call from Alan Carlson,
25 attorney Alan Carlson, sometime in November of last

1 year.

2 Q And what did Mr. Carlson ask you to do?

3 A He indicated that he was and is an
4 attorney representing Dynamic Air in litigation
5 involving these particular patents and wanted to
6 know if I and my firm would be willing and
7 interested in assisting in this litigation -- or
8 this patent matter.

9 Q Had you worked with Mr. Carlson or his law
10 firm previously?

11 A No, I have not.

12 Q Had you known him from any other
13 connection before?

14 A No.

15 Q Do you know how he ended up with your name
16 and contact?

17 A I do not.

18 Q And what materials did Mr. Carlson or his
19 firm provide you?

20 A He and his firm provided me with copies of
21 the relevant patents. He and others of his firm
22 provided me with various background documents,
23 including publications, technical papers, product
24 literature, other patents. He provided me with
25 videos showing examples of drill cuttings. He

1 provided me with the prosecution history. He and
2 others at his firm provided me with prosecution
3 history of the patents that are in question. I
4 think that's a reasonably complete description of
5 what he and others at his firm provided me.

6 Q When he first contacted you did he inform
7 you that he wanted to engage you to opine that the
8 patents were invalid?

9 MR. WERNER: Objection to the form. And
10 we're getting into the close topic of discussions
11 with the expert about what I believe to be work
12 product information and not the fair scope of
13 examination.

14 MR. ROSE: Okay.

15 MR. WERNER: But I'll -- You can answer
16 this question on a nonwaiver basis.

17 A No. He didn't indicate he wanted me to
18 testify one way or another. It was simply to be of
19 assistance in understanding the issues and
20 developing an opinion.

21 Q (BY MR. ROSE) You had listed several
22 materials that were provided to you by Mr. Carlson
23 and his firm. Does that include the prior art
24 references that you rely on in your declarations?

25 MR. WERNER: Objection to form.

1 A Most of the prior art references were ones
2 that he provided, yes.

3 Q (BY MR. ROSE) Did you do any searching on
4 your own?

5 A Yes.

6 Q Which references did you locate on your
7 own that were not provided by Mr. Carlson or his
8 firm?

9 A My firm had already -- we had already had
10 copies of the Marcus book. We did not have a copy
11 of the first edition, but we had copies of the, I
12 believe, second and third. Maybe there's a fourth
13 edition. So I was certainly aware of that
14 reference, although I didn't have that particular
15 edition.

16 We had in our files copies of Macawber
17 literature. I don't recall if we had the specific
18 ones that are listed as exhibits, but certainly we
19 were well aware of the company and their products.
20 Those are the only things that I can think of at
21 this moment.

22 Q But the first edition of the Marcus book
23 was provided by Mr. Carlson or his firm?

24 A That's correct.

25 Q And then while you did have in your files

1 Macawber literature, was some of the literature
2 that's cited in your declarations, was that also
3 provided by Mr. Carlson or his firm?

4 A Yes.

5 Q Looking at page 6 of your declaration,
6 Exhibit 1044, the second bullet on page 6 is the
7 prosecution history of each of the patents. Do you
8 recall if you read the prosecution histories of
9 those patents?

10 And let me take a step back. Do you know
11 what a prosecution history is?

12 A Yes.

13 Q Okay. Did you read the prosecution
14 histories of those patents?

15 A I read some of them. I skimmed most of
16 them.

17 Q All right. And in the Marcus book, which
18 is the third bullet, pneumatic conveying, did you --
19 you just read portions of that?

20 A Yes.

21 Q Okay. Did counsel direct you on which
22 portions to read?

23 A No.

24 Q How did you make the decision which
25 portions to read and which portions not to read?

1 A It was quite obvious from just the topics
2 that are in that book as to which would be
3 applicable to this matter and which would not.

4 Q The U.S. patents listed below the Marcus
5 book, those were all provided by Mr. Carlson or his
6 firm?

7 A Yes.

8 Q Who prepared the first draft of your
9 declarations?

10 MR. WERNER: Objection to form.

11 A There were several of us that were
12 involved in not only the first but subsequent
13 drafts. I certainly participated in that effort.
14 There were two engineers, key engineers in my
15 company that were involved, as well as attorneys
16 from Mr. Carlson's firm. So we worked
17 collaboratively on both the first draft as well as
18 the subsequent drafts.

19 Q (BY MR. ROSE) So when you first saw a
20 document that ultimately resulted in being your --
21 one of your declarations, was that something that
22 was prepared by the Carlson firm and then sent to
23 you?

24 A I don't recall.

25 Q Who were the other individuals that helped

1 work on your declarations?

2 A Primarily Brian Pittenger,
3 P-I-T-T-E-N-G-E-R, and Eric Maynard, M-A-Y-N-A-R-D.
4 And I believe Dr. David Craig, C-R-A-I-G, provided
5 some assistance, but very limited.

6 Q These are all folks at Jenike & Johanson?

7 A Yes.

8 Q And they were compensated as well for
9 their time?

10 A As employees of the company.

11 Q Jenike & Johanson was compensated for
12 their time, correct?

13 A Yes.

14 Q Do you know how much so far Jenike &
15 Johanson has billed for this matter?

16 A I don't know.

17 Q Can you estimate it?

18 A It's probably in the range of 30- to
19 50,000, but I honestly don't know. That's just
20 speculation on my part.

21 Q Do you know roughly how much time you have
22 invested in this matter?

23 A I don't. I don't know that number off the
24 top of my head, no.

25 Q When I asked you about the prosecution

1 histories that are identified as the second bullet
2 on page 6 of Exhibit 1044, you said you read some
3 and you skimmed others. Were you told by someone
4 which to particularly read and which ones to just
5 skim?

6 A I don't believe I was, no.

7 Q How did you make that decision?

8 A As I recall, I skimmed all of the
9 prosecution histories and just then focused on
10 particular pages that I thought would be helpful in
11 developing my opinion.

12 Q What did you do to get ready for this
13 deposition today?

14 A I reread all of my declarations, all six
15 of them; I reviewed the key reference documents that
16 are listed here on page 6 and 7; and I met with the
17 attorneys from Mr. Carlson's firm yesterday.

18 Q How long was that meeting?

19 A Roughly six hours.

20 Q Those are the attorneys that are here
21 today?

22 A Plus Mr. Carlson, yes.

23 Q Was there anybody else involved in those
24 meetings?

25 A No.

1 Q You said you reviewed the key reference
2 documents. Which ones are those? And if you've
3 identified them on Exhibit 1044 that'll help.

4 A Well, obviously the patents themselves.
5 That's the first bullet. The Marcus reference,
6 which is the third bullet; the fourth, fifth and
7 sixth references, which are the Ciaffone and
8 Dietzen I and Dietzen II; the Laster patent; the
9 1989 DAI Publication; Macawber; second Macawber
10 brochure, Macawber Coal Ship; DAI Molding Sand
11 publication; Cyclonaire. I think I listed DAI
12 Basics, but I may not have. 1989 DAI publication,
13 the Toth patent, ISO standards. That would be the
14 extent of the ones that are listed.

15 MR. ROSE: We've been going about an hour
16 now. It's probably a good time for a quick break.

17 (Whereupon, the proceedings were in recess
18 at 9:59 a.m. and subsequently reconvened at
19 10:11 a.m., and the following proceedings were
20 entered of record:)

21 Q (BY MR. ROSE) Dr. Carson, I want to go
22 back and just touch base and make sure I'm
23 understanding something clearly regarding the --
24 When we talk about the definition of bulk solids and
25 granular and you had used the example as something

1 as large as this table here, if this table was being
2 moved on a conveyor belt, would that be the flow of
3 a bulk solid or is that just movement? Is there a
4 difference between movement and flow?

5 A I don't consider any difference between
6 the two, no.

7 Q All right. If somebody picks up the table
8 and moves it is it flowing?

9 MR. WERNER: Objection to form.

10 A I think these are, in my opinion, extreme
11 examples. The issue, as I testified previously,
12 Mr. Rose, is that we're dealing with particles, not
13 a single particle but particles that are in contact
14 with other particles, and those particles are being
15 moved in some way. Very often that movement is in a
16 bin, a hopper, a silo, a bunker, some sort of
17 storage vessel.

18 In some cases that movement is by some
19 sort of a feeding device or metering device, such as
20 a rotary valve, a screw feeder, a belt feeder,
21 vibrating hand feeder. In other cases that movement
22 is by mechanical means, such as a screw conveyor or
23 a belt conveyor. In some cases that movement is by
24 pneumatic means, so either a positive or negative
25 pressure and pneumatic conveying system. All of

1 those encompass flow, as I use the term.

2 Q (BY MR. ROSE) Why don't we talk about
3 some different terms, and that may help us going
4 forward. What is your understanding or
5 interpretation of the word viscosity?

6 A Viscosity is a term that is used to
7 describe the resistance to flow of a liquid.

8 Q So if something has high viscosity, that
9 means it has high resistance to flow?

10 A Yes.

11 Q Okay. What about elasticity?

12 MR. WERNER: Objection to scope.

13 A In reference to what?

14 Q (BY MR. ROSE) To the conveyance of
15 materials.

16 MR. WERNER: Same objection.

17 A I don't see the connection between
18 conveyance and elasticity, necessarily.

19 Q (BY MR. ROSE) Do you have a general
20 definition or understanding of the term elasticity?

21 MR. WERNER: Objection to form and scope.

22 A As I testified previously, Mr. Rose, in
23 terms of my PhD work, when it comes to metals,
24 elastic behavior or elasticity refers to a condition
25 in which the metal is capable of returning to its

1 initial condition or a condition that it had before
2 it was stressed or strained.

3 Q (BY MR. ROSE) Okay. And then the
4 plasticity, I think you had said elastic-plastic
5 fracture. Does plasticity have to do with when it
6 doesn't return?

7 A Yes. It's basically nonrecoverable
8 definition.

9 Q Okay.

10 A Again, those are the terms that are used
11 in reference to metals. Now, Jenike, in some of his
12 publications, has used the term plastic behavior in
13 a slightly different way.

14 Q What is that way?

15 MR. WERNER: Objection to form and scope.

16 A Most bulk solids don't have the same
17 elastic-plastic behavior as metals. Jenike used the
18 term plastic behavior to connote or describe a
19 condition where there is -- where you want to reach
20 the yield limit of the bulk material, and it begins
21 to flow in a nonrecoverable way, so there is --
22 while there is some similarity in terms of being
23 nonrecoverable, the terms are used somewhat
24 differently, or the term is used somewhat
25 differently when it comes to metal behavior.

1 Q (BY MR. ROSE) Okay. What does the
2 word -- the term yield limit mean?

3 MR. WERNER: Objection to scope.

4 A Again, the term is used differently when
5 it comes to metals than with regard to bulk solids.

6 Q (BY MR. ROSE) Right. I'm referring to
7 how you used it in your last answer. I didn't
8 understand that term, and I'm hoping to get some
9 clarification.

10 MR. WERNER: Same objection.

11 A Perhaps I can give a simple example of
12 what a yield limit is.

13 Q (BY MR. ROSE) Sure.

14 A Consider that we have a container like
15 this coffee cup, and we fill this container with a
16 bulk solid, and we compress the particles in the
17 container to a certain extent. We remove that load.
18 The material is, in most cases, not going to spring
19 back in any way. It's going to basically retain the
20 consolidation that it had as a result, first of all,
21 of gravity, and, second, by the application of this
22 load.

23 Now, if I take this container and in some
24 way remove the sidewalls of the container so all I
25 have now is a column of particles that are cohesive

1 enough so that they retain the shape that they were
2 in here, if I now take that column of particles and
3 now apply a vertical load and keep increasing that
4 load until all of a sudden that particle -- that
5 mass of particles collapses, that's a rough
6 description of the yield limit of that bulk
7 material.

8 Q Okay. Can you describe what a Newtonian
9 fluid is?

10 MR. WERNER: Objection to scope.

11 A A Newtonian fluid is one that has a
12 particular stress shear strain relationship.

13 Q (BY MR. ROSE) Could you give me an
14 example of what you mean by that?

15 MR. WERNER: Objection to form and scope.

16 A Water would be a good example of a
17 Newtonian fluid.

18 Q (BY MR. ROSE) When you say it has a
19 particular stress shear strain relationship, what
20 does that mean?

21 MR. WERNER: Objection to scope.

22 A I really can't define it any better than
23 that.

24 Q (BY MR. ROSE) Okay. Do you know what
25 shear stress is?

1 A Yes.

2 MR. WERNER: Objection to scope.

3 Q (BY MR. ROSE) What's that?

4 A First of all, I talked about shear strain,
5 not shear stress.

6 Q Okay.

7 A But do you want me to define shear stress?

8 Q Let's start with shear stress and shear
9 strain, and maybe you can explain what the
10 differences are to me.

11 A Well, the term stress, in the field of
12 mechanical engineering, is what is called a tensor
13 quantity, and that means that you can have both
14 normal stresses and normal -- not as different from
15 abnormal, but normal in the sense that they are
16 stresses that are applying perpendicular to the face
17 of that solid or collection of particles. So you
18 have normal stresses and you have shear stresses.
19 So normal stresses are applied perpendicular to a
20 face of either a solid or an accumulation of solids,
21 whereas shear stresses are stresses that are applied
22 parallel to that face.

23 Q So you had said a Newtonian fluid is one
24 that has a particular shear stress-strain
25 relationship. Does that mean a relationship between

1 the shear stress -- Can you describe what that
2 means?

3 MR. WERNER: Objection to the form.
4 Scope. Asked and answered.

5 A Well, I've described to you shear stress.

6 Q (BY MR. ROSE) Okay.

7 A Strain, again, is a tensor quantity.
8 There can be normal strain, which is perpendicular
9 to a face, and shear strain, which is parallel to a
10 face, so it's deformation in the shearing direction.

11 Q So it has to do with -- Correct me if I'm
12 wrong. It has to do with, if there's stress in the
13 parallel direction, it has to do with the strain in
14 the perpendicular direction?

15 A No.

16 Q I'm not a very good student. So what is
17 the particular shear stress-strain relationship of
18 the Newtonian fluid?

19 MR. WERNER: Objection to form. Scope.

20 A Perhaps the confusion is the way I
21 responded. What I intended to say and what I was
22 expected -- what I thought I was saying is, it's a
23 relationship between shear stress and shear strain.

24 Q (BY MR. ROSE) Okay. And then what is a
25 non-Newtonian fluid?

1 A Again, it's a fluid that doesn't behave in
2 a Newtonian fashion, so nondairy creamer might be an
3 example of a non-Newtonian fluid.

4 Q Going back to my college days, is Silly
5 Putty an example of a non-Newtonian fluid? I seem
6 to recall that in my classes.

7 MR. WERNER: Object to the scope.

8 A I wouldn't consider Silly Putty to be a
9 non-Newtonian fluid.

10 Q (BY MR. ROSE) Okay. Do you have an
11 understanding of the term thixotropic?

12 MR. WERNER: Objection to scope.

13 Q (BY MR. ROSE) Or thixotropy?

14 A As I recall, a thixotropic material is one
15 in which the behavior of the material changes as the
16 material is deformed or sheared. So it's not a
17 repeatable condition. For example, if you put
18 material into a container and were to stir that
19 material, the faster you stir it the properties
20 would change, depending on the speed of the
21 stirring.

22 Q Do you have a definition of what the term
23 paste means?

24 MR. WERNER: Objection to form. Are you
25 asking him with respect to the patent or generally?

1 MR. ROSE: 5'll ask generally. If it's
2 different for the patents, then we'll explore that.

3 A Paste is not a well-defined term. I
4 believe I stated in my declaration that my
5 understanding is that the patent office examiner
6 used the term paste or concluded the term paste and
7 sludge can be used interchangeably, and I agree with
8 that. It's not a term that is well-defined. It's
9 basically a non-free flowing material. And when
10 it's a paste or a sludge, again, I would use those
11 terms interchangeably.

12 Q (BY MR. ROSE) You would use those terms
13 interchangeably in connection with the patents or
14 that and in general?

15 MR. WERNER: Objection to scope.

16 A The latter.

17 Q (BY MR. ROSE) And how would you define a
18 sludge?

19 A A paste.

20 Q So there's no -- If you were to look at a
21 material, how would you determine whether it's a
22 paste or a sludge?

23 A I would look at how the material behaves
24 when something is done to affect that material, such
25 as pouring the material out of a container.

1 Q So how would a paste behave when poured
2 out of a container?

3 A I would expect, first of all, there may be
4 difficulty in pouring it at all, but if it does
5 pour, it's going to pour in a very nonuniformed
6 fashion. It may come out in clumps, or it may run
7 out for a while and stop moving. So intermittent or
8 no flow occurring as a result of trying to pour it
9 from a container.

10 Q What's a fluidizing agent?

11 MR. WERNER: Objection to scope.

12 A A fluidizing agent, as used in the field
13 of bulk solids handling, generally -- I'm sorry.
14 Fluidizing agent? Was that your question?

15 Q (BY MR. ROSE) Yes.

16 A In the field of bulk solids handling, the
17 term fluidizing agent usually refers to a gas,
18 typically air, but it could be other gasses, that
19 change the properties of the material that is being
20 fluidized.

21 Q And how does the air change or the gas
22 change the properties of the material?

23 MR. WERNER: Objection to form and scope.

24 A Basically what happens -- And this doesn't
25 always happen. It depends on the material that's

1 being fluidized. But if a material is capable of
2 being fluidized, the gas does a couple of things.
3 One, it will tend to surround the particles,
4 surround each particle, and in so doing separate the
5 particles microscopically from each other. And at
6 the same time there would be development of what's
7 called a pressure drop, where you have higher
8 pressure -- that is, gas pressure -- at one point,
9 lower gas pressure at another point, and so you have
10 what's called a delta P or a pressure drop across
11 that bed of particles. And the combination of
12 surrounding gas around the particles and the
13 pressure drop thereby changes the behavior of that
14 mass of particles.

15 Q (BY MR. ROSE) Can paste be fluidized?

16 MR. WERNER: Objection to form and scope.

17 A Given that paste is not a well-defined
18 term, it seems to me possible, although unlikely,
19 that you could fluidize a paste, but it is possible.

20 Q (BY MR. ROSE) And why would it be
21 unlikely?

22 MR. WERNER: Objection to form and scope.

23 A It would be unlikely because of the
24 cohesiveness of most pastes, that it's difficult to
25 separate individual particles from each other and

1 thereby allow the gas to surround the particles.
2 And furthermore the -- because of the cohesiveness
3 of the paste, while it's possible to establish a
4 pressure drop across a paste, it's not going to have
5 the same effect as it would if it were a more
6 free-flowing material.

7 Q (BY MR. ROSE) And I'd like to go back to
8 your declaration that's Exhibit 1044. And on
9 page 4, paragraph 13, you identify materials that
10 Jenike & Johanson has tested. Do you see that?

11 A Yes.

12 Q And you identify wet and/or sticky bulk
13 materials such as corn stover and others. Is corn
14 stover a paste?

15 MR. WERNER: Objection to form and scope,
16 and incomplete.

17 A I don't have a recollection of that.

18 Q (BY MR. ROSE) Can you tell me what corn
19 stover is?

20 A It's some form of refuse from a stalk of
21 corn, but I don't know specifically.

22 Q Wood chips are not paste, are they?

23 A No.

24 Q What about cellulose acetate?

25 A It's probably not a paste.

1 Q And what about ceiling tile scrap from a
2 wet scrubber?

3 A I would characterize that as a paste or a
4 sludge.

5 Q Or a sludge. And what -- Can you describe
6 what ceiling tile scrap from a wet scrubber is?

7 A I don't know that I can do it justice.
8 It's basically a refuse material in a plant that is
9 producing ceiling tiles. There is a so-called
10 scrubber, which is used to remove particulate
11 materials so it doesn't get into the environment.
12 In this case it's a wet scrubber as opposed to a dry
13 scrubber, so the material that is collected on that
14 scrubber would be the ceiling tile scrap.

15 Q So it says a wet scrubber. Is water used
16 to scrub it?

17 A Not necessarily. It's some liquid.
18 Probably water, but some liquid.

19 Q Have you heard use of the term dense phase
20 or dense phase conveyance?

21 A Yes.

22 Q What is that?

23 A Dense phase is understood to be the
24 opposite of dilute phase, in that it's basically
25 nonsuspension conveying of particles.

1 Q So dilute phase is suspension conveying of
2 particles?

3 A Yes.

4 Q Is that what you were describing regarding
5 fluidizing agent, when the air particles surround
6 the individual solid particles?

7 A That's not what I was thinking of in
8 response to that question, but I suppose you could
9 consider it in that fashion.

10 Q Okay. That's what I'm trying to
11 understand, is what is suspension conveying?

12 A Suspension conveying is a form of
13 pneumatic conveying in which the individual
14 particles are suspended within the pipeline.
15 There's no -- And so you have individual particles
16 separate from each other, whereas dilute phase,
17 those particles drop out of suspension, and now you
18 have particles in contact with each other, either at
19 the bottom of the pipeline, or perhaps, in some
20 cases, actually encompassing the entire diameter of
21 the pipe.

22 Q So in dense phase conveyance the particles
23 are suspended by the air; is that correct?

24 MR. WERNER: Objection to form.

25 A No.

1 Q (BY MR. ROSE) Okay. I'm getting
2 backwards then. In suspension conveying the solid
3 particles are surrounded by the air and therefore
4 they are suspended. Is that dense phase or is that
5 dilute phase?

6 MR. WERNER: Objection to form.

7 A You're confusing, with all due respect,
8 the matter just a little bit. In both dilute phase
9 and dense phase you could have air around the
10 particles. In fact, just in a bunch of particles
11 here on the table, there's going to be air
12 surrounding the particles. The difference between
13 the two is, in dilute phase conveying, the air
14 velocity is such that the particles remain suspended
15 in the airstream, so they are separate from each
16 other. They're not dropping out of suspension onto
17 the bottom of the pipe, if it's a horizontal pipe.

18 Whereas in dense phase conveying the
19 velocity is lower, air velocity is lower, to the
20 point where the particles drop out of suspension and
21 there is either what's called a moving bed of
22 particles on the bottom of the pipe, if it's a
23 horizontal pipe, or a condition called plug flow
24 dense phase, where you have actually an accumulation
25 of particles that occupy the entire diameter of the

1 pipe itself.

2 Q (BY MR. ROSE) So is there some way that
3 the volume -- the fraction of solid to air is used
4 to define dense phase and dilute phase?

5 A Yes.

6 Q Okay. Can you describe that for me?

7 A One uses the -- The common term is solids
8 loading ratio, which is defined as the mass of
9 solids to the mass of air, and so in dilute phase
10 conveying, that ratio typically ranges from 0 up to
11 roughly 15. Whereas with dense phase conveying,
12 it's higher than 15, typically 25 to 100 to 150, and
13 any -- quite a wide range, but those are basically
14 the regions within which dilute phase stops and
15 dense phase begins.

16 Q Okay. So if I'm understanding correctly,
17 if your ratio of the mass of solids to the mass of
18 air is from 0 to 15, that would be considered dilute
19 phase?

20 MR. WERNER: Objection to the form and
21 scope.

22 A That's -- that's generally the range over
23 which dilute phase occurs, but, again, dilute phase
24 is defined by suspension conveying of the material.
25 So that's -- it's, again -- Well, I don't know if I

1 can define it any better than that.

2 Q (BY MR. ROSE) Okay. Are you familiar
3 with the term bridging?

4 A Yes.

5 Q What does that mean?

6 A Bridging, as used in this field of bulk
7 solids technology, refers to a condition in which a
8 stable arch or dome -- those terms, arch, dome or
9 bridge used interchangeably -- but basically a
10 stable flow obstruction -- or a stable obstruction
11 to flow occurs, usually at the narrowest
12 cross-section of a container.

13 Q Is that something that would occur during
14 dense phase conveyance?

15 MR. WERNER: Objection to form.

16 A I guess I could answer your question a
17 couple of ways. First of all, if bridging occurs,
18 there won't be any conveying, whether it's dilute or
19 dense. The material won't move out of the container
20 that is a part of the dense phase conveying system.
21 And, second, as I alluded to just a moment ago, it's
22 a condition that would occur in the container
23 upstream of the equipment. So it could be a bin, a
24 silo, a hopper, a blow tank, any number of storage
25 vessels in which bridging could occur, and if it

1 does occur there's no flow of the material and hence
2 no conveying.

3 Q (BY MR. ROSE) That's something that would
4 occur before the material gets to the pneumatic
5 conveyor?

6 A Yes.

7 Q We talked a little bit about the term
8 thixotropic or thixotropy. Are pastes thixotropic,
9 in your view?

10 MR. WERNER: Objection to form and scope.

11 A They most likely are, yes.

12 Q (BY MR. ROSE) And why do you say that?

13 MR. WERNER: Objection to form and scope.

14 A In my experience, most pastes and sludges
15 change their property as they are -- as they are
16 acted upon, such as stirring in a container.

17 Q (BY MR. ROSE) So as a paste sits and is
18 not acted upon, does it set up or congeal? Is that
19 what happens?

20 MR. WERNER: Objection to form.

21 A That's one of the things that can happen,
22 yes.

23 Q (BY MR. ROSE) Okay. And then by causing
24 some movement such as by stirring or shaking, that
25 congealing can be, I guess, broken up?

1 MR. WERNER: Objection to form. Scope.

2 A It can be, yes.

3 Q (BY MR. ROSE) And do pastes -- We talked
4 about bridging. Do pastes have an issue with
5 bridging?

6 MR. WERNER: Objection to form.

7 A Very often they do, yes.

8 Q (BY MR. ROSE) Pastes are not particulate
9 solids; is that correct?

10 MR. WERNER: Objection to form.

11 A Pastes -- A paste is a combination of
12 particles and a liquid of some sort, whether it be
13 water, oil, or some other liquid. So there are
14 particulates within the paste, but there's also a
15 liquid phase as part of that.

16 Q (BY MR. ROSE) Are drill cuttings
17 thixotropic?

18 MR. WERNER: Objection to form.
19 Incomplete.

20 A They could be, yes. They are a paste, in
21 my opinion, or a sludge, so they could be
22 thixotropic, yes.

23 Q (BY MR. ROSE) What are the shear stress
24 characteristics of a paste?

25 MR. WERNER: Objection to form and scope.

1 A Again, the material is not a well-defined
2 term, or the term paste is not well-defined, so
3 it's -- The response of a paste to shearing could
4 vary considerably. It could be a material where
5 deformation occurs relatively easily, and, for
6 example, in pouring from a container, the material
7 requires little stress in order for movement to
8 occur, or it could be very non-free flowing and have
9 difficulty in being poured from a container or
10 reactive to stress.

11 Q (BY MR. ROSE) Are drill cuttings the same
12 as drilling mud?

13 A My understanding is that the drill
14 cuttings very often are mixed with drilling mud but
15 that the two are different from each other. And as
16 I understand the technology on an oil rig, one
17 attempts to separate, as much as possible, the drill
18 cuttings from the drilling mud so that the mud can
19 be reused, whereas the drill cuttings need to be
20 disposed of.

21 Q Is barite the same as drilling mud?

22 MR. WERNER: Objection to scope.

23 A I would characterize barite as a potential
24 component of drill cuttings but not of the drilling
25 mud itself.

1 Q (BY MR. ROSE) What about water? Can
2 water be the same as drilling mud?

3 MR. WERNER: Objection to form and scope.

4 A Again, I would -- I'm of the opinion that
5 water could be and often is a component of drilling
6 mud and also a component of drill cuttings.

7 Q (BY MR. ROSE) You mentioned being on the
8 oil rig. Have you ever been on an oil rig?

9 A No.

10 Q Have you ever seen actual drill cuttings?

11 MR. WERNER: Objection to form.

12 A I have seen photos and videos of examples
13 of drill cuttings, yes.

14 Q (BY MR. ROSE) But not the actual physical
15 cuttings themselves?

16 MR. WERNER: Objection to form.

17 A I've not touched and felt drill cuttings,
18 no.

19 Q (BY MR. ROSE) Have you ever done any
20 testing of drill cuttings?

21 A I have not personally. I don't believe my
22 firm has, either.

23 Q Have you witnessed cuttings coming off of
24 a shale shaker?

25 MR. WERNER: Objection to form.

1 A I've referenced in my declaration two
2 videos that show examples of drill cuttings.

3 Q (BY MR. ROSE) In preparing your and
4 coming to your opinions, did you interview anybody
5 who had been on an oil rig or worked firsthand with
6 drill cuttings?

7 A Not that I recall, no.

8 Q Can you tell me what, to your knowledge,
9 makes up -- make up drill cuttings?

10 A My understanding of drill cuttings is that
11 it is the refuse that is brought up with the
12 drilling mud as drilling on an oil rig, so basically
13 it's the -- whatever the particulate matter of the
14 earth, if we call it that, under the ocean bed or
15 constitutes the ocean bed, whatever that material
16 might be, shale, limestone, any number of materials
17 that are brought up with the drilling mud.

18 Q So just to make sure I'm understanding
19 correctly, the drill is going into the earth and
20 there's drilling mud. What's the purpose of the
21 drilling mud?

22 A Basically to lubricate the drill.

23 Q Okay. And then the drilling mud is
24 brought back up, along with other materials?

25 A Yes.

1 Q And those materials are the earth?

2 A Yes.

3 Q Okay. So there's drilling mud and earth
4 coming up. Is there anything else that comes up in
5 that material?

6 A I suppose it's possible that there could
7 be some metal particles if there's any wear of the
8 drill itself. But in most cases, I would believe
9 the preponderance of the material would be earth
10 particles.

11 Q And the drilling mud?

12 A And the drilling mud and any water or oil
13 that comes as part of that.

14 Q And then that would be in the form of a
15 slurry?

16 MR. WERNER: Objection to form and scope.

17 A I believe as it would come up from the
18 drilling rig, it could be in the form of a slurry,
19 yes.

20 Q (BY MR. ROSE) Okay. Then what happens to
21 that material next?

22 MR. WERNER: Objection to form.

23 A It's -- As much as possible, the drilling
24 mud is separated from the drill cuttings, and the
25 drilling mud is then reused, and the cuttings are

1 then disposed of.

2 Q (BY MR. ROSE) So then the drill cuttings
3 and the drilling mud are separated?

4 MR. WERNER: Objection to form.

5 A An attempt is made to separate, as much as
6 possible, the two, yes.

7 Q (BY MR. ROSE) Okay. And how is that
8 done?

9 MR. WERNER: Objection to form. There's
10 18,000 offshore oil rigs in the world or something.
11 This is a little vague.

12 Q (BY MR. ROSE) I mean, to your knowledge.

13 A I don't know all the ways that it's done.
14 I would think there's some sort of a screening
15 operation, typically, but there could be a number of
16 ways that that separation occurs.

17 Q Is centrifuge one of them?

18 A It could be. Again, I don't know all of
19 the ways that separation occurs.

20 Q And you said that you saw video of a
21 shaker?

22 A I saw video of drill cuttings that I
23 believe had come from a shaker.

24 Q Okay. Just so we're clear --

25 MR. ROSE: 1037.

1 (Previously Marked Deposition Exhibit
2 Number 1037 introduced to the witness.)

3 Q (BY MR. ROSE) I've just handed you what
4 has been identified as Exhibit 1037. Can you
5 describe what that is?

6 A Exhibit 1037 is, as I understand it, a
7 still shot from one of the videos that I referenced
8 in my declaration.

9 Q And the brown material, what's that?

10 A That's the drill cuttings.

11 Q Okay. What is the white thing in the
12 bottom?

13 A I believe it's a nozzle, but you'd have to
14 look at the video to be sure.

15 Q Okay.

16 MR. WERNER: Could you describe what
17 you're identifying as the white thing?

18 MR. ROSE: To the left of -- it looks like
19 to be a timestamp. It says 7/11/2000, 1506, and
20 then there is something that appears to be white and
21 silver to the left of that.

22 MR. WERNER: Thank you.

23 (Previously Marked Deposition Exhibit
24 Number 1038 introduced to the witness.)

25 Q (BY MR. ROSE) You now have before you

1 what was marked as Exhibit 1038. Can you describe
2 for me what is shown in this exhibit?

3 A This is similar to 1037, in that, as I
4 recall, this is a still shot from one of the videos
5 that I've referenced in my declaration showing drill
6 cuttings, an example of drill cuttings.

7 Q What's the container that the drill
8 cuttings are in?

9 A It appears to me from this still -- And
10 I'd like to refer to the video itself to be certain,
11 but it would appear to me that it's some sort of a
12 hopper configuration, a conical hopper section.

13 Q And is this depicting the cuttings flowing
14 into the hopper?

15 A That's what it appears to me to be, yes.

16 (Previously Marked Deposition Exhibit
17 Number 1039 introduced to the witness.)

18 Q (BY MR. ROSE) And I've now handed you
19 Exhibit 1039. Can you tell me what you see there?

20 A Again, this is similar to the other two,
21 in that I believe this is a still from one of the
22 videos that I referenced in my declaration, and this
23 is showing drill cuttings in a drum, a steel drum,
24 and there is a spoon or spatula that is at the top
25 center of this. There appears to be somebody just

1 standing behind that spoon or spatula.

2 Q Okay. Now, the cuttings that we're
3 looking at here in Exhibit 1039, are those with the
4 drilling mud already removed or is that before the
5 drilling mud gets removed?

6 A My recollection is that this is after as
7 much mud has been removed as was possible on this
8 particular rig.

9 Q And so this would qualify as a paste?

10 A Yes.

11 Q Do the drill cuttings, do they have a
12 particular particle size?

13 MR. WERNER: Objection.

14 Q (BY MR. ROSE) I'm talking in general, not
15 just in the picture.

16 MR. WERNER: Object to form.

17 Q (BY MR. ROSE) To your knowledge do the
18 drill cuttings -- What are the particle sizes?

19 A Well, as I testified earlier, Mr. Rose,
20 drill cuttings, as I understand the term, involve a
21 mixture of particles and some liquid. Could be oil,
22 could be water, some other liquid. And the
23 particles could vary in size and shape, depending on
24 both the formation through which the drill is
25 cutting the material as well as the operation of the

1 drill itself, so there's no defined size or size
2 range.

3 Q Okay. And there's no air in between the
4 particles in the drill cuttings; is that correct?

5 MR. WERNER: Objection to form.

6 A There's no air in the drill cuttings that
7 are shown in these photographs, no.

8 Q (BY MR. ROSE) Right. And if left to sit
9 will the liquid separate from the solids in the
10 drill cuttings?

11 MR. WERNER: Objection to form.

12 A Typically it would, but it doesn't have
13 to.

14 Q (BY MR. ROSE) So you could decant off the
15 liquid and be left with a dry solid?

16 A No. I wouldn't describe it that way.

17 Q So there would always be some liquid that
18 would be holding the particles together?

19 MR. WERNER: Objection to form. This is a
20 boundless hypothetical.

21 A I would expect that there's always going
22 to be some liquid in contact with the particles,
23 whether some of that liquid separates or not.

24 Q (BY MR. ROSE) To the extent there's
25 solids and there are liquids, those solids are in a

1 suspension of whatever amount of liquid there is?

2 MR. WERNER: Objection to form.

3 A Suspension is perhaps not the correct
4 term. I would say that the particles are surrounded
5 by a liquid.

6 Q (BY MR. ROSE) And just so I'm clear, you
7 didn't do any testing or modeling with the drill
8 cuttings to measure the particle size; is that
9 correct?

10 MR. WERNER: Objection to form.

11 A As I testified, I didn't actually look at
12 or receive a sample of drill cuttings, no.

13 Q (BY MR. ROSE) Okay. Would drill cuttings
14 be characterized as Newtonian or non-Newtonian
15 materials?

16 A Non-Newtonian.

17 MR. WERNER: Objection to scope.

18 Q (BY MR. ROSE) And drill cuttings won't
19 flow under their own weight, will they?

20 MR. WERNER: Objection to form and scope.

21 A They can.

22 Q (BY MR. ROSE) Okay. But not always?
23 Well, strike that.

24 There are -- Some drill cuttings can flow
25 under their own weight and some don't.

1 MR. WERNER: Objection to the form of the
2 question and foundation.

3 Q (BY MR. ROSE) Is that a fair
4 characterization?

5 A Given that drill cuttings is such a broad
6 term, I would expect that there are conditions in
7 which drill cuttings would flow under their own
8 weight and other conditions where they would not.

9 Q Okay. In practice, to your knowledge,
10 when the materials come up from the drill that
11 include both the drill cuttings and the drill mud,
12 there's always at least some form of a step taken to
13 try to separate, as much as possible, the drilling
14 mud from the cuttings. Is that your understanding?

15 MR. WERNER: Objection to form, scope and
16 foundation.

17 A That is my understanding, yes.

18 Q (BY MR. ROSE) And so if one of those
19 methods of separation is the use of a shaker to
20 vibrate the cuttings, having been shaken and moving
21 from the vibration, would those cuttings flow more
22 freely due to their thixotropic properties?

23 MR. WERNER: Objection to form and
24 foundation and scope.

25 A No. I would think just the opposite.

1 They probably don't flow as readily because of the
2 removal of the mud.

3 Q (BY MR. ROSE) Comparing the -- I
4 understand the removal of the mud would make them
5 flow less, but my question is comparing drill
6 cuttings that have been shaken in a shaker compared
7 to drill cuttings that have not been shaken and have
8 just sat after the mud is removed. The cuttings
9 that have been shaken would move more freely than
10 those that have not been shaken due to their
11 thixotropic properties; is that right?

12 MR. WERNER: Objection to form, scope and
13 foundation.

14 A There's going to be a time-dependent
15 behavior to the material, so I would expect that in
16 the process of being shaken, that the properties, as
17 a result of that shaking action, are going to be
18 different than if that shaken material is then
19 allowed to sit for a period of time.

20 Q (BY MR. ROSE) All right. After it sits
21 for a period of time, it's not going to flow as
22 freely as right after it had been shaken. Is that a
23 fair characterization?

24 MR. WERNER: Objection to form.
25 Incomplete. Foundation.

1 A It's difficult to make absolute
2 statements, given that drill cuttings is such an
3 undefined term, but in general I would say my answer
4 to your question is yes.

5 Q (BY MR. ROSE) Are you familiar with the
6 term or the concept of localization?

7 MR. WERNER: Objection to form and scope.

8 A Could you be -- Can you elaborate on that
9 a little?

10 Q (BY MR. ROSE) Yeah. The flow or the
11 characteristics can be nonuniform; for example,
12 after the shaking, as the cuttings are setting up,
13 some areas may still have better flow than other
14 areas during the process of it setting up or
15 congealing?

16 MR. WERNER: Object to form and assumes
17 facts.

18 A I would expect that that condition could
19 occur, yes, given that we're dealing with a
20 nonhomogeneous material.

21 MR. ROSE: Now is probably a good time for
22 a break.

23 (Whereupon, the proceedings were in recess
24 at 11:05 a.m. and subsequently reconvened at
25 11:16 a.m., and the following proceedings were

1 entered of record:)

2 Q (BY MR. ROSE) Dr. Carson, I wanted to
3 follow up on one thing that you had said just before
4 the break. You had mentioned -- We were talking
5 about the drill cuttings. You said, given that
6 we're dealing with a nonhomogeneous material. What
7 did you mean by a nonhomogeneous material?

8 A What I mean by that is, it's a material
9 that can have extremely variable constituents,
10 extremely variable properties, depending on the
11 material below the seabed or the ocean bed or the
12 riverbed, whatever, where the drilling is taking
13 place, what that material is, how the drill
14 operates, so it's a material that is extremely
15 variable in both its appearance, its condition, its
16 properties.

17 Q Okay. I want to go back now and talk
18 about granular materials as opposed to pastes. Am I
19 understanding correctly that granular material, it
20 does contain air for flow, such as in dense phase or
21 dilute phase?

22 MR. WERNER: Objection to form.

23 A I wouldn't define it that way.

24 Q (BY MR. ROSE) How would you define it?

25 A Well, as I've testified earlier, Mr. Rose,

1 I think the term granular material might be
2 misconstrued or is misconstrued by some people. I
3 prefer the term bulk material or bulk solid.

4 Q Okay.

5 A A bulk solid, as I testified previously,
6 consists of discrete solid particles that are then
7 caused to move, to flow, whether it be in a
8 container -- from a container to some other
9 container or process, or to move via a feeding or
10 conveying device, whether it be pneumatic or
11 mechanical, or it may be moving in a vessel where
12 there's some reaction taking place. Now, those
13 particles, in most cases, are -- in fact, I would
14 say in all cases -- are surrounded by some -- Let me
15 back up. Strike that.

16 Those particles, in most cases, have a
17 gas, typically air, that is either within the
18 particle itself or more often surrounding the
19 particle. There often is some liquid -- typically
20 water, but, again, could be oil or any other type of
21 liquid -- that is either within the particles or on
22 the surface of the particles or in some cases within
23 the void space between the particles. So the term
24 bulk solid encompasses a very wide range of
25 conditions.

1 Q Within the broad scope of the term bulk
2 solid, as you've used it, is there some substantive
3 bulk solids that would include such things that are
4 significantly smaller than this table, such as sand
5 or ash?

6 A Yes. As I testified earlier, bulk solids
7 vary, anything from submicron powders to particles
8 of the size of this table.

9 Q Right. What would you call those, the
10 smaller ones that are submicron or up to the sand or
11 something along those lines, as opposed to a table?
12 What would you call that?

13 A The term powder is often used to describe
14 particles. This is not -- again, this is not a
15 strict definition, certainly not a universally
16 accepted definition. But typically the term powder
17 is used to refer to particles that are less than
18 around a hundred microns in size.

19 Q Okay. What about something the size of
20 wood chips that you identified in paragraph 13?
21 Certainly much smaller than the table. That
22 wouldn't be considered a powder, would it?

23 A No. It would be considered -- again, all
24 of -- Everything from submicron to this table is
25 considered, in my opinion, and generally accepted,

1 as a bulk solid, and there's one extreme on the
2 lower end of the particle size range, which is
3 typically referred to as a powder, and it's a subset
4 of a bulk solid. From that point on up, there's
5 really no universal term that's used to describe
6 that bulk solid.

7 Q You had said in paragraph 13 that Jenike &
8 Johanson had tested pneumatic conveying of
9 materials. You identified powders, pellets and
10 granular bulk solids. Again, does the term granular
11 give some indication as to the size of the
12 particles?

13 A To some people it does. Again, it's a
14 term of art that connotes something larger than a
15 powder, but there's no strict definition of where a
16 powder stops and a granular bulk solid begins.

17 Q But in those instances for powders,
18 pellets and granular bulk solids, when those were
19 conveyed they would be surrounded by air?

20 MR. WERNER: Objection to form.
21 Foundation.

22 A In most cases that's true, but it's not
23 exclusive.

24 Q (BY MR. ROSE) And in those cases of the
25 powders, pellets and granular solids, those

1 materials are not thixotropic; is that correct?

2 MR. WERNER: Objection to form and scope.

3 A Again, it's difficult to make generalities
4 in this field. I would say in most cases the answer
5 is no, but I'm thinking of tar sands as an example
6 of a bulk solid that is also thixotropic.

7 Q (BY MR. ROSE) What are tar sands? I'm
8 not familiar with that term.

9 A The term tar sands or oil sands is a
10 formation, principally, in Alberta, Canada, or there
11 are other parts of the world that have this, but
12 it's basically an oil-rich formation that -- in
13 which one separates the oil from the refuse and sold
14 on the open market.

15 Q I want to turn and talk briefly about your
16 definition of a person of ordinary skill in the art.
17 And I'm on Exhibit 1044 at paragraph 29. You
18 identify the person of ordinary skill as a person
19 with a bachelor's degree in science or engineering,
20 such as mechanical, industrial or chemical
21 engineering, along with five years of experience in
22 the design of systems for the handling of bulk solid
23 and fluid materials, including through the use of
24 pneumatic conveyance.

25 Do you see that?

1 A I do see it. You left out two words in
2 two occasions here. I said at least a bachelor's
3 degree and at least five years experience.

4 Q On what do you base that conclusion? How
5 did you come up with those terms?

6 A I don't recall how I arrived at that
7 particular wording. It could have been in
8 discussion with my colleagues or attorneys here at
9 this firm, but it's my best description of a person
10 that I would consider to have ordinary skill in the
11 art.

12 Q And the other alternative, I think you
13 said, is a person who had a graduate degree, a
14 master or a PhD in an engineering or related
15 discipline. She or he would have at least three
16 years of experience in the design of systems for
17 handling and transfer of bulk solid fluid materials,
18 including pneumatic conveyance.

19 Do you see that?

20 A Yes.

21 Q And where did you come up with that
22 conclusion?

23 A My answer would be the same as my previous
24 one. I don't recall.

25 Q Neither of your definitions requires that

1 the person of skill have any experience on a
2 drilling rig; is that correct?

3 A That's correct.

4 Q Or any experience in conveying drill
5 cuttings?

6 A That's correct.

7 Q Why is that?

8 A Because, in my opinion, it's not necessary
9 for a person to have experience on an oil rig,
10 because it's simply another location where a
11 pneumatic conveying system could be used and is used
12 as far as these patents are concerned. And,
13 similarly, it is not necessary for a person to have
14 experience with drill cuttings, because, again,
15 drill cuttings is not a well-defined term. It's
16 basically a paste or a sludge that is being
17 processed and conveyed either on a drilling rig or
18 from a drilling rig to a boat or a ship.

19 So as I see it, this is basic pneumatic
20 conveying 101, that you're taking a material, you
21 are placing that material in a blow tank, you're
22 pressurizing that blow tank and you're conveying
23 material. Whether that system is on an oil rig or
24 on an industrial plant, whether the material is
25 drill cuttings or some other non-free flowing

1 material, to me, those are immaterial. And one
2 should be able to take from the literature, from
3 other patents, from books and publications, and use
4 that basic pneumatic conveying 101 technology to
5 design and operate such a system.

6 Q I'd like to turn to page 41 of your
7 declaration, Exhibit 1044. And there, beginning
8 with paragraph 91, you begin a discussion of the
9 Laster reference. Do you see that?

10 A Yes.

11 Q And there is a statement to Laster
12 teaching the use of a pneumatic pumping apparatus
13 for pumping drilling mud and like thick, difficult
14 to pump slurry fluids that can be used on drilling
15 rigs. And then next you say, Laster describes
16 drilling mud as a thick, viscous fluid that is quite
17 thick and difficult to pump or move when it is used
18 up. And then the next sentence you talk about
19 Laster directed to drilling mud that had been used
20 to the point that it has become too polluted or too
21 filthy to reclaim. Then you say, one of ordinary
22 skill would understand this to be indicating that
23 drilling mud has been so contaminated with drill
24 cuttings that it can no longer be used for the
25 drilling operations and must be removed from the

1 site.

2 How would somebody who's not had any
3 experience with drill cuttings or on a drilling rig
4 understand that what is being said in Laster is that
5 the mud has been so contaminated with drill
6 cuttings?

7 A I think that a person of ordinary skill
8 could make that determination by going to the
9 literature and reading whatever the patents or
10 various publications about operation of a
11 drilling -- of a driller -- oil drilling rig.

12 Q But you didn't identify anything other
13 than Laster in order for the person of ordinary
14 skill to come to that conclusion in this case; is
15 that right?

16 A That's right.

17 Q Now, we've heard the term used today
18 non-free flowing. Isn't non-free flowing the
19 opposite of free-flowing?

20 MR. WERNER: Objection to form.

21 A Yes. I would say that non-free flowing is
22 not free-flowing, by definition.

23 Q (BY MR. ROSE) What I've handed you is the
24 petition regarding the '062 patent, claims 1 through
25 29. And I'd like to direct your attention to the

1 bottom of page 11, and here the petitioner is
2 talking about what is free-flowing and cites to a
3 dictionary definition for free-flowing that is,
4 quote, characterized by easy freedom in movement,
5 progression or style.

6 Do you see that?

7 A Yes.

8 Q So non-free flowing is defined in terms of
9 freedom. Emphasis is on the word freedom, correct?

10 MR. WERNER: Objection to form. Scope.

11 Q (BY MR. ROSE) I'll hand you another
12 document that was also -- has been previously marked
13 as Exhibit 1043.

14 (Previously Marked Deposition Exhibit
15 Number 1043 introduced to the witness.)

16 Q (BY MR. ROSE) And that dictionary
17 definition is found here for free-flowing,
18 characterized by easy freedom in government,
19 progression or style -- in movement, progression or
20 style. Sorry. And, again, so here the definition
21 relied on by the petitioner defines non-free flowing
22 in terms of freedom, correct?

23 MR. WERNER: Objection to form and scope.

24 A No. I wouldn't say that is correct. If
25 I -- These are dictionary definitions, as stated in

1 this petition, and just prior to that I indicate, on
2 the second line of this paragraph, the specification
3 does not provide any guidance concerning how to
4 differentiate between these two categories, namely
5 free-flowing versus non-free flowing. Further --
6 And I'm quoting now. Further, as stated in
7 Exhibit 1016, the material itself cannot be
8 characterized as non-free flowing, close quotes.
9 Continue: In discussing the flowability of powders
10 around the time that the alleged invention of the
11 '062 patent, Exhibit 1016, states, quote, flow
12 behavior is multi-dimensional, close quote, and
13 depends on many characteristics beyond the material
14 itself, such that, quote, no one test could ever
15 quantify flowability, close quotes.

16 Q (BY MR. ROSE) But in the petition, at the
17 top of page 12, petitioner refers to something that
18 is non-free flowing if it does not freely move,
19 i.e., it exhibits some resistance to flow.

20 So is it your opinion that something is
21 non-free flowing if it exhibits some resistance to
22 flow?

23 A Yes.

24 Q Any resistance to flow?

25 MR. WERNER: Objection to form.

1 A No. I wouldn't go that far. Again, it's
2 not a very well -- there's not a strict bound
3 between something that is free-flowing and non-free
4 flowing. There's always going to be some resistance
5 to flow, just in terms of friction of particles
6 against a surface, for example.

7 Q (BY MR. ROSE) Right. That was sort of
8 where I was going with my next question. Doesn't
9 everything have some resistance to flow?

10 A Yes.

11 Q But not everything is non-free flowing.
12 Some things are free-flowing even though they have
13 some resistance to flow?

14 A Yes. And the point that is made here --
15 and I make this point in my declaration -- is that
16 one cannot look solely at the material itself but at
17 the system or the container in which that material
18 is placed. And there's an interaction between the
19 two. You can take what most people would consider a
20 free-flowing material, such as dry sand or plastic
21 pellets, and if you put that material in a hopper,
22 and that outlet size is smaller than, say, three or
23 four grains of that material, it won't discharge.
24 In that case you would say the material is non-free
25 flowing because it's not coming out. So it's not

1 just the material, but it's the system in which that
2 material is being handled that allows one to
3 differentiate, as crudely as is the case, whether
4 the material readily discharges or it does not
5 discharge.

6 Q We've already discussed, and I think
7 you've already agreed, but correct me if I'm wrong,
8 that when talking about drill cuttings, for example,
9 sometimes the drill cuttings are free-flowing and
10 sometimes they are non-free flowing, correct?

11 MR. WERNER: Objection to form.

12 A Again, Mr. Rose, drill cuttings is not a
13 term that, in my opinion, has any particular metes
14 or bounds as to its definition, depending on the
15 subsurface formation, the way that the material --
16 that the drill is operating, the drilling mud, how
17 much the mud is separated from the cuttings, can
18 have and does have extreme importance in terms of
19 the characteristics of the material. In most cases
20 I would expect that drill mud, drilling mud is
21 non-free flowing, but I could see a situation
22 where --

23 Q (BY MR. ROSE) You mean drill cuttings?

24 A Drill cuttings. Excuse me. Thank you for
25 the clarification. Where drill cuttings are

1 non-free flowing, but in some cases they could be
2 free-flowing.

3 Q And isn't the term non-free flowing used
4 in your field to mean -- at least sometimes to mean
5 does not generally flow freely by gravitational
6 force?

7 A That's a term that's often used, yes.

8 Q And in your declaration, when you talk
9 about non-free flowing at paragraph 41, you recite
10 to Exhibit 1016. That's on page 17. I'm sorry.
11 Page 17, paragraph 41, and the citation to
12 Exhibit 1016. If I got that wrong I apologize.

13 (Previously Marked Deposition Exhibit
14 Number 1016 introduced to the witness.)

15 Q (BY MR. ROSE) And I'll just hand you
16 Exhibit 1016. That's an article about powder
17 flowability, correct?

18 A Yes.

19 Q And drill cuttings are not powder,
20 correct?

21 MR. WERNER: Objection to the form and
22 foundation.

23 A I would say that, as a general rule, drill
24 cuttings are not powder, but I would point out to
25 you in this particular article, which is written by

1 two engineers in my company who work for me and have
2 for years, this particular article was written for
3 Pharmaceutical Technology magazine. And so in the
4 pharmaceutical world, most of the materials, bulk
5 solids that are handled, are less than a hundred
6 microns in size, and hence the term powder is used
7 very often to describe that material.

8 Having said that, in my opinion, the
9 description of flowability and how the system is as
10 important as the material itself in defining
11 flowability applies, whether it be a powder or any
12 other type of bulk solid.

13 Q (BY MR. ROSE) And so at page 62 of
14 Exhibit 1016, the author or authors state -- and I'm
15 on the first paragraph towards the top with the
16 sentence beginning with therefore. Therefore, a
17 more accurate definition of powder flowability is
18 the ability of powder to flow in a desired manner in
19 a specific piece of equipment.

20 Is that right?

21 A Yes.

22 Q So in that instance, the term of
23 free-flowing is tied to the piece of equipment or
24 the particular container?

25 A Yes. As I said earlier, it's a

1 combination of the material, the bulk solid and the
2 container, or the system in which you're trying to
3 get that material to move. And the following
4 sentence just reinforces what I said earlier about
5 taking the material, such as dry sand or plastic
6 pellets. It's only free-flowing if the container
7 opening is such that it allows the material to
8 discharge.

9 Q If you will, turn to page 74 of
10 Exhibit 1016. And in the middle column, the last
11 full paragraph, beginning with the word because. Do
12 you see where I'm referring, in the middle column?

13 A Which paragraph?

14 Q Page 74. I'm sorry.

15 A And which page?

16 Q The last full paragraph starts with the
17 word because.

18 A 74. Okay.

19 Q And six lines down in that paragraph
20 there's a sentence starting with, if the powder.

21 A Yes.

22 Q If the powder is sufficiently free flowing
23 and dense, gravity-driven flow into the rolls may be
24 possible.

25 Do you see that?

1 A Yes.

2 Q And further down, if the powder is poor
3 flowing so that compaction is required to improve
4 flow (as is often the case), then gravity-driven
5 feed into the rolls may be possible. So
6 free-flowing --

7 A Excuse me. May be impossible.

8 Q Impossible. That's right. I read that
9 incorrectly. So free-flowing is being described
10 here in terms of whether gravity-driven flow is
11 possible, correct?

12 MR. WERNER: Objection to form.

13 A In this particular instance, this whole
14 section, as you can see, near the top of the first
15 column on this page, this whole section has to do
16 with compaction processes.

17 Q (BY MR. ROSE) So it is possible to define
18 non-free flowing in terms of gravity.

19 MR. WERNER: Objection to form.

20 Q (BY MR. ROSE) Is that fair?

21 A It is possible, yes.

22 Q I want to turn you back to your
23 Exhibit 1044, your declaration. And I'm looking at
24 the -- in paragraph 43, just following your citation
25 to the two YouTube videos.

1 A Yes.

2 Q There's a sentence that says, while I do
3 not believe the boundaries of the term paste could
4 be ascertained by those of ordinary skill in the art
5 with any reasonable certainty, I believe the
6 materials shown in this video and photographs --
7 photographs would be considered by those of ordinary
8 skill in the art to qualify as examples of a paste
9 form of drill cuttings.

10 You use the term paste form. Is that
11 because there are other forms of drill cuttings that
12 aren't necessarily a paste?

13 A Again, Mr. Rose, as I've testified
14 numerous times here, drill cuttings, in my opinion,
15 are -- refer to a material that could be extremely
16 variable, and while in many cases the material would
17 be considered paste form, in other cases it could be
18 a nonpaste.

19 Q So isn't it a fair construction of the
20 term non-free flowing drill cuttings to be material
21 generated by the drilling of an oil well containing
22 a mixture of earth and drilling fluid or oil that
23 does not generally flow freely by gravitational
24 force?

25 MR. WERNER: Objection to form.

1 A On paragraph 41 I've provided a
2 description of what I believe those of ordinary
3 skill would believe to be the broadest reasonable
4 interpretation of the phrase non-free flowing drill
5 cuttings as used in the patent. And I state here,
6 quote, would cover, quote, a mixture of liquid and
7 earth-extracted material that exhibits some
8 resistance to flow, close quotes.

9 Q (BY MR. ROSE) We've talked about the use
10 of the term some resistance to flow. All drill
11 cuttings resist -- some resistance to flow, don't
12 they?

13 MR. WERNER: Objection to form.

14 A Yes.

15 Q (BY MR. ROSE) But we've also discussed
16 that there are some drill cuttings that are non-free
17 flowing and some drill cuttings that are
18 free-flowing, correct?

19 MR. WERNER: Objection to form.
20 Mischaracterizes testimony.

21 A There are some that are more free-flowing
22 than others.

23 Q (BY MR. ROSE) All right.

24 A Again, there's not a sharp demarcation,
25 whether it comes to drill cuttings or any other bulk

1 solid, between non-free flowing and free-flowing.

2 Q You will agree with me that there are some
3 drill cuttings that are not non-free flowing?

4 MR. WERNER: Objection to form and
5 foundation.

6 A It is -- Given, again, this is such a
7 broad range of materials, I could envision a
8 condition in which the material would be -- the
9 drill cuttings would be more on the free-flowing
10 side as opposed to the non-free flowing side. I
11 would think the majority of the cases, however,
12 we're talking about a non-free flowing material.

13 Q (BY MR. ROSE) Those materials you just
14 described as being on the more free-flowing side,
15 those would still exhibit some resistance to flow,
16 wouldn't they?

17 A Yes.

18 MR. WERNER: Objection to form.

19 Q (BY MR. ROSE) And so using your
20 definition at the bottom of page 16, paragraph 41,
21 using your definition, those cuttings that you just
22 described as being more on the free-flowing side
23 than on the -- I'm sorry. Yeah. More on the
24 free-flowing than the non-free flowing side, those
25 would still fall under your definition of non-free

1 flowing drill cuttings; isn't that correct?

2 MR. WERNER: Objection to form.

3 Incomplete hypothetical.

4 A Based on the definition I've provided
5 here, yes. Everything's going to have some
6 resistance to flow.

7 Q (BY MR. ROSE) We talked a little bit
8 earlier today about mass flow -- I believe you
9 mentioned that early on -- based on some work that
10 Dr. Jenike did in the early 1960s. Do you remember
11 our discussion about mass flow?

12 A Yes.

13 Q Mass flow appears in several of the claims
14 in these cases; isn't that correct?

15 A Yes.

16 Q You did not provide a definition of mass
17 flow, did you, in your declarations?

18 A I don't recall doing so. I might have.

19 (Previously Marked Deposition Exhibit
20 Number 1004 introduced to the witness.)

21 Q (BY MR. ROSE) Go ahead and hand you a
22 copy of Exhibit 1004, which is U.S. Patent
23 7,186,062. And, for example, if you could turn to
24 column 7 of the '062 patent, claim 9, that claim
25 reads, the method according to claim 8 wherein the

1 conical hopper portion has a predetermined cone
2 angle, wherein the cone angle enables mass flow of
3 the drill cuttings.

4 Do you see that?

5 A Yes.

6 Q And without going through all the other
7 claims that have mass flow, I'd like to turn your
8 attention to column 2 of the '062 patent,
9 Exhibit 1004. And at column 2, line 53, after the
10 word value -- Do you see where I am?

11 A Yes.

12 Q Okay. The patent states, then the flow
13 changes from core flow to so-called mass flow. In
14 the case of mass flow, the material descends as a
15 mass in a uniform way towards the outlet with all
16 the material moving.

17 Do you see that?

18 A Yes.

19 Q Is that a fair definition, a reasonable
20 definition for the term mass flow?

21 A The only -- In general I would say yes.
22 The only thing that I would disagree with is the
23 word uniform. The key for mass flow is to get all
24 of the material moving, which is the last part of
25 that sentence. If you have a tall cylindrical

1 vessel, then in the upper portion of that vessel the
2 material will move at a uniform velocity across this
3 cross-section.

4 In the converging hopper section,
5 typically a cone, at least in terms of these patents
6 are concerned, there's going to be a velocity
7 gradient, such that the material at the center is
8 going to flow faster than the material at the walls.
9 As long as the material is moving, that's considered
10 to be mass flow.

11 Q And if you will, turn to column 5 of
12 Exhibit 1004. And in particular I'd like to direct
13 you to the sentence beginning at line 39 of column
14 5. It begins with, due to the conical. Are you
15 there?

16 A Yes.

17 Q Okay. The '062 patent states, due to the
18 conical angle of the conical or hopper section 93
19 being less than a certain value, the material flow
20 out of the container 93 is of the type known as mass
21 flow and results in all of the material exiting
22 uniformly out of the container.

23 Do you see that?

24 A Yes.

25 Q So, again, that's the definition of mass

1 flow that's used in the '062 patent, correct?

2 A Yes.

3 Q And if we can take a look back at
4 Exhibit 1016 that we had out earlier.

5 MR. WERNER: Which exhibit?

6 MR. ROSE: 1016.

7 Q (BY MR. ROSE) And in particular I'm
8 looking at page 64. And there are two diagrams
9 there showing, on the right, mass flow. Do you see
10 that?

11 A Yes.

12 Q Would you agree that that's a depiction of
13 mass flow?

14 A Yes.

15 Q And in that depiction is the material not
16 flowing uniformly?

17 MR. WERNER: Objection to form.

18 A It depends how one defines uniformly. And
19 I'm not certain exactly how Mr. Snowdon was using
20 that term. If one considers uniformly to be the
21 velocity across the cross-section, then at the top
22 of this container, if one were to look at that top
23 surface as it moves downward, it would be uniform in
24 velocity. It would be all moving down vertically
25 and at essentially the same velocity. In the hopper

1 section, as you can see by the length of the arrows,
2 the material is moving, first of all, at the
3 centerline that's moving down vertically, and
4 whereas at the walls it's moving down parallel to
5 the walls, so that the direction of movement has
6 changed.

7 And, second, by the length of the arrows,
8 you can see that what is being depicted here is that
9 the velocity at the center is greater than the
10 velocity at the walls, and that's just effect of
11 natural physics. At the centerline there's no
12 resistance to the movement of the particles, whereas
13 at the wall the particles are sliding against a
14 stationary surface, and therefore their velocity is
15 going to be lower. So whether or not one that
16 considers to be uniform or not, I don't know.

17 But that's -- This is just basic physics
18 of how material flows in a container in which one
19 has a mass flow pattern, as contrasted with funnel
20 flow, or as Mr. Snowdon calls it, core flow, they're
21 one and the same. On the left side of this figure,
22 figure number 2, you can see that there is an
23 indication that you have some moving material. It's
24 moving at the walls at the top of the vessel. But
25 as you get down in the lower half of the cylinder

1 and into the hopper, there's only a central core
2 that is moving, and the material outside of that
3 core is stagnant.

4 Q (BY MR. ROSE) Does this mean that the
5 flow is localized?

6 MR. WERNER: Objection to the form.

7 A I think that's a reasonable term to use to
8 describe the flow, yes. Localized at least in a
9 portion of the container.

10 Q (BY MR. ROSE) We talked earlier about
11 granular materials. And without getting back
12 through that whole discussion of, as far as the size
13 of the table. But we talked about in your paragraph
14 13 where you reference powders, pellets and granular
15 bulk solids, those materials. Can those experience
16 uniform flow in a pneumatic conveyance?

17 MR. WERNER: Objection to form.

18 A Now we're talking pneumatic conveyance,
19 and we're talking about uniform flow and pneumatic
20 conveyance. It's very different than what we were
21 just talking about. Do I understand that correctly?

22 Q (BY MR. ROSE) What's the difference
23 between what we've been talking about and pneumatic
24 conveyance? We've been talking about in terms of
25 the '062 patent.

1 MR. WERNER: Objection to form.

2 A Let me understand your question then.
3 When you talk about pneumatic conveyance, are you
4 talking about within the pipeline itself or are you
5 talking in relation to the patent, within the blow
6 tank?

7 Q (BY MR. ROSE) I'm talking about what's
8 shown in Figure 2 of Exhibit 1016.

9 A Which has nothing to do with pneumatic
10 conveying.

11 Q Okay.

12 A At least as far as the pipe is concerned.
13 It may have to do with the blow tank in the case of
14 these patents, but we're talking -- in Figure 2 of
15 Exhibit 1016, we're talking about a storage
16 container in which there is a mass of particles of
17 some size and shape, and one is looking at what
18 happens as that mass of particles is discharged from
19 that container. And does all of the material move
20 as soon as anything is withdrawn? Mass flow? Or is
21 some of the material stationary while the rest is
22 moving, which is funnel flow, or as Mr. Snowdon
23 calls it, core flow.

24 Q Well, if in a blow tank it's being --
25 pneumatic pressure is being applied to, would such

1 materials as powders, pellets and granular bulk
2 solids experience mass flow?

3 MR. WERNER: Objection to form.
4 Incomplete.

5 A They could if, as Mr. Snowden points out,
6 a critical angle is achieved as far as that design
7 is concerned.

8 Q (BY MR. ROSE) And does it also require a
9 sufficient separation of the particles?

10 MR. WERNER: Objection to form.

11 A No.

12 Q (BY MR. ROSE) Have you heard of the term
13 rat holes?

14 A Absolutely.

15 Q How are those formed?

16 A Rat holes are formed in funnel flow
17 containers or can form in a funnel flow container.
18 Not all funnel flow containers will
19 exhibit rat-holing, but if you have, in the case of
20 Exhibit 1016, Figure 2, if you have material that is
21 stagnant as material is discharging, then, depending
22 upon the cohesiveness of that material, once that
23 central core of material discharges, the remaining
24 stagnant material is stationary and never
25 discharges. And so you end up, if you look into the

1 top of that vessel, with a condition as shown in
2 Figure 1 of the same exhibit, where a rat hole forms
3 because of that stagnant material that on its own
4 cannot and does not discharge through the outlet.

5 Q So is it your understanding and your
6 testimony that Figure 2 in Exhibit 1016, that does
7 not relate to the application of air to solids? Is
8 that what you're saying?

9 MR. WERNER: Objection to the form.

10 A I don't understand your question.

11 Q (BY MR. ROSE) Does that -- Is what's
12 being shown in Figure 2, is it solely showing
13 gravity flow?

14 MR. WERNER: Objection to form.

15 A No. As far as this particular publication
16 is concerned, I haven't taken the time to read
17 through line by line of what the authors state here,
18 but for this particular publication, it's probable
19 that they were referring to gravity flow condition.
20 But as Mr. Snowdon explains in the patent, depending
21 upon the material that's being handled and depending
22 upon the configuration that is the cone angle -- and
23 I would also point out the outlet size and the
24 amount of pressure that's being applied -- that it
25 is possible to have a mass flow condition in a blow

1 tank.

2 MR. ROSE: I think we're at a good
3 stopping point. It's a little after noon, so lunch
4 break?

5 MR. WERNER: Okay.

6 (Whereupon, the proceedings were in recess
7 at 12:05 p.m. and subsequently reconvened at
8 1:10 p.m., and the following proceedings were
9 entered of record:)

10 (Previously Marked Deposition Exhibit
11 Number 1006 introduced to the witness.)

12 Q (BY MR. ROSE) Dr. Carson, I've handed you
13 a document that was previously marked as
14 Exhibit 1006. This is what's sometimes referred to
15 as the Ciaffone reference. Is that how you
16 pronounce it?

17 A I don't know. It's as good as any.

18 Q Okay. Are you familiar with this
19 reference?

20 A I am.

21 Q Can you walk me through what exactly is
22 being done with this system that's shown in
23 Figure 2?

24 MR. WERNER: Objection to form.

25 A So as I understand Figure 2, is that

1 material is collected in item 40. This has to do
2 with, as I recall, hospital waste and sludge,
3 organic material, skimmings, unwashed grit, unground
4 screenings. So the material is collected there, and
5 then when valve 20 is opened, that material then
6 drops down into what I'll call the blow tank, number
7 11, and then valve 20 is closed, and the vessel is
8 then pressurized using line 22, and once a
9 particular pressure is reached, then the material is
10 then conveyed through line 29 and goes into an
11 incinerator, which is item 30.

12 Q And so the material that goes into the
13 container 11, or 19, those are fed in by gravity
14 feed; is that correct?

15 A I don't recall how it's fed in. It looks
16 from this that it might be gravity fed, yes.

17 Q And Ciaffone teaches the conveying of
18 solids, right?

19 MR. WERNER: Objection to the form.

20 A Well, he calls it waste material. And I
21 enumerated what he says in the first paragraph. So
22 yes, it's various forms of solids, including organic
23 matter. I would imagine this would be liquid of
24 some sort, potentially, mixed in with the material.

25 Q (BY MR. ROSE) Liquid mixed in with the

1 solids?

2 A Yes.

3 Q And in column 1, beginning at line 70,
4 Ciaffone lists several materials, right?

5 A Yes.

6 Q And he includes screenings, grit, sludge
7 cake, skimming, hospital waste, refuse, garbage,
8 bark, plastics and the like, from the collection
9 chamber?

10 A Yes.

11 Q And none of those are sludge, correct?

12 MR. WERNER: Objection to form.

13 Foundation.

14 A I wouldn't characterize it this way.
15 Indeed he talks about a sludge cake. To me that's
16 sludge.

17 Q (BY MR. ROSE) What is sludge cake as
18 compared to sludge?

19 MR. WERNER: Objection to form.

20 A I don't know the difference. I would take
21 it to be one in the same.

22 Q (BY MR. ROSE) Are sludge cakes dried
23 sludge?

24 A Could be, but, again, I don't think it's a
25 well-defined term.

1 Q Are any of these materials non-free
2 flowing pastes?

3 MR. WERNER: Objection to form.

4 A I would say that several of them are --
5 could be considered non-free flowing paste. Sludge
6 cake, skimmings, hospital waste, garbage. Garbage
7 is probably not a paste, but those first three
8 certainly could be paste.

9 Q (BY MR. ROSE) The materials are fed into
10 the pressure chamber by gravity feed; isn't that
11 right?

12 A You asked me that a moment ago. I believe
13 that's the case. I'd have to go through the
14 specification to see for sure, but it looks from
15 Figure 2 that that's the case.

16 Q There's also an -- The materials are also
17 somewhat aerated, aren't they?

18 MR. WERNER: Objection to form.
19 Foundation.

20 A I don't see how you would come to that
21 conclusion.

22 Q (BY MR. ROSE) If you would, turn to
23 column 3, beginning at line 11. There's a
24 discussion of, thus, the waste is compacted in the
25 ejector.

1 Wouldn't there need to be some component
2 of air in order for the material to be compacted?

3 MR. WERNER: Objection to form.

4 A I'm sorry. Your question again?

5 Q (BY MR. ROSE) Yes. It says, when the
6 waste is compacted in the ejector.

7 In order for there to be compaction,
8 doesn't there necessarily need to be some amount of
9 entrained air? Otherwise it would already be
10 compacted.

11 MR. WERNER: Objection to form.

12 A I don't follow that at all.

13 Q (BY MR. ROSE) How is waste compacted if
14 there's no air entrained in it?

15 A By the application of air pressure to the
16 top of the ejector.

17 Q And then the materials are then
18 transferred out of the ejector, correct?

19 A Yes.

20 Q And then through piping at the bottom?

21 A Yes.

22 Q Then it goes up a rigid piping to the top
23 of Figure 2, where you see numeral 31?

24 A Yes.

25 Q And then it enters item 30, which is an

1 incinerator, right?

2 A Yes.

3 Q So this is being used to incinerate waste?

4 A Yes.

5 Q Okay. And is there any discussion of what
6 the liquid or water content is in the materials of
7 the sludge material you identify?

8 A I'm sorry. In this patent?

9 Q Yeah. You said sludge cake. Is there any
10 way to determine how much water, what the liquid
11 content is?

12 A No.

13 Q And we don't have any understanding what
14 the air to solid ratio is, correct?

15 A That's correct.

16 Q Do you know why Ciaffone refers to
17 compressing the waste in the injector?

18 A I believe it would be for the same reason
19 as in the Snowden patents, that air, or in general
20 some gas, is being introduced at the top of the
21 vessel, and that acts as a piston to compact the
22 material that is below the free board space of the
23 vessel.

24 Q And then when it gets to the incinerator
25 it disperses, correct?

1 A Yes.

2 Q Would there necessarily be some air in the
3 material in order for it to disperse?

4 A No. I wouldn't say in order for it to be
5 dispersed. As it's being dispersed some air would
6 be introduced.

7 Q And then it's incinerated?

8 A That's my understanding, yes.

9 Q Well, taking a look at the materials
10 shown, for example, in Exhibit 1037, the drill
11 cuttings, would those be able to be incinerated in
12 an incinerator?

13 MR. WERNER: Object to the scope.

14 A I don't know.

15 Q (BY MR. ROSE) Or in Exhibit 1039?

16 A I don't know.

17 Q But Ciaffone doesn't teach fluidizing the
18 material in the ejector, does it?

19 A No.

20 Q Other than the sludge cake, are any of the
21 materials identified in column 1, starting at line
22 70, would those constitute sludge?

23 MR. WERNER: Objection to the form.

24 A As I testified a few moments ago,
25 Mr. Rose, I would expect that it's possible. Again,

1 these are just words. Hard to know exactly what's
2 being referred to. But skimmings and hospital
3 waste, and I guess I would include refuse, all of
4 those could be sludges. And I would also point out,
5 above this, starting at line 49, it talks about
6 similar problems in the conveyance and disposal of
7 other types of waste, include, for example, skimming
8 and digestive scum and sewage waste, hospital waste,
9 animal waste, refuse, garbage and the like.

10 Q Right. And it's identifying much the same
11 as it identified starting at 70, going on to wood,
12 bark, sawdust, waste plastics and the like.

13 A Yes.

14 Q How would you determine whether any of
15 those materials is a sludge?

16 MR. WERNER: Objection to form.

17 A Well, as I stated in my declaration,
18 there's not a universally accepted definition of
19 either a sludge or a paste. It's basically a
20 non-free flowing cohesive material. It usually has
21 some liquid component in addition to particles.
22 Liquid could be water, oil or some other liquid.

23 Q (BY MR. ROSE) But if it's non-free
24 flowing it wouldn't go into the ejector by gravity,
25 would it?

1 MR. WERNER: Objection to form.

2 A It could, depending on the size of pipe 14
3 and the opening to the ejector.

4 Q (BY MR. ROSE) Then it would not be
5 non-free flowing, would it?

6 MR. WERNER: Objection to form,
7 foundation, assumes facts, and mischaracterizes
8 testimony.

9 A As I testified earlier, Mr. Rose, and as
10 pointed out in my -- by my colleagues in
11 Exhibit 1016, whether the material is free-flowing
12 or non-free flowing depends not only on the material
13 or the container or the vessel in which that
14 material is being handled. So while I could see a
15 situation where the material is able to flow by
16 gravity from vessel 40 through pipe 14 into the
17 ejector 11, that doesn't necessarily mean that the
18 material would flow from the ejector into pipe 26.
19 And so you could have the material that flows in one
20 instance but doesn't flow in another instance, and
21 that's entirely consistent with Exhibit 1016.

22 Q (BY MR. ROSE) And Ciaffone doesn't make
23 any mention of mass flow, does he?

24 A I don't recall that he did, no.

25 (Previously Marked Deposition Exhibit

1 Number 1007 introduced to the witness.)

2 Q (BY MR. ROSE) You now have a document
3 that was marked as Exhibit 1007. Do you recognize
4 this?

5 A I do.

6 Q What is this?

7 A This is the so-called Macawber brochure.

8 Q All right. This is a piece of marketing
9 literature, correct?

10 A That is correct.

11 Q And on page -- I don't know that they have
12 page numbers here, but the fifth page.

13 A Yes.

14 Q Where it says Macawber Engineering
15 Limited at the top?

16 A Yes.

17 Q What is that unit that's shown in the top
18 middle set of drawings?

19 A That is Macawber's so-called Denseveyor
20 device, and it has the Macawber dome valve at the
21 top.

22 Q And the air intake in the Macawber
23 Denseveyor is on the side of the tank; isn't that
24 right?

25 A It's shown near the top of the cone

1 section, yes.

2 Q Why is the air added on the side?

3 A I do not know.

4 Q Does that affirm that the air serves as a
5 fluidizing agent inside the tank?

6 MR. WERNER: Object to the form.

7 A No, it does not.

8 Q (BY MR. ROSE) Why not?

9 A Because if the -- It depends on the amount
10 of material that is placed into the blow tank, but
11 as shown in number 3, if the level is below the
12 inlet nozzle, then the air that's being introduced
13 is simply compacting and pressurizing the material
14 that's below it.

15 Q And that's different from what's shown in
16 Figure 2?

17 A That's correct. Figure 2 shows the
18 material being filled into the container such that
19 it goes all the way up to the dome valve, and in
20 that instance there could be -- as the air is
21 introduced, there could be some limited amount of
22 fluidization of the material above the air inlet.
23 And indeed in item 3 and that list to the right of
24 six items talks about air is introduced at a
25 controlled rate to pump the material to its

1 destination without fluidizing excessively. And I
2 understand that to refer to that material that in
3 item 2 is -- some of that material that's above the
4 air inlet. Once the material is pressurized and it
5 settles, then, in item 3, then there's no
6 fluidization. It's simply driving the material
7 through the vessel.

8 Q Wouldn't it have already been fluidized by
9 the time you get to drawing 3?

10 MR. WERNER: Objection to form.

11 A There could have been some fluidization of
12 the material, some portion of the material above the
13 nozzle in number 2, but by the time it gets to
14 number 3, I would expect that the material, because
15 of the compacting effect of that air pressure, that
16 it would have removed any degree of fluidization the
17 material had.

18 Q (BY MR. ROSE) The item 3 that you read,
19 it uses the phrase without fluidizing excessively.
20 Do you see that?

21 A Yes.

22 Q So by using the word excessively, doesn't
23 that suggest there is fluidization, there's just not
24 too much of it?

25 MR. WERNER: Object to the form.

1 Incomplete.

2 A The way I interpret that wording is that
3 there could be some amount of fluidization occurring
4 during a portion of the cycle, namely in item 2, if
5 the material level is above that of the nozzle.
6 But, again, once the level drops down to what's
7 shown in number 3, I wouldn't expect there to be any
8 fluidization remaining.

9 Q (BY MR. ROSE) And there's no mention in
10 Exhibit 1007 of using this product to convey pastes,
11 correct?

12 MR. WERNER: Objection to form.

13 A I do not see the word paste in this
14 document, but there are many materials that are
15 listed which could be pastes.

16 Q (BY MR. ROSE) Where do you see those?

17 A Well, I'm looking on page 2, the first
18 column. It mentions in the second full paragraph, a
19 little over half way down, materials such as ultra
20 fine cohesive powders. It mentions a couple lines
21 below that high moisture content materials,
22 chemicals and food stuffs could be pastes. It goes
23 on to say, quote, the list is endless. In fact, at
24 Macawber we call it our A to Z of material handling,
25 close quotes. I see in item 3 in the middle column,

1 quote, whatever the matter, Macawber can handle it.

2 So that implies to me that a paste or a
3 sludge could be handled with this system. And I see
4 on page 3 in the second column it talks about the
5 company's installation of its Denseveyor system,
6 diverse products. Minced dog food in this condition
7 could be a paste. Detergent fines I suppose could
8 be a paste. So while the word paste itself is not
9 here, it's apparent to me that Macawber is promoting
10 their Denseveyor as a system that can handle
11 virtually any type of material, including a paste or
12 a sludge.

13 Q Right. But it never says we can handle
14 every material including a paste or a sludge. It
15 just says our product can handle everything.

16 MR. WERNER: Object to the form.

17 A Basically that's what it says.

18 Q (BY MR. ROSE) And this is a promotional
19 advertisement, isn't it?

20 MR. WERNER: Object to the form.

21 A Promotional brochure.

22 Q (BY MR. ROSE) Wouldn't that fall under
23 the category of puffery?

24 MR. WERNER: Objection to the extent it
25 calls for a legal conclusion.

1 A I don't know how I can answer that. It's
2 a promotional brochure. One would expect that
3 Macawber, being a reputable company, would not
4 exaggerate their capabilities if they're not able to
5 meet that.

6 Q (BY MR. ROSE) Well, when they say
7 whatever the matter, Macawber can handle it, surely
8 they did not test everything under the sun.

9 MR. WERNER: Objection to form.

10 A By definition, no, they did not, but they
11 certainly give no indication that there's any
12 material they've come up against that they couldn't
13 handle.

14 Q (BY MR. ROSE) They don't say that they
15 can't handle paste, but they also don't specifically
16 identify paste as something that can be handled,
17 correct?

18 A That's true.

19 Q And then on -- I guess it's page 5, the
20 green page, the column to the right, that second
21 paragraph, they talk about excellent reliability
22 record on a wide variety of materials, cohesive
23 powders, granular products up to 5 millimeters, and
24 certain high moisture content substances can be
25 transported. Are any of those a paste?

1 MR. WERNER: Objection to form.

2 A They could be. Certain high moisture
3 content substances. This refers to their
4 Controlveyor, which is a different technology or an
5 extension of their Denseveyor system, as I
6 understand it.

7 Q (BY MR. ROSE) I'm referring now to the
8 page that had the drawing of the Denseveyor.

9 MR. WERNER: Which one? There's a couple.

10 MR. ROSE: I'm sorry. They don't number
11 all their pages, so let me just count from the
12 beginning. One, two -- Five.

13 MR. WERNER: Macawber Engineering Limited?

14 MR. ROSE: Macawber Engineering Limited.

15 A Excuse me just a second. The previous
16 page we were talking about would have been page 4.

17 Q (BY MR. ROSE) Page 5 at the bottom. So
18 you're right. The previous one would have been 4.

19 Now on the page that's entitled Macawber
20 Engineering Limited, on the left-hand column the
21 document states, material is transferred from
22 totally enclosed plumb lines at low velocity by the
23 Denseveyor. The fully automatic system is designed
24 to incorporate only one moving part, the dome valve.
25 Macawber used an air ratio of 25 to 1, which ensures

1 minimal material velocity and degeneration.

2 Isn't using an air ratio of 25 to 1,
3 doesn't that mean that it's fluidizing?

4 A No.

5 Q What does that mean, then, when you're
6 using an air ratio of 25 to 1?

7 A That, to me, is referring to a solids
8 loading ratio, which as I testified earlier, if it's
9 above 20 to 25 -- and typically 25 would be a lower
10 limit -- then it's dense phase conveying.

11 Q Then so -- Okay. When you say an air
12 ratio of 25 to 1, which is the air, the 25 or the 1?

13 A The air is the 1.

14 Q Okay. And the 25 is the what?

15 A Is the product, the material.

16 Q And in a paste, though, there is no air,
17 correct?

18 MR. WERNER: Objection to form.

19 A There is no air within the paste itself,
20 but in the application of a blow tank, such as shown
21 here in this exhibit, one could and would introduce
22 air at the top of the vessel with the paste inside,
23 and in so doing use that piston effect of driving
24 that paste through the pipe at the bottom.

25 Q (BY MR. ROSE) Is a paste a bulk granular

1 solid?

2 MR. WERNER: Objection to form.

3 A As I've testified earlier, Mr. Rose, a
4 paste is not a well-defined term, nor is the term
5 sludge well-defined. In the world of bulk solids
6 one generally thinks of dry, free-flowing bulk
7 solids and powders on one extreme and a liquid on
8 the other, and there's a wide range of materials and
9 characteristics in between, and over a good portion
10 of that in-between range is material that has some
11 solids characteristics, some liquid characteristics,
12 and that's a paste or a sludge.

13 Q (BY MR. ROSE) Okay. So in your view is a
14 paste a bulk granular solid?

15 MR. WERNER: Objection to form. Asked and
16 answered.

17 A It's a material that consists of solid
18 particles in combination with a liquid, and it has
19 certain characteristics of a bulk solid, it has
20 certain characteristics of a liquid, so I can't say
21 that it's definitely one or the other; it's in
22 between.

23 Q (BY MR. ROSE) So you'd have no opinion
24 one way or the other whether a paste is a bulk
25 granular solid?

1 MR. WERNER: Objection to form.

2 Mischaracterizes testimony.

3 A I don't know that I can testify any more
4 clear than I have.

5 (Previously Marked Deposition Exhibit
6 Number 1008 introduced to the witness.)

7 Q (BY MR. ROSE) I've given you what's been
8 marked as Exhibit 1008. Do you recognize this
9 exhibit?

10 A I do.

11 Q What is this?

12 A This is the so-called Macawber Coal Ships
13 exhibit. At least a portion of it is.

14 Q And you're referring to the portion
15 starting at page 21?

16 A Yes.

17 Q Is this the project that you worked on
18 with Mr. Snowdon?

19 A The project that I worked on with
20 Mr. Snowdon is referenced on page 24, under the
21 title coal cargo provides fuel.

22 Q And the portion that you worked on was not
23 the pneumatic conveying portion of that project,
24 right?

25 A That's what I already testified. Yes.

1 Q Okay. Turning back now to page 21, there
2 is a statement starting at the top of the far right
3 column starting with the. It says, the ash content
4 may also be very high. In some cases it may be
5 represented by clays, which, when coupled with high
6 moisture contents, form a sticky,
7 difficult-to-handle material that blocks the
8 pneumatic pipeline.

9 Do you see that?

10 A Yes.

11 Q What is the "it" that's being referred to
12 there?

13 A The ash. The ash content.

14 Q So the ash may be represented by -- is
15 that clay that contaminates the coal?

16 A It's -- Clay is one of the noncombustible
17 components of what is called coal. Coal consists of
18 a carbonaceous material, and that obviously can be
19 burned, to some extent, anyway, and then a
20 nonburnable component, which is referred to as ash.
21 So what it's referring to here is that in some cases
22 that ash may have a high content of clay.

23 Q Okay. So the coal burns but the clay
24 doesn't, and so the result of the coal burning and
25 the clay not, is that what it's referring to there?

1 A In general my answer is yes. It's just
2 that ash could be more than just clay. It's any
3 nonburnable, noncombustible component. But it's not
4 uncommon for clay to be a major component of ash.

5 Q Again, referring now to page 22, and
6 there's a reference in the second paragraph,
7 beginning with, the three groups, on the right --
8 I'm sorry -- on the left-hand column, pneumatic
9 conveying - lean, medium and dense phase.

10 A Yes.

11 Q That refers to the ratio of air to the
12 material being conveyed. And then it refers to
13 those ratios there, 100 to 1 and 25 to 1. What are
14 those ratios that are referred to there?

15 A That's the inverse of the solid loading
16 ratio.

17 Q So still the solids -- in the 100 to 1
18 portion, solids are 100 and air is 1?

19 A No. In this case it's the inverse, so it
20 would be the air is 100 and the solids is 1.

21 Q And so in that instance is the material
22 fluidized by the air?

23 MR. WERNER: Objection to form.
24 Incomplete.

25 A It's not so much fluidized, but there's

1 sufficient air that the particles remain in
2 suspension, and hence you end up with what is called
3 here a lean phase system. In most articles that
4 would be referred to as a dilute phase or
5 nonsuspension phase of conveying.

6 Q (BY MR. ROSE) Okay. That's what we
7 referred to earlier when we were talking about dense
8 phase versus dilute phase?

9 A Yes.

10 Q Okay. And then so the 25 to 1 reference,
11 that would be to the dense phase --

12 A That's correct.

13 Q -- conveyed? Okay. And so does that not
14 represent a pneumatic system for suspending solids
15 in a moving air stream?

16 A I don't follow your question.

17 Q Well, if you've got a dense phase
18 operation the particles are suspended in air, and so
19 they are moved with that air?

20 A No. That's not true at all.

21 Q How are the particles moved?

22 A By air pressure and by pressure drop along
23 the line. It's a nonsuspended flow of the material,
24 so you either have a moving bed along the bottom of
25 the pipe, if it's horizontal, or you have a plug of

1 material across the full cross-section of the pipe.
2 That's dense phase conveying.

3 Q And what are the solids that are
4 suspended?

5 MR. WERNER: Objection to the form.

6 A In a dense phase system there's nothing
7 suspended. It's out of suspension.

8 Q (BY MR. ROSE) What are the solids that
9 are moved, as shown here?

10 A The solids that are being moved here are
11 the coal and ash particles, the coal particles that
12 contain ash.

13 Q So in the -- I just want to make sure I'm
14 understanding clearly. In the instance where the
15 ratio is 25 to 1, that's the dense phase system,
16 correct?

17 A That's correct.

18 Q And the particles being moved are the coal
19 and the ash, the coal particles that contain ash.

20 A That's correct.

21 Q Okay. And are those particles fluidized?

22 MR. WERNER: Objection to form, foundation
23 and scope.

24 A It depends on the mode of dense phase
25 conveying, which in turn depends upon the particles

1 and the velocity of the air. As I testified a
2 moment ago, you could have -- if it's a relatively
3 fine material, you could have a moving bed of
4 particles on the bottom of the pipe, and although
5 those particles have some entrained air, but not
6 enough entrained air to result in the particles
7 being suspended in the air stream.

8 Q (BY MR. ROSE) But in that instance there
9 would be entrained air?

10 A In that instance there would be some
11 entrained air within the particles, within the mass
12 of particles, yes.

13 Q Within the coal particles that contain
14 ash?

15 A Not so much within the particles
16 themselves, but --

17 Q Amongst the particles.

18 A -- in the void space between the
19 particles.

20 Q Taking a look back at Exhibit 1007, and
21 the Denseveyor apparatus shown on Macawber
22 Engineering Limited page, the one we looked at last,
23 how big of a unit is the Macawber Denseveyor that's
24 being discussed there?

25 A The one that's shown in the center doesn't

1 have any dimensions to it.

2 Q In your experience how big of a unit is
3 that? You've had experience with those products,
4 correct?

5 A I have had experience. Typically it's of
6 the size that's shown in that photograph to the
7 left, so it might be something that could be 6,
8 8 feet tall, or it may be smaller than that, but a
9 variety of sizes. But, again, there's no limitation
10 either in this figure on page 5, or to my
11 recollection, anything in the text that limits this
12 to any particular size.

13 (Previously Marked Deposition Exhibit
14 Number 1014 introduced to the witness.)

15 Q (BY MR. ROSE) I've handed you a document
16 that's been marked previously as Exhibit 1014. Do
17 you recognize this document?

18 A I do.

19 Q This is the Laster reference that you
20 discuss?

21 A Yes.

22 Q Laster refers to drilling mud and the
23 like, and like thick, difficult to pump slurries.
24 Correct? I'm referring to column 1, starting at
25 line 12.

1 A Yes. I'll just quote: Pumping, drilling
2 mud, and like thick, difficult to pump slurry
3 fluids.

4 Q And as we discussed, drilling mud is
5 fundamentally different than drill cuttings,
6 correct?

7 MR. WERNER: Objection to form.

8 A What I believe I testified is that the
9 cuttings could include some mud, but generally one
10 would want to separate as much of the mud from the
11 cuttings as possible to be able to reuse the mud.

12 Q (BY MR. ROSE) All right. So mud is --
13 drilling mud is more free-flowing than drill
14 cuttings; isn't that right?

15 MR. WERNER: Objection to form.
16 Foundation.

17 A Well, it's not clear to me from this
18 specification. I'm looking in column 1, starting at
19 line 26, and if I might read it into the record.
20 Quote: The mud used in drilling is quite thick and
21 difficult to move or pump when it is used up. Waste
22 mud frequently runs off the drilling platform to an
23 area below the rig into what is known in the art as
24 the rig cellar. From the rig the unwanted mud,
25 which is often polluted or too filthy to reclaim,

1 must be pumped to a holding pond or pit, which is
2 known in the art as a "reserve pit".

3 So in referring to unwanted mud that is
4 polluted or too filthy to reclaim, I understand that
5 wording to refer to a mixture of mud and drill
6 cuttings. I don't know what else would pollute the
7 mud if not drill cuttings.

8 Q (BY MR. ROSE) But it would still be mud
9 that is contaminated as opposed to drill cuttings
10 with some amount of mud.

11 MR. WERNER: Objection to the form.

12 Q (BY MR. ROSE) Isn't there a difference
13 between the two?

14 MR. WERNER: Objection to the form.

15 A I think we're splitting hairs. To me it
16 could be one or the other.

17 Q (BY MR. ROSE) If you could describe for
18 me how the valve system of the Laster reference
19 works. And in particular I'm looking at Figure 3,
20 but if other figures will help, if you would
21 describe how that valve works.

22 A Well, without going through all of the
23 detailed description of the preferred embodiment
24 starting on column 3, my understanding is that the
25 so-called drilling mud is -- it enters the vessel

1 through -- I believe through 20, and then once the
2 material is in the vessel it is -- the inlet is
3 sealed, the vessel pressurized, and then as a result
4 of that pressurization, material is then forced out
5 through line 80 at the bottom.

6 Q And at some point doesn't the valve, which
7 is 35, isn't that used to open and relieve pressure
8 in the vessel? I can refer you to column 4,
9 starting at line 2, where it states, this allows
10 fluid or other weighted material to be added to the
11 interior of the flow chamber 35 to thus provide an
12 adjustability to the buoyant force provided by float
13 chamber 35. It will be appreciated by one skilled
14 in the art that the addition of fluid to flow
15 chamber 5 will displace air and cause a different
16 buoyant effect.

17 So you understand what they're referring
18 to as far as a buoyant effect?

19 A I would have to go through this in more
20 detail to be able to answer your question.

21 Q Well, did you consider that aspect of
22 Laster when you prepared your declaration?

23 A I did not specifically go through step by
24 step the description of what I considered. And I
25 discuss this in my declaration, is that Laster

1 describes a device for handling what he calls mud,
2 but it's -- he calls it unwanted mud, which is
3 polluted or too filthy to reclaim, so to me that's
4 another way of describing a paste or a sludge, such
5 as the drill cuttings that are referenced in the
6 patent. So he's describing a means by which this
7 non-free flowing material, which has very similar
8 characteristics to the material that is being
9 described in the Snowden patent, that that material
10 can be discharged from a container by pressurizing
11 that container. So while the actual device itself
12 in Figure 3 looks different than a blow tank, the
13 technology is similar; namely, put in a non-free
14 flowing sludge or paste-like material, seal the
15 container, pressurize it, and discharge the material
16 through a pipe.

17 Q So he calls it unwanted mud, which is
18 polluted or too filthy to reclaim. That just means
19 it can't be used anymore, correct?

20 MR. WERNER: Objection to form.

21 A I would say so, yes.

22 Q (BY MR. ROSE) That doesn't necessarily
23 say it has thickened to the point of becoming a
24 paste or a sludge, has it?

25 MR. WERNER: Objection to form.

1 A It doesn't say. Doesn't say one way or
2 another. But it does talk about a thick viscous
3 fluid, which is a known drilling mud. But then that
4 mud, in line 26, quite thick, difficult to pump or
5 move when it's used up, and it's often polluted, too
6 filthy to reclaim, must be pumped to a holding pond.
7 So it's a non-free flowing material that I believe
8 could be considered or called a paste or a sludge.

9 Q (BY MR. ROSE) He also refers in column 1,
10 starting at line 12, the pumping apparatus for
11 dumping drilling mud and like thick, difficult to
12 pump slurry fluids. So he's just referring there to
13 drilling mud, not polluted drilling mud or not
14 drilling mud that's contaminated with cuttings.
15 Drilling mud. And he's referring to drilling mud as
16 being thick and difficult to pump, correct?

17 A Well, he does use the term drilling mud in
18 line 12. You're correct. But then follows that by
19 saying, quote, and like thick, difficult to pump
20 slurry fluids, close quotes. And then down starting
21 in 26 is where he talks about the contaminated -- I
22 guess line 30, where he talks about the unwanted mud
23 is often polluted or too filthy to reclaim.

24 Q And then on column 2, starting at line 30,
25 he refers to heavy viscous drilling mud, slurries,

1 oil and the like, so he's comparing drilling mud to
2 oil.

3 MR. WERNER: Objection to the form.

4 Q (BY MR. ROSE) Isn't that right?

5 A I don't know that I would agree with you.
6 He talks about sufficient to move any fluid, even
7 heavy viscous drilling mud, slurries, oil and the
8 like. So oil could be on its own or in combination
9 with these other materials to make them -- to make
10 it a material that's difficult to move.

11 Q I want to refer you now to column 5.

12 (Discussion held off the record.)

13 MR. ROSE: We can take a break.

14 (Whereupon, the proceedings were in recess
15 at 2:01 p.m. and subsequently reconvened at
16 2:15 p.m., and the following proceedings were
17 entered of record:)

18 Q (BY MR. ROSE) Where we left off, I
19 believe we were talking about the Laster reference,
20 Exhibit 1014. And I had a question on column 5,
21 starting at line 10, and this refers to how the
22 valve works. It states, it will be appreciated that
23 once a buoyant member 30 onto conduit 60 --

24 A I'm sorry. You skipped a sentence.

25 Q I did. Once a buoyant force overcomes the

1 weighted pressure, holding valving member 30 onto
2 conduit 60, air will be allowed to discharge through
3 seat opening 66. This will be an explosive
4 discharge, since one static forces are overcome,
5 compressed air will rapidly fill a space between
6 conduit seal mount 51 and opening 66 and will
7 pressurize this space firstly providing the
8 explosive driving force necessary to power valving
9 member upwardly into its sealing arrangement.

10 So if I'm understanding this correctly,
11 doesn't this mean that the valve is forced up using
12 a buoyant force?

13 A It would appear that way. I haven't gone
14 through all of the lines that precede this, but
15 earlier we talked about adding water, it appeared,
16 to lift the valve to seal it, to seal the container.

17 Q And if that's the case, then, that valve
18 would not work in the case of adding drill cuttings,
19 would it?

20 MR. WERNER: Objection to form.

21 A It could.

22 Q (BY MR. ROSE) If the drill cuttings are
23 not free-flowing wouldn't they just surround the
24 valve and not provide a buoyant force?

25 MR. WERNER: Objection to form.

1 A Again, my understanding is the buoyant
2 force is being provided by the water that's added
3 after the drilling mud is added, so the drill
4 cuttings, as you're referring to, if they're down
5 below the valve and then you add water, then as long
6 as you clean off that sealing or seating surface, it
7 seems to me that this would work.

8 (Previously Marked Deposition Exhibit
9 Number 1009 introduced to the witness.)

10 Q (BY MR. ROSE) You've now been handed what
11 was marked previously as Exhibit 1009. Do you
12 recognize this exhibit?

13 A I do.

14 Q What is this?

15 A This is edition 1 of the book written by
16 Roy Marcus and three other authors, and it's
17 referred to in my declaration as simply Pneumatic
18 Conveying.

19 Q And this edition was provided to you by
20 counsel, right?

21 A It was.

22 Q Do you use this reference in your
23 day-to-day activities?

24 MR. WERNER: Objection to form.

25 A I personally do not use it day to day.

1 There are others in my company that I wouldn't say
2 use it day to day, but whenever they're involved in
3 pneumatic conveying, they'll typically use or could
4 refer to a later edition of this same document, the
5 same book.

6 Q (BY MR. ROSE) And at page 6 of
7 Exhibit 1009, the first full paragraph starts with,
8 the ideal candidates for pneumatic conveying are
9 free flowing, non-abrasive and non-fibre materials.

10 Do you see that?

11 A Yes.

12 Q Do you agree with that statement?

13 A I would agree that these are materials
14 that are much easier to handle and hence easier to
15 convey than other so-called non-ideal materials.
16 But the following sentence notes that, quote, with
17 the development of new types of conveyors operating
18 at low gas velocity, cohesive, abrasive and friable
19 materials can be handled.

20 Q But that doesn't mention sludge or paste,
21 does it?

22 MR. WERNER: Objection to the form.

23 A Those words are not there, but it does
24 refer to a cohesive material, of which a sludge and
25 a paste would be considered cohesive.

1 Q (BY MR. ROSE) And on pages 3 to 5 of
2 Exhibit 1009 it lists numerous materials for
3 pneumatic conveying under what can be conveyed,
4 correct?

5 A It lists some of the literally thousands
6 and thousands of materials that are handled in
7 industry on a day-by-day basis and some materials
8 that they use as examples of those that have been
9 pneumatically conveyed.

10 Q And the vast majority of those are free
11 flowing, non-abrasive and non-fibre materials,
12 correct?

13 MR. WERNER: Objection to form.

14 A I wouldn't characterize it that way at
15 all. You'd have to go through material by material.

16 Q (BY MR. ROSE) Do you see paste identified
17 on here?

18 MR. WERNER: Objection to form.

19 A I don't recall. And I'd have to go
20 through line by line, but I don't recall the word
21 paste being in here, but there certainly are
22 paste-like materials that are listed here and I
23 believe I identified in my declaration.

24 Yes. In Exhibit 1044 I list, in paragraph
25 76, some of the non-free flowing materials, which

1 certainly could be a paste -- I'm looking at
2 two-thirds of the way down. I mention paper mill
3 wood paste. Excuse me. Paper mill wood waste
4 (wet). That certainly could be a paste or a sludge.
5 There is an edible paste products listed.

6 Q (BY MR. ROSE) The majority of what you
7 listed is not paste, correct?

8 MR. WERNER: Objection to the form.

9 A It's not clear from just a generic name,
10 activated earth, not clear whether that's a paste or
11 not.

12 Q (BY MR. ROSE) What about crushed brick?

13 A Probably not a paste.

14 Q Or salt?

15 A Probably not a paste.

16 Q Sand?

17 A Probably not a paste.

18 Q Do you consider this to be a reliable
19 reference, Exhibit 1009?

20 MR. WERNER: Objection to form.

21 A I consider it to be a useful reference.
22 It's been revised at least two, maybe three times
23 since it was first published, so there are changes
24 that the authors have made. And with any textbook
25 of this type, there is always room for error or

1 different ways of presenting things than what others
2 might present it. So I wouldn't say it's the be all
3 and end all as far as pneumatic conveying is
4 concerned, but it's certainly a useful textbook to
5 provide background information.

6 Q (BY MR. ROSE) Of those materials
7 identified in paragraph 76 of Exhibit 1044, which if
8 any would exhibit the flow characteristics of what's
9 shown in Exhibits 1037 and 1039?

10 MR. WERNER: Objection to form.
11 Foundation.

12 A Again, these are just generic names of
13 materials. It's possible that material, as I've
14 already identified, paper mill -- wet paper mill
15 wood waste or edible paste products could have
16 characteristics similar to those shown in these
17 photographs.

18 Q (BY MR. ROSE) I'd like to turn to
19 page 282. And actually looking over on page 281,
20 that's a drawing of the Denseveyor that we looked at
21 earlier, isn't it?

22 A Yes, it is. Figure 7.32.

23 Q And that's referred to on page 282 as a
24 small capacity blow vessel, correct?

25 A Yes.

1 Q There's a reference in that first full
2 paragraph on page 282 that the use of such a small
3 capacity blow vessel is designed based on the
4 conveying of material as a series of discrete plugs
5 rather than a continuous stream.

6 What is the difference between those two?

7 MR. WERNER: Objection to form.

8 A It's basically the difference between what
9 I earlier testified is a moving bed type of dense
10 phase conveying and a plug form of dense phase
11 conveying.

12 Q (BY MR. ROSE) And a plug form of dense
13 phase conveying, is that what we saw in the Ciaffone
14 reference?

15 A I don't know that Ciaffone described the
16 form of dense phase conveying. I don't recall that
17 he did.

18 Q Well, they refer here to a small capacity
19 blow vessel. Is that an indicator that the
20 Denseveyor is a small capacity blow vessel?

21 A That may be the author's term, the author
22 of this book, their term, but I see nothing in the
23 Macawber -- either in Macawber or Macawber Coal Ship
24 that limits the size of the blow tank or the blow
25 vessel. And, similarly, in the patents at issue

1 here, I don't see anything that limits the size of
2 the blow tank. So while the authors appear to be
3 using this as an example of what they call small
4 capacity, whatever small might be, I don't see that
5 Macawber, either in their literature or in the
6 patents, limits the capacity to any particular
7 maximum value.

8 Q The author here also says that such blow
9 vessels -- and he's referring to Figure 7.32, which
10 is a Denseveyor -- are designed on the basis of
11 conveying material as a series of discrete plugs
12 rather than as a continuous stream.

13 Is that author correct?

14 A I don't believe that that description
15 necessarily applies to all Denseveyor products or
16 Denseveyor applications.

17 Q Do you have any understanding as to why he
18 would say that then?

19 A I do not.

20 MR. WERNER: Objection. No foundation.

21 Q (BY MR. ROSE) Do you agree with him that,
22 whether they are all used for that, that that's what
23 they were designed for?

24 A I don't know.

25 MR. WERNER: Objection to the form.

1 Foundation.

2 A I do not know. Again, as I testified
3 earlier, this is a useful reference, but it's by no
4 means the final statement with regard to this whole
5 field.

6 Q (BY MR. ROSE) Is this a more useful
7 reference than the advertising materials of Macawber
8 that state such things as, whatever the matter,
9 Macawber can handle it?

10 MR. WERNER: Objection to form.

11 A This is a textbook. It is many hundreds
12 of pages long, so from that standpoint it has more
13 useful information than a company brochure, but I
14 don't discount the company brochure, either.

15 Q (BY MR. ROSE) If you would, turn to
16 page 452 of Exhibit 1009. This reference refers to
17 the use of flexible piping. Do you see that?

18 A Yes.

19 Q It refers to discharge hoses from bulk
20 containers?

21 A I believe that's a typo.

22 Q I assume it means hoses.

23 A Yes.

24 Q Is there any discussion of using such
25 hoses to load bulk containers?

1 A I don't see anything in the text,
2 beginning on 452, section 11.5.4, which refers
3 specifically to inlet piping, but I don't see
4 anything that says you cannot use it for that,
5 either.

6 Q On page 453 there's a reference in that
7 first full paragraph to building up a static charge.
8 Do you have any understanding as to why a static
9 charge builds up?

10 A There are many dry materials. It could be
11 plastic powders, it could be plastic pellets, that
12 when you rub those particles on a surface that you
13 generate an electrostatic charge, and so that same
14 phenomenon can occur in a pneumatic conveying line.

15 Q Would that phenomenon occur when conveying
16 pastes?

17 A No.

18 MR. WERNER: Objection to the form.

19 Give me a second to object.

20 THE WITNESS: Sorry.

21 (Previously Marked Deposition Exhibit
22 Number 1012 introduced to the witness.)

23 Q (BY MR. ROSE) You've now been handed what
24 was marked before as Exhibit 1012. This is patent
25 5,402,857 to Dietzen. Do you recognize this as what

1 we have sometimes referred to as Dietzen I?

2 A Yes.

3 Q What is being performed by the apparatus
4 shown in Dietzen I?

5 A What is being --

6 MR. WERNER: Objection to form.

7 A What is being shown as?

8 Q (BY MR. ROSE) For example, if you look at
9 Figure 1, can you describe what's being performed
10 there?

11 MR. WERNER: Same objection.

12 A What is being shown is pneumatically
13 conveying drill cuttings that had been collected in
14 vessel 17. Or maybe it's vessel 11. But the drill
15 cuttings have been collected there. They're being
16 pneumatically removed by suction by line 22 and
17 conveyed over to container 27 and 24.

18 Q (BY MR. ROSE) And the materials being
19 conveyed are able to flow by gravity, correct?

20 MR. WERNER: Objection to the form.

21 A I don't see where it necessarily says
22 that.

23 Q (BY MR. ROSE) Take a look at the abstract
24 on the front. Four lines from the bottom doesn't it
25 read, the tank is configured to be emptied via

1 gravity flow at a remote disposal site by opening
2 the access openings and allowing the cuttings to
3 flow via gravity from the tank interior access
4 openings?

5 Is that not a reference to gravity flow?

6 MR. WERNER: Objection to form.

7 A It is a reference to gravity flow with
8 regard to the containers shown in Figure 1 as 27 and
9 24 and by rotating that container, but rather than
10 having a horizontal orientation it has a vertical
11 orientation, and the material is able to discharge.

12 Q (BY MR. ROSE) And the material also flows
13 into the trough 11 via gravity, correct?

14 MR. WERNER: Objection to form.

15 A I don't know how material gets into the
16 trough.

17 Q (BY MR. ROSE) Okay. Let's take a look at
18 column 3. And starting at line 23 it reads, shakers
19 12 through 15 channel away the desirable drilling
20 mud to a mud pit. The well cuttings fall via
21 gravity into trough 11.

22 A Yes.

23 Q So there gravity is being used to
24 introduce those cuttings to trough 11, correct?

25 A That's correct.

1 Q And then the material, you had said, goes
2 through line 22 into the container 24, correct?

3 A 24 and 27.

4 Q 24 and 27. Thank you. But that's not on
5 the ship, is it?

6 A I don't know exactly where it is.

7 Q Okay.

8 A Could or could not be.

9 Q Do you see where there are eyelets located
10 as 29, 30 and 31 --

11 A Yes.

12 Q -- in Figure 1? Those are used so that a
13 crane can lift that container and transport it to
14 the ship, correct?

15 MR. WERNER: Objection to form.

16 A Yes.

17 Q (BY MR. ROSE) So in that case they're not
18 transferred by pneumatic conveyance to the ship;
19 they're carried to the ship in a container, right?

20 A Yes.

21 Q I want to go back to column 1 of the
22 Dietzen I reference. And I'm reading in the first
23 paragraph, with the background of the invention.

24 A Which line?

25 Q Starting at line 15.

1 Even more particularly, the present
2 invention relates to an improved well cuttings
3 disposal system that collects oil and gas well
4 cuttings in a transportable tank that is subjected
5 to a vacuum, formed with a motor driven blower that
6 moves about 300 to 1300 cubic feet per minute of air
7 containing cuttings, and in relatively small hoses
8 to generate flow velocities between about 100 to
9 300 feet per second.

10 Can you tell me what's being described
11 there?

12 A What's being described is basically what's
13 shown in Figure 1. So the material collects in the
14 trough 17, it's then being pneumatically conveyed by
15 suction to 24 and 27, and that is a portable
16 container that then can be moved onto the ship.

17 Q Where's the motor driven blower that moves
18 300 to 1300 cubic feet per minute of air?

19 A The motor is 58 and the blower is 57.

20 Q And so is it your testimony that they're
21 talking about the cuttings moving through line 22
22 into containers 27 and 24 at 100 to 300 feet per
23 second?

24 A That's what is being stated here. That
25 seems like very high velocity, but that's what's

1 stated.

2 Q I'd like to look again at Figure 1. And
3 there are two containers in that box in the top
4 middle, 45 and 43. What material is traveling
5 there?

6 A A mixture of drill cuttings and air.

7 Q I thought only drill cuttings went to
8 containers 24 and 27.

9 A Essentially all of the drill cuttings do
10 end up in 27 and 24, but as with any vacuum system
11 there's going to be, in the line that's pulling the
12 vacuum, the potential for some of those drill
13 cuttings to remain in the line, which in this case
14 is line 40, where the vacuum is being pulled. And
15 it's essential that those particles don't enter the
16 blower. Otherwise it's going to ruin the blower.
17 So in between are what I believe Dietzen I calls
18 separators, if I'm not mistaken, 43 and 45, fine
19 separator 43, a second fine separator 45. This is
20 column 4, line 19.

21 Q With that rate of movement of air, 300 to
22 1300 cubic feet per minute, would that not entrain
23 or fluidize the materials?

24 MR. WERNER: Objection to form.

25 A First of all, this is a volumetric rate,

1 not a velocity, and, second, this is a vacuum
2 system. I question the numbers that are given here,
3 particularly the 100 to 300 feet per second, but I
4 don't believe there's any fluidization occurring
5 here. It's simply a pneumatic conveying system for
6 sucking the material from 17 into 27 or 24.

7 Q (BY MR. ROSE) It did refer to a rate,
8 though, because it said 300 to 1300 cubic feet per
9 minute.

10 A That's the volume of the flow rate of the
11 air.

12 Q And what's the purpose of the drain 20 in
13 Figure 1? Do materials also flow out the bottom via
14 gravity?

15 A My understanding -- Well, on column 3,
16 line 31, trough bottom 19 includes a discharge
17 opening 20 that communicates with discharge conduit
18 21. The opening 20 is typically sealed during
19 operation with a closure plate (not shown).

20 So the way I interpret this is that most
21 of the material is removed by vacuum line 22 but
22 that there could be some remaining material in the
23 bottom of this trough and that that material would
24 be removed by opening that valve and discharging
25 through 21. Maybe the material is washed down once

1 the vacuum operation is over. I don't know. It's
2 not clear in the specification.

3 Q And the material that travels into tanks
4 24 and 27, that includes drilling mud, correct?

5 A Well, I think whenever we're talking drill
6 cuttings, as I testified earlier, it is certainly
7 possible that some of the mud hasn't been separated
8 from the cuttings, so, yes, I would expect there's
9 going to be some mud with it.

10 Q And what are units 12, 13, 14 and 15?
11 Those are coarse shakers, correct?

12 A That's my recollection, yes. I could go
13 over to the text to find for sure, but --

14 Q And so those shakers --

15 A Well, 12 and 13 are coarse shakers, and
16 fine shakers are 14 and 15.

17 Q What's the difference between a coarse
18 shaker and a fine shaker?

19 A The opening size of the screen deck.

20 Q So the shakers 12, 13, 14 and 15 shake the
21 cuttings so that they flow by gravity into the
22 trough 17, correct?

23 A Yes.

24 Q Okay. And due to the thixotropic nature
25 of those cuttings at the time that they go in there,

1 they are not non-free flowing, correct?

2 MR. WERNER: Objection to form,
3 foundation, and assumes facts.

4 A I wouldn't characterize it in that way at
5 all. It's certainly not free-flowing material.

6 Q (BY MR. ROSE) We talked about thixotropic
7 nature, correct?

8 A Yes.

9 Q And why do you say they're not
10 free-flowing at all?

11 A Because the material, while it may be
12 agitated in some way going over those fine and
13 coarse screens, once it drops and consolidates in
14 trough 17 it's not going to be free-flowing any
15 longer, if it ever was at all.

16 Q Does it need to set up in time in order
17 for the thixotropic nature to take effect?

18 MR. WERNER: Objection to form, and
19 assumes facts.

20 A No. It doesn't take -- it does not
21 necessarily take time for this to occur.

22 Q (BY MR. ROSE) Correct me if I'm wrong,
23 but I thought you testified earlier about the use of
24 shakers or stirrers to -- and the thixotropic effect
25 of pastes, that when at rest they are much more

1 non-free flowing than when stirred up or shaken,
2 which improves their flowing capabilities. Isn't
3 that the nature of thixotropic?

4 MR. WERNER: Objection to form.
5 Mischaracterizes testimony.

6 A At the point where the material is
7 agitated, in general the material is more
8 free-flowing, although I would not even at that
9 point characterize it as a free-flowing material,
10 but it is more flowable than when you don't have
11 that agitation. But as soon as the material drops
12 from 12, 13, 14, 15, into 17, the material is no
13 longer being agitated, no longer being stirred, and
14 so it's going to lose that more free-flowing
15 ability, capability soon after it -- in fact,
16 probably at the instant that it drops into trough
17 17.

18 Q (BY MR. ROSE) So does the, quote, more
19 flowable nature go away immediately when shaking
20 stops, or does it take time to set up?

21 MR. WERNER: Objection to form.

22 A It depends. Again, drill cutting is such
23 a general term to describe such a wide range of
24 materials, I could envision conditions where it sets
25 up immediately and other conditions where it might

1 take minutes or hours to set up.

2 (Previously Marked Deposition Exhibit
3 Number 1013 introduced to the witness.)

4 Q (BY MR. ROSE) I've handed you a document
5 that was marked previously as Exhibit 1013, U.S.
6 Patent 6,179,071 to Dietzen. Do you recognize this
7 as what we referred to or you referenced to
8 previously as Dietzen II?

9 A Yes.

10 Q Can you describe generally what's taking
11 place or being shown in Dietzen II?

12 MR. WERNER: Objection to form.

13 A Referring to Figure 1A, drill cuttings are
14 being collected in trough 77. They're being
15 suctioned using line 37 into vessels 26, 27, 28.
16 The blower that's providing the suction is 30. Once
17 the material is collected there and a ship then
18 comes along, a ship or a boat, which is 20, then a
19 flexible line 4 is connected between 31 on the rig
20 and storage vessel 23 on the boat, a vacuum is
21 pulled in 23 using line 25 and blower 22, and the
22 material is vacuum conveyed from 26 or 27 or 28,
23 through 31, into 24 and then into 23.

24 Q (BY MR. ROSE) And then what happens once
25 the material is on the boat?

1 MR. WERNER: Objection to form.

2 A There can be some processing that occurs,
3 as shown in Figure 11, box 20, or Figure 12, also
4 box 20, and then eventually the material then leaves
5 the boat and goes on shore.

6 Q (BY MR. ROSE) So did I understand
7 correctly that a vacuum is used to suction the
8 cuttings from trough 77 to the tanks?

9 A Yes. The tanks 26, 27, 28, and then later
10 a vacuum is used to suck from those tanks into tank
11 23 on the boat.

12 Q And referring to column 5 -- Well, step
13 back. Dietzen II is the only reference that you've
14 relied on that teaches transfer of cuttings to a
15 ship, correct?

16 MR. WERNER: Objection to form.

17 A Well, Dietzen I has this container 24 and
18 27, which would then be picked up and presumably put
19 onto a ship. I'd have to go through the
20 specification to see if it mentions specifically a
21 ship, but the intent is that that container would be
22 moved in place and presumably onto a ship.

23 Q (BY MR. ROSE) That would be unit handling
24 that you described earlier?

25 A Yes.

1 Q That would not be a flow of material,
2 correct?

3 A The movement of that container from the
4 rig to the ship would not be what I call bulk
5 handling, but it would be unit handling.

6 Q Now, so the vacuum is used to suck
7 material from the trough to the tanks, correct, on
8 the rig?

9 A Yes.

10 Q Okay. And then once they're in those
11 tanks -- I'm referring now to column 5. And here
12 they're talking about -- This is in the second full
13 paragraph starting at line 22, and they're referring
14 to Figures 2, 3, and 3A, shows the construction of
15 one of the vacuum tanks. And the interior of the
16 vacuum tanks at the lower end -- this is reading at
17 line 29 -- at the lower end of tank 28, interior 40,
18 and auger or augers can be used to transfer cuttings
19 that settle in tank to discharge line 32.

20 So an auger is what's being primarily used
21 to convey the cuttings at the bottom to line 32;
22 isn't that correct?

23 A That isn't correct.

24 MR. WERNER: Objection to form.

25 Q (BY MR. ROSE) Did I read that

1 incorrectly? An auger or augers 44 can be used to
2 transfer cuttings that settle in tank 28 to
3 discharge line 32.

4 MR. WERNER: That's a different question,
5 but you can answer.

6 Q (BY MR. ROSE) If I framed it poorly I
7 apologize. But isn't an auger being used to
8 transfer cuttings that settle in the tank to the
9 discharge line?

10 MR. WERNER: Objection to form.

11 A First of all, Mr. Rose, I would point out
12 that it says can be used. It does not say that it
13 must be used. And indeed in some of the claims it
14 mentions the inclusion of an auger, and other claims
15 do not.

16 Q (BY MR. ROSE) You understand there's a
17 difference between a patent's disclosure and a
18 patent's claims, correct?

19 A I understand. But, again, the word is
20 can. It doesn't say must. Second, it talks about
21 the cuttings that settle in the tank. So to me,
22 because it's a horizontal tank, there is the
23 possibility that, over time, some of those cuttings
24 are going to settle to the bottom of the tank and
25 thereby not be removed by the vacuum that develops

1 through line 32. So in order to achieve complete or
2 nearly complete cleanup of the tank, an auger can be
3 used to do that, to effect that final cleanout. It
4 is not the primary means of discharge. The primary
5 means of discharge is suction.

6 Q So the cuttings at the bottom of the tank
7 are non-free flowing and an auger removes it; isn't
8 that correct?

9 MR. WERNER: Objection to the form.

10 A I believe that all of the cuttings are
11 non-free flowing, but some are less flowable than
12 others, and in order, as I said, to effect complete
13 or nearly complete cleanout of the vessel, an auger
14 can be used.

15 Q (BY MR. ROSE) Let's go back to Figure 3A.
16 What is the material that's identified by 40? Or
17 what is 40 identifying?

18 A I believe it's the cuttings, but let me be
19 certain. I misstated. At column 9, at the very
20 top, part number 40 is the interior of the tank.

21 Q I guess that leads to my next question,
22 which is, what is item 79? What is being drawn into
23 it by those arrows?

24 A Well, again, column 9 indicates that 79 is
25 a screen, 78 is a suction line.

1 Q So is something being suctioned out
2 through line 78?

3 A I believe the text -- or the specification
4 references this as an alternative, as far as
5 Figure 3A, as opposed to Figure 3, that that is the
6 possibility that, if there is some separation and
7 there's some liquid near the top of this container,
8 that that liquid could be -- it could be sucked out
9 of the container. Let me just refer, if I could, to
10 the specification to confirm that.

11 Yes. Column 5, starting at line 45, the
12 suction line 78 can be used to recycle drilling
13 fluid after solids within the interior 40 of tank 28
14 have settled, leaving the drilling fluid as upper
15 portion of the material contained within interior 40
16 of tank 28.

17 Q So what's happening in tank 28 is, the
18 combination of drill cuttings and drill mud are
19 going into the tank, the drill cuttings settle on
20 the bottom, and the drill mud is suctioned out
21 through line 78? Am I understanding that correctly?

22 MR. WERNER: Objection to form.

23 A Well, it calls here the drilling fluid
24 after the solids have settled.

25 Q (BY MR. ROSE) And so the solids that

1 settle on the bottom as shown in Figure 3 and 3A are
2 moved using an auger, correct?

3 MR. WERNER: Objection to the form.

4 A No. No. Again, that's not what I've
5 said. What I've said is that the primary movement
6 of the solids, the drill cuttings within this
7 vessel, is by suction, and if there's some -- if as
8 much material had been withdrawn as possible by
9 suction, then the screw is used at the bottom to
10 effect final cleanout, as much as possible, of this
11 container.

12 Q (BY MR. ROSE) Where do you get that, that
13 it's used to effect final cleanout?

14 A Well, again, I refer to column 5, line 30,
15 can be used to transfer cuttings that settle in the
16 tank.

17 Q All right. So if there is settling in the
18 tank, that means that the cuttings have separated
19 from the drill fluid, the drill fluid is suctioned
20 out and the cuttings that settled are then augered
21 out?

22 A No.

23 MR. WERNER: Objection to the form.
24 Assumes an impossible fluid.

25 A No. I don't see it that way at all. I

1 see that we have material inside this vessel, inside
2 this container, that consists primarily of drill
3 cuttings, but there could be some amount of drill
4 mud interspersed with drill cuttings. Even if there
5 is no -- Even if there is no drilling mud, this
6 paste or sludge could -- over time and with movement
7 on the oil rig, there could be some settlement of
8 some portion of the cuttings within this container
9 that then accumulate at the bottom of this tank.
10 And because we're dealing with a horizontal tank,
11 not a vertical tank, as in -- shown in most of the
12 examples in the pneumatic conveying and also the
13 Snowdon patents, if that were to occur, then it's
14 possible, as shown in Figure 3 and 3A, to have a
15 screw to clean out that settled material. But,
16 again, it doesn't say that you must have that screw.
17 Indeed, many of the claims do not include a screw.

18 Q (BY MR. ROSE) Right. Again, I'm not
19 worried about the claims. I'm worried about the
20 disclosure. And I want to go back to my last
21 question, where you were talking about a final
22 cleanout or a final cleanup, and I don't know where
23 that is in this reference. Can you show me where it
24 says something about a final cleanout?

25 MR. WERNER: Objection. Asked and

1 answered.

2 A I do not see the word final cleanout, but
3 to me it is obvious that, if you have a horizontal
4 vessel that is located on a drill rig and you want
5 to utilize as much of the capacity of that vessel as
6 possible so that you don't have to have a boat next
7 to the rig at all times, that you have some ability
8 to accumulate material in this vessel, in this
9 container, until the next ship comes. So you want
10 to clean out the vessel as much as possible when the
11 material is being discharged onto the boat. And
12 because of the fact that it is a horizontal
13 container and not vertically oriented, and because
14 there is the possibility that some of the -- some
15 portion of the drill cuttings may settle to the
16 bottom of this tank, it stands to reason to me that
17 that would be the purpose of having this screw to
18 remove that settled material and thereby clean out
19 the vessel as much as possible so that you have as
20 much of the volume usable the next time that you are
21 filling it.

22 Q (BY MR. ROSE) So am I understanding
23 correctly, then, that you're saying that there are
24 three layers within the tank, namely the drill fluid
25 that's being suctioned out via line 78, the drill

1 cuttings, and then a separate group of drill
2 cuttings that settle to the bottom?

3 MR. WERNER: Objection to the form.

4 A I'm not saying that there are three
5 distinct layers. I'm saying that I would call all
6 of the material in this container the drill cutting.
7 As I've testified earlier, drill cuttings could
8 contain some amount of drilling mud. So there could
9 be water and oil that is -- that has not been
10 separated from the drill cuttings when the material
11 is put into this container. And so given the
12 movement of the rig, given the time that material
13 sits in this container before the next boat arrives,
14 given the highly variable characteristics of drill
15 cuttings, you could have a situation -- you could
16 have several situations. You could have one where
17 it's possible to completely discharge this container
18 by using suction through line 32. You could have a
19 situation -- And that's covered by some of the
20 claims. You could have a situation where some of
21 the drill cuttings settled to the bottom of this
22 container, and so after you have suctioned as much
23 of it as possible through 32, you turn on the screw
24 conveyor to clean out as much as possible to empty
25 the container. And, third, you could have a

1 situation where, not only do you have some
2 settlement of larger, denser particles to the
3 bottom, but you have some more liquid material that
4 is at the top of this container, and that then is
5 sucked out, through 79, through line 78.

6 Q (BY MR. ROSE) Does the Dietzen II
7 reference describe those three different scenarios
8 specifically, or is that something that you've come
9 up with just by looking at the way the drawings are
10 set up and -- Where are those three separate
11 scenarios described in Dietzen II?

12 MR. WERNER: Objection to form.

13 A To me it's obvious, in reading the patent,
14 that the auger shown in 3 and 3A is an optional
15 piece of equipment; it's not essential.
16 Furthermore, that the screen and the suction line in
17 79 and 78 in Figure 3A, again, optional pieces of
18 equipment. So it's obvious to me that Dietzen II is
19 providing for a variety of conditions that could
20 occur in this vessel.

21 But the primary point I want to emphasize
22 is that Dietzen II, as with Dietzen I, is teaching
23 that you can take drilling mud -- excuse me --
24 drilling cuttings and pneumatically convey drilling
25 cuttings from one vessel to another vessel. In

1 Dietzen I it's conveying it to a portable container.
2 In Dietzen II it's conveying it from a trough to a
3 container on the rig and then from the container on
4 the rig to a container on the boat.

5 Q (BY MR. ROSE) In referring further in
6 Dietzen II to column 7, here they're talking
7 about -- talking, starting at line 14, discussion of
8 Figures 9 and 10. There is yet another auger being
9 used to direct the drill cuttings discharged by
10 tanks 103, correct?

11 A Well, in column 7, starting at line 2,
12 talks about what Dietzen II calls optional treatment
13 features, so there's Figures 9 and 10, which show
14 some optional treatment figures on the boat, on the
15 deck of the boat, and in Figure 12 -- Figures 11 and
16 12 show these optional treatment figures -- features
17 below the deck of the boat, or I suppose it could be
18 below the deck of the rig, also.

19 Q Right. The optional treatment feature
20 being, for example, the recycling of the drilling
21 fluid that's referenced there in line 10. But to
22 get the cuttings out of tanks 103 --

23 A In which figure?

24 Q In Figures 9 and 10. And in 7 and 8.

25 A Well, I'm looking now at Figure 11. And

1 12 is probably -- Let's look at Figure 11. So
2 Figure 11, box 20 shows what's happening on the
3 boat. Let's go up to the top. So box 11 is showing
4 what's happening on the rig, and so a vacuum is
5 being pulled with 30 to pull material from trough 71
6 into tanks 26, 27, 28 and 29, and then using blower
7 22 and line 24, which is then connected to line 31.
8 So the material is being vacuumed from 26 through 29
9 into tanks 103. And then using that same vacuum
10 system 22 on the boat, the material is then being
11 vacuumed from 103 through line 110 into 108, which
12 as I recall is a grinder.

13 I'm not sure I've answered your question,
14 but that's the way I look at the system. And then
15 there's things downstream of 108.

16 Q Right. You had -- I had asked you
17 previously about the auger in column 7, and you had
18 said, well, column 7 is talking about optional
19 treatment features. And I think -- I agree with
20 that, but I think what they're talking about as
21 optional treatment features are what takes place
22 below 103. I mean, in all instances the material is
23 going to go from tanks 26 through 29 on the rig down
24 to tanks 103 on the boat, correct?

25 A Yes.

1 Q And then the optional treatment features
2 are taking the material from 103 and doing things
3 with them, such as in tanks 101, or the grinder,
4 108, right?

5 A Well, it's partially right. It's through
6 grinder 108, and then there's some sort of a
7 screening operation 113 that's separating the
8 material into 114 and 115, and then that material is
9 being pulled by vacuum into 101 through line 117.

10 Q And in each of the tanks shown in
11 Figures 11 and 12, as 26 through 29, and in each of
12 the tanks 103, do you understand that those two
13 circular objects in the bottom of each tank
14 represent augers?

15 A Yes.

16 MR. ROSE: Let's take a quick break.

17 (Whereupon, the proceedings were in recess
18 at 3:23 p.m. and subsequently reconvened at
19 3:39 p.m., and the following proceedings were
20 entered of record:)

21 Q (BY MR. ROSE) I wanted to talk just
22 briefly about the Dietzen I reference we were
23 talking about before.

24 A Yes.

25 Q And we were talking about the materials,

1 because they're thixotropic, coming out of the
2 shakers 12, 13, 14 and 15 and dropping into the
3 trough 17. Do you know what temperature those
4 materials would come out of those shakers at?

5 MR. WERNER: Objection. Form, foundation.

6 A I do not.

7 Q (BY MR. ROSE) Do you know how long it
8 would take those materials to set up once they fell
9 into the trough?

10 MR. WERNER: Objection to form, and
11 foundation.

12 A I do not.

13 Q (BY MR. ROSE) Looking at Exhibits 1038
14 and 1037, maybe 1039 over there as well, do you know
15 if that's what the materials would look like when
16 they came out of shakers and landed into the trough
17 on Dietzen?

18 MR. WERNER: Objection to form.

19 A As I indicated in my declaration, I
20 believe that these still shots and the accompanying
21 videos represent one form of drill cuttings that
22 these patents are designed to handle. Again, as
23 I've testified on numerous occasions here today,
24 drill cuttings, pastes, sludge are all terms for
25 which there's no defined bounds as to what

1 constitutes these materials. As I testified
2 earlier, it's somewhere between a dry bulk solid and
3 a liquid, somewhere in between. So I believe that,
4 again, these Exhibits 1037 to 1039 and the
5 accompanying movies present examples of drill
6 cutting, but by no means are they the only way which
7 drill cuttings could be -- by no means the only
8 forms of drill cuttings.

9 Q (BY MR. ROSE) Right. And I may not have
10 asked my question clearly. What I was trying to get
11 at is the form or the condition of the drill
12 cuttings. You said these are drill cuttings of the
13 patents. You're referring to the patents that are
14 being challenged here?

15 A Yes.

16 Q All right.

17 A And I will also say Dietzen I and
18 Dietzen II. Again, it's all drill cuttings, which
19 there's no metes and bounds as to what constitutes
20 drill cuttings.

21 Q And my question originally was -- I am
22 more focused on the condition of the drill cuttings
23 when they come out of a shaker. Are what we see in
24 these pictures and what we can see in those videos,
25 are they in a state of fluidity that would be

1 similar to just coming off the shakers? Would they
2 be more viscous than what comes off the shakers?
3 Less viscous? Is there any way to tell what their
4 viscosity would be as you see them in these videos
5 and images as compared to what comes off the shaker?

6 MR. WERNER: Objection to form.

7 A There's no way to tell.

8 Q (BY MR. ROSE) And are you saying that
9 it's -- that indeed it may be that they would
10 congeal or set up with those thixotropic properties
11 instantly when they land in the trough?

12 MR. WERNER: Objection to form.

13 A Anything is possible with such a
14 non-homogenous material, undefined homogenous
15 material.

16 Q (BY MR. ROSE) And how do you know that
17 there are other types of drill cuttings?

18 MR. WERNER: Objection to form.

19 A It's just by common logic, that when
20 you're taking a drill, putting it on an ocean bed or
21 a sea bed and drilling through hundreds if not
22 thousands of feet of subsea material -- which can
23 vary widely in terms of the chemical composition,
24 geological formation, everything -- that you're
25 going to have an extremely variable material. And

1 that, to me, is the nature of drill cuttings. Not
2 only the formation through which the drill is
3 working, but also the manner in which the drill is
4 operating, the size and rotational speed of the
5 drill, the type of drilling mud that's used. All of
6 those I would expect can and does have an influence
7 on the properties of the drill cuttings.

8 MR. ROSE: We're at a good stopping point
9 for the day.

10 MR. WERNER: Okay.

11 (Whereupon, at 3:44 p.m., Tuesday,
12 August 9, 2016, the taking of the Deposition of
13 JOHN W. CARSON, PhD was in recess.)

14 * * *

1 I, JOHN W. CARSON, PhD, do hereby certify that I
2 have read the foregoing transcript of my Deposition and
3 believe the same to be true and correct (or, except
4 as follows, noting the page and the line number of
5 the change or addition desired and the reason why):

6

7 Page Line Change or Addition Reason

8

9

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25 Dated this ____ day of _____, 2016.

1 STATE OF MINNESOTA)
) ss. CERTIFICATE
2 COUNTY OF ANOKA:)

3 Be it known that I took the deposition of
4 JOHN W. CARSON, PhD on the 9th day of August, 2016,
at Minneapolis, Minnesota;

5 That I was then and there a Notary Public
6 in and for the County of Anoka, State of
Minnesota, and that by virtue thereof, I was duly
authorized to administer an oath;

7
8 That the witness, before testifying, was
by me first duly sworn to testify the whole truth
and nothing but the truth relative to said cause;

9
10 That the testimony of said witness was
recorded in shorthand by me and was reduced to
typewriting under my direction;

11
12 That the cost of the original transcript
has been charged to the party noticing the
deposition, unless otherwise agreed upon by Counsel,
13 and that copies have been made available to all
parties at the same cost, unless otherwise agreed
14 upon by Counsel;

15 That I am not related to any of the parties
16 hereto nor interested in the outcome of the action;

17 That the reading and signing of the
deposition by the witness and the Notice of Filing
were reserved.

18
19 WITNESS MY HAND AND SEAL this 15TH day of
AUGUST, 2016.

20

21

22

23

24

25



Christine K. Herman, RPR, CRR

DYNAMIC AIR, INC. v. M-I DRILLING FLUIDS UK LTD.

John W. Carson, Ph.D. on 08/09/2016

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John W. Carson, Ph.D. on 08/09/2016

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John W. Carson, Ph.D. on 08/09/2016

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