

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

ENERCORP SAND SOLUTIONS, INC.,
Petitioner,

v.

SPECIALIZED DESANDERS, INC.,
Patent Owner.

Case IPR2018-01748

U.S. Patent No. 8,945,256

Deposition of DAVID A. SIMPSON

Volume II

Houston, Texas

Wednesday, September 11, 2019 - 9:09 a.m.

Reported by:

Susan Perry Miller,
CSR-TX, CCR-LA, CSR-CA-13648
NCRA Registered Diplomate Reporter
NCRA Certified Realtime Reporter
NCRA Certified Realtime Captioner

Job No.: 25987

1 ORAL DEPOSITION OF DAVID A. SIMPSON,
2 produced as a witness at the instance of the Patent
3 Owner, and duly sworn, was taken in the above-styled
4 and numbered cause on Wednesday, September 11, 2019,
5 from 9:09 a.m. to 3:15 p.m., before Susan Perry
6 Miller, CSR-TX, CCR-LA, CSR-CA-13648, RDR, CRR, CRC,
7 Notary Public in and for the State of Texas,
8 reported via Machine Shorthand with Realtime
9 Computer Translation, at the offices of Cabello Hall
10 Zinda, PLLC, 801 Travis Street, Suite 1610, Houston,
11 Texas.

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INDEX

Page

EXAMINATION OF DAVID A. SIMPSON:

BY MR. KESACK.....95, 288

BY MR. HALL..... 274

Reporter's Note:

No exhibits were tendered for attachment.

(Wednesday, September 11, 2019, 9:09 a.m.)

(Witness sworn by the reporter.)

P R O C E E D I N G S

DAVID A. SIMPSON, P.E.,

having taken an oath to tell the truth, the whole truth, and nothing but the truth, testified as follows:

EXAMINATION

BY MR. KESACK:

Q. Good morning, Mr. Simpson.

A. Good morning.

Q. And welcome back.

You understand you're under oath just like the last deposition, right?

A. I do.

Q. Do you remember all the ground rules we discussed last time?

A. I do.

Q. Would you like me to repeat any of them?

A. Please.

Q. Sure.

Do you understand it's important to give your best, most accurate testimony here in this proceeding?

A. Yes, I do.

1 Q. If you don't understand the question,
2 please let me know and I'll either repeat it or have
3 the court reporter repeat it.

4 Do you understand?

5 A. I do.

6 Q. If I ask a question and you don't hear
7 it, let me know and we'll have it repeated.

8 Do you understand?

9 A. Yes.

10 Q. Is there any reason that you could not
11 give your best and most accurate testimony today?

12 A. No.

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

15 A. I read through my rebuttal document, my
16 last deposition; I read through the petition -- the
17 rebuttal from the petitioner and spot-looked at
18 references that were mentioned in those other
19 documents.

20 Q. Okay. Was Hemstock one of those
21 references?

22 A. Yes.

23 Q. Was Davis one of those references?

24 A. Yes.

25 Q. Was the Data Book one of those

1 references?

2 A. Yes.

3 Q. Any other references you looked at that
4 you can remember?

5 A. Not that I can remember.

6 Q. Did you speak with counsel?

7 A. Yes.

8 Q. And when was that?

9 A. Yesterday.

10 Q. And was your review of all the documents
11 you mentioned also yesterday?

12 A. It's been over the last few days.

13 Q. Did you meet with anybody else?

14 A. No.

15 Q. Did you talk about the substance of your
16 previous deposition with anybody?

17 A. No.

18 Q. When was the last time you reviewed
19 Hemstock in its entirety?

20 A. Probably in May.

21 Q. So a while ago.

22 A. Been a while.

23 Q. You don't remember it?

24 A. No.

25 Q. I'm going to just ask you to review it.

1 Take as much time as you need. I'm going to ask you
2 some questions about it. I want it to be in your
3 memory.

4 A. Okay.

5 Q. The document I just handed you is
6 Hemstock, correct?

7 A. Correct.

8 (Document review by witness.)

9 A. Okay.

10 BY MR. KESACK:

11 Q. So you just reviewed the entirety of
12 Hemstock? Is that right?

13 A. I did.

14 Q. You said the last time you did that was
15 May?

16 A. Yes.

17 Q. And you wrote a declaration in August,
18 right?

19 A. Yes.

20 Q. You didn't review Hemstock to write
21 that?

22 A. I did not read the entire thing in --
23 when I was writing that.

24 Q. How did you choose which sections of
25 Hemstock to read when you were writing your

1 declaration?

2 A. I don't know how to answer that.

3 Q. Was it random?

4 A. It was mostly looking at drawings,
5 looking at the drawings in Hemstock and refer --
6 excuse me -- and referring back to the write-ups on
7 the drawings.

8 Q. Why did you refer to the drawings?

9 A. They tell the story clearer than the
10 text does.

11 Q. If you can go to column 6, starting at
12 about line 16, this is the last paragraph of the
13 specification. Do you see it?

14 A. Column 6, line 16. Yes.

15 Q. You just read this paragraph, right?

16 A. Yes.

17 Q. What's this paragraph about? What's it
18 teaching?

19 A. It's talking about how the de- -- the
20 device in the patent is more effective than a
21 previous device.

22 Q. Is it fair to say this paragraph is
23 discussing the benefits of the invention disclosed
24 in Hemstock?

25 A. Yes.

1 Q. If you go down to line 32 --

2 A. Okay.

3 Q. -- we have the sentence that says: The
4 sander is capable of handling multiphase production
5 and has demonstrated an ability to remove sand from
6 both gas and oil streams.

7 Do you see that?

8 A. Yes.

9 Q. What does that sentence mean?

10 A. It says that the desander can process a
11 mixed stream, encompassing some mixture of gases,
12 liquids and solids.

13 Q. From where?

14 A. From a well.

15 Q. And do you think this is talking about
16 one specific type of multiphase flow or is it
17 talking about the multiphase flow that's coming from
18 oil and gas streams?

19 MR. HALL: Objection; form.

20 A. I believe it's talking about oil and gas
21 streams.

22 BY MR. KESACK:

23 Q. Do oil and gas streams have slug flow?

24 A. Yes.

25 Q. Is there any reason for you to believe

1 that this sentence was intended to exclude slug flow
2 from it?

3 A. No.

4 Q. And you have -- I'm going to put Miller
5 aside for a second. Let's just forget about Miller.
6 I know you have opinions about Miller, but let's put
7 that aside.

8 You have two main opinions about
9 obviousness in this case, right?

10 MR. HALL: Objection; form.

11 BY MR. KESACK:

12 Q. Let me say it differently. You have two
13 grounds of obviousness in this case if you put
14 Miller aside. Is that correct?

15 A. I can't answer that. I don't -- I don't
16 have that document in front of me.

17 Q. Do you remember a ground that combines
18 Hemstock with Davis?

19 A. Yes.

20 Q. Do you remember a ground that combines
21 Hemstock with the Data Book?

22 A. Yes.

23 Q. So those are the two main opinions you
24 have about obviousness against the '852 -- or the
25 '256 patent, right?

1 A. Yes.

2 Q. And in your opinion, the reason for
3 your -- strike that.

4 The reason for your obviousness
5 opinions is, in your opinion, a person of ordinary
6 skill in the art would have wanted to improve
7 Hemstock. Is that right?

8 A. Yes.

9 Q. What reasons would a person of ordinary
10 skill in the art want to improve Hemstock --

11 MR. HALL: Objection.

12 BY MR. KESACK:

13 Q. -- based on what you just read?

14 MR. HALL: Objection; form.

15 A. The primary problem I would see
16 operating this Hemstock device is where does the --
17 where do solids accumulate in the vessel? They tend
18 to accumulate away from the opening, the end that
19 opens to remove solids; and I would expect that
20 would be inconvenient for the operators.

21 BY MR. KESACK:

22 Q. So if you were to improve Hemstock based
23 on what you just said, what would the improvement
24 be?

25 A. To tilt it to cause the natural flow of

1 the solids to come towards the -- towards the
2 cleanout opening.

3 Q. So the improvement that you found after
4 reading Hemstock was you would like the sand to move
5 closer to the opening so you could clean it out
6 easier.

7 A. Yes.

8 Q. Anything else?

9 MR. HALL: Objection; form.

10 A. I would always be looking for less sand
11 in the outlet. I don't know -- you know, based on
12 reading Hemstock, they talk about a site changing
13 from multiple failures to zero failures. It doesn't
14 explain over what period of time.

15 Is that a complete elimination of
16 failures or is that an increased time between
17 failures? I don't know.

18 BY MR. KESACK:

19 Q. And so what improvement are you trying
20 to achieve, then?

21 A. Better sand -- or more complete sand
22 separation.

23 Q. Of what?

24 A. Removing the sands from the
25 multiphase -- removing solids from the multiphase

1 flow.

2 Q. And what in the document you just read
3 leads you to believe that more sand needs to be
4 removed from the multiphase flow?

5 A. There was a mention there, and I can't
6 point to it exactly right -- there is a mention in
7 there of it reducing the sand leaving, not
8 eliminating the sand leaving.

9 Q. Okay. And what is the purpose of
10 removing sand in Hemstock?

11 A. To reduce damage to downstream piping
12 and facilities from high-velocity solids.

13 Q. And does Hemstock teach that that
14 purpose is achieved?

15 MR. HALL: Objection; form.

16 A. He has examples of where it did. That
17 doesn't mean that it would -- those examples would
18 apply to the next location.

19 BY MR. KESACK:

20 Q. Can you go to column 6, line 25?

21 A. Column 6, line 25. Okay.

22 Q. It says: Sand is removed from the fluid
23 stream without erosive effects on the operator's
24 downstream equipment.

25 Right?

1 A. Yes.

2 Q. What does that mean?

3 A. It means that sand is removed.

4 Q. To what end?

5 A. To reduce erosive effects on the
6 downstream piping and equipment.

7 Q. And that's the goal you just mentioned
8 for removing sand, right?

9 A. Right.

10 Q. So this is saying that that goal is
11 achieved, right?

12 MR. HALL: Objection; form.

13 A. It's saying that -- it's claiming that
14 it's achieved.

15 BY MR. KESACK:

16 Q. All right. So after reading column 6,
17 why would you still think more sand needs to be
18 removed?

19 A. After reading column 6, I don't -- after
20 reading that sentence, if you could take it on face
21 value, it doesn't. I don't believe you can take it
22 on its face value.

23 Q. So your opinion is although Hemstock
24 says one thing, we should believe something else.
25 Right?

1 A. I'm saying that Hemstock makes a claim
2 that sand is removed, that the removal of that sand
3 reduces erosive effects downstream.

4 I don't believe Hemstock is saying
5 that all sand is removed.

6 Q. All right.

7 A. Which says the potential for downstream
8 erosive effects is not zero.

9 Q. Right. But it doesn't say reduced,
10 right? The sentence you just read doesn't say
11 reduced, right?

12 A. It does not say reduced right there, no.

13 Q. It says without erosive effect, right?

14 A. Right.

15 Q. It means there isn't an erosive effect.

16 MR. HALL: Objection; form.

17 BY MR. KESACK:

18 Q. There is not an erosive effect, right?

19 MR. HALL: Objection; form.

20 A. In that paragraph, that is what it says.

21 BY MR. KESACK:

22 Q. And so your opinion needs to ignore what
23 that paragraph says.

24 MR. HALL: Objection; form.

25 A. It needs to treat that statement as an

1 unsubstantiated claim.

2 BY MR. KESACK:

3 Q. What is your claim substantiated by?

4 MR. HALL: Objection; form.

5 A. Experience.

6 BY MR. KESACK:

7 Q. Anything else?

8 A. No.

9 Q. What experience is that based on?

10 A. My experience in the oil and gas
11 industry, working around wells that produced solids
12 from frac sand to formation sand to coal. It's
13 always there. If it's ever there, it's always
14 there, and the rate at which the reservoir produces
15 solids is variable from day to day, from year to
16 year.

17 So a system or a device that
18 effectively removes the risk of downstream erosion
19 today may not always remove that risk.

20 Q. Have you ever operated a desander which
21 meets the description of Hemstock?

22 A. I have not.

23 Q. So you don't know whether or not sand
24 going through a Hemstock vessel produces sand on the
25 outlet, right?

1 A. I do not.

2 Q. So your opinion for why the statement in
3 column 6 is incorrect is based on your general
4 experience in the field?

5 A. Yes.

6 Q. And nothing else?

7 A. Nothing else.

8 Q. Okay. Does Hemstock discuss the
9 separation of solids from liquids in the belly
10 portion of the vessel anywhere in the document you
11 just reviewed?

12 A. Not that I recollect.

13 Q. Does Hemstock discuss the need for
14 better separation of solids from liquids in the
15 belly portion in anything you just read?

16 A. Not that I recollect.

17 Q. Does Hemstock discuss that improving the
18 settling efficiency of solids in the liquid portion
19 of the vessel would be beneficial, anywhere in the
20 document you just read?

21 A. No.

22 Q. Do you have any other evidence, other
23 than your experience, that the separation between
24 solids and liquids in the belly portion of Hemstock
25 was inadequate?

1 MR. HALL: Objection; form.

2 A. No.

3 BY MR. KESACK:

4 Q. So then how do you know that a person of
5 ordinary skill in the art would want to improve the
6 settling efficiency of solids in the liquid portion
7 of the Hemstock vessel?

8 A. I don't understand the question.

9 Q. Yeah. Your opinion is that a person of
10 ordinary skill in the art would want to improve the
11 settling efficiency of solids in the liquid portion
12 of the Hemstock vessel, right?

13 A. Yes.

14 Q. How do you know that?

15 A. Because I've never seen a device in the
16 oil and gas field, in anywhere in the industry, that
17 somebody wasn't trying to make better.

18 Q. So just the general march of technology,
19 you always want to improve?

20 A. Yes.

21 Q. Anything else?

22 A. No.

23 Q. Okay. Did you analyze at all how much
24 sand would exit the Hemstock desander based on the
25 description in Hemstock?

1 A. I did not.

2 Q. Can you think of any other reason other
3 than wanting to improve the settling efficiency of
4 solids in the liquid portion of Hemstock for which
5 you would want to look at sedimentation references
6 to improve Hemstock?

7 MR. HALL: Objection; form.

8 A. I'm not sure I'm understanding that
9 question.

10 BY MR. KESACK:

11 Q. Okay. So we started out with you saying
12 it was your opinion that a person of ordinary skill
13 would want to improve the settling of solids in the
14 liquid portion, right? That's the improvement you
15 would want to make.

16 A. Yes.

17 Q. And the way you would do that is to
18 increase the sedimentation rate, right?

19 A. Yes.

20 Q. Is there any other reason besides solids
21 settling in the liquid that you would look at
22 references to improve sedimentation rate?

23 MR. HALL: Objection; form.

24 A. No.

25 --oOo--

1 BY MR. KESACK:

2 Q. So it's only the solids in the liquid
3 that you're talking about.

4 A. Yes.

5 Q. Okay. So let's look at Hemstock
6 Figure 3.

7 A. Okay.

8 Q. Now, in the first declaration that you
9 wrote, it was your opinion that Figure 3 inclined
10 would meet the '256 patent, right?

11 MR. HALL: Objection; form.

12 A. Yes.

13 MR. HALL: Counsel, do you have a
14 specific paragraph in his declaration you're
15 referring to?

16 MR. KESACK: He was able to answer
17 the question without the specific reference
18 so we'll take his answer.

19 BY MR. KESACK:

20 Q. So it's in Figure 3 where you would have
21 sand which you believe is coming out of the outlet,
22 right?

23 A. Could you say that again?

24 Q. Sure.

25 In Figure 3, you believe that there

1 is some sand that will be coming out of the outlet,
2 correct?

3 MR. HALL: Objection; form.

4 A. I believe that there are situations
5 where there will be sand coming out of the outlet.

6 BY MR. KESACK:

7 Q. Okay. Which situations is that?

8 A. As the vessel tends to fill, as he talks
9 about, the vessel stops separating sand from the
10 liquids and all of the sand that enters leaves.

11 Other than that, as the solids
12 approach the outlet, that turbulent area of the
13 gases and liquids exiting will take some solids with
14 it.

15 Q. Okay. So it's -- excluding the case
16 where the desander is no longer operating as a
17 desander because it's too full, right, the sand
18 you're talking about is sand that's in the turbulent
19 portion of the fluid of the gas and the liquid at
20 the outlet. Is that right?

21 A. Yes.

22 Q. Okay. Is that sand going to be the
23 heaviest particles or the lightest particles?

24 MR. HALL: Objection; form.

25 A. I don't think there's any way to know.

1 BY MR. KESACK:

2 Q. Okay. Do you see the part of the figure
3 marked "sand," or "S" for sand?

4 A. Yes.

5 Q. It is for Sand, right?

6 A. Solids, sand, yeah.

7 Q. Solids, sand. Okay.

8 There's no difference in this patent
9 between solids and sand, right?

10 A. Correct.

11 Q. That's not the sand you're talking about
12 leaving the outlet, right?

13 A. It's the same substance.

14 Q. Sure. But that sand has settled, right?

15 MR. HALL: Objection; form.

16 A. There's flow over the top of it. It's
17 going to tend to be reentrained and settle and
18 reentrained and settle. It's going to be quite
19 chaotic.

20 BY MR. KESACK:

21 Q. Okay. Your obviousness opinion is about
22 causing the sand to settle faster, right?

23 A. Yes.

24 Q. You're not talking about sand that has
25 already settled, right?

1 A. Sand that has settled is not necessarily
2 sand that will never become sedimentation again.

3 Q. Okay.

4 A. Okay? So there is always some amount of
5 churning in the process. So sand that has stopped,
6 has settled, can easily become mobile again.

7 Q. Does Hemstock teach that sand that has
8 settled becomes mobilized again?

9 A. It does not.

10 Q. Okay. When you gave your opinion that
11 you would want to increase sedimentation rate in
12 Hemstock, was that based on sand which had already
13 settled and became reentrained in the liquid and
14 then needs to settle again?

15 MR. HALL: Objection; form.

16 A. It was based on the sand that's in the
17 vessel.

18 BY MR. KESACK:

19 Q. But specifically, did it include sand
20 that had settled --

21 MR. HALL: Objection.

22 BY MR. KESACK:

23 Q. -- and then became unsettled and then
24 settled again?

25 MR. HALL: Objection; asked and

1 answered.

2 A. I don't know the -- a grain of sand
3 could have gone through that process an infinite
4 number of times. I don't know how you designate a
5 grain of sand that has settled from one that has
6 never stopped moving.

7 BY MR. KESACK:

8 Q. Okay. So in your opinion, does Davis
9 teach a way to improve settling of sand which has
10 settled and then became unsettled and then settles
11 again?

12 A. Davis and the whole sedimentation
13 discussion talks about sand that is in a fluid.
14 Whether it has been in the fluid before or never or
15 this is the first time it was ever mobile is not a
16 discussion topic in sedimentation that I'm aware of.

17 Q. So Davis isn't talking about -- strike
18 that.

19 There's no specific discussion in
20 Davis about sand which was in suspension, settled,
21 and then got put back in suspension again. Is that
22 right?

23 MR. HALL: Objection; form.

24 A. Not to my recollection.

25 --oOo--

1 BY MR. KESACK:

2 Q. So in your opinion, improving Hemstock
3 based on Davis isn't based on sand which has
4 settled, became resuspended and then settles again,
5 right?

6 MR. HALL: Objection; form.

7 A. I don't know that that's true. I -- any
8 particle of a solid that is mobile will tend to
9 settle. Whether it will then become mobile again is
10 completely indeterminate.

11 BY MR. KESACK:

12 Q. But your opinion is not indeterminate,
13 right? You have a specific opinion about combining
14 these two references, right?

15 A. I do.

16 Q. Does that opinion include sand which has
17 settled, becomes resuspended and settles again?

18 MR. HALL: Objection; form.

19 A. Where? You're asking a question that
20 does not have a specific temporal reference, so a
21 grain of sand that is part of a formation was once
22 part of a grain of sand floating in the ocean
23 300 million years ago.

24 So to say that that has never been
25 mobile or will always not be mobile is not a

1 question I can answer.

2 BY MR. KESACK:

3 Q. Let me try to be more specific for you.

4 Does your opinion that Hemstock needs to be
5 improved, right, you have an opinion that Hemstock
6 needs to be improved, right?

7 A. Yes.

8 Q. Does your opinion that Hemstock needs to
9 be improved include sand which comes in the inlet,
10 falls into the liquid portion of the belly, settles,
11 becomes reentrained in the liquid, and then needs to
12 settle again?

13 MR. HALL: Objection; form.

14 A. Yes, it does.

15 BY MR. KESACK:

16 Q. Okay. So in your opinion, you need to
17 find a way to improve that process of sand settling,
18 becoming resuspended and then settling again.

19 A. Yes.

20 Q. In your opinion, does Davis teach that?

21 A. Yes.

22 Q. Okay. Did you write about that in your
23 declaration?

24 A. Not that I recall.

25 Q. Why not?

1 A. That thought process did not enter my
2 mind.

3 Q. So it wasn't part of your opinion before
4 but it is now?

5 MR. HALL: Objection; form.

6 A. As I'm answering your questions, I am
7 evaluating my -- I'm reassessing my opinions, yes.

8 BY MR. KESACK:

9 Q. Let me hand you Davis.

10 A. Okay.

11 Q. And I want you to point me in Davis
12 where it is you believe it teaches improving sand
13 which has settled, becomes resuspended, and settles
14 again.

15 A. Okay. When Davis talks about
16 sedimentation, he's talking about --

17 Q. Are you on a specific page?

18 A. No, I'm not. I'm trying to figure out
19 your statement mechanism here.

20 (Document review by witness.)

21 A. In page 10 of 30, at the bottom it says:
22 Preliminary investigations of stable,
23 non-coagulating suspensions containing a small
24 number of distinct species indicate that the
25 particle concentration does not remain uniform.

1 BY MR. KESACK:

2 Q. So in your opinion, that's teaching a
3 way to improve sedimentation of a solid which has
4 settled, becomes resuspended, and settles again?

5 MR. HALL: Objection; form.

6 A. It's talking about the fact that the
7 process of sedimentation is not a uniform, one-time
8 thing. Okay? Settling develops -- as settling
9 develops, faster-falling particles move away from
10 the others, creating different regions in the
11 interior of the suspension.

12 BY MR. KESACK:

13 Q. You see Figure 2?

14 A. Figure -- yes.

15 Q. You don't think that sentence is talking
16 about Figure 2, the different regions of
17 sedimentation?

18 MR. HALL: Objection; form.

19 A. It is talking about Figure 2.

20 BY MR. KESACK:

21 Q. That's not talking about sand which has
22 settled, becomes resuspended, and settles again,
23 right?

24 MR. HALL: Objection; form.

25 A. It's talking about a dynamic process, a

1 nonuniform fluid. What part of that fluid has
2 reached a point of zero velocity and then been
3 stirred back up, it doesn't talk about.

4 BY MR. KESACK:

5 Q. All right. So when I asked you where in
6 Davis does it teach improving settling of a solid
7 which has settled, becomes resuspended, and then
8 settles again, this doesn't cover that, right?

9 MR. HALL: Objection; form.

10 A. Not that I recall.

11 BY MR. KESACK:

12 Q. Is there anywhere in Davis that teaches
13 that?

14 MR. HALL: Objection; form.

15 A. I can't -- I can't answer that.

16 BY MR. KESACK:

17 Q. You're not aware of anything in Davis
18 that teaches that, right?

19 A. No.

20 MR. HALL: Objection; form.

21 BY MR. KESACK:

22 Q. So going back to Hemstock Figure 3.

23 A. Okay.

24 Q. Although your opinion may include sand
25 which has settled, becomes resuspended and settled

1 again, Davis doesn't help you with improving that,
2 right?

3 MR. HALL: Objection; form.

4 A. Inclining the vessel, as Davis teaches,
5 moves the point of accumulation away from the
6 outlet, reducing the rate at which solids will be
7 accumulated. So --

8 MR. KESACK: Objection; move to
9 strike, nonresponsive.

10 BY MR. KESACK:

11 Q. Although your --

12 MR. KESACK: Can you read back the
13 question I asked, please?

14 (The reporter read back the following
15 portion of the preceding record.)

16 "QUESTION: Although your opinion may
17 include sand which has settled, becomes
18 resuspended and settled again, Davis doesn't
19 help you with improving that, right?"

20 (End of readback.)

21 MR. HALL: Objection; form.

22 A. Okay. Not specifically, no, it does
23 not.

24 BY MR. KESACK:

25 Q. So your obviousness opinion is not

1 talking about that settlement, right? Is that fair?

2 MR. HALL: Objection; form.

3 A. No, it is not.

4 BY MR. KESACK:

5 Q. So what sand is it talking about?

6 A. It's talking about -- it's talking about
7 the sand that is in the vessel that is mobile.
8 Whether that sand is sand that has just entered the
9 vessel or sand that is stirred up inside the vessel,
10 there's no way to determine.

11 Q. But we just said that the sand that's
12 already settled isn't the sand which you can improve
13 based on Davis, right?

14 MR. HALL: Objection; form.

15 A. I don't know how else to say it. The
16 sand in the fluid is the sand in the fluid. Where
17 it comes from is indeterminate.

18 BY MR. KESACK:

19 Q. Is it your opinion that Davis is going
20 to help you deal with the problem of sand not
21 settling fast enough?

22 A. Yes.

23 Q. And Davis can't do that with sand which
24 has settled and becomes resuspended again because
25 that's not taught anywhere in Davis. Is that right?

1 MR. HALL: Objection; form.

2 A. I believe that Davis is talking about
3 sand that is in -- or solids that are in the fluid.
4 Whether those solids have ever been immobile or not,
5 it doesn't speak of.

6 BY MR. KESACK:

7 Q. You just testified that the sand which
8 has settled, becomes resuspended and settles again
9 is not part of your obviousness opinion. Are you
10 saying it is again?

11 MR. HALL: Objection; form.

12 A. No, I'm not.

13 BY MR. KESACK:

14 Q. Okay. So we're not talking about the
15 sand which has settled. Is that fair?

16 MR. HALL: Objection; form.

17 BY MR. KESACK:

18 Q. In your obviousness opinion, we're not
19 talking about the sand which has settled in
20 Figure 3. Is that fair?

21 MR. HALL: Objection; form.

22 A. Yes.

23 MR. HALL: David, please wait for my
24 objection before you answer.

25 THE WITNESS: I'm sorry. Sorry.

1 BY MR. KESACK:

2 Q. So then I'll ask you again because I
3 don't think we've gotten the answer yet, is which
4 sand are you talking about in your obviousness
5 opinion with respect to Figure 3?

6 MR. HALL: Objection; form.

7 A. Sand that is in the fluid.

8 BY MR. KESACK:

9 Q. Where did that sand come from?

10 A. It came from where it was. It could be
11 from the reservoir, it could be from the belly
12 portion, it could be from wherever it was.

13 Q. So when you say "sand that was in the
14 belly portion," what do you mean?

15 A. I mean sand that has settled and then
16 been reentrained through turbulence.

17 Q. The same sand you just said wasn't part
18 of your obviousness opinion?

19 MR. HALL: Objection; form.

20 A. In my obvious opinion [sic] I did not
21 differentiate sand that has settled in the -- I'm
22 only talking about solids that are mobile in the
23 fluid.

24 BY MR. KESACK:

25 Q. So you just told me twice that your

1 obviousness opinion does not include sand which has
2 settled, becomes resuspended and settles again.

3 Right?

4 MR. HALL: Objection; misstates
5 prior testimony.

6 A. I don't know how to answer that.

7 BY MR. KESACK:

8 Q. You don't know how to answer what you
9 testified to?

10 A. I don't know how to answer your
11 question.

12 Q. You don't remember what you testified?

13 Mr. Simpson, I'm just asking you, I
14 need to understand the scope of your obviousness
15 opinion. I need to understand whether or not your
16 obviousness opinion includes sand which has settled,
17 becomes resuspended and settles again.

18 Now, you've told me twice that it
19 doesn't include that, and then when I go back to
20 asking you about the sand which has settled, it
21 becomes part of your opinion again so I just need to
22 understand what your obviousness opinion includes.

23 MR. HALL: Objection. Is there a
24 question?

25 BY MR. KESACK:

1 Q. Could you please let me know whether or
2 not your obviousness opinion includes sand which has
3 settled, becomes resuspended and settles again?

4 MR. HALL: Objection; form.

5 A. My opinion is that it is not possible to
6 differentiate sand which came into the vessel
7 immediately and sand that was reentrained from the
8 vessel. Sand is sand. Solids are solids.

9 Davis does not specifically speak of
10 solids becoming mobile after having been immobile.
11 So my opinion is that Davis is talking about the
12 initial separation of solids from fluids.

13 BY MR. KESACK:

14 Q. So Davis will not help you improve the
15 settling rate of sand which has settled, becomes
16 resuspended, and settles again. Is that right?

17 MR. HALL: Objection; form.

18 A. It does not specifically address that.
19 It addresses solids that are mobile in a liquid.
20 Whether they were never mobile before or whether
21 they were mobile before, it doesn't address.

22 BY MR. KESACK:

23 Q. So would you -- if you were trying to
24 improve the settling rate of solids which had
25 settled and became resuspended and you want them to

1 settle again, would you go to Davis?

2 A. No, I would not.

3 Q. Do you think a person of ordinary skill
4 in the art would?

5 A. I can't answer that.

6 Q. Why not?

7 A. Because I wouldn't. Am I a typical
8 person of ordinary skill in the art? I don't know.
9 A person of ordinary skill in the art is a wide
10 range of individuals.

11 Q. Is your declaration based on the
12 viewpoint of yourself or of a person of ordinary
13 skill in the art?

14 MR. HALL: Objection; form.

15 MR. KESACK: What's the objection?

16 MR. HALL: That's stated in his
17 declaration. He's already testified to
18 that.

19 MR. KESACK: I haven't asked or
20 answered that question so I don't understand
21 the objection. I can ask him questions
22 about what he's previously testified, right?

23 MR. HALL: That's the objection.

24 MR. KESACK: Okay.

25 A. Okay. Could you repeat the question,

1 please?

2 MR. KESACK: Could you read it,
3 please?

4 (The reporter read back the following
5 portion of the preceding record.)

6 "QUESTION: Is your declaration based
7 on the viewpoint of yourself or of a person
8 of ordinary skill in the art?"

9 (End of readback.)

10 MR. HALL: Objection; form.

11 A. It's based on a person of ordinary skill
12 in the art.

13 BY MR. KESACK:

14 Q. So you're able to set forth opinions
15 about what a person of ordinary skill in the art
16 would have understood throughout your declaration,
17 right?

18 A. I made that effort, yes.

19 Q. But you can't do it in relation to
20 whether a person would go to Davis to improve sand
21 which has settled, becomes resuspended and settles
22 again. Is that right?

23 A. I would say that a person of ordinary
24 skill in the art would not.

25 Q. Thank you.

1 So putting aside the sand which has
2 settled, becomes resuspended and settled again,
3 whether there's sand, in your opinion, that is
4 leaving the vessel in Figure 3 of Hemstock?

5 A. Was there a question there?

6 Q. Yes. Putting aside the sand which has
7 settled, becomes resuspended and settles again,
8 which sand, in your opinion, is leaving the vessel
9 in Figure 3 of Hemstock?

10 A. Sand that has not settled.

11 Q. Where would you find that sand in
12 Figure 3?

13 A. I would expect it to be in the dotted
14 portion which is the raw well fluid coming in.

15 Q. Anywhere else?

16 A. That's the only place I see it here in
17 Figure 3.

18 Q. Is there anywhere that you don't see it
19 that you would expect it to be in Figure 3, the sand
20 which hasn't settled?

21 A. Yeah. I would expect it to go farther
22 than they show the dots.

23 Q. Okay. So where would it be?

24 A. It would be throughout the void area,
25 throughout the freeboard area.

1 Q. Would it be in the liquid anywhere?

2 A. Yes.

3 Q. Where?

4 A. In the two liquid portions.

5 Q. Throughout the entire part of the
6 liquid?

7 A. To some extent.

8 Q. So you see the "L" on the top of
9 Figure 3?

10 A. The L on the top of Figure 3, yes.

11 Q. You see how it's pointing?

12 A. Yes.

13 Q. If there was sand there, would it go out
14 of the outlet, in your opinion?

15 A. Which L are you talking about?

16 Q. So you said you saw an L at the top of
17 Figure 3. Which one are you talking about?

18 A. There are two. There's an L in the top
19 section, in the top portion of the vessel, and an L
20 in the bottom portion of the vessel.

21 Q. Sure. So when I said do you see the L,
22 which one were you referring to?

23 A. I was referring -- I saw an L. I was
24 referring to the one on the inlet in the vessel.

25 Q. Okay. Let's talk about that one then.

1 MR. HALL: I'm sorry, Counsel. Can
2 we annotate what he's talking about?
3 Because the record is unclear as to what L
4 he's referring to.

5 MR. KESACK: I think he just
6 testified that the L is the one that's
7 pointing near the inlet, and there's only
8 two Ls in the figure. That's the one
9 pointing near the inlet; the other one's
10 not, so...

11 MR. HALL: I see three L's, so --
12 but that's fine.

13 BY MR. KESACK:

14 Q. You understand which L we're talking
15 about when we say the L near the inlet, correct?

16 A. I do.

17 Q. If there was sand at the place where
18 that L is pointing to that hasn't settled yet, would
19 you expect that sand to go out of the outlet?

20 A. That would be a function of the rate of
21 water inflow, of liquid inflow. If the rate of
22 liquid inflow was high enough to cause liquid to go
23 over the top of the sand pile in the center, then
24 yes.

25 Q. You would expect sand that had almost

1 reached the bottom at the L to go back up and go to
2 the outlet? Is that right?

3 A. I would expect that the liquid, with
4 some amount of sand in the process of settling, to
5 be able to flow over the top of the sand to the
6 outlet.

7 Q. I'm asking about the sand which had
8 reached the point where the L is pointing to. In
9 your opinion, sand which had settled to there, that
10 hadn't reached the bottom yet, there's a situation
11 where that sand would go out of the outlet. Is that
12 right?

13 A. Yes.

14 MR. HALL: Objection; asked and
15 answered.

16 BY MR. KESACK:

17 Q. And in your opinion, is that sand which
18 needs to be improved settling, in your obviousness
19 opinion?

20 A. Yes.

21 Q. And in your opinion, does Davis teach
22 you how to deal with that?

23 A. Yes.

24 Q. Okay. So in your opinion, Davis teaches
25 how to deal with a situation where sand has almost

1 settled, an influx of liquid came into the vessel,
2 caused the sand to become resuspended, and then go
3 to an outlet. Is that right?

4 MR. HALL: Objection; form.

5 A. No. What you said a moment ago was the
6 sand was still in the liquid, still mobile. Influx
7 of liquid could carry that mobile -- that sand that
8 has not settled to the outlet.

9 BY MR. KESACK:

10 Q. So in your opinion, Davis teaches you
11 how to improve the settling of sand which hasn't
12 settled and an influx of liquid carries it somewhere
13 else. Is that right?

14 A. Yes.

15 Q. Okay. Show me in Davis where that is.

16 A. On page 17 of 30, Section 4, it's
17 talking about Enhanced Sedimentation in Inclined
18 Channels. It says: The sedimentation process is
19 often very slow, especially when particles are
20 small, hence there exists a need for constructing
21 simple devices that can accomplish this solid-liquid
22 separation more rapidly.

23 Q. Okay. Where is the influx of liquid?

24 MR. HALL: Objection; form.

25 A. I don't know what you're talking about.

1 BY MR. KESACK:

2 Q. So I'd previously asked you whether
3 Davis would help you improve the settling of a
4 situation where sand had not yet settled and there
5 was influx of liquid which carried that sand
6 particle, and you said yes.

7 And I asked you to find that in
8 Davis and you pointed me to the first sentence on
9 page 17. I'm asking you where the influx of liquid
10 is. Do you understand?

11 A. I do.

12 Q. Where is that influx of liquid?

13 MR. HALL: Objection; form.

14 A. I don't see it. I don't.

15 (Document review by witness.)

16 A. Davis is talking about an event, a state
17 of the mixture. It's saying that we can improve the
18 sedimentation in that state through the mechanisms
19 he talks about.

20 He doesn't talk about how the
21 mixture of liquids and solids got to the state of
22 his analysis. He doesn't talk about it being a
23 batch event, a continuous event. He just talks
24 about when you have a mixture of liquids and solids,
25 you can enhance the sedimentation rate through

1 inclining the sedimentation channel.

2 MR. KESACK: Move to strike,
3 nonresponsive.

4 BY MR. KESACK:

5 Q. Where is liquid influx in Davis?

6 MR. HALL: Objection; form.

7 A. There is not a liquid influx in Davis.

8 BY MR. KESACK:

9 Q. So why, in your opinion, does Davis help
10 you with sand which is about to settle and then a
11 liquid influx causes it not to settle?

12 MR. HALL: Objection; asked and
13 answered.

14 A. Davis talks about sedimentation of a
15 mixture; that's the event that led to that mixture.
16 The event that is subsequent to that mixture is not
17 what Davis is talking about. Davis is talking about
18 how do I improve sedimentation of the mixture that I
19 have.

20 BY MR. KESACK:

21 Q. In your opinion, it doesn't matter what
22 the state of the liquid is; as long as you're
23 inclining the vessel, you're going to improve
24 sedimentation. Is that right?

25 A. Yes. I think that's what Davis teaches.

1 Q. Where does Davis teach that, that it
2 doesn't matter what the state of the liquid is; as
3 long as you incline, you improve sedimentation?

4 A. All through.

5 Q. All right. Point me to a specific
6 location, please.

7 (Document review by witness.)

8 A. I'm not finding it.

9 BY MR. KESACK:

10 Q. So even though you just testified that
11 it can be found all throughout Davis, you can't find
12 a single instance of it. Is that right?

13 MR. HALL: Objection to form.

14 A. As I read Davis, I think I see an
15 intermediate step in the process, the process of
16 causing a mobile solid to become immobile. I don't
17 see where Davis teaches the rate of influx of the
18 mixture of solids and fluids. It talks about when
19 it has a mixture, here's how to improve
20 sedimentation.

21 BY MR. KESACK:

22 Q. Does Davis talk at all about fluids
23 moving?

24 A. It talks about laminar flow, turbulent
25 flow.

1 Q. Of what?

2 A. Of fluids.

3 Q. Show me where.

4 (Document review by witness.)

5 A. On page 19 of 30 down at the bottom: A
6 key feature of our analysis is to treat the
7 suspension as an effective fluid whose properties
8 depend on the solids volume fraction. The particles
9 are assumed to move with the bulk average velocity
10 plus a slip velocity in the direction of gravity,
11 which is a vertical settling velocity of the
12 suspension.

13 BY MR. KESACK:

14 Q. What part of that is talking about the
15 velocity of the liquid?

16 A. It's the bulk average velocity.

17 Q. So the particles are assumed to move
18 with the bulk average velocity; you think that's the
19 liquid velocity?

20 A. That's the way I read it.

21 Q. Which way is the bulk average velocity?
22 Which direction?

23 MR. HALL: Objection; form.

24 A. It's in the direction of flow.

25 BY MR. KESACK:

1 Q. What does Davis teach that the bulk
2 average velocity, what effect does that have on
3 settling rate? What does Davis teach about that?

4 MR. HALL: Objection; form.

5 BY MR. KESACK:

6 Q. Let me strike that.

7 Does your opinion have any --
8 include any reference to that paragraph?

9 A. Not that I recall.

10 Q. Was your obviousness opinion based on
11 that paragraph?

12 A. Not that I recall.

13 Q. Is your obviousness opinion based on any
14 liquid flow in Davis?

15 A. No.

16 Q. So your opinion is based on taking a
17 dynamic system like Hemstock where fluid is flowing
18 from the inlet to the outlet and applying Davis for
19 which there was no fluid in your obviousness
20 opinion. Is that right?

21 MR. HALL: Objection; form.

22 A. No, it's not. The area of Hemstock past
23 the outlet is a dead leg. It's a leg with all of
24 the characteristics that Davis is talking about.

25 BY MR. KESACK:

1 Q. So in your opinion, once you get past
2 the outlet, the fluid is no longer flowing?

3 A. It's -- fluid flow is so not black and
4 white. Is there movement in the fluid downstream of
5 the outlet, probably, but I don't know that it's in
6 a particular direction that you can give a velocity
7 vector. It is, on average, not moving.

8 Q. Is sand which is in this dead leg
9 portion that you described going to get to the
10 outlet --

11 MR. HALL: Objection; form.

12 BY MR. KESACK:

13 Q. -- if there's no bulk velocity?

14 MR. HALL: Objection; form.

15 A. It depends on how much sand. I mean, if
16 the sand accumulates to the point where it is in the
17 part of the fluid that is moving, then yes. But if
18 it doesn't, then it's not.

19 BY MR. KESACK:

20 Q. So you just testified that in the dead
21 leg portion of the vessel, there's no fluid
22 velocity, right?

23 MR. HALL: Objection; misstates
24 prior testimony.

25 A. There's no net fluid velocity, yes.

1 BY MR. KESACK:

2 Q. Okay. So that's not in the part of the
3 fluid that's moving, right?

4 MR. HALL: Objection; misstates
5 prior testimony.

6 A. That's correct.

7 BY MR. KESACK:

8 Q. So we're talking -- in talking only
9 about this dead leg portion where you said the
10 environment approximates Davis. Is that right?

11 A. Correct.

12 Q. There's no bulk velocity of the fluid
13 there, right?

14 A. Correct.

15 Q. Is sand from that area going to the
16 outlet?

17 MR. HALL: Objection; asked and
18 answered.

19 A. As long as that area is not full of
20 solids, sand from that area will not tend to go to
21 the outlet.

22 BY MR. KESACK:

23 Q. So then why do you want to improve
24 settling in that area?

25 A. Because it's a wasted space. The -- if

1 you'll look at Figure 3, the solids are accumulating
2 in the center of the vessel, okay? The liquid that
3 gets over that mound will -- the solids in that
4 liquid will tend to settle out and get to the
5 outlet.

6 But when it does that, there's still
7 a considerable amount of the outlet that doesn't
8 have sand -- that has not -- is not doing anything.

9 Q. You said there's a considerable part of
10 the outlet which isn't doing anything.

11 A. Of the end of the -- the distal end of
12 the vessel.

13 Q. So you want to improve settling rate at
14 the distal end of the vessel because it's not doing
15 enough?

16 A. I want to be able to use the space at
17 the distal end of the vessel.

18 Q. We agree that sand is going to settle in
19 that portion one way or another, right? You're not
20 trying to cause settling; you're trying to improve
21 settling. Is that right?

22 A. That's correct.

23 Q. And what's the purpose of improving the
24 setting rate in that area of the vessel?

25 A. I want the solids to be closer to the

1 outlet so I can get them out.

2 Q. So you want settling in that portion of
3 the vessel, I understand that. But what's the
4 reason you want to improve the rate at which it
5 settles in that area?

6 A. That question is not making sense to me.

7 Q. Sand's not going from there to the
8 outlet, right?

9 MR. HALL: Objection; form.

10 A. Right.

11 BY MR. KESACK:

12 Q. So it's going to settle at some point,
13 right?

14 A. Or not, yeah.

15 Q. So what does it matter how fast it
16 settles?

17 A. Sand that doesn't settle has a chance of
18 becoming mobile again or a chance of exiting the
19 vessel.

20 Q. So you testified that the sand is not
21 going to exit the vessel from that area. You just
22 said that you want the sand to settle at that
23 portion of the vessel which is wasted.

24 A. I'm saying that if that -- as long as
25 there is a liquid portion there, that's going to

1 tend to be immobile. If that part of the vessel
2 becomes sand-filled, then that sand will either plug
3 the outlet or be carried out of the outlet.

4 Q. And once that area becomes sand-filled,
5 you're no longer worried about how fast the sand is
6 settling, right? It can't settle anywhere.

7 A. Right.

8 Q. So why do you care about how fast sand
9 is settling in that portion of the vessel?

10 A. I'm -- why do I care where sand is --

11 Q. Why do you care how fast sand is
12 settling in that portion of the vessel?

13 MR. HALL: Objection; form.

14 A. Because any sand in suspension has the
15 potential of exiting the vessel.

16 BY MR. KESACK:

17 Q. Yet you testified that sand is not going
18 to exit the vessel in that portion because there's
19 no bulk velocity. So I'll ask you again, why do you
20 care about that portion of the vessel where sand is
21 not going to the outlet, how fast it settles?

22 MR. HALL: Objection; misstates
23 prior testimony.

24 A. Production from a well is a very
25 dynamic, rapidly changing, constantly changing

1 process. Sand that is in suspension in the distal
2 end of the vessel has the potential of exiting the
3 vessel in a slug event, in a large liquid volume
4 event.

5 Sand that has settled has a lower
6 chance of becoming mobile again. It still can. It
7 has a lower chance. I want the sand to be immobile,
8 or as immobile as possible, because I don't know
9 what the next second is going to bring in well
10 production.

11 BY MR. KESACK:

12 Q. You just said sand in suspension. How
13 do you know sand is in suspension in that area?

14 A. I can't tell you why it wouldn't be.

15 Q. What is a suspension?

16 A. A suspension is a case where solids are
17 mobile in a liquid.

18 Q. Mobile in a liquid?

19 A. Mobile in a liquid.

20 Q. So if they're traveling straight down,
21 that's a suspension?

22 A. Yes.

23 Q. If I throw a boulder into a stream,
24 that's a suspension because it moved through the
25 stream?

1 A. Until it becomes immobile.

2 Q. So any solid in a liquid, until it lands
3 at the bottom, is a suspension, in your opinion?

4 A. Yes.

5 Q. What's the basis for that opinion?

6 A. The definition of suspension.

7 Q. Where is that definition coming from?

8 A. Stokes' law.

9 Q. You think Stokes' law defines
10 suspension?

11 A. I believe so.

12 Q. What is Stokes' law?

13 A. Stokes' law --

14 Q. I don't want the formula. I just want
15 to know what it is generally.

16 A. It's a description of the way that a
17 solid will move in a liquid under the force of
18 gravity.

19 Q. Is it limited to liquids?

20 A. No, it's not. It's a fluid.

21 Q. Is a colloid a suspension?

22 A. Yes.

23 Q. So in your opinion, there can't be any
24 mixture of liquids and solids except for solids
25 which have settled to the bottom for which a

1 suspension is not included?

2 MR. HALL: Objection to form.

3 A. Could you please repeat that again?

4 BY MR. KESACK:

5 Q. I'll ask you a different question.

6 When Davis is talking about a
7 suspension, is it applying the definition you're
8 talking about?

9 A. I believe so.

10 Q. So you think Davis is teaching that
11 inclining a vessel will increase the sedimentation
12 rate of a boulder in a stream?

13 MR. HALL: Objection; form.

14 A. A boulder in a stream?

15 BY MR. KESACK:

16 Q. You testified that's a suspension,
17 right?

18 A. It absolutely is.

19 Q. In your opinion, will inclining the
20 stream increase the sedimentation rate of that
21 boulder?

22 A. No.

23 Q. Why not?

24 A. Because the buoyant forces are
25 inadequate to allow the lapsed time required for

1 sedimentation to be enhanced. It's at a -- a
2 boulder in a body of water, which it can be
3 submerged in, be that a stream, a lake, whatever,
4 will fall at a terminal velocity that is very high.

5 And to increase that terminal
6 velocity, inclining the stream would not increase
7 that terminal velocity.

8 Q. Is it your opinion that Davis is
9 teaching you how to increase that terminal velocity?

10 A. No.

11 Q. So why does the terminal velocity of the
12 boulder matter?

13 A. Davis talks about a range of particle
14 sizes. You know, the title of it is non-colloidal,
15 I believe.

16 Q. We can agree that a boulder is
17 non-colloidal, right?

18 A. A boulder is not colloidal. So, yeah.
19 He's talking about non-colloidal particles, so he's
20 talking about particles bigger than some minimum,
21 which is a function of particle density and fluid
22 density that will tend to fall under gravity. Okay?

23 But it will experience this viscous
24 resistance. A boulder is such a large mass that the
25 viscous resistance is insignificant to its rate of

1 fall.

2 Q. It's not zero, right?

3 A. Subzero.

4 Q. Why won't -- strike that.

5 What definition of suspension is
6 Davis using when it teaches that inclining a vessel
7 will increase sedimentation rate of a suspension?

8 A. I believe the same one I'm using.

9 Q. Just tell me it doesn't apply to the
10 boulder in the stream, which you said is a
11 suspension, right?

12 A. Sedimentation is an event that takes
13 place over time. What Davis is teaching is how to
14 shorten the time towards a minimum. The boulder
15 represents the minimum.

16 Q. Why does the boulder represent the
17 minimum?

18 A. Because viscosity -- if you'll look at
19 the Stokes' law equation, the diameter of the
20 boulder is very large, which is in the top of the
21 equation; the viscosity is a very small number,
22 which is in the bottom of the equation. So if I
23 divide a very large number by a very small number, I
24 get a large number. Okay?

25 As that diameter gets smaller, with

1 viscosity being constant, then the numbers -- then
2 the rate of sedimentation gets slower.

3 Q. If you slowed down the velocity of the
4 stream, would you increase the sedimentation rate?

5 MR. HALL: Objection; form.

6 A. No. That's a drag calculation, not a
7 sedimentation calculation.

8 BY MR. KESACK:

9 Q. There's no situation where the stream
10 would be moving fast enough that the boulder
11 wouldn't settle straightaway. Is that right?

12 A. Certainly. That happens all the time.

13 Q. Okay. Imagine that situation. Does
14 Davis apply to that situation?

15 A. No, nothing applies to that situation.

16 Q. Is that a suspension?

17 A. Yes.

18 Q. But Davis doesn't apply to that
19 suspension?

20 A. Davis is talking about low Reynolds
21 numbers, without really setting boundaries on the
22 Reynolds number, but a couple of places talked about
23 Reynolds numbers on the order of 1. A boulder in a
24 stream would be on the -- a boulder in a flash flood
25 that is mobile, that is moving with the flood, would

1 have a particle Reynolds number in the thousands.
2 So the low Reynolds number restriction of Davis
3 would not apply to your boulder in a flash flood.

4 Q. Does it apply to a particle in the
5 turbulent portion of Hemstock?

6 MR. HALL: Objection; form.

7 A. No.

8 BY MR. KESACK:

9 Q. Looking back at Figure 3 --

10 A. Okay.

11 Q. -- can you identify which portions of
12 Hemstock aren't turbulent?

13 MR. HALL: Objection; form.

14 A. Not without some numbers.

15 BY MR. KESACK:

16 Q. It's your opinion that part of Hemstock
17 is laminar, right?

18 A. Not without some numbers.

19 Q. So you don't know.

20 A. I can put together scenarios where all
21 of Hemstock is turbulent and I can put together
22 scenarios that are perfectly valid where none of
23 Hemstock is turbulent.

24 Q. Can you think of a situation where
25 Hemstock is applied to an oil or gas production

1 stream where the entire system is laminar?

2 A. Not in my experience.

3 Q. That's what Hemstock teaches, right?

4 That's what we're hooking this up to.

5 A. Right.

6 Q. So based on what Hemstock actually
7 teaches -- which you just read, right? -- will there
8 be any portion of Hemstock which is laminar?

9 A. There's no way to tell that. He's
10 teaching that the inlet stream is high velocity,
11 which would -- without numbers, you can generally
12 assume a high-velocity stream has a high Reynolds
13 number and would be turbulent.

14 Within the belly portion of the
15 vessel, there is a range of velocities from zero to
16 whatever the velocity of the freeboard section is.
17 So whether there are regions of the belly portion of
18 Hemstock that are laminar, it's fairly likely.

19 Q. But you don't know for sure?

20 A. No, not without numbers.

21 Q. And Davis is limited to only laminar
22 flow, right? That's what you just testified.

23 MR. HALL: Objection; form.

24 A. Yes.

25 BY MR. KESACK:

1 Q. So how do you know that you can apply
2 Davis to Hemstock if you don't know that there's
3 laminar flow in Hemstock?

4 A. Because I know from my well, from the
5 well that I'm trying to apply this to, whether I
6 would expect laminar flow or turbulent flow.

7 Q. And you said that you would never expect
8 laminar flow from an oil or gas well that Hemstock
9 teaches.

10 A. In the freeboard portion.

11 Q. What about in the liquid portion? You
12 said you don't know, right?

13 A. But I don't know in a general sense
14 because every well is different, every stream is
15 different, every stream changes often. So when I
16 look at the mixtures that I'm expecting from the
17 well and the size of the vessel and determine that I
18 have laminar flow in the belly portion would just be
19 a well-by-well determination.

20 Q. So in your opinion, you can only apply
21 the Davis to Hemstock when you're operating a well
22 which produces laminar conditions in Hemstock?

23 MR. HALL: Objection to form.

24 A. That's an odd way to twist my words.

25 BY MR. KESACK:

1 Q. That's why I'm asking if it's correct,
2 and if it's not, please correct me.

3 A. I'm saying that on drawing -- on
4 Figure 3, the fluid incoming, the F in the top part
5 of the drawing -- will rarely be other than
6 turbulent in a commercial gas and oil well.

7 What happens after the stream enters
8 the vessel is a different calculation.

9 Q. You didn't do that calculation, right?

10 A. I don't have a set of conditions with
11 which to apply those numbers.

12 Q. But you're trying to apply a reference
13 which is limited to laminar flow to it, right?

14 A. Yes.

15 Q. How do you know you can do that?

16 MR. HALL: Objection; form.

17 A. You know you can do it by calculating
18 the velocities in the particular stream that you're
19 talking about.

20 BY MR. KESACK:

21 Q. But you didn't do that, right? You
22 didn't do that.

23 A. I didn't do that.

24 Q. So how do you know -- sitting here, how
25 do you know that Davis can be applied to the

1 Hemstock vessel when it's limited to laminar flow?

2 MR. HALL: Objection; form.

3 A. I know that there are wells -- I did not
4 do the calculations. I am trying to apply
5 general -- general concepts. You're asking for
6 specific numbers. I don't know how to generalize
7 well performance.

8 BY MR. KESACK:

9 Q. So I'm not asking for specific numbers.
10 I'm asking you how you know you can apply Davis,
11 which is limited to laminar flow, to Hemstock, where
12 you don't know if there's laminar flow.

13 MR. HALL: Objection; misstates
14 prior testimony.

15 A. I didn't do those calculations so I'm
16 looking at it as a generalized case that says I
17 think I will often have laminar flow, but it's not
18 based on specific calculations.

19 BY MR. KESACK:

20 Q. Where will you have laminar flow?

21 A. In the belly portion.

22 Q. Which part of the belly portion?

23 A. In the belly portion that's not
24 solid-filled.

25 Q. So anywhere there's liquid in Figure 3

1 there's going to be laminar flow, is that your
2 opinion?

3 MR. HALL: Objection.

4 A. No. No.

5 BY MR. KESACK:

6 Q. Which part of the liquid that's not
7 sand-filled is going to be laminar flow in Figure 3?

8 A. I'm expecting some portions of the
9 liquid towards the head end and the fluid in the
10 distal end will tend to be either quiescent or
11 laminar or turbulent, depending on what the fluid
12 level is at the outlet.

13 Q. Does Figure 3 have a fluid level at the
14 outlet?

15 A. It's below the outlet.

16 Q. It's not at the outlet?

17 A. It's below the outlet.

18 Q. And so in the situation of Figure 3,
19 where will there be laminar flow? Not at the
20 outlet, but below the outlet?

21 MR. HALL: Objection; asked and
22 answered.

23 BY MR. KESACK:

24 Q. That was a bad question. Let me strike
25 that.

1 Based on Figure 3 -- now I'm talking
2 about liquid level below the outlet rather than at
3 the outlet, which is what your previous answer was
4 based on --

5 MR. HALL: Objection.

6 BY MR. KESACK:

7 Q. -- where in the liquid portion will
8 there be laminar flow?

9 MR. HALL: Objection; misstates
10 prior testimony. Objection; form.

11 A. It would likely have laminar flow from
12 near where the end of the arrow 32 is in the bottom
13 drawing, which is just upstream of the descending
14 weir. I would expect you to have laminar flow from
15 there towards where you would quiesce after the
16 outlet.

17 BY MR. KESACK:

18 Q. So in your opinion, the area where the
19 liquid is pretty narrow -- not deep, pretty narrow,
20 you would expect that area, which is right below the
21 turbulent flow of the freeboard portion, you would
22 expect that to be laminar?

23 MR. HALL: Objection; asked and
24 answered.

25 A. Yes.

1 BY MR. KESACK:

2 Q. Based on what?

3 A. That's more gut feel than anything else.

4 Q. Gut feel.

5 When a turbulent gas flows over a
6 body of water, won't the top of the body of water be
7 turbulent as well?

8 MR. HALL: Objection; form.

9 A. Not necessarily. There's a no-flow
10 boundary at the interface between the gas and the
11 liquid that the gas and the liquid have to be at the
12 same velocity at that point.

13 BY MR. KESACK:

14 Q. Uh-huh.

15 A. So the liquid will tend to slow the gas
16 down, the gas will tend to accelerate the liquid.
17 Then that result is -- the liquid weighs more than
18 the gas, so the net result tends to be a slowing of
19 the gas rather than acceleration of the liquid.

20 Q. So you don't think there would be waves?

21 MR. HALL: Objection; form.

22 A. Who knows?

23 BY MR. KESACK:

24 Q. It's not your opinion there would be
25 waves in this Hemstock vessel?

1 MR. HALL: Objection; form.

2 A. I'm sure there are conditions where
3 there will be waves, and there are conditions where
4 there will be absolutely laminar flow at that
5 interface.

6 BY MR. KESACK:

7 Q. Just to be clear, I'm not asking you
8 about hypothetical situations. I'm asking you about
9 what's described in Hemstock.

10 A. Okay.

11 Q. After reading Hemstock --

12 A. Yeah.

13 Q. -- looking at Figure 3, is it your
14 opinion that the gas-liquid interface is going to
15 have waves?

16 MR. HALL: Objection; form. Is that
17 question limited to Hemstock or Figure 3?

18 MR. KESACK: Figure 3 of Hemstock,
19 after reading the entirety of Hemstock.

20 A. I don't believe that there is enough
21 information in Hemstock to answer that question.

22 BY MR. KESACK:

23 Q. And how do you know that it's laminar
24 flow at that part?

25 A. As I said, that's my feeling. It's a

1 gut feel. It's an impression that that section of
2 the fluids in the vessel would tend to be towards
3 laminar flow.

4 Q. Can you flip over to Figure 4A?

5 A. Okay.

6 Q. Is that liquid in laminar flow?

7 MR. HALL: Objection; form.

8 A. Can't answer that.

9 BY MR. KESACK:

10 Q. Why not?

11 A. There's no numbers.

12 Q. What does your gut tell you?

13 A. My gut tells me that I've got chaos at
14 Figure 4A, that the gas volume trying to pass
15 between the weir and the liquid surface is going to
16 cause spraying, splashing, reentrainment of
17 everything. It is a very chaotic model.

18 Q. Is that laminar flow?

19 A. No.

20 Q. What's different between Figure 4A and
21 Figure 3 that lets you assign laminar flow to
22 Figure 3 but not to Figure 4A?

23 A. I've got more space for the fluids to
24 pass in Figure 3 than I do in Figure 4A. Figure 4A
25 to me looks as though they are attempting to show a

1 fluid level at the weir. In Figure 3 they're
2 showing a fluid level below the weir.

3 Q. Both figures show a wavy appearance to
4 the liquid, right?

5 A. They both show a wavy appearance.

6 Q. If there's a wavy appearance to the
7 liquid, is that laminar flow?

8 MR. HALL: Objection; form.

9 A. I don't know. I don't know. These
10 drawings without units, without velocities, without
11 flow rates, are just drawings.

12 BY MR. KESACK:

13 Q. What's causing the wavy nature of the
14 liquid?

15 A. A draftsman.

16 Q. What did the draftsman intend to depict
17 when he showed wavy nature of the liquid in
18 Figure 3?

19 A. You'll have to ask him.

20 Q. You can't tell?

21 A. I can't tell.

22 Q. As a person of ordinary skill in the
23 art, you have no idea what the liquid is trying to
24 show there with the wavy nature of the liquid?

25 A. I would assume they're trying to show a

1 wavy -- wavy surface, but --

2 Q. Your gut tells you that's wrong, right?

3 MR. HALL: Objection; form.

4 A. My gut tells me that I don't know what
5 he's trying to depict here. I...

6 BY MR. KESACK:

7 Q. But you know it's laminar, right?

8 MR. HALL: I'm sorry, what was that?

9 BY MR. KESACK:

10 Q. I said, but you know it's laminar,
11 right?

12 MR. HALL: Objection; form.

13 A. I expect it could be.

14 BY MR. KESACK:

15 Q. Could be or it is?

16 A. I don't -- I would not ever say that it
17 is, that I know -- without knowing his expected
18 fluid velocities, his fluid mixtures, without
19 knowing any of the details required to calculate a
20 Reynolds number, whether a stream is going to be
21 laminar, turbulent or creep flow.

22 Q. Which portions of the Hemstock vessel
23 can you apply Davis to?

24 MR. HALL: Objection to form.

25 A. I believe it's -- I believe I would be

1 very comfortable applying Davis to the area of the
2 vessel beyond the outlet.

3 BY MR. KESACK:

4 Q. The part where the sand doesn't get to
5 the outlet?

6 MR. HALL: Objection; form.

7 A. That's the way he's got it drawn.

8 BY MR. KESACK:

9 Q. So by applying Davis to Hemstock, you
10 are not preventing any sand from getting to the
11 outlet. Is that right?

12 MR. HALL: Objection; form.

13 A. That is right.

14 MR. KESACK: Let's take a break.

15 (Recess, 10:48 a.m. to 10:56 a.m.)

16 BY MR. KESACK:

17 Q. So the second ground of obviousness that
18 we referred to earlier was Hemstock based on the
19 Data Book, right?

20 A. Yes.

21 Q. And in your opinion, there's -- strike
22 that.

23 Earlier I asked you about reasons
24 why you would want to improve Hemstock and we talked
25 about sand settling and I think you talked about

1 slug flow. Is that right?

2 A. Yes.

3 Q. What portion of Hemstock leads you to
4 believe that a person of ordinary skill in the art
5 would want to improve the ability to handle slug
6 flow in Hemstock?

7 A. Could you please repeat it? I
8 distracted myself.

9 (The reporter read back the following
10 portion of the preceding record.)

11 "QUESTION: What portion of Hemstock
12 leads you to believe that a person of
13 ordinary skill in the art would want to
14 improve the ability to handle slug flow in
15 Hemstock?"

16 (End of readback.)

17 THE WITNESS: Thank you.

18 A. Hemstock is trying to maintain a
19 freeboard based on either the extension of the
20 nozzle into the vessel or the weir, one of the --
21 Figure 4A versus 4C. That does not leave a very
22 large freeboard.

23 So in a slug event, the freeboard
24 fills with liquid and, as Hemstock talks about, its
25 ability to separate out sand falls off -- I believe

1 he says the vessel becomes as though it were not
2 there when it's full of liq- -- when it's full.

3 Wells give you slugs. They give you
4 what they're going to give you. It's not anything
5 you can control. And the bigger that surge volume
6 or that freeboard volume is, the bigger the slug you
7 can handle.

8 BY MR. KESACK:

9 Q. So where is that in Hemstock?

10 A. Where it says that the vessel -- should
11 be a lot easier searching the electronic version.
12 It is in here.

13 (Document review by witness.)

14 A. Yeah. On page 9, column 4, line 62:
15 However, should a maximum depth of particulates S be
16 reached during operation and encroach on the
17 freeboard portion 30, operations may yet continue as
18 if the vessel were not installed.

19 BY MR. KESACK:

20 Q. And in your opinion, that's describing a
21 slug?

22 MR. HALL: Objection. Misstates
23 prior testimony.

24 A. I'm saying that that's describing this
25 vessel when it is full, whether from a slug, from

1 plugging, from whatever. When the vessel is full,
2 it's as though it were not there.

3 BY MR. KESACK:

4 Q. So in your opinion, during a slug event,
5 would a maximum depth of particles S be reached and
6 encroach on the freeboard portion?

7 MR. HALL: Objection; form.

8 A. Interesting point. Yeah, because this
9 is talking about the particulates being full. I
10 read it to be the vessel being full.

11 BY MR. KESACK:

12 Q. So this part is not talking about slugs,
13 right?

14 MR. HALL: Objection; form.

15 A. No, it's not talking about slugs.

16 BY MR. KESACK:

17 Q. Anywhere else in Hemstock where you
18 think it teaches that there's a need to improve slug
19 capacity?

20 A. That was the section I was thinking of.
21 I can't think of -- I can't recall another section.

22 Q. Okay. In your opinion, would a person
23 of ordinary skill in the art, after reading
24 Hemstock, understand that the Hemstock vessel needs
25 to increase capacity to improve -- or to deal with

1 slugs flow?

2 A. I think a person of ordinary skill in
3 the art would look at Figure 3 and say that's not
4 very much room for slugs. That was the first
5 thought that went through my mind when I looked at
6 it was, that's not a lot of room. Anything I can do
7 to increase that space, that slug capacity, would be
8 good.

9 Q. Anything else or just the figure?

10 A. The figure is the thing that jumped out
11 at me.

12 Q. So based on you looking at the figure,
13 your opinion is a person of ordinary skill in the
14 art would look at that and say, hey, not a lot of
15 room, I would want more room, so I need to increase
16 slug capacity. Is that fair?

17 A. I believe that's fair.

18 Q. What's that opinion based on?

19 MR. HALL: Objection; asked and
20 answered.

21 A. It's based on experience with wells
22 giving you what they're going to give you.

23 BY MR. KESACK:

24 Q. So just your general experience with
25 wells?

1 A. Yes.

2 Q. Not with dealing with the sand drill
3 like Hemstock, right?

4 A. No.

5 Q. When you gave your opinions regarding a
6 person of ordinary skill in the art, were they as of
7 today or as of the date of the invention?

8 MR. HALL: Objection; asked and
9 answered.

10 A. As of the date of the invention.

11 BY MR. KESACK:

12 Q. And how did you differentiate between
13 the two?

14 A. The things that I looked at to form that
15 opinion, if they were dated after the date of the
16 invention, then I didn't consider them.

17 Q. Did you consider anything other than the
18 documents cited in your two declarations?

19 MR. HALL: Objection; form.

20 A. Not explicitly.

21 BY MR. KESACK:

22 Q. So in portions of your declaration where
23 you talk about the understanding of a person of
24 ordinary skill in the art, but you don't mention any
25 documents, where did that opinion come from?

1 A. I'm not sure I understand what you're
2 asking.

3 Q. Do you remember in your first
4 declaration you talked about how a person of
5 ordinary skill in the art would understand, in a
6 slug catcher, there are three different states, a
7 liquid-starved and two other ones?

8 A. Yes.

9 Q. That wasn't based on any document you
10 looked at, right?

11 A. No.

12 Q. So how did you know that the opinion you
13 were setting forth there was as of the time of the
14 invention rather than as of today?

15 A. I don't.

16 Q. That would be true of anything where you
17 weren't citing to a specific document, right?

18 A. Correct.

19 Q. Now, if you were a person of ordinary
20 skill in the art looking at the Hemstock vessel --
21 actually, strike that.

22 When you testified that it was the
23 figure in Hemstock that led you to believe that slug
24 flow capacity should be increased, which figure were
25 you talking about?

1 A. Figure 3.

2 Q. Okay. And in your opinion, how would a
3 person of ordinary skill in the art increase the
4 slug capacity of Figure 3?

5 A. By making the vessel bigger or inclining
6 the vessel.

7 Q. And what would inclining the vessel do?

8 A. It would shift the average fluid level
9 away from the inlet.

10 Q. So in dealing with slug flow, you're
11 only concerned about flow at the inlet? Is that
12 right?

13 A. You're only concerned about the
14 nonliquid-filled capacity of the vessel.

15 Q. And do you want that nonliquid-filled
16 capacity of the vessel to not encroach the inlet or
17 the outlet or both?

18 A. It doesn't matter if it encroaches the
19 inlet. You will tend to not be able to get much
20 below the outlet unless you're severely
21 liquid-starved.

22 Q. In a slug event --

23 A. In a slug event.

24 Q. -- what are you trying to prevent?

25 A. What I'm trying to prevent in a slug

1 event is a large-volume slug overwhelming the
2 capacity of the equipment. So if I can turn a
3 short-duration, large-capacity slug event into a
4 longer-duration, lower-capacity multiphase flow
5 event, then the downstream equipment has a better
6 chance of being able to properly process it.

7 Q. How do you prevent that from happening?

8 A. How do I prevent which part from
9 happening?

10 Q. The whole thing, how you described
11 dealing with slugs.

12 A. You cannot prevent a slug.

13 Q. Right. But there are the effects of
14 slugs that you just said you'd like to prevent,
15 right?

16 A. Right. You can --

17 Q. How do you prevent those effects from
18 happening?

19 A. By providing a surge volume.

20 Q. And where do you need to provide a surge
21 volume?

22 A. Anyplace you can. If you've got a
23 Hemstock vessel between the wellhead and the
24 separator and you went to take advantage of any
25 nonliquid-filled portion of the Hemstock vessel to

1 reduce the volume or to increase the length of time
2 it takes for a given volume to process through the
3 separator.

4 Q. Let me ask a different question.
5 Looking at Figure 3 of Hemstock, and I'm picturing a
6 slug coming into the vessel, how do you know when
7 the slug has caused problems?

8 A. Well sites are not manned, so a slug
9 comes in that is beyond the capacity of this, it
10 goes to the next vessel, and the next vessel is
11 hopefully a real separator that has level controls
12 and kills that if the slug overwhelms that vessel,
13 it shuts it down before the liquid goes into a
14 compressor and into a pipeline.

15 Q. So is it your opinion that when the
16 Hemstock is completely filled with liquid, it's no
17 longer able to handle slug flow?

18 A. It's no longer able to mitigate slug
19 flow. What comes into the vessel will go out the
20 vessel.

21 Q. If there was any freeboard section left
22 in Hemstock, in a slug event, would you characterize
23 that as Hemstock had handled that slug?

24 MR. HALL: Objection; form.

25 A. No. If there were freeboard -- if there

1 were a void section in the Hemstock vessel larger
2 than the volume of the slug, the Hemstock has
3 handled the slug.

4 BY MR. KESACK:

5 Q. So if, for example, a slug event occurs
6 and at the exact time where the slug has finished
7 entering the vessel, if there's any freeboard
8 portion available still at all, you would have
9 considered that as Hemstock handling the slug?

10 MR. HALL: Objection; scope.

11 A. Yes.

12 BY MR. KESACK:

13 Q. Even if the slug has covered the outlet,
14 for example? You're not trying to prevent the slug
15 from covering the outlet; you just want to make sure
16 the vessel is big enough to handle the entire slug.

17 A. Yes.

18 Q. So in that situation, the amount or the
19 ability to handle a slug is based only on how big
20 the vessel is, right?

21 MR. HALL: Objection; form.

22 A. It's based only on how much void space
23 there is in the vessel.

24 BY MR. KESACK:

25 Q. Right. So if a 1-liter slug came in and

1 the vessel was bigger than a liter, the freeboard
2 portion was bigger than a liter, then the vessel can
3 handle that, right?

4 MR. HALL: Objection; form.

5 A. Yes.

6 BY MR. KESACK:

7 Q. So if you were looking to improve
8 Hemstock to handle slug flow, the most obvious thing
9 would be to just increase the vessel size, right?

10 A. Or turn it on its end.

11 Q. Vertical?

12 A. Yes.

13 Q. What does turning it vertical do?

14 A. It shifts where the liquid can exit. It
15 tends to give you a bigger void volume. That's why
16 we use vertical vessels, vertical separators on a
17 lot of gas wells, to give us as large a void volume
18 as we can get.

19 Q. If you turned Figure 3 of Hemstock on
20 its end, what would the negative effects be?

21 MR. HALL: Objection; form.

22 A. The volume for collecting solids would
23 become very small.

24 BY MR. KESACK:

25 Q. In your opinion, which is more

1 important, the volume for collecting solids or the
2 ability to handle slugs?

3 A. I think it really depends on the well.
4 A well that has a very high tendency towards
5 intermittent liquid flows, I'm more concerned about
6 handling slugs.

7 On a well that has a steadier liquid
8 flow rate that doesn't tend to slug as much, then
9 I'd go back to the primary purpose of the vessel,
10 and that's removing solids.

11 Q. So in your opinion, if a slug only
12 caused Hemstock to be partially filled with liquid,
13 that's not something that a person of ordinary skill
14 would be concerned with. Is that right?

15 MR. HALL: Objection; form.

16 A. Correct.

17 BY MR. KESACK:

18 Q. Now, in your opinion, a person of
19 ordinary skill, if they wanted to increase the slug
20 capacity, they would turn to the Data Book, right?

21 A. In general, that's the first place most
22 of us turn to.

23 Q. Okay. And why would you -- so why do
24 most people turn to the Data Book?

25 A. It's a very compact source of an

1 incredible range of information.

2 Q. And how does Hemstock describe its
3 desander, as a pipe or a vessel?

4 A. Both.

5 Q. Where does it describe it as a pipe?

6 A. When it talks about -- you're going to
7 make me find it, aren't you. It talks about the
8 schedule -- oh, where's it at? Yeah, under
9 Examples. Typical vessel according to -- on page 10
10 and 11, column 5: A typical vessel according to the
11 present invention, and for reference are roughly
12 approximated by the proportions of Figure 3, can be
13 a 6- or 8-inch diameter. Using an 8-inch diameter,
14 schedule 160 shell for the vessel can result in a
15 fluid stream capacity.

16 So when he's talking about
17 schedules, that is a pipe specification, not a
18 boiler pressure vessel code specification.

19 Q. Can you point me to the line again? I
20 missed it.

21 A. It's line 65.

22 Q. Line 65, all right. So the first three
23 reds you -- strike that.

24 The first three words you read was
25 "A typical vessel," right?

1 A. Right.

2 Q. So he's describing a vessel there,
3 right?

4 A. Yep.

5 Q. And he's describing a material the
6 vessel could be made out of, right?

7 A. Yes.

8 Q. It could be made out of pipe material.

9 A. Uh-huh.

10 Q. But it's still a vessel.

11 A. Yes.

12 Q. So I'll ask you, even in the example you
13 gave me, he's calling it a vessel even though it's
14 made out of pipe material, right?

15 A. Yeah. I don't see a point, but yes.

16 Q. So a person of ordinary skill reading
17 Hemstock would understand the Hemstock to be a
18 vessel, wouldn't they?

19 A. I think you are purporting a definition
20 to "vessel" that nobody else does.

21 Q. Well, let me ask you a different
22 question, then.

23 A. Okay.

24 Q. You get done reading Hemstock, right,
25 you want to improve Hemstock. There's two sections

1 of the Data Book; one on vessels, one on pipes.
2 Your opinion is you would go to the pipe section
3 instead of the vessel section, right?

4 A. No. My opinion is he would look for
5 single-phase vessels, pipeline accessories, or
6 separators. There are all -- the difference between
7 a pipeline accessory and a pressure vessel is the
8 code or standard to which it's built.

9 Q. Uh-huh.

10 A. That's it. Okay?

11 So when we talk about vessels, a
12 vessel is an identifiable thing that holds pressure
13 and fluids.

14 Q. So we've talked about the different
15 standards between pipes and vessels, right?

16 A. Yes.

17 Q. Which one is harder to meet?

18 MR. HALL: Objection; form.

19 A. I meet them both regularly. I don't
20 know that one is more difficult to meet than the
21 other. They have different things that are
22 important. In the boiler pressure vessel code, I
23 spend more time doing calculations on nozzles than I
24 do in the ASME B31 codes. But neither one is
25 terribly difficult to me.

1 BY MR. KESACK:

2 Q. Which one is more stringent, for
3 example? Which one has tougher or more limiting
4 circumstances to meet them?

5 MR. HALL: Objection; form.

6 A. They're both pretty limiting. There's
7 probably a slight increase in the requirements in
8 the -- well, there's certainly an increase in the
9 reporting requirements in the boiler pressure vessel
10 code than there is in the piping codes.

11 BY MR. KESACK:

12 Q. So if a person was required to meet the
13 pressure vessel code, would you look at the pipe
14 section of the Data Book?

15 A. I did when I was designing the vessel I
16 invented. So I would say yes.

17 Q. Can you explain what you mean?

18 A. I hold a patent for a pressure vessel,
19 and it's built out of pipe, built to boiler pressure
20 vessel code standards, and one of the references I
21 used to decide whether or not this thing was
22 patentable was looking at the pipe specifications,
23 looking at the pipe part of the Data Book.

24 Q. So you weren't looking at the Data Book
25 to improve your vessel; you were looking at the pipe

1 part of the Data Book to make sure your vessel
2 wasn't disclosed somewhere else.

3 A. Yes.

4 Q. I'm asking you, if you needed to meet
5 the code for a pressure vessel and you were looking
6 for ways to improve that pressure vessel, would you
7 be looking at the pipe section of the Data Book?

8 A. Possibly. I might be looking at the
9 compressor section. There are a lot of details
10 about how fluids work, fluids interact with each
11 other, fluids interact with systems, in a
12 significant number of sections of the Data Book.

13 Q. So I'm going to give you the Data Book
14 just so you'll remember what we're talking about.

15 A. Okay.

16 Q. Now, you're talking about Section 17 and
17 you're talking about the pipe section, right?

18 MR. HALL: Do you have a copy?

19 MR. KESACK: Oh, I'm sorry.

20 MR. HALL: Thanks.

21 A. Let me make sure.

22 (Document review by witness.)

23 A. Yes.

24 BY MR. KESACK:

25 Q. There's no compressors in this section,

1 right?

2 A. No.

3 Q. So I'll ask you again. If you're trying
4 to meet the ASME code for pressure vessels and you
5 want to improve your pressure vessel, would you look
6 at Section 17 of the Data Book?

7 A. Yes.

8 Q. For what?

9 A. For friction texture calculations. The
10 separator part of the Data Book is very specific to,
11 I don't know, separators. The pipe flow section
12 talks a lot more about how fluids interact with each
13 other, okay? So to look at pipe roughness and the
14 effect of fittings.

15 I mean, there's just -- there's an
16 awful lot of very sound fluid mechanics in the pipe
17 section that is not repeated in the vessel section.
18 Okay? So when I'm looking at how to make a fluid
19 mechanics device more effective, I end up in
20 Chapter 17 a lot more often than Chapter 7.

21 Q. All right. Turn to page -- is it 41,
22 that's the page you rely on?

23 MR. HALL: Objection; form.

24 BY MR. KESACK:

25 Q. Strike that. Please turn to page 41 of

1 the Data Book.

2 A. And that's referring to the numbers at
3 the bottom?

4 Q. Yeah.

5 A. Okay.

6 Q. This is the part of the Data Book that
7 your opinion is you should apply to Hemstock, right?

8 A. Yes.

9 Q. What does this Data Book teach you about
10 inclining a pipe?

11 A. I don't know. I've designed a large
12 number of devices like this that, after seeing some
13 that other people had designed, I sloped. So I got
14 a better performance, a larger slug-carrying
15 capacity, by sloping the vessel, is what this
16 taught -- is what this teaches.

17 Q. Where does it teach that?

18 A. In the picture right here.

19 Q. So you think this picture teaches you
20 that inclining the pipes have a benefit?

21 A. Yes.

22 Q. What benefit does this picture teach you
23 sloping the pipes have?

24 A. It allows you to have a freeboard
25 section without -- it allows you to have a freeboard

1 section with the outlet on the top of the pipe.

2 Q. So you can't have a freeboard portion at
3 the outlet at the top of the pipe unless you slope
4 the pipe?

5 A. Not in my experience.

6 Q. So a horizontal pipe, with the outlet on
7 the top, can't have a freeboard portion?

8 MR. HALL: Objection; form.

9 A. Not if it's -- not if it's flowing
10 liquid.

11 BY MR. KESACK:

12 Q. Does Hemstock have a freeboard portion?

13 A. Yeah.

14 Q. Does Hemstock have a liquid outlet on
15 the top -- you said the liquid outlet on the top or
16 the vapor outlet on the top?

17 A. It has the outlet on the top, the only
18 outlet.

19 Q. So Hemstock does?

20 A. Hemstock does and they have the weir to
21 create the freeboard. So without a weir, without
22 some sort of descending device, then the way you get
23 a freeboard portion of a vessel -- of a single-phase
24 vessel is by making it vertical or sloping it off
25 the horizontal.

1 Q. So in your opinion, this figure here is
2 teaching you that if you need to create a freeboard
3 portion, you should incline the pipe.

4 A. Yes.

5 Q. And Hemstock already has a freeboard
6 portion, right?

7 A. Yes.

8 Q. So you're not applying that portion of
9 the Data Book to Hemstock, right? You already have
10 a freeboard portion.

11 MR. HALL: Objection; form.

12 A. I have a freeboard portion that I would
13 like to improve.

14 BY MR. KESACK:

15 Q. Sure. But you said that this figure is
16 teaching you, to create a freeboard portion, you
17 should incline the pipe, right?

18 A. Yes.

19 Q. And you don't need to do that because
20 Hemstock already has a freeboard portion, right?

21 MR. HALL: Objection; asked and
22 answered.

23 A. I'm not -- I don't -- I don't see your
24 point. I look at the slug catchers in the world and
25 say, they're sloped. I look at plumbing in the

1 world and it's sloped. And I see a benefit to
2 sloping a multiphase process.

3 BY MR. KESACK:

4 Q. Which is to create a freeboard portion?

5 A. Which is to create a freeboard portion.

6 Q. Any other benefit?

7 A. Not that's explicit in here. In my
8 experience, I've seen accumulation of solids in the
9 end of these things.

10 Q. And you want to accumulate solids in a
11 non-sloped pipe. Is that right?

12 A. When you accumulate solids in a
13 non-sloped pipe, you have no control over where the
14 solids are going to accumulate, which makes removal
15 of those solids problematic in many cases.

16 What we've found -- and this is
17 through nearly 100 years of experience with these
18 sort of things in the industry -- is that we
19 frequently get solids out of the toe end of a sloped
20 slug hinge.

21 Q. And in Hemstock, the vessel is
22 accumulating solids without inclination, right?

23 A. Yes.

24 Q. Any other benefits to inclination of the
25 figure on page 41?

1 A. Not that's discussed in the Data Book.

2 Q. How about in your opinion, any other
3 benefits?

4 A. I have found, in my experience, that
5 sloping the slug catchers gives me better access to
6 the solids than not sloping them.

7 Q. But you're not suggesting that a person
8 would want to improve the ability to clean out
9 solids from Hemstock and would look to the Data
10 Book, this figure, to do so, right?

11 A. I don't know that. I don't know that
12 somebody looking at this vessel on location would go
13 to the Data Book and -- we all go to the Data
14 Book -- but would look in this section of the Data
15 Book and say, huh, if I slope, that I'd get a better
16 result.

17 I would because I have experience
18 with sloped slug catchers.

19 Q. What was your first experience with a
20 sloped slug catcher?

21 A. Actually taking one out at a station
22 called PLA-9. We were changing the piping
23 configuration from a slug catcher to a very large
24 vessel and that was the very first one I ever saw.

25 Q. When was that?

1 A. 1992.

2 Q. And why did you replace pipes with a
3 vessel?

4 A. The pipes were very effective at
5 previous operating pressures. We were lowering the
6 pressure from a nominal 200-pound inlet to the site
7 to a 30-pound inlet to the site, and my calculations
8 said that the slug catcher was not going to have
9 enough velocity inside of it to do the job I needed
10 done.

11 Q. Did you slope the vessel?

12 A. No. It was a very large-diameter
13 horizontal vessel. I did not slope it.

14 Q. Why not?

15 A. The problem I was trying to solve was
16 not the problem of solids accumulation. The problem
17 I was trying to solve was dealing with slugs in a
18 very low-pressure environment.

19 Q. Same problem -- the problem you
20 identified for improving Hemstock was to deal with
21 slugs, right?

22 A. Different pressure environment.

23 Q. So the difference was a low-pressure
24 versus a high-pressure environment?

25 A. Yes.

1 Q. And in your opinion, in a high-pressure
2 environment, you would want to incline the vessel?

3 A. In a high-pressure environment, the slug
4 catcher worked just fine. And it was inclined.

5 Q. But if you were to use the vessel, you
6 would have inclined it in a high-pressure situation?
7 Is that right?

8 A. Not if the -- not if -- okay. Let me
9 back up.

10 A separator has got a list of things
11 it must have to be a separator rather than a slug
12 catcher or a scrubber. One of those things is mist
13 elimination; another is level control. So a
14 separator, to be a true separator, must have the
15 ability to control fluid level, a liquid level,
16 separate from the gas outlet. Okay?

17 So when I install a separator, I'm
18 managing the liquid using a mechanical device rather
19 than a single-phase vessel like Hemstock, where I'm
20 making no effort to manage the fluid level within
21 the vessel.

22 MR. KESACK: Objection;
23 nonresponsive, move to strike.

24 BY MR. KESACK:

25 Q. Is it your opinion that if you're using

1 a vessel in a high-pressure environment as a slug
2 catcher, you should incline it?

3 MR. HALL: Objection; form.

4 A. Yes.

5 BY MR. KESACK:

6 Q. Why?

7 A. To increase the freeboard portion.

8 Q. How many pressure vessels have you ever
9 used as slug catchers?

10 A. Pressure vessels as slug catchers,
11 three.

12 Q. How many of them are inclined?

13 A. All of them.

14 Q. And when were those done?

15 A. Between '94 and '98.

16 Q. And the only purpose of the vessel was a
17 slug catcher?

18 A. Yes.

19 Q. Do you have any information on those
20 slug catchers?

21 A. In my book.

22 Q. But you didn't reference that book in
23 here, right?

24 A. I didn't. It was written after this --
25 after the date of the '256 patent.

1 Q. Who made the slug catcher?

2 A. It was my design. It was built by a
3 company called Pesco.

4 Q. Is there any literature on this 1992
5 slug catcher vessel that was inclined?

6 A. What do you mean?

7 Q. Is there any literature describing the
8 pressure vessel slug catcher that you're describing?

9 MR. HALL: Objection; asked and
10 answered.

11 A. You mean did I write a report or --
12 BY MR. KESACK:

13 Q. Is there a product manual, is there
14 literature from the company, is there anything at
15 all that we can look at to see the pressure vessel
16 slug catcher that you're describing?

17 A. I designed it. It was built to my
18 specifications. I never published it. Never
19 published. I wasn't selling them.

20 Q. What happened to the specification?

21 A. It's in Amoco's files.

22 Q. What portion of page 41 would cause not
23 you, but a person of ordinary skill in the art, to
24 incline Hemstock?

25 A. I believe I've answered that. The

1 drawing and people's -- and general experience that
2 you slope single-phase vessels.

3 Q. And what is your opinion that the slug
4 catcher in this diagram is a single-phase separator
5 based on?

6 A. Again, experience. If you were to open
7 those liquid outlets in normal operation, during
8 non-slug events you would blow gas out the liquid
9 outlet. So people don't do that. If there is not a
10 level control on the vessel, something to provide
11 automatic nonmanual removal of liquids, then you
12 shut those.

13 Q. So based on your personal experience?

14 A. Yeah.

15 Q. Not based on any of the words in the
16 document?

17 A. Not based on any of the words in the
18 document.

19 Q. And your experience isn't supported by
20 any other documents either, right?

21 A. No.

22 Q. Is it based on today or at the time of
23 the invention?

24 A. At the time of the invention.

25 Q. How do you know?

1 A. Because I built sloped slug catchers
2 before the invention.

3 Q. And you know that -- strike that.
4 What's the time of the invention?

5 A. I don't recall.

6 Q. So you don't recall the time of the
7 invention, but you know what a person of ordinary
8 skill understood at the time of the invention. Is
9 that right?

10 A. When I was writing my opinions, I had
11 that date at my fingertips. I don't have that date
12 at my fingertips today.

13 Q. When you were writing your opinion, you
14 didn't say that a person would look at this figure
15 and determine that that person should tilt Hemstock,
16 did you?

17 MR. HALL: Excuse me?

18 A. Again, those words aren't making sense
19 to me. Could you say it a different way?

20 BY MR. KESACK:

21 Q. Sure.

22 So when I asked you what portion of
23 the Data Book you were relying on, you said only the
24 picture. Is that right?

25 MR. HALL: Objection to form.

1 A. Yes, I said that.

2 BY MR. KESACK:

3 Q. Is that accurate?

4 A. Yes.

5 Q. Was that your opinion in your
6 declaration?

7 A. Yes.

8 Q. And you said -- and your opinion in your
9 declarations was that a person of ordinary skill
10 would have understood that that creates more
11 freeboard portion in the slug catcher?

12 A. Yes.

13 Q. Okay. Let's hand you your declaration.
14 Is that the first declaration or the second one?

15 A. I believe it was the first.

16 Q. Okay. And specifically, I'm asking you
17 to identify where in your declaration you say the
18 figure on page 41 of the Data Book teaches a person
19 of ordinary skill in the art that it creates more
20 freeboard portion.

21 (Document review by witness.)

22 A. Yeah. On page 69 of 90, paragraph 170:
23 According to the Data Book, sloped slug catchers
24 were well known and useful for absorbing fluctuating
25 liquid slugs that sometimes occur in two-phase (gas

1 and liquid) flow in process and transmission piping.
2 The Data Book explains that such devices are
3 generally inclined from 1 to 10 degrees based on
4 design choices.

5 BY MR. KESACK:

6 Q. So where in that paragraph do you say
7 that based on the figure on page 41 of the Data Book
8 you can increase the freeboard portion of the pipe?

9 MR. HALL: Objection; form.

10 BY MR. KESACK:

11 Q. Which is the question I asked you.

12 A. The ability to handle liquid -- to
13 absorb fluctuating liquid slugs is a function of the
14 freeboard.

15 Q. Where do you say that?

16 A. I don't know that I use exactly those
17 words.

18 Q. Did you use approximately those words?

19 A. On page 70 of 90, at the top: Because
20 the slug catcher is inclined, liquid will
21 necessarily gravitate or pool towards the
22 separator's lower discharge end.

23 That's a statement of increased
24 freeboard.

25 Q. That says "increased freeboard"?

1 A. That's what that says.

2 Q. So what was the freeboard before
3 inclination?

4 A. None.

5 Q. None. So this isn't increased
6 freeboard, right? This is --

7 MR. HALL: Objection; form.

8 BY MR. KESACK:

9 Q. In your opinion, this sentence says
10 you're creating freeboard by inclination?

11 A. Yes.

12 Q. Because it would gravitate or pool
13 towards the lower discharge end?

14 A. Yes.

15 Q. And what is freeboard portion in this
16 opinion you're giving?

17 MR. HALL: Objection. Can you read
18 that question back?

19 (The reporter read back the following
20 portion of the preceding record.)

21 "QUESTION: And what is freeboard
22 portion in this opinion you're giving?"

23 (End of readback.)

24 MR. HALL: Objection; form.

25 A. The freeboard portion is the portion

1 that's filled with gas, not liquid.

2 BY MR. KESACK:

3 Q. So, for example, an annular flow, your
4 freeboard portion would be in the middle?

5 A. No. Annular flow is a function of so
6 many things. Annular flow tends to not happen in a
7 vessel. It happens in pipe.

8 Q. We're talking about pipe, right?

9 A. We're talking about a device.

10 Q. We're talking about a slug catcher on
11 page 41 of the Data Book, aren't we?

12 A. Yep.

13 Q. That's pipe, right?

14 MR. HALL: Objection, form.

15 A. It's made of pipe components.

16 BY MR. KESACK:

17 Q. Are you testifying that this is a
18 vessel?

19 A. I'm testifying that it's a pipeline
20 accessory. It is not pipe.

21 Q. Is it a vessel?

22 A. By definition of what a vessel is, yes.

23 Q. What definition of vessel are you using?

24 A. A component for containing fluids and
25 pressures that is not a part of a continuous flow

1 stream.

2 Q. Is this a separator?

3 A. No.

4 Q. So it's not a single-phase separator?

5 A. (Laughing.)

6 Q. What's funny?

7 A. What's funny is we go back and forth
8 between common usage and strict definitions, and I'm
9 messing myself up.

10 Q. All right. So let me ask you, a
11 person -- all my questions are about a person of
12 ordinary skill in the art. I just want to make that
13 clear.

14 A. Okay.

15 Q. So a person of ordinary skill in the art
16 reading the Data Book, would he understand the
17 figure on page 41 of the Data Book to be a
18 separator?

19 A. He would understand it to be a pipeline
20 accessory. If he used the terminology that I coined
21 for this document that it's a single-phase
22 separator, then yes. But one of the components of
23 the definition of a separator is that it has liquid
24 level controls.

25 This does not have liquid level

1 controls. It is a single-phase process. Common
2 usage would call it a separator. A strict
3 definition of a separator would exclude it.

4 Q. The Data Book defines separator, right?

5 A. Uh-huh.

6 Q. And it defines slug catcher, right?

7 A. Yes.

8 Q. Are you applying those definitions or
9 your own?

10 A. If we look at the Chapter 7 definition
11 of a separator, this is not a separator.

12 MR. KESACK: Move to strike,
13 nonresponsive.

14 BY MR. KESACK:

15 Q. Are you applying the definitions in the
16 Data Book or are you applying your own definitions?

17 MR. HALL: Objection; form.

18 A. I'm applying my own definitions.

19 BY MR. KESACK:

20 Q. Why?

21 A. Because my own definitions are clearer
22 to me, have tended to make communication easier
23 until just a few minutes ago. The term
24 "single-phase separator" does not exist in
25 literature, as far as I can see.

1 Q. You made it up.

2 A. I made it up.

3 Q. Is the slug catcher a separator as
4 defined in the Data Book?

5 A. No.

6 Q. Go to page 3.

7 A. Of what?

8 Q. The Data Book.

9 A. Page what?

10 Q. Three.

11 A. 30?

12 Q. Page 3 of the Data Book.

13 A. Page 3. The end of your words were
14 dropping off.

15 Q. Sorry. I'll try to be clearer.

16 A. Page 3, okay.

17 Q. What's the definition of slug catcher?

18 A. A vessel used to separate a mixed-phase
19 stream into gas and liquid phases that are
20 relatively free of each other.

21 Q. I'm going to stop you. I asked the
22 definition of slug catcher.

23 A. Oh, slug -- I'm sorry. A particular
24 separator design able to absorb sustained inflow of
25 large liquid volumes at irregular intervals usually

1 found in gas gathering systems or other two-phase
2 systems. A slug catcher may be a single large
3 vessel or a manifold system of pipes.

4 Q. After reading that definition of slug
5 catcher, is it your opinion that a slug catcher is
6 not a separator?

7 A. I believe that the Data Book has applied
8 a nontechnical definition of the word "separator."

9 In separator design school, there
10 were a list of things that a separator must have.
11 This doesn't include that list.

12 Q. So a person of ordinary skill in the
13 art, when reading a document, do they apply their
14 own definitions of words or do they apply the
15 definitions listed in the document?

16 MR. HALL: Objection; form.

17 BY MR. KESACK:

18 Q. In your experience.

19 MR. HALL: Objection; form.

20 A. In my experience, they use the
21 definition -- the definitions that they are
22 comfortable with, be that if they -- if I feel that
23 I know the definition of the word "separator," then
24 I will not go look at the definition of separator,
25 unless they say something in here that goes against

1 my definition of a separator.

2 Q. Okay. So is it your opinion, then, that
3 when we're evaluating the Data Book, we should
4 ignore the definitions in the Data Book and apply
5 your definitions?

6 MR. HALL: Objection; form.

7 A. That would be up to you.

8 BY MR. KESACK:

9 Q. Well, you wrote these opinions for a
10 purpose, right?

11 A. I did.

12 Q. What was that purpose?

13 MR. HALL: Objection; form.

14 A. The purpose was to explain how the
15 documents I was referring to applied to the
16 discussion at hand.

17 BY MR. KESACK:

18 Q. And so -- and who was that for? Was
19 that for your own benefit, was that for me or was
20 that for the Patent Office?

21 A. It was for the Patent Office.

22 Q. All right. So when you are asking the
23 Patent Office to consider your testimony, would you
24 like them to apply the definitions in the Data Book
25 or your own definitions when evaluating what the

1 Data Book teaches?

2 A. I would expect them to use the
3 definitions in the Data Book.

4 Q. Okay. So from the definitions in the
5 Data Book, is slug catcher a separator?

6 A. Yep.

7 Q. Does a slug catcher separate gas and
8 liquid?

9 A. That's not a simple question to answer.

10 Q. What's the definition of separator in
11 the Data Book?

12 A. Definition of separator in the Data
13 Book, it separates a mixed-phase stream into gas and
14 liquid phases that are relatively free of each
15 other.

16 So at the outlet of a separator, I
17 have a gas stream that's relatively liquid-free and
18 a liquid stream that's relatively gas-free.

19 At the outlet of the slug catcher in
20 here, the harp trap slug catcher, I have an outlet
21 stream that is very similar to the inlet stream.

22 Q. Despite what the definition of slug
23 catcher and separator is?

24 A. Well, the definition of slug catcher
25 says --

1 Q. It says a separator, right?

2 A. Able to absorb sustained inflows, and it
3 doesn't talk about what the outlet looks like.

4 Q. But it calls it a separator, correct?

5 A. It calls it a separator.

6 Q. And the definition of separator tells
7 you what the outlets look like, right?

8 A. Right. So based on the definition of
9 separator, a slug catcher is not a separator, even
10 though they use the word "separator" in it because
11 it fails the definition of a separator.

12 Because the only characteristic that
13 the separator definition has is that the gas outlet
14 is relatively liquid-free and the liquid outlet is
15 relatively gas-free.

16 In a slug catcher, the outlet stream
17 is largely indistinguishable from the inlet stream.

18 Q. So in your opinion, although the Data
19 Book calls the slug catcher a separator in its
20 definition, a slug catcher is not a separator?

21 A. The separator --

22 MR. HALL: Objection; form.

23 A. -- fails the definition of a -- slug
24 catcher fails the definition of separator in the
25 Data Book.

1 BY MR. KESACK:

2 Q. So in order for the Patent Office to
3 accept your opinion, we'd have to ignore these
4 definitions, right?

5 MR. HALL: Objection; form.

6 A. I don't believe so.

7 BY MR. KESACK:

8 Q. If it applied these definitions, it
9 would understand that there was a liquid outlet and
10 a gas outlet and those outlets were relatively free
11 of one another, wouldn't it?

12 MR. HALL: Objection; form.

13 A. Yes.

14 BY MR. KESACK:

15 Q. And your opinion is that it's not that,
16 right?

17 A. Yes.

18 Q. So they would have to ignore the
19 definitions in the Data Book to accept your opinion,
20 right?

21 A. Yes.

22 Q. Should they do that?

23 A. I would have to defer to them to make
24 that decision.

25 Q. What is your basis for ignoring

1 definitions of this reference to interpret this
2 reference and apply your own opinion instead?

3 A. The internal inconsistency between a
4 slug catcher -- calling a slug catcher a separator
5 when the only characteristic they've provided of a
6 separator is that the gas is relatively liquid-free
7 and the liquid is relatively gas-free. It's the
8 only characteristic they provided of a separator.

9 So then to call a slug catcher,
10 which has a single outlet, where the outlet stream
11 is largely indistinguishable from the inlet stream,
12 a separator is patently sloppy use of language.

13 Q. How many outlets are depicted in
14 Figure 17-21 on page 41, one or two?

15 A. Two.

16 Q. So it's not just one outlet, right?

17 A. It's not.

18 Q. And if the liquid outlet was open rather
19 than closed, as your opinion is, you'd have a liquid
20 outlet and a vapor outlet, right?

21 A. If the liquid outlet was open, you would
22 have two vapor outlets.

23 Q. And is it possible that the vapor outlet
24 would be relatively liquid-free?

25 A. No.

1 Q. There's no circumstance in which a
2 sloped pipe could have an outlet that the vapor
3 outlet is relatively liquid-free?

4 A. Not in my experience. If you were to
5 open -- let me back up. I think I answered a
6 question that you weren't asking.

7 If I open both the gas outlet and
8 the liquid outlet and leave them open, in the
9 absence of a slug event, both outlets are going to
10 be identical. They're both going to be relatively
11 liquid-free because the liquid will all blow out.
12 So I will have gas blowing out the top and gas
13 blowing out the bottom.

14 Q. So in your opinion, in a non-slug event,
15 there's no liquid coming in the pipe?

16 MR. HALL: Objection; form.

17 A. No. My opinion is that a non-slug
18 event, what comes in goes out.

19 BY MR. KESACK:

20 Q. Is liquid coming in?

21 A. If there is liquid coming in, it goes
22 out.

23 Q. What does the reference say? Is there
24 liquid coming in? You can look at the reference.
25 What does page 41 say? Is there liquid or not?

1 A. Page 41. Page 41, on the left column
2 towards the bottom, it says: Slugs can also form
3 due to terrain effects. Liquid collects at a sag in
4 the pipeline and blocks the gas flow.

5 That says -- not implies -- that
6 says, there is liquid in the inflow, there is liquid
7 in the pipe. And if it collects in a sag at a low
8 point, then those sags can launch as slugs.

9 Otherwise, it's just liquid in the line that comes
10 into the slug catcher and leaves the slug catcher.

11 Q. So there's no liquid other than during a
12 slug event, in your opinion?

13 MR. HALL: Objection; form.

14 A. That's not what I said.

15 BY MR. KESACK:

16 Q. I'm asking you, is there liquid coming
17 into the slug catcher in a non-slug event?

18 MR. HALL: Asked and answered.

19 Objection.

20 MR. KESACK: He's not answered it.

21 A. There are -- there's a significant
22 possibility that there will often be liquid coming
23 into the slug catcher.

24 BY MR. KESACK:

25 Q. In what situations would there not be

1 liquid coming into the slug catcher?

2 A. When there's not. We're talking about a
3 very dynamic multiphase flow scenario, so liquids
4 drop out, liquids become reentrained, liquids become
5 immobile, they become mobile, based on this moment's
6 pressure-velocity-temperature regime, okay?

7 We have evaporation in the line that
8 is subsequently followed by condensation. We have
9 rain in pipes, regular rain. So in a multiphase
10 flow environment, like a wellhead, like a pipeline,
11 to say at any given instant there is or is not
12 liquid coming in, there is or is not a slug coming
13 in, is laughable.

14 Q. Okay. Why does gas go out the vapor
15 outlet?

16 A. Gas always travels from a higher
17 pressure towards a lower pressure.

18 Q. And the vapor outlet is lower pressure?

19 A. Yes.

20 Q. Which is lower pressure, the vapor
21 outlet or the liquid outlet?

22 MR. HALL: Objection; form.

23 A. If the liquid outlet is shut, then the
24 vapor outlet. If the liquid outlet is open, then
25 that depends on what's downstream of that valve.

1 BY MR. KESACK:

2 Q. So you can't tell.

3 A. No.

4 Q. So if both valves are open, you can't
5 tell where the gas would go?

6 MR. HALL: Objection; form.

7 A. That would be correct.

8 BY MR. KESACK:

9 Q. Where would the freeboard portion be in
10 the multiple-pipe slug catcher in Figure 17-21?

11 MR. HALL: Objection; form.

12 A. I would expect if you drew a line from
13 the gas outlet horizontally back to the pipe, that
14 would, on average, define the limits of the
15 freeboard.

16 BY MR. KESACK:

17 Q. So your opinion is that in normal
18 operation, the liquid outlet is closed, liquid fills
19 the space that you didn't just describe, everything
20 other than the freeboard portion, and then
21 everything else coming into the pipe is leaving out
22 the vapor outlet. Is that right?

23 MR. HALL: Objection. Objection;
24 form.

25 A. Yes.

1 BY MR. KESACK:

2 Q. Not acting as a separator?

3 A. Right.

4 Q. And when a slug comes in, you have only
5 liquid going out the vapor outlet. Is that right?

6 MR. HALL: Objection; form.

7 A. You have only liquid going out the vapor
8 outlet, yes.

9 BY MR. KESACK:

10 Q. So again, not a separator?

11 MR. HALL: Objection; form.

12 A. Again, not a separator.

13 BY MR. KESACK:

14 Q. So in what instance is this pipe slug
15 catcher acting as a separator?

16 A. It's not.

17 Q. Okay. During a slug event, what comes
18 into the pipe looks like what's coming out of the
19 pipe, right?

20 MR. HALL: Objection; form.

21 A. Yes.

22 BY MR. KESACK:

23 Q. How is it catching a slug?

24 A. The slug comes in at velocity A, the
25 liquid leaves at velocity B.

1 Q. Which one is faster?

2 A. Velocity A.

3 Q. What slows it down?

4 A. The size of the vessel.

5 Q. The size of the vessel. Not the
6 incline?

7 A. The volume of the freeboard.

8 Q. What's that opinion based on?

9 A. Fluid mechanics.

10 Q. What fluid mechanics?

11 A. The fluid mechanics that I was trained
12 in.

13 Q. Do you have any reference which shows
14 that?

15 A. No.

16 Q. You were on page 70 of 90 of your
17 declaration before.

18 A. Yes.

19 Q. You see where you say: Compared to a
20 non-inclined horizontal separator, the inclined
21 device will necessarily have a larger
22 cross-sectional area in its gravity section?

23 A. Yes.

24 Q. Are you talking about a pipe slug
25 catcher there?

1 A. I'm talking about any horizontal conduit
2 or any circular conduit. If I incline it, then I
3 get a different gas-liquid interface.

4 Q. But didn't you tell me before that a
5 horizontal pipe won't have an interface?

6 MR. HALL: Objection; form.

7 BY MR. KESACK:

8 Q. Or a freeboard portion?

9 MR. HALL: Objection; form.

10 A. Yeah.

11 BY MR. KESACK:

12 Q. How can it be larger if there wasn't one
13 before?

14 A. Something is larger than nothing.

15 Q. So when you said it's going to
16 necessarily have a larger cross-sectional area, you
17 actually meant it's going to have a cross-sectional
18 area where it didn't have one before; that's what
19 you meant here.

20 MR. HALL: Objection; form.

21 A. Not necessarily, because you look at
22 Figure 3 of Hemstock and they create a freeboard
23 with their weir.

24 BY MR. KESACK:

25 Q. Where the pipe creates its freeboard

1 through inclination?

2 A. Right.

3 Q. Different mechanisms?

4 A. Yes.

5 Q. So in here you're using the term
6 "horizontal separator," right?

7 MR. HALL: Objection; form.

8 A. I am.

9 BY MR. KESACK:

10 Q. What do you mean by "separator" here?

11 A. I was my own lexicographer here. I
12 defined --

13 Q. You -- sorry?

14 A. -- a single-phase separator as a device
15 that has a single nonautomatic outlet.

16 Q. If the Patent Office determines that the
17 slug catcher on page 41 of the Data Book is a
18 separator as a separator is defined in the Data
19 Book, is there any reason why you would apply that
20 slug catcher to Hemstock?

21 MR. HALL: Objection; form.

22 A. I -- I don't understand the question.

23 BY MR. KESACK:

24 Q. I'm asking you to assume for a second
25 that they're not going to accept your definition of

1 separator, they're not going to accept your opinion
2 of how that separator works. Instead, they're going
3 to say, separator is defined as splitting up gas and
4 liquid so they're relatively free of one another,
5 and we're going to interpret that figure that way.

6 Does that make sense?

7 A. I understand what you're saying.

8 Q. Okay. If they have that understanding
9 of that figure, is there any reason that you can
10 think of that you should apply that figure, the
11 teachings of that figure, to Hemstock?

12 MR. HALL: Objection; form.

13 A. I'm having a hard time getting my head
14 around that concept. The reason that I would apply
15 Figure 17-21 to Hemstock is it creates -- sloping it
16 creates an increased volume.

17 If you --

18 BY MR. KESACK:

19 Q. An increased volume of what?

20 A. Freeboard, increased void volume.

21 Q. Increased from zero?

22 A. Increased from zero.

23 MR. HALL: Objection; form.

24 BY MR. KESACK:

25 Q. Hemstock you're not increasing from

1 zero, right?

2 A. Right. But you are increasing.

3 So if Figure 17-21 is not a
4 single-phase vessel, then the obviousness of its
5 applicability to Hemstock changes.

6 Q. And I'm asking you, what does it change
7 to?

8 MR. HALL: Objection; scope.

9 A. I don't know. I really am having a very
10 difficult time getting my head around the whole
11 concept that you've proposed.

12 BY MR. KESACK:

13 Q. Let me try to ask you a slightly
14 different way. Other than the fact that the Data
15 Book, in your opinion, is disclosing a single-phase
16 separator and Hemstock is a single-phase separator,
17 is there any other reason why you would apply the
18 figure on page 41 to Hemstock?

19 A. If Hemstock -- I see Hemstock's
20 freeboard as less than I would like. Looking at
21 Figure 17-21, I see that it gives me more freeboard
22 if I'm maintaining a fluid level at the outlet. I
23 don't know the -- that's the only reason. Sloping
24 it gives me more freeboard.

25 Q. Okay. So a couple of questions ago you

1 testified that the freeboard portion would start at
2 the outlet and would extend horizontally. Is that
3 right?

4 A. Yes.

5 Q. In that situation, is the slug catcher a
6 liquid-starved?

7 A. That would be what I referred to in this
8 document as normal or steady state operation.

9 Q. Okay. I'm going to hand you your new
10 declaration, if I can find it.

11 MR. KESACK: Now is a good time for
12 a break. Let's take a break.

13 (Recess, 12:11 p.m. to 1:09 p.m.)

14 (The reporter read back the following
15 portion of the preceding record.)

16 "QUESTION: Okay. So a couple of
17 questions ago you testified that the
18 freeboard portion would start at the outlet
19 and would extend horizontally. Is that
20 right?

21 "ANSWER: Yes.

22 "QUESTION: In that situation, is the
23 slug catcher a liquid-starved?

24 "ANSWER: That would be what I
25 referred to in this document as normal or

1 steady state operation."

2 (End of readback.)

3 BY MR. KESACK:

4 Q. Do you remember that system?

5 A. Yes.

6 Q. You remember we were talking about the
7 figure in the Data Book?

8 A. Right.

9 Q. On page 41.

10 All right. I'm going to hand you
11 what is your rebuttal declaration.

12 A. Okay.

13 Q. If you could turn to page 51 of 61 of
14 your rebuttal declaration.

15 A. Okay.

16 Q. About halfway down on the left-hand
17 side, there is the word "necessarily."

18 Do you see that?

19 A. Yes.

20 Q. If you go over about halfway, the
21 sentence starts "Although," right?

22 A. Right.

23 Q. It says, "Although the preferred normal
24 mode of operation of any slug catcher is
25 liquid-starved."

1 Do you see that?

2 A. Yes.

3 Q. Do you still agree with that sentence?

4 A. Yes.

5 Q. That's not the same as the testimony
6 that you just had read back where you said that the
7 slug catcher in the Data Book would be at steady
8 state, right?

9 A. I don't see the disconnect. I would
10 prefer to have it liquid-starved. I don't have
11 control over that. I would most often see it at the
12 normal or steady state level. I would prefer to see
13 it liquid-starved.

14 Q. So in your opinion, the preferred normal
15 mode of operation of the slug catcher in the Data
16 Book doesn't happen because the liquid has to be --
17 liquid outlet has to be closed?

18 MR. HALL: Objection; form.

19 A. No, that's not true at all. Because
20 liquid comes in when liquid comes in. If it comes
21 in to the point where the liquid reaches the outlet,
22 then you're going to get a two-phase, liquid-gas
23 stream leaving.

24 If it slows down, then you'll reach
25 a point where it's below the outlet and you'll get

1 very little entrained liquid. You could still get
2 evaporation and the level can keep dropping until
3 fluid comes in to cause it to come back up.

4 BY MR. KESACK:

5 Q. But if you had a choice of where to set
6 the liquid level in a slug catcher, you would set it
7 below the outlet. Is that what you're saying in
8 this paragraph? That's what "preferred normal mode"
9 means?

10 A. Yeah, preferred normal mode is
11 liquid-starved. That's the way that we see the slug
12 catcher most of the time is the fluid level below
13 the outlet.

14 Q. So when you're talking about normal mode
15 of operation, that's non-slug flow operation. Is
16 that correct?

17 MR. HALL: Objection to form.

18 A. Correct.

19 BY MR. KESACK:

20 Q. So if you were to apply the Data Book
21 and the slug catcher teaching that you're talking
22 about here to Hemstock, the preferred normal mode of
23 operation would be to be in the liquid-starved
24 condition, right?

25 A. Yes.

1 Q. And in that condition, as you say here,
2 the liquid level will be below the fluid outlet,
3 right?

4 A. If there's any way to maintain it, but
5 there's not. The liquid level is what the liquid
6 level is unless you have some sort of level control.
7 You have no control over where it's going to be.
8 It's going to be where it is based on the rate of
9 evaporation, the rate of inflow, the rate of
10 outflow.

11 So when the fluid level is about at
12 the outlet, then the inlet stream is going to be
13 very similar to the outlet stream, not counting any
14 solids that have dropped off and stayed in the
15 vessel.

16 When the level comes down, when it's
17 liquid-starved, the outlet will have more gas than
18 the inlet. A larger proportion of gas than the
19 inlet does. How much difference it's going to be is
20 very situational.

21 Q. So it's your opinion that there's never
22 a steady state mode in any of these vessels, right?
23 That's a fiction.

24 MR. HALL: Objection to form.

25 A. It really depends on your time horizon.

1 If you're willing to call steady state
2 20 milliseconds, then it happens all the time. If
3 you're going to call it hours, then, no, it is not a
4 reality.

5 BY MR. KESACK:

6 Q. What's your opinion of what the patentee
7 means in Hemstock when he says steady state?

8 A. What it appears to mean to me is a
9 preferred level. If he were to have control, that's
10 where he would control it.

11 Q. And you don't think, for example, the
12 flow barrier helps him control where the liquid
13 level is?

14 A. No.

15 Q. So what's the point of the downcomer?

16 A. It gives you some freeboard. You mean
17 the weir, right?

18 Q. Same thing in the patent, right?

19 A. I don't believe so.

20 Q. You want to call it a weir? All right.
21 The weir.

22 A. It was downwardly facing but it wasn't a
23 downcomer. That's got its own meaning in vessels.

24 The point of the weir is to create a
25 freeboard.

1 Q. And that freeboard is maintained based
2 on where the liquid level is, right?

3 MR. HALL: Objection to form.

4 A. Yes.

5 BY MR. KESACK:

6 Q. So the weir is sitting where the liquid
7 level can rise to, right?

8 A. At a certain set of inlet conditions,
9 yes.

10 Q. So, for example, Figure 3 is in steady
11 state mode, right?

12 MR. HALL: Objection; form.

13 A. It says -- it's intended to indicate a
14 preferred method or a steady state method.

15 BY MR. KESACK:

16 Q. Okay. Can you go to column 6 of
17 Hemstock?

18 A. Column 6 of Hemstock. Maybe.

19 Q. Got it somewhere.

20 A. Column 6.

21 Q. The fourth line of column 6 and the line
22 above it says that: Typical collection rate of
23 1.5 gallons of sand particles per day.

24 Do you see that?

25 A. I see that.

1 Q. Does the entire 1.5 gallons of sand
2 particles come into Hemstock at the same time?

3 MR. HALL: Objection to form.

4 A. Do you mean does it come in over a
5 5-millisecond time period or a 24-hour --

6 BY MR. KESACK:

7 Q. Sure, a minute or an hour, yeah. What's
8 the time period that the 1.5 gallons of sand comes
9 into that vessel?

10 A. It says per day.

11 MR. HALL: Objection to form.

12 BY MR. KESACK:

13 Q. So you would expect sand to be coming in
14 continuously over the full day, right?

15 MR. HALL: Objection; form.

16 A. Not really. I would expect it to be
17 amazingly intermittent. You know, some amount comes
18 in, and none comes in for an hour, and then some
19 more comes in, and it's -- it's a natural process.
20 The reservoir gives you what the reservoir is going
21 to give you.

22 BY MR. KESACK:

23 Q. Right. But it's not, for example, in
24 the first five minutes and then nothing the rest of
25 the time.

1 MR. HALL: Objection; form.

2 A. There's nothing to prevent that.

3 BY MR. KESACK:

4 Q. So you think when he's saying
5 1.5 gallons of sand per day, he's talking about five
6 minutes of collection and then nothing for the rest?

7 MR. HALL: Objection; form.

8 A. No, he's talking about over a 24-hour
9 period, 1.5 gallons came in. It does not in any way
10 indicate the duration of the sand inflowing in.

11 BY MR. KESACK:

12 Q. How much is 1.5 gallons of sand, in your
13 own words?

14 A. Probably 25 pounds.

15 Q. Would you expect 25 pounds of sand to
16 come into the Hemstock vessel over the period of 5
17 seconds?

18 MR. HALL: Objection; form.

19 A. Not in my experience.

20 BY MR. KESACK:

21 Q. In an hour?

22 MR. HALL: Objection to form.

23 A. I've seen that much coal flow in an
24 hour.

25 --oOo--

1 BY MR. KESACK:

2 Q. All right. When you read column 6, do
3 you think that the inventor is saying that they
4 collected 1.5 gallons of sand over a short period of
5 time or over an entire day?

6 A. I don't think he knows.

7 Q. You don't think he knows?

8 A. I do not think he knows.

9 Q. You think he wrote this sentence and had
10 no idea when the sand came in?

11 A. No. What he said was 1.5 gallons per
12 day and that's what he meant was 1.5 gallons per
13 day. If I only open the vessel once a day, then I
14 can only tell how much has come into it since the
15 last time I opened it.

16 If I open it once a month and it's
17 got 45 gallons in it, then I say, yeah, that was
18 about 1½ gallons a day. It might have all come in
19 in a 10-minute period.

20 The rate is based on the sampling
21 frequency.

22 Q. So is the Hemstock vessel intended to be
23 a continuous desanding vessel or a burst desanding
24 vessel?

25 MR. HALL: A --

1 MR. KESACK: Burst.

2 MR. HALL: Objection to form.

3 A. In terms of sand removal, it's a batch
4 event versus the words we like to use when we're
5 talking about pressure vessels. It is a batch event
6 to remove the sand. I don't see anything in
7 Hemstock that would lead me to believe he thinks
8 that it comes in at a steady rate.

9 BY MR. KESACK:

10 Q. I'm not asking at a steady rate; I'm
11 just asking, is it going to be continually coming in
12 over the course of a day or will it all come in in a
13 short amount of time and then nothing the rest of
14 the day?

15 MR. HALL: Objection to form.

16 A. Absolutely no way to know. And there's
17 nothing I read in Hemstock that would indicate that
18 he's making up an answer. He says, I've got a day's
19 worth of data and it's 1.5 gallons.

20 BY MR. KESACK:

21 Q. Go to column 1, line 30, 29. You see
22 where it says: In a typical startup after
23 stimulating a well by fracturing, the stimulated
24 well may produce sand until the well has stabilized,
25 often up to a month?

1 A. Yes.

2 Q. Do you think that's one of the
3 applications he's teaching this desander for?

4 A. Yeah.

5 Q. And it says that you're going to be
6 producing sand for up to a month, right?

7 A. You're going to be producing -- he
8 thinks that frac sand will only come back for a
9 month.

10 Q. That's longer than a day, right?

11 A. Yes, it is.

12 Q. Is there a reason to believe that sand
13 will be produced for more than five minutes in one
14 of these desanders based on that sentence?

15 A. The reservoir will give you what the
16 reservoir will give you.

17 Q. I'm asking what the description in the
18 patent is, not what a hypothetical well will give
19 you.

20 A. What the patent says, clearly, is that
21 in this particular mode of operation or this
22 particular scenario, where what I'm getting is
23 flow-back of frac sand, there will be a
24 measurable -- there will be an amount of frac sand
25 produced for up to a month, he says. That doesn't

1 say whether it's 1½ gallons a day every day for the
2 month. It doesn't say if it's 5,000 pounds. It
3 just says that the issue I'm going to address, which
4 is frac sand flow-back, can last for a month.

5 Q. Okay. If sand comes in in hour 1, sand
6 comes in in hour 5, and sand comes in in hour 10,
7 all that sand will settle, right?

8 MR. HALL: Objection; form.

9 BY MR. KESACK:

10 Q. Based on the description of Hemstock.

11 MR. HALL: Objection; form.

12 A. All that sand will have a potential to
13 settle.

14 BY MR. KESACK:

15 Q. And the description in the patent would
16 lead you to believe that under normal operating
17 conditions, the sand's going to settle, right?

18 MR. HALL: Objection; form.

19 A. That the patent owner expects the sand
20 to settle, yes.

21 BY MR. KESACK:

22 Q. And in that situation where you have
23 sand coming in in hour 1, sand coming in in hour 5
24 and sand coming in in hour 10, is that sand
25 accumulating over time?

1 A. Yes.

2 Q. If you made Hemstock a 70-foot vessel,
3 would that increase its slug capacity?

4 MR. HALL: Its flow capacity?

5 MR. KESACK: Slug capacity.

6 MR. HALL: Objection; form.

7 A. With the same -- the same weir, yes, it
8 would.

9 BY MR. KESACK:

10 Q. Okay. Go to page 57 of your new
11 declaration. Actually, don't do that yet. My
12 question is, would a person of ordinary skill in the
13 art be motivated to do that, 70-foot vessel?

14 A. I don't know why. We're always limited
15 in space and what we can fit on locations, so I
16 don't know what parameters you're looking at that
17 would lead somebody to say this needs to be a
18 70-foot vessel, not a 69-foot vessel or 71-foot
19 vessel.

20 I know that I have looked to
21 manufacturers of equipment to say, would longer be
22 better.

23 Q. Not longer, though, right? Diameter,
24 70-foot diameter.

25 A. A 70-foot-diameter vessel.

1 Q. Yeah. That would increase the slug
2 capacity, right?

3 A. It would increase slug capacity.

4 Q. You said it would or wouldn't?

5 A. It would.

6 Q. It would.

7 Would a person of ordinary skill in
8 the art be motivated to do that to Hemstock?

9 A. Not in my experience. There's no space
10 to put it.

11 Q. Okay. Now go to paragraph 300 of your
12 declaration.

13 A. Paragraph 300, did you say?

14 Q. Uh-huh. It's on page 57.

15 A. The paper is slick. Okay.

16 Q. Here you say: There is simply no
17 question that a person of ordinary skill in the art
18 would have been motivated to modify Hemstock's
19 design in any way possible to improve its ability to
20 handle such flow.

21 Do you see that?

22 A. Uh-huh.

23 Q. You just testified that you wouldn't
24 make a 70-foot-diameter vessel, right? That's a
25 possible way.

1 A. As the diameter of the vessel gets
2 bigger, the amount of pressure it can handle gets
3 smaller. If I take it to the ludicrous 70 feet that
4 you're talking about, then making it strong enough
5 to handle expected early well flowing pressures
6 would not be something that would be economically
7 reasonable.

8 Q. But possible, right?

9 A. Possible.

10 Q. And you say "any way possible" in your
11 declaration. Why do you say any way possible? Did
12 you write --

13 A. It was a bad choice of words.

14 Q. Did you choose those words?

15 A. I don't recall.

16 Q. You don't agree with them now, are you?

17 A. In light of your 70-foot vessel
18 diameter, I would say in any way reasonable. But --

19 Q. And how would you determine what's
20 reasonable and what's not?

21 A. It's almost always a cost-benefit
22 analysis. If I go to a 36-inch vessel, I have a
23 cost; is the benefit worth the cost? I go to a
24 70-foot diameter vessel, it has a cost, and no
25 benefit could be worth that cost.

1 Q. What is the cost-benefit analysis of
2 improving slug capacity in a desander like Hemstock?
3 What's the cost breaking point for which you would
4 no longer consider it reasonable?

5 A. That would depend on the well
6 conditions. I can't give you a number -- a
7 hypothetical number because if I have a well that is
8 slugging oil, then my concern about slug might be
9 lower than if I have a well that's slugging a
10 mixture that's mostly water.

11 So the concerns -- the issues that I
12 face at a particular well set the parameters for
13 that cost-benefit analysis.

14 Q. So when you gave your opinion that you
15 would want to increase slug flow capacity in
16 Hemstock, what kind of slugs are you talking about?

17 A. I was talking about mostly water slugs.

18 Q. Why did you pick water slugs?

19 A. They have the least economic value with
20 about the same potential to do harm.

21 Q. And your opinion is that Hemstock
22 describes water slugs?

23 A. Hemstock's talking about what comes out
24 of the well.

25 Q. And after reading Hemstock like you did

1 this morning, you're unable to identify what kind of
2 slugs Hemstock would be talking about?

3 A. I am.

4 Q. Is that right?

5 A. Yes, that is right.

6 Q. Okay. But you chose water because it
7 was the least cost-effective slugging?

8 MR. HALL: Objection; form.

9 A. Yes.

10 BY MR. KESACK:

11 Q. Can you go to page 60 of 61?

12 A. Okay.

13 Q. The last sentence in paragraph 306
14 states that: A person of ordinary skill in the art
15 would have understood that Hemstock and the Data
16 Book's harp-style slug catchers operated in exactly
17 the same manner.

18 Do you see that?

19 A. Yes, I do.

20 Q. Do you agree with that statement?

21 A. I do.

22 Q. Do you remember testifying earlier that
23 the freeboard portion of Hemstock is created by a
24 weir while the freeboard portion in the slug catcher
25 is created by inclining the pipe?

1 A. Yes.

2 Q. It's not exactly the same manner, is it?

3 A. They both use a freeboard.

4 Q. That's not --

5 MR. KESACK: Move -- objection; move
6 to strike, nonresponsive.

7 BY MR. KESACK:

8 Q. That's not operating in exactly the same
9 manner, is it?

10 MR. HALL: Objection to form.

11 A. Yes, it is.

12 BY MR. KESACK:

13 Q. One is creating freeboard through a
14 weir, one is creating freeboard through inclination,
15 and to you, that's operating in exactly the same
16 way?

17 A. In terms of the ability to handle a
18 slug, I don't care how the freeboard was created. I
19 want a freeboard.

20 Q. So this sentence is limited to slugs or
21 is it saying that the Hemstock and the Data Book
22 harp-style slug catchers operate in exactly the same
23 manner?

24 A. It's relative to slugs.

25 Q. So it's only slugs here.

1 A. It is.

2 Q. So you think that Hemstock, without
3 inclination, handles slugs the exact same way that
4 the Data Book's harp-style slug catcher operates?

5 MR. HALL: Objection; form.

6 A. It handles it in exactly the same
7 technique.

8 BY MR. KESACK:

9 Q. Than non-inclined Hemstock?

10 MR. HALL: Objection; form.

11 A. It provides freeboard for the arrival of
12 slugs.

13 BY MR. KESACK:

14 Q. In exactly the same manner, right?

15 MR. HALL: Objection to form.

16 A. It provides freeboard. That's all that
17 matters to slugs. How I created that freeboard does
18 not matter to the slug.

19 BY MR. KESACK:

20 Q. So in your opinion, is the velocity of
21 the fluid leaving Hemstock slower than the velocity
22 of the fluid entering the Hemstock during a slug
23 event?

24 MR. HALL: Objection; form.

25 A. During a slug event, they would be the

1 same.

2 Q. How about not during a slug event?

3 MR. HALL: Objection; form.

4 A. The velocity of the inlet fluid,
5 typically in a multiphase flow, we talk about
6 superficial velocity or the velocity that a
7 particular species of fluid would exhibit if it were
8 the only thing in the pipe. Because velocity,
9 putting a number on velocity of a multiphase flow
10 stream has eluded our capabilities. We don't -- we
11 are not able to do that.

12 So we define it in terms of
13 superficial velocity, which says that the gas
14 portion of the fluid entering Hemstock's vessel in
15 the same size pipe would have the same velocity as
16 the gas in the same size pipe exiting.

17 BY MR. KESACK:

18 Q. Do you remember earlier when you
19 testified that the slug catcher in the Data Book
20 handles slugs by slowing down the velocity of the
21 liquid?

22 MR. HALL: Objection; form.

23 A. Two different questions. The fluids in
24 the conduit coming up to the slug catcher have a
25 velocity. When they drop into the slug catcher, the

1 diameter is bigger, the flow space is bigger, so
2 consequently, for the same mass flow rate, velocity
3 will be lower. That's how it slows it down.

4 BY MR. KESACK:

5 Q. So in your opinion, the figure in the
6 Data Book teaches that there's a bigger
7 cross-sectional area in the pipe than in the inlet?

8 MR. HALL: Objection; form.

9 A. In the slug catcher than in the inlet,
10 yes.

11 BY MR. KESACK:

12 Q. Where does it say that at?

13 A. There's one pipe coming in to five
14 pipes. So even if the slug catcher were the same
15 size as the inlet pipe, it would be five times
16 bigger.

17 Q. So you're relying on the multiple pipes.

18 MR. HALL: Objection; form.

19 A. I'm relying on design of the slug
20 catcher, of harp-style slug catchers, which in my
21 experience have a larger diameter plus multiple
22 pipes.

23 BY MR. KESACK:

24 Q. Which is exactly the same as Hemstock,
25 right?

1 MR. HALL: Objection; form.

2 A. I don't understand.

3 BY MR. KESACK:

4 Q. I'm asking you if it's exactly the same.

5 Is that how Hemstock creates a larger

6 cross-sectional area?

7 MR. HALL: Objection; form.

8 A. They create a larger cross-sectional

9 area by going from a smaller pipe into a bigger

10 vessel.

11 BY MR. KESACK:

12 Q. Not five pipes, right?

13 A. Not five pipes.

14 Q. So not exactly the same.

15 A. I've designed many slug catchers with

16 one pipe.

17 Q. The slug catcher in the Data Book is not

18 one pipe, right?

19 A. Right.

20 Q. And in this paragraph you say the

21 harp-style slug catcher in the Data Book operates in

22 exactly the same manner as Hemstock, right?

23 A. Yes.

24 Q. But the harp-style slug catcher in the

25 Data Book creates a larger cross-sectional area by

1 having five pipes, and Hemstock doesn't, right?

2 MR. HALL: Objection; form,
3 misstates prior testimony.

4 MR. KESACK: I'm not asking about
5 prior testimony. I am asking about what's
6 written in here.

7 MR. HALL: You just assumed what he
8 said in your question.

9 MR. KESACK: What did I assume?

10 MR. HALL: Read the question back.

11 (The reporter read back the following
12 portion of the preceding record.)

13 "QUESTION: And in this paragraph you
14 say the harp-style slug catcher in the Data
15 Book operates in exactly the same manner as
16 Hemstock, right?

17 "ANSWER: Yes.

18 "QUESTION: But the harp-style slug
19 catcher in the Data Book creates a larger
20 cross-sectional area by having five pipes,
21 and Hemstock doesn't, right?"

22 (End of readback.)

23 MR. HALL: And that was his prior
24 testimony that you were referring to.
25 That's not what he testified to.

1 BY MR. KESACK:

2 Q. You can answer the question. Was that
3 the exact same way?

4 MR. HALL: Objection; form.

5 A. Two different things. You're talking
6 about the construction of a vessel versus the fluid
7 mechanics. When you talk about -- when I'm talking
8 about it's the exact same manner, I'm talking about
9 the fluid mechanics.

10 So the fluid mechanics say if I have
11 a void space, the slug will fill the void space.
12 Whether that void space is five pipes or one pipe,
13 whether that void space is created by a weir or by
14 an incline, I have created void space.

15 The slug fills the void space.

16 BY MR. KESACK:

17 Q. So let me make sure we're clear, then.
18 When you say exactly the same manner, you're not
19 only talking about slug flow but you're talking
20 about the extra volume in which slugs can occupy is
21 the same in both.

22 MR. HALL: Objection; form.

23 A. No, I'm not. I'm saying that the fact
24 of the volume -- the void volume is the same fact,
25 the same fluid mechanics, regardless of size. I

1 will fill the void volume.

2 If I have a larger void volume, I
3 can handle a bigger slug. But what this is saying
4 is that what both the Data Book slug catcher and
5 Hemstock do is provide a void volume.

6 BY MR. KESACK:

7 Q. And by void volume, you mean freeboard.

8 A. Yes.

9 Q. So when you say it operates in exactly
10 the same manner, you're saying they both have a
11 freeboard for a slug to go into.

12 MR. HALL: Objection; form.

13 A. Yes.

14 BY MR. KESACK:

15 Q. Nothing else?

16 MR. HALL: Objection; form.

17 A. That's what I mean.

18 BY MR. KESACK:

19 Q. That's what you mean, okay.

20 Can you go to page 1 of your
21 declaration? The last sentence of the second
22 paragraph of your introduction --

23 A. Page 1 is the title page.

24 Q. Roman I, not little (i).

25 A. So you're talking about page 5?

1 Q. Oh, I don't know -- sorry, I don't have
2 the page numbers on it. It's the one with your
3 introduction. Let me switch to this. So it would
4 be, yes, page -- I'm looking at the wrong thing, I'm
5 sorry. Strike that question.

6 All right. Go to page 7 of your
7 declaration.

8 A. Of the rebuttal or the original?

9 Q. The rebuttal, please. Paragraph 211.

10 MR. HALL: 20 -- paragraph 209?

11 MR. KESACK: 211.

12 MR. HALL: 211.

13 A. Okay.

14 BY MR. KESACK:

15 Q. You see where it says: Claim 10 teaches
16 that the gas/liquid interface can begin from about
17 the fluid outlet?

18 A. Yes.

19 Q. What does that mean?

20 A. It means that the gas-liquid interface
21 is going to be somewhere around the fluid outlet.

22 Q. How close?

23 MR. HALL: Objection; form.

24 A. No way of telling.

25 BY MR. KESACK:

1 Q. So in your opinion, you have no way to
2 know if claim 10 is met or not?

3 MR. HALL: Objection; form.

4 A. I have no way.

5 BY MR. KESACK:

6 Q. So under your interpretation of
7 claim 10, we have no way of knowing whether prior
8 art meets that limitation or not?

9 MR. HALL: Objection; form.

10 A. Correct.

11 BY MR. KESACK:

12 Q. But in your opinion, the prior art
13 doesn't meet this limitation, right?

14 A. When we're talking about -- mushy terms,
15 "about the fluid outlet," "near the fluid outlet,"
16 "narrow," "wide," it teaches nothing. Okay? So to
17 say that "about the fluid outlet" has a physical
18 meaning is just interpretation.

19 So I could say I mean that -- I
20 think that means an inch, a foot, a mile. There's
21 no way in this language to know what he means by
22 "about."

23 Q. Does the Data Book meet this claim
24 limitation?

25 MR. HALL: Objection; form.

1 A. Yes. As much as any of it meets the
2 limitation, the Data Book meets the limitation.

3 BY MR. KESACK:

4 Q. How do you know?

5 A. How do I know about any of it? I know
6 that a fluid level somewhere around the fluid outlet
7 is a possible operational chara- -- or operational
8 event for either the Data Book or for the '256 or
9 Hemstock.

10 Q. Hemstock Figure 3, does that meet "about
11 at the fluid outlet"?

12 A. Sure.

13 Q. So you think that Hemstock Figure 3
14 shows that the interface begins at about the fluid
15 outlet?

16 MR. HALL: Objection; form.

17 A. Yes.

18 BY MR. KESACK:

19 Q. Even though it's on the side of the
20 vessel and not on the -- right? That's where the
21 gas/liquid interface begins, right, on the side of
22 the vessel?

23 A. What?

24 Q. Figure 3 of Hemstock, where does the
25 gas/liquid interface begin?

1 A. What do you mean by "begin"?

2 Q. It's your words.

3 All right. You say: Claim 10
4 teaches that the gas/liquid interface can begin from
5 about the fluid outlet, right?

6 A. Okay.

7 Q. Where does the gas/liquid interface
8 begin in Figure 3 of Hemstock?

9 A. At about the fluid outlet.

10 Q. Where? Describe where it begins, in
11 your own words.

12 A. By "begins," I mean what is the
13 elevation, not longitudinally.

14 Q. So you think "begins" -- you think
15 "extending horizontally from about the fluid outlet"
16 means vertically?

17 A. Yes. Yes.

18 Q. So how do you extend from a point in the
19 middle of the vessel? You think it extends in both
20 ways, is what it's talking about here?

21 A. Yes.

22 Q. What is the gas/liquid interface?

23 A. It is the point where the fluids above
24 it conform to the shape of the container, and below
25 it exhibit a surface.

1 Q. So, then, in your understanding, the
2 interface is defined by a vertical position and it
3 also begins at a vertical position. Is that right?

4 MR. HALL: Objection; form.

5 BY MR. KESACK:

6 Q. Let me hand you the '256 patent.

7 A. Okay.

8 Q. And I want you to point me to anywhere
9 in this patent that supports your contention that
10 "begins" means in a vertical direction.

11 MR. HALL: Objection to form.

12 A. So you want me to read the patent?

13 BY MR. KESACK:

14 Q. You also don't have anything in your
15 declaration supporting that, right?

16 MR. HALL: Objection; form.

17 A. I'm just -- I'm absolutely flabbergasted
18 by the concept that you are treating "begins" as a
19 linear position down the vessel. I can't get my
20 head around that. It's meaningless.

21 MR. HALL: So can we have a
22 conference outside?

23 MR. KESACK: Sure.

24 MR. HALL: Clear something up.

25 (Recess, 1:46 p.m. to 1:47 p.m.)

1 (The reporter read back the following
2 portion of the preceding record.)

3 "QUESTION: You also don't have
4 anything in your declaration supporting
5 that, right?"

6 Objection to form.

7 "ANSWER: I'm just -- I'm absolutely
8 flabbergasted by the concept that you are
9 treating 'begins' as a linear position down
10 the vessel. I can't get my head around
11 that. It's meaningless."

12 (End of readback.)

13 BY MR. KESACK:

14 Q. So you were looking for support in the
15 patent, right?

16 MR. HALL: Objection; form.

17 A. Yeah, I couldn't -- I didn't take the
18 time to read the entire patent.

19 BY MR. KESACK:

20 Q. So paragraphs 211 through 214 are your
21 evidence of the construction of the interface
22 limitations using the evidence of the claims,
23 correct?

24 A. Yes.

25 Q. And you cite only claims 9 and 10,

1 right?

2 A. Yes.

3 Q. Is it your opinion that claim 1 and
4 claim 9 has the same scope?

5 MR. HALL: Objection; form.

6 A. I have not memorized claim 9.

7 BY MR. KESACK:

8 Q. Please read them and let me know if, in
9 your opinion, claim 1 and claim 9 have the same
10 scope.

11 MR. HALL: Objection to scope.

12 Did you get that, scope?

13 THE REPORTER: Yes, sir.

14 (Document review by witness.)

15 A. Could you repeat the question, please?

16 (The reporter read back the following
17 portion of the preceding record.)

18 "QUESTION: Is it your opinion that
19 claim 1 and claim 9 have the same scope?"

20 Objection to form.

21 "ANSWER: I have not memorized
22 claim 9.

23 "QUESTION: Please read them and let
24 me know if, in your opinion, claim 1 and
25 claim 9 have the same scope."

1 Objection to scope.

2 (End of readback.)

3 A. Claim 1 is discussing the configuration
4 of the vessel. Claim 9 is discussing a method.
5 They seem to cover about the same scope from
6 different angles.

7 BY MR. KESACK:

8 Q. You see on the top of page 6 where the
9 interface limitations are?

10 MR. HALL: Objection; form.

11 Page 6 of?

12 A. What page numbers are we using now?

13 BY MR. KESACK:

14 Q. The dark ones, 6 of 61. Your
15 declaration, sorry. You see on page 6 of your
16 declaration where the interface limitations are?

17 A. Okay.

18 Q. Is it your opinion that these
19 limitations mean the same thing?

20 A. Again, there, claim 1 is talking about a
21 device -- they are the same.

22 Q. So where claim 1 says "at the fluid
23 outlet" is the same as "establishing a liquid
24 interface in a belly portion of the vessel, the
25 belly being formed below the fluid outlet" --

1 A. Yes.

2 Q. -- and "a freeboard above the fluid
3 outlet"?

4 A. Yes.

5 Q. Means the same thing.

6 And in this section of your
7 declaration, you were doing claim construction,
8 right?

9 A. Yes.

10 Q. Is it your opinion that a claim
11 limitation needs to cover every figure in the
12 patent?

13 A. No. I don't believe that, no.

14 Q. But it's your opinion that it's a
15 mistake not to consider Figure 7 in the construction
16 of the interface limitations. Is that right?

17 A. I believe Figure 7 should be considered,
18 yes.

19 Q. Why?

20 A. Because it's the only figure that
21 actually shows a way to get sand out of the vessel.

22 Q. What does that mean? You think that the
23 remaining figures of the patent aren't showing sand
24 being removed from the vessel?

25 A. No, they are not. Unless you consider

1 using a welding torch being a reasonable way to get
2 sand out of the vessel.

3 Q. So in your opinion, Figure 2 doesn't
4 show sand being removed from the vessel. Is that
5 right?

6 A. There's a weld cap on the end of the
7 pipe, on the end of the vessel.

8 Q. So you're talking about removing sand.

9 A. Yes.

10 Q. Not --

11 A. Batch removal of sand.

12 Q. Batch removal of sand.

13 You're talking about taking sand out
14 of the vessel itself rather than out of the fluid
15 stream.

16 A. Yes.

17 Q. So your opinion about why we should
18 include Figure 7 in the interpretation of the
19 interface limitations is because Figure 7 shows how
20 to remove sand from the vessel in a batch process.
21 Is that correct?

22 MR. HALL: Objection; form.

23 A. Figure 7 is the only drawing in this
24 drawing package that represents a vessel which can
25 accomplish the goals of the patent.

1 BY MR. KESACK:

2 Q. Okay. And specifically, that goal is
3 removing sand from the vessel itself?

4 MR. HALL: Objection, form.

5 A. It's removing sand from the process.

6 BY MR. KESACK:

7 Q. What do you mean by "process"?

8 A. As when the vessel is in service, sand
9 settles out of the fluids. When the operator
10 determines he's removed as much sand as he feels
11 safe removing and holding in the vessel, then he
12 shuts the vessel down, shuts the well in, opens the
13 closure and shovels the sand out.

14 Q. In your opinion, does that have any
15 relation to the interface limitations?

16 MR. HALL: Objection; form.

17 A. Does a vessel that has a chance to work
18 versus one that has no chance to work impact this
19 discussion? I think it does. Because the vessel --
20 the patent in total is about making solids not
21 impact downstream piping. The only vessel that can
22 accomplish that is drawing 7.

23 BY MR. KESACK:

24 Q. If we're trying to figure out what the
25 patent means by the interface limitations --

1 A. Okay.

2 Q. -- is it your opinion that you can't
3 rely on Figure 2 or Figure 3A or 3B?

4 A. No. In terms of the -- the narrow scope
5 of that investigation, Figure 2 -- the earlier
6 figures do show that interface. I think there's an
7 awful lot of engineering by wishful thinking in the
8 way that those drawings are drawn, but that's what
9 the inventor chose to do.

10 Q. In fact, Figure 3A and B are the only
11 ones which are described as showing the belly
12 portion and the freeboard portions of the desander,
13 right?

14 MR. HALL: Objection to form.

15 A. Yes.

16 MR. HALL: Objection to form. And
17 David, again, wait for my objection.

18 THE WITNESS: I'm sorry.

19 BY MR. KESACK:

20 Q. Does the patent's description of
21 Figure 7 have anything to do with the gas/liquid
22 interface?

23 MR. HALL: Objection to form.

24 (Document review by witness.)

25 A. It doesn't mention the -- specifically

1 the fluid interface in the description of Figure 7.

2 BY MR. KESACK:

3 Q. It does in Figures 2 and 4, right?

4 A. It does.

5 Q. But in your opinion, we shouldn't
6 consider Figures 2 and 4; we should consider
7 Figure 7 when deciding what the interface
8 limitations means, right?

9 MR. HALL: Objection; form.

10 A. I will always prefer to consider a
11 drawing that has potential to perform its function
12 than one that won't.

13 BY MR. KESACK:

14 Q. So that's how you interpret a patent is
15 you value the figures which show the full model of
16 the device being shown rather than portions of it
17 which won't work. Is that right?

18 A. Not necessarily. What I consider is the
19 drawing -- is does the portion of the drawing shown
20 represent a device that meets the functions of the
21 patent.

22 So when I look at Hemstock
23 Figure 4a, b and c, I see a portion of the vessel
24 that describes a function that's important. When I
25 look at Figure 2a, I see a portion of the vessel

1 that performs the function. I don't have to think
2 about what's outside of the drawing.

3 When I look at Figure 1b, I see a
4 vessel that, in the prior art, could not perform the
5 function of sand removal. When I look at '256,
6 Figures -- Figure 1 can perform the function.
7 Figures 2 and 3 can't.

8 So that, in my estimation, when I
9 look at what's purported to be an entire vessel and
10 it doesn't have the cleanout that is required by the
11 description of the purpose of the patent, then it's
12 difficult for me as an engineer to take that drawing
13 seriously.

14 Q. So although, as you concede, the only
15 explicit mention of where the belly and liquid
16 portions are supposed to be is in Figure 3A and 3B?

17 A. Yes.

18 Q. Because it's not an entire vessel, we
19 shouldn't consider that one for claim construction.

20 MR. HALL: Objection; form.

21 BY MR. KESACK:

22 Q. Is that right?

23 MR. HALL: Objection; form.

24 A. I don't know what you mean by "it's not
25 an entire vessel." They have an inlet, they have an

1 outlet.

2 BY MR. KESACK:

3 Q. Because it won't perform the required
4 functions, as you state, then we shouldn't consider
5 it for the construction of the interface
6 limitations. Is that your testimony?

7 MR. HALL: Objection; form.

8 A. Yes.

9 MR. KESACK: Let's take a break.

10 (Recess, 2:05 p.m. to 2:11 p.m.)

11 BY MR. KESACK:

12 Q. All right. Please turn to page 10 of
13 your declaration, specifically paragraph 217.

14 A. Okay.

15 Q. The second sentence after the first
16 comma says: A person of ordinary skill in the art
17 would not understand either vessel to function for
18 any extended length of time in steady-state mode.

19 Do you see that?

20 A. Yes.

21 Q. What is that sentence based on?

22 A. Say again?

23 Q. What's the basis for that statement?

24 A. The experience of multiphase flow.

25 Q. So not based on the description in the

1 patent but based on your own experience?

2 A. Yes.

3 Q. Does the patent teach that steady state
4 operation won't function for any extended length of
5 time?

6 A. I think I saw that in there.

7 MR. HALL: When you say "the
8 patent," you're talking about the '256?

9 MR. KESACK: Yes.

10 (Document review by witness.)

11 A. I saw it but it's not jumping out at me.

12 He talks about steady state at the
13 bottom of page 8. It says: At a steady state, the
14 maximum level of the interface 32 is controlled at
15 the distal end 33, set by eventual liquid
16 entrainment and discharge at the fluid outlet. Gas
17 G discharges at the fluid outlet. At steady state,
18 when the liquid level reaches the fluid outlet.

19 So he's talking about even at a
20 steady state, the liquid level changes: Reaches the
21 fluid outlet, any oil or other liquids are
22 reentrained with the gas exiting the fluid outlet.

23 So even when he's talking about a
24 steady state, he's talking about a fluid level
25 changing.

1 Q. So in your opinion, that supports your
2 statement that a person of ordinary skill in the art
3 would not understand either vessel to function for
4 any extended length of time in steady state mode?

5 A. Yes.

6 Q. The description of steady state mode
7 which you read --

8 A. Right.

9 Q. -- supports that the vessel won't
10 operate in steady state mode for an extended period
11 of time?

12 A. Yes.

13 MR. HALL: Objection; asked and
14 answered.

15 BY MR. KESACK:

16 Q. Which figure is that describing? Should
17 we consider Figure 2 when performing claim
18 construction analysis on the interface limitation?

19 A. Yes.

20 Q. Should we consider Figure 3A and 3B?
21 Did you answer Figure 2 without looking at it?

22 A. I had a picture in my mind what Figure 2
23 was.

24 Q. Look at Figure 2 again and let me know
25 if you think we should consider that figure when

1 determining the meaning of the interface
2 limitations.

3 A. Yes.

4 Q. Even though it doesn't describe a
5 functioning vessel, right?

6 A. Yes.

7 Q. How about Figure 3?

8 A. The same.

9 Q. So what were you telling me before about
10 how Figures 2 and 3 don't depict a functioning
11 vessel and therefore aren't relevant to the
12 limitation?

13 MR. HALL: Objection; form.

14 A. You're taking my words a little far
15 there. I give more weight to a drawing of a vessel
16 or a device that can perform its function. If
17 Figure 2 and 3 did not include a weld cap at the
18 end, they would have more validity in my mind and I
19 could take them more seriously.

20 Just like the description of the
21 sand pile in Figure 2, I consider that to be
22 engineering by wishful thinking. There is no fluid
23 mechanics or solid mechanics reason that that sand
24 would pile up in that way.

25 BY MR. KESACK:

1 Q. So in your opinion, although the
2 patentee says his invention operates as shown in
3 Figure 2, we shouldn't believe him?

4 MR. HALL: Objection; form.

5 BY MR. KESACK:

6 Q. Is that fair?

7 MR. HALL: Objection; form.

8 A. I don't believe him, but if -- that's a
9 choice I make as a person knowledgeable in fluid
10 mechanics.

11 BY MR. KESACK:

12 Q. The Patent Office is trying to
13 understand the meaning of the claims.

14 A. Right.

15 Q. Should they consider Figure 2 to be
16 accurate?

17 MR. HALL: Objection; form.

18 Objection; scope.

19 A. I look at Figure 2 and I understand that
20 he's trying to demonstrate a way the vessel does
21 function, may function. I'm not sure what he's
22 trying to say here.

23 But in the way that the sand has
24 accumulated and the fact that you can't remove the
25 sand from the vessel makes me consider it suspect.

1 BY MR. KESACK:

2 Q. So the Patent Office should not believe
3 that sand would settle in that manner in your
4 opinion, right?

5 A. I would -- if the Patent Office asked me
6 that question, I would say you should not believe
7 it.

8 Q. And the basis for that opinion is your
9 own experience, right?

10 A. Yes.

11 Q. It's not based on any other documents
12 you looked at.

13 A. No.

14 Q. Can you go to your original declaration?
15 On page 3 -- not page 3, page 8.

16 A. Okay.

17 Q. Do you see paragraph 12?

18 A. Paragraph what?

19 Q. 12.

20 A. No.

21 Q. On page 8 of your original declaration?

22 A. Oh, page 8. Yeah. Okay. I was on the
23 wrong page 8. Page 8 of 90, okay.

24 Do I see what?

25 Q. Paragraph 12.

1 A. Yes.

2 Q. What is your understanding that you
3 state in paragraph 12 based on?

4 A. Instructions from my lawyer.

5 Q. Did you -- when you wrote your rebuttal
6 declaration, did you interpret it to give the claim
7 its broadest reasonable construction in light of the
8 specification?

9 MR. HALL: Objection; form.

10 A. I tried to.

11 BY MR. KESACK:

12 Q. If you were to incline Hemstock based on
13 the teaching of the Data Book, would that increase
14 or decrease the capacity to collect sand, and how
15 so?

16 MR. HALL: Objection; form.

17 A. I believe it would increase it.

18 BY MR. KESACK:

19 Q. Let's go to the page 43 of your
20 declaration.

21 A. Of the original declaration?

22 Q. Yes, please. Right above paragraph 95
23 you have your figure of inclined Hemstock.

24 MR. HALL: Page 43 of 90?

25 MR. KESACK: Yes.

1 A. Okay.

2 BY MR. KESACK:

3 Q. If you were to incline Hemstock based on
4 the teaching of the Data Book, would it look like
5 your figure here?

6 A. Yes.

7 Q. Now, is there more or less area to
8 collect sand in your inclined vessel as compared to
9 the not-inclined Hemstock vessel?

10 MR. HALL: Objection; form.

11 A. There's more.

12 BY MR. KESACK:

13 Q. What is the area that collects sand in
14 the not-inclined vessel?

15 A. Say again?

16 Q. What is the area in which to collect
17 sand in the non-inclined Hemstock vessel?

18 A. It's the area below the freeboard.

19 Q. Which extends from the left-hand side
20 all the way to the right-hand side and fills about
21 two-thirds of the vessel. Is that correct?

22 A. Yes.

23 Q. And in your picture, the gas/liquid
24 interface starts less than halfway and extends to
25 the outlet. Is that right?

1 A. Yes.

2 Q. And so you think that triangle has more
3 area than the original belly portion?

4 MR. HALL: Objection; form.

5 A. Again, there's no dimensions on this
6 document, on this drawing. But my statement that
7 there's more is based on the ability to fill the
8 vessel up against the quick closure with solids
9 instead of with liquids.

10 BY MR. KESACK:

11 Q. Okay. Let me ask you a slightly
12 different question. You see all the sand that's to
13 the right of your gas/liquid interface for an
14 inclined vessel?

15 A. I do.

16 Q. You think all that sand is going to fit
17 to the left of that line?

18 MR. HALL: Objection; form.

19 A. I have no way of knowing.

20 BY MR. KESACK:

21 Q. You can't look at that picture and
22 eyeball it?

23 A. No.

24 Q. No?

25 A. No.

1 Q. Why not?

2 A. Because it's -- I don't have scales. I
3 don't know if this is a 6-inch-diameter vessel or a
4 36-inch diameter vessel.

5 Q. Why does that matter?

6 A. Because the amount of space between the
7 horizontal freeboard and the top of the vessel,
8 which is now available to hold sand in the inclined
9 vessel, could be huge, or not. I don't know what it
10 is.

11 Q. This is your only picture of the
12 inclined vessel, right?

13 MR. HALL: Objection; form.

14 A. I don't -- I didn't catch the words.

15 BY MR. KESACK:

16 Q. I said, this is your only figure of the
17 inclined Hemstock vessel, correct?

18 A. Yes.

19 Q. In either declaration.

20 A. Yes.

21 Q. So this is all we have to rely on to
22 understand what you mean by the inclined vessel,
23 right?

24 A. Yes.

25 MR. HALL: Objection; form.

1 BY MR. KESACK:

2 Q. So, then, based on your figure, which is
3 your only example, has the sand capacity increased
4 or decreased? Based on your figure, your scale,
5 everything that you wrote here --

6 MR. HALL: Objection; form.

7 BY MR. KESACK:

8 Q. -- has the sand capacity increased or
9 decreased?

10 MR. HALL: Again, objection.

11 A. I don't know.

12 BY MR. KESACK:

13 Q. You don't know.

14 You see the liquid portion to the
15 left of your interface for inclined vessel?

16 A. Yes.

17 Q. Is that amount of liquid more or less
18 than the amount of sand to the right of the
19 interface or inclined vessel?

20 MR. HALL: Objection; form.

21 A. The drawing is not to scale.

22 BY MR. KESACK:

23 Q. How do you know that?

24 A. There's no scale indicated.

25 Q. So then how do you know that there's

1 more capacity?

2 A. The drawing is not to scale. I can put
3 my own scale on it.

4 Q. So you're inventing a scale to answer
5 this question?

6 A. I don't know how else to answer it. I
7 don't know.

8 Q. Is your answer "I don't know if there's
9 more capacity" or is your answer "There's more
10 capacity"?

11 A. My answer is: I don't know.

12 Q. If the figure were to scale, could you
13 figure it out?

14 A. Yes.

15 MR. HALL: Objection; form.

16 BY MR. KESACK:

17 Q. Let's assume as a hypothetical that the
18 figure is to scale.

19 MR. HALL: Objection; form.

20 Objection; scope.

21 BY MR. KESACK:

22 Q. Would the sand capacity have increased
23 or decreased based on your drawing?

24 MR. HALL: Same objection.

25 A. If everything here is to scale, then the

1 sand capacity -- I can't -- I can't picture it,
2 because if I take the mound of sand that's above
3 where I've marked as gas/liquid interface, does it
4 fit in the area that is liquid and the area that is
5 gas after the outlet, and I -- I can't do that
6 spatial estimation. I'd have to measure it.

7 BY MR. KESACK:

8 Q. The sand could also settle on the liquid
9 all the way by the inlet, right?

10 A. Say again.

11 MR. HALL: Objection.

12 BY MR. KESACK:

13 Q. The sand could settle in the liquid all
14 the way over by the inlet in this figure, right?

15 A. It could.

16 Q. If you consider the sand plus that
17 liquid, is that greater or less than the area to the
18 left of your gas/liquid interface?

19 A. The area is greater to the right and
20 above.

21 Q. So there's less area, potential area,
22 for sand to settle?

23 A. If this drawing were to scale, yes.

24 Q. If a person of ordinary skill in the art
25 were looking to improve the Hemstock desander, do

1 you think they would be more concerned with the area
2 available for settling or the area available for
3 slug flow?

4 MR. HALL: Objection; form and
5 scope.

6 A. Depends on the well. It depends --
7 everything you're asking is very, very situational.
8 It's I've got a well with a problem. What parameter
9 is most important to addressing that problem is
10 specific to that particular well. There is not a
11 general answer to any of the questions that you're
12 asking.

13 BY MR. KESACK:

14 Q. Okay. So when you gave the opinion that
15 a person of ordinary skill in the art would be
16 motivated to incline Hemstock to increase the
17 freeboard portion to better handle slug flow, what
18 kind of well were you considering?

19 A. I was considering wells that I've had
20 experience with, wells that have made solids -- not
21 sand as much as coal, but solids -- and think about
22 how much -- how much they make over a period of time
23 I'd be willing to let them run without opening them
24 up to take the solids out. I was thinking wells in
25 my experience.

1 Q. Did you consider a particular flow rate?

2 A. Yeah, the flow rate specific to the
3 wells in my experience, yeah.

4 Q. What was that flow rate?

5 A. 100 barrels of water a day, 10 million
6 cubic feet of gas.

7 Q. You didn't include those in your
8 declaration, right?

9 A. I didn't put any of that in my
10 declaration.

11 Q. Why not?

12 A. Didn't seem relevant. It never occurred
13 to me to put it in the declaration.

14 Q. Can you go to column 6, lines 57 to 65?

15 A. Of what?

16 Q. Of the '256 patent. Column 6, 57 to 65.

17 A. Okay.

18 Q. Does this give you parameters of the
19 well?

20 A. He quite honestly stated this is an
21 example. His statement here of 50 cubic meters a
22 day really has no meaning because when you use the
23 term m3, most people consider that to be actual flow
24 rate instead of flow rate at standard conditions.
25 Actual flow rate has no meaning without a reference

1 pressure and temperature.

2 Q. So you didn't consider a well with these
3 parameters when doing your analysis, correct?

4 A. I can't -- I can't make these parameters
5 mean anything.

6 Q. I'm sorry, what did you say your flow
7 rate was?

8 A. About 10 million standard cubic feet a
9 day.

10 Q. Okay. And that flow rate, how much sand
11 did you assume was coming into the vessel?

12 A. We're getting about 15 pounds a month.

13 Q. And were you considering that as a
14 continuous influx of sand or a periodic influx of
15 sand?

16 A. I was considering that the vessel would
17 hold about 25 pounds, so I wanted to batch-clean it
18 out once a month.

19 Q. Okay. And did you assume anything about
20 how often the sand was coming into the vessel?

21 A. No. It was coal, but no. It was --
22 we've observed it is this much a month and so we
23 need to make sure we have capacity for that.

24 Q. So just to be clear, when you were
25 considering whether or not you could apply the Data

1 Book to Hemstock, that was based on the parameters
2 of wells you've worked on in the past?

3 MR. HALL: Objection; form.

4 A. Yes.

5 BY MR. KESACK:

6 Q. And those were coal wells?

7 MR. HALL: Objection; form.

8 A. Yes.

9 BY MR. KESACK:

10 Q. In your opinion, would a person of
11 ordinary skill in the art have considered those same
12 wells?

13 A. No. They would have considered the
14 wells that they're working on.

15 Q. And so you think a person of ordinary
16 skill in the art couldn't understand Hemstock
17 without having a particular well in mind. Is that
18 right?

19 MR. HALL: Objection; form.

20 A. That is my experience. I would not look
21 to Hemstock if I did not have a problem with solids.
22 So if I don't have a problem, which says I have a
23 specific well that is causing the problem, then why
24 would I be looking at any of this stuff?

25 BY MR. KESACK:

1 Q. Okay. So we can't understand whether or
2 not the Data Book would improve Hemstock without
3 knowing well parameters? Is that fair?

4 MR. HALL: Objection to form.

5 A. I would not say it that way. What I
6 would say is I would not have looked to Hemstock
7 unless I had a problem which defines a set of
8 parameters associated with that problem, and I would
9 look at that and say can Hemstock solve this? Would
10 it work better in a different configuration?

11 But I'm not -- a person of ordinary
12 skill in the art is a person with a job and they're
13 not randomly searching for solutions to problems
14 they don't have. So any real-world person of
15 ordinary skill in the art has got a problem before
16 they start looking. And that problem has
17 boundaries, and they look at solutions in light of
18 those boundaries.

19 BY MR. KESACK:

20 Q. And is that what you did for your
21 obviousness opinions?

22 A. I applied wells in my experience to --
23 as though I was using these devices to solve those
24 problems.

25 Q. And so, for example, the reason you

1 believe Hemstock needs more slug capacity is because
2 the wells you were working on had larger slugs --

3 A. Yes.

4 Q. -- than would be able to be helped in
5 Hemstock?

6 MR. HALL: Objection; form.

7 A. Yes.

8 BY MR. KESACK:

9 Q. And the reason you would want to improve
10 the separation efficiency of sand in the liquid
11 portion is because the wells you were working on,
12 the outlet of the desanders, had sand coming in?

13 MR. HALL: Objection; form.

14 A. Actually, they're actual separators with
15 level control, but yes.

16 BY MR. KESACK:

17 Q. Okay. So it's not just reading Hemstock
18 and deciding there's problems. It's "I worked on a
19 well that Hemstock wouldn't work on, and I would
20 want to improve Hemstock to work on that well." Is
21 that fair?

22 MR. HALL: Objection; form.

23 A. Yes.

24 MR. KESACK: No further questions.

25 MR. HALL: We can go off the record.

(Recess, 2:40 p.m. to 2:46 p.m.)

EXAMINATION

BY MR. HALL:

Q. Mr. Simpson, do you recall the Davis reference?

A. Yes.

Q. What does Davis teach generally?

A. It generally teaches methods of understanding sedimentation and enhancing sedimentation.

Q. Does its general teaching apply to particles suspended in a liquid?

A. Yes.

Q. Does it matter in Davis where those particles were immediately before they were suspended in a liquid?

MR. KESACK: Objection; leading.

A. No.

BY MR. HALL:

Q. Let's take a look at your rebuttal declaration, paragraph 265. Just take a moment and read that, please.

A. I'll get to it.

Q. It's on page 39 of 61. Just let me know when you're done.

1 (Document review by witness.)

2 A. Okay.

3 BY MR. HALL:

4 Q. When patent owner's counsel was
5 questioning you, he asked you several questions
6 where he predicated it and assumed in the question
7 that Davis was limited to laminar flow.

8 Is it your understanding that Davis
9 is limited to laminar flow?

10 A. No.

11 Q. Is Davis Equation 4.1 limited to laminar
12 flow?

13 A. Yes.

14 Q. Did you intend to change your testimony
15 when you were answering his questions regarding
16 Davis?

17 A. I did not.

18 Q. You weren't intending to change your
19 testimony in paragraph 265, correct?

20 A. Yes. In that paragraph it talks about
21 enhanced sedimentation in inclined channels has been
22 demonstrated in other than laminar flow regimes.

23 Q. I believe you had testified when patent
24 owner's counsel was questioning you, basically he
25 asked you the question, "By applying Davis to

1 Hemstock, you were not preventing sand from reaching
2 the outlet," as a leading question. And I think you
3 answered yes.

4 Take a look at your original
5 declaration in paragraphs 167 and 168.

6 A. Okay.

7 Q. Do you still stand by those -- that
8 testimony?

9 MR. KESACK: Objection; form.

10 A. I do.

11 BY MR. HALL:

12 Q. Did you intend to change it when you
13 were answering Mister -- or patent owner's counsel's
14 questions?

15 MR. KESACK: Objection; form.

16 A. I did not.

17 BY MR. HALL:

18 Q. Let me take a look at your rebuttal
19 declaration, paragraph 247: So this is on page 31
20 of 61. Are you there?

21 A. Yeah.

22 Q. Okay. So about three-quarters of the
23 way down the page, on the left-hand side there's a
24 sentence that starts with "Particulates striking."

25 Do you see that?

1 A. Yes.

2 Q. It says: Particulates striking the
3 fluid outlet/flow barrier would most probably fall
4 into the liquid in the belly portion in the area
5 immediately around the flow barrier - the very same
6 liquid that could be reentrained with the gas
7 leaving the vessel.

8 Can you explain what you meant
9 there?

10 MR. KESACK: Objection; form and
11 scope.

12 A. It means that a particulate moving with
13 the fluids runs into a solid barrier and the most
14 likely outcome is losing its forward velocity and
15 falling.

16 BY MR. HALL:

17 Q. And where does it fall?

18 MR. HALL: Same objections.

19 A. Gravity would say it falls down. Drag
20 would say it goes in the direction of the flow.

21 BY MR. HALL:

22 Q. Well, that's a good point. What -- a
23 better question from me would have been, what does
24 it fall into?

25 MR. KESACK: Objection; form, scope.

1 A. It falls into whatever fluid is under
2 it.

3 BY MR. HALL:

4 Q. Okay. And in Hemstock, going back to
5 Figure 3 of Hemstock, for example, what is under the
6 flow barrier?

7 MR. KESACK: Objection; form, scope.

8 A. Liquids, immediately.

9 BY MR. HALL:

10 Q. Okay. Going back to paragraph 247, the
11 next sentence, you see where it says "Any sand
12 falling into this liquid"?

13 A. Yes.

14 Q. Do you see that?

15 It says: Any sand falling into this
16 liquid, assuming it does not settle out immediately
17 (which it would not as discussed below), would be
18 reentrained.

19 Did you intend to change that
20 testimony?

21 A. No.

22 MR. KESACK: Objection; form.

23 BY MR. HALL:

24 Q. Take a look at paragraph 280 of your
25 rebuttal declaration. It's on page 47 of 61.

1 A. 280, you say?

2 Q. Yes, sir. It's on page 47 of 60.

3 A. 47, okay. I thought you said 37. Okay.

4 Q. So do you recall Mr. Kesack questioning
5 you about where in the vessel sand -- in the
6 Hemstock vessel sand would be in suspension?

7 MR. KESACK: Objection to form.

8 A. Yes.

9 BY MR. HALL:

10 Q. Let me ask a better question.

11 Do you recall him asking you where
12 sand in a Hemstock vessel would be in suspension in
13 the liquid?

14 A. Yes.

15 Q. Take a look at the last sentence, the
16 last -- the next-to-last or the penultimate sentence
17 in paragraph 280. You see where it says, "In my
18 opinion"?

19 A. Yes.

20 Q. Please read that to yourself.

21 (Document review by witness.)

22 BY MR. HALL:

23 Q. Did you intend to change this testimony
24 in your responses to Mr. Kesack's questions?

25 MR. KESACK: Objection; form.

1 A. I did not.

2 BY MR. HALL:

3 Q. So when you were answering his
4 questions, you were talking about there being sand
5 in suspension past the fluid outlet, and then I'm
6 doing my best based on my memory, but you didn't
7 talk about immediately below the fluid outlet.

8 Why would you expect there to be
9 sand in suspension immediately below the fluid
10 outlet?

11 MR. KESACK: Objection; form, scope
12 and leading.

13 A. If there is liquid immediately below the
14 fluid outlet, I would expect there to be sand in
15 suspension in that liquid. If the sand has built up
16 to where there is no liquid immediately below the
17 fluid outlet, then I wouldn't.

18 BY MR. HALL:

19 Q. Okay. Let's look at your original
20 declaration, paragraph 18.

21 A. 18, okay.

22 Q. So you see where it says, "I have been
23 instructed to assume for purposes of my analysis
24 that February 3rd, 2012, is the relevant date for
25 determining what is 'prior art'?"

1 A. Yes.

2 Q. Is that also the date that you used to
3 determine the level of ordinary skill in the art?

4 A. Yes, it is.

5 MR. KESACK: Objection; leading.

6 A. Yes, it is.

7 BY MR. HALL:

8 Q. And that was the date you used -- or let
9 me ask you. Was that the date you used when
10 preparing your opinions?

11 A. Yes.

12 Q. Mr. Kesack had asked you how you could
13 be sure that your opinions didn't contain anything
14 from after that date, and I believe you said you
15 didn't know. Do you recall that?

16 A. I do.

17 Q. Is there anything in -- that you're
18 aware of in the principles of fluid flow or
19 vessel -- let me restate this.

20 Is there anything that you're aware
21 of with regard to the principles of fluid flow or
22 sedimentation or slug flow or slug catcher design
23 that has changed between now and this date that you
24 gave in paragraph 18?

25 MR. KESACK: Objection; scope,

1 leading.

2 A. No. The principles of fluid mechanics,
3 of slug flow, of sedimentation, vary from hundreds
4 of years old to certainly decades.

5 BY MR. HALL:

6 Q. Is there anything that you're aware of
7 that you used in preparing your opinions that dated
8 from after February 3rd, 2012?

9 MR. KESACK: Objection; leading.

10 A. I was careful to not use anything that
11 dated after that.

12 BY MR. HALL:

13 Q. And as far as your general experience,
14 can you identify anything in your general experience
15 that dated after February 3rd, 2012, that you
16 considered in forming your opinions?

17 A. No.

18 MR. KESACK: Objection; leading.

19 Scope.

20 A. No.

21 BY MR. HALL:

22 Q. That's a no?

23 A. That's a no.

24 Q. Take a look at your reply or rebuttal
25 declaration, paragraph 284.

1 A. Okay.

2 Q. So you had testified that you'd made up
3 the phrase "single-phase separator." Is that
4 correct?

5 A. That is correct.

6 Q. Okay. Did you make up the concept for a
7 single-phase separator?

8 MR. KESACK: Objection; leading.

9 A. Certainly not.

10 BY MR. HALL:

11 Q. So others in the industry, in your
12 opinion, would have been aware of the concept of a
13 single-phase separator, even if they were not aware
14 of that term?

15 MR. KESACK: Objection; leading,
16 scope.

17 A. Yes.

18 BY MR. HALL:

19 Q. Let me ask you a different way.
20 Would others in the industry have
21 been aware of the concept of a single-phase
22 separator even if they didn't know that term?

23 MR. KESACK: Same objection.

24 A. Yes.

25 --oOo--

1 BY MR. HALL:

2 Q. Take a look at the Data Book. It's
3 Exhibit 1008. I want to go to the slug catcher
4 picture on page 41.

5 A. Yep.

6 Q. You see that? So take a look at
7 Figure 17-21 on page 41.

8 A. Yes.

9 Q. Would a person of ordinary skill in the
10 art reviewing that figure -- again, this is all as
11 of the February 2012 date we were referencing
12 earlier -- would they have understood that to be a
13 single-phase separator as you're using that term?

14 A. Yes.

15 Q. I wanted to ask you, so stay there with
16 the Data Book, on page 36, turn back to that. And
17 look at Figure 17-14. Do you see where there's --
18 the title of this figure is Two-Phase Flow Regimes,
19 correct?

20 A. Yes.

21 Q. Mr. Kesack was asking you questions
22 about the freeboard in a pipe. I was confused by
23 them, so I wanted -- I was confused by his questions
24 and your answers.

25 Is it possible for there to be a

1 freeboard in a pipe? Is there a possibility of
2 vapor space in a pipe?

3 A. Yes.

4 Q. So would that be -- so I'm looking at
5 the wave flow regime here on the bottom right of
6 Figure 17-14. So the way -- I want you to tell me
7 if I'm correct in my interpretation of this.

8 The liquid is in the bottom below
9 and it's kind of shaded by horizontal lines, and
10 then above that where it's just white, is that
11 vapor?

12 A. Yes.

13 MR. KESACK: Objection; leading.

14 BY MR. HALL:

15 Q. With regard to the oil and gas wells
16 that are discussed in Hemstock, I want to focus on a
17 Hemstock vessel being applied to oil and gas wells.
18 Would you expect there -- or would a person of
19 ordinary skill in the art expect there to be water
20 slugs from such wells?

21 MR. KESACK: Objection; leading.

22 A. Yes.

23 BY MR. HALL:

24 Q. Go to paragraph 306 of your rebuttal
25 declaration.

1 A. Okay.

2 Q. So I would like you to read
3 paragraph 306 to yourself. Just let me know when
4 you're done.

5 (Document review by witness.)

6 A. Okay.

7 BY MR. HALL:

8 Q. Do you remember Mr. Kesack asking you
9 about the last sentence of this paragraph, about the
10 manner of operation of Hemstock in the Data Book's
11 slug catchers? Do you recall that?

12 A. Yes.

13 Q. What is the difference between the way
14 that a two-phase slug catcher works and the
15 single-phase slug catchers or single-phase
16 separators of Hemstock in the Data Book?

17 MR. KESACK: Objection; scope.

18 A. The difference is in the two-phase
19 separator, like a Rhinesmith separator, there is a
20 level control device that opens a liquid flow valve
21 to maintain a level at a predetermined height.

22 So if water comes in, some
23 accumulates, then water goes out. If a lot of water
24 comes in, the valve opens and allows it to go out as
25 fast as it can. That level control, that mechanical

1 device that controls level, doesn't exist in '256 or
2 Hemstock or in the harp-style slug catcher.

3 BY MR. HALL:

4 Q. And what does that mean with regard to
5 the liquid level in the vessel?

6 MR. KESACK: Objection; scope.

7 A. In single-phase separator, the liquid
8 level is what the liquid level is. You have no
9 control over it. It will go up or down depending on
10 the inflow of liquids.

11 BY MR. HALL:

12 Q. So you've submitted two declarations in
13 this matter, correct?

14 A. Correct.

15 Q. Did you intend to alter any of the
16 opinions provided in those declarations here today?

17 MR. KESACK: Objection; scope.
18 Form.

19 A. I did not.

20 BY MR. HALL:

21 Q. Did you intend to limit your opinions in
22 those declarations here today and by any of your
23 testimony here today?

24 A. I did not.

25 MR. KESACK: Objection; form, scope.

1 A. I did not.

2 BY MR. HALL:

3 Q. Do you still stand by all the testimony
4 in your two declarations?

5 A. I do.

6 MR. HALL: No further questions.

7 FURTHER EXAMINATION

8 BY MR. KESACK:

9 Q. Please turn to page 17 of Davis.

10 A. Page what?

11 Q. 17, of Davis.

12 A. Okay.

13 Q. You just testified that page 17 of Davis
14 includes language which allows you to believe that
15 Davis can be applied to turbulent flow, correct?

16 A. Yes.

17 Q. What language is that?

18 A. I'm sorry. I don't recall saying that
19 page 17 of Davis led me to believe that.

20 Q. What page of Davis did you say it led
21 you to believe?

22 A. I did not say. I said Davis did.

23 Q. You don't remember looking at a
24 particular quote from Davis that your counsel showed
25 you and saying that supported your position, and

1 this is specifically in paragraph 265 of your
2 declaration?

3 A. 265 of my declaration...

4 (Document review by witness.)

5 A. Okay.

6 BY MR. KESACK:

7 Q. Now, you testified -- and I wrote this
8 one down -- that that sentence supports your opinion
9 that Davis can be applied to, quote, "other than
10 laminar flow regimes," unquote.

11 Do you remember that?

12 A. Yes.

13 Q. What about this sentence allows you to
14 apply Davis to non-laminar flow regimes?

15 A. "Many investigators have studied the
16 phenomenon for a variety of suspensions and have
17 reported an increase in sedimentation rate."

18 Q. It doesn't say turbulent or laminar
19 flow, right? Turbulent or laminar flow, sorry.

20 A. No, it doesn't.

21 Q. No mention of turbulent flow at all,
22 right?

23 A. Right.

24 Q. No mention of laminar flow, right?

25 A. Right.

1 Q. So how is it that you can determine that
2 Davis can be applied beyond laminar flow based on
3 this sentence?

4 A. Based on that sentence, I don't see how
5 I did.

6 Q. And no other support in this paragraph
7 for applying Davis other than laminar flow, right?

8 A. In that paragraph, yes.

9 Q. How about anywhere else in your
10 declaration?

11 A. Not that I recall.

12 Q. So do you have any basis, sitting here
13 now, having looked at the testimony your counsel
14 pointed you to and having read Davis page 17, do you
15 have any basis to apply Davis to non-laminar flow?

16 A. On page 23 it talks about theory
17 experiments for unstable flow, which I take an
18 unstable flow to mean other than laminar.

19 Q. And what mechanism is Davis teaching you
20 to apply to unstable flow?

21 A. Some arithmetic that can't be solved.

22 Q. So in your opinion, unstable flow means
23 turbulent flow?

24 A. Yes.

25 Q. And although this is in Davis, you've

1 never relied on it before?

2 A. I didn't refer to it in any of these
3 documents, no.

4 Q. And you never referred to it when you
5 were asked about it either, right?

6 A. No. It's been a while since I read it.

7 Q. So none of your obviousness opinions in
8 either of your declarations is relying on this part
9 of Davis, right?

10 MR. HALL: Objection; form.

11 A. Not explicitly.

12 BY MR. KESACK:

13 Q. Are you saying implicitly it relies on
14 this part of Davis?

15 A. I'm saying that having read Davis, I
16 reached a conclusion that it applies to other than
17 laminar flow.

18 Q. But your declaration doesn't include it?

19 A. My declaration doesn't include it.

20 Q. And do you believe that more information
21 is required than what's in your declaration to show
22 that the '256 patent is obvious?

23 MR. HALL: Objection to form.

24 A. No, I don't.

25 --oOo--

1 BY MR. KESACK:

2 Q. You were asked questions about
3 paragraph 247 of your new declaration so I'd like
4 you to turn there.

5 A. Okay.

6 Q. About six lines from the bottom, it
7 says: Any sand falling into this liquid, assuming
8 it does not settle out immediately (which it would
9 not as discussed below), would be reentrained.

10 What does that mean?

11 A. Okay. Above it says the flow stream
12 hits the flow barrier, solids can't change direction
13 very fast, they fall. If they fall into the liquid,
14 then unless they're part of the liquid that is
15 exiting the vessel and reentrained, they will tend
16 to fall out.

17 Q. What do you mean, fall out? Where does
18 it say fall out?

19 A. Okay. "Any sand falling into this
20 liquid, assuming it does not settle out
21 immediately" --

22 Q. Which it would not, right? That's what
23 your parenthetical says.

24 A. Which it would not, would be
25 reentrained.

1 Q. What is reentrained?

2 A. Begins moving with the bulk velocity of
3 the fluid again.

4 Q. And by fluid, you mean in the freeboard?

5 A. The fluid leaving the outlet.

6 Q. Right. So any sand that falls in in the
7 manner you're describing above is going to get
8 reentrained and go out the outlet; that's what
9 you're saying here?

10 A. It's going to tend to do that, yes.

11 Q. So it's not going past the outlet to the
12 far wall, right?

13 A. Not that particular solid -- that
14 particular subset of the solids.

15 Q. So you wouldn't expect, in claiming
16 Hemstock, to improve the sand that is falling in and
17 becoming reentrained, right?

18 MR. HALL: Objection; form.

19 A. Correct.

20 Q. You were asked questions about
21 Rhinesmith by your counsel. Do you remember that?

22 MR. HALL: Objection; form.

23 A. I believe I brought up Rhinesmith.

24 BY MR. KESACK:

25 Q. Do you have an understanding of what the

1 slug catchers are in Rhinesmith?

2 A. I believe I do.

3 Q. Would the slug catchers of Rhinesmith
4 meet the definition of separator laid out in the
5 Data Book on page 3?

6 A. Yes.

7 MR. KESACK: No further questions.

8 (Proceedings recessed at 3:15 p.m.)

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CHANGES AND SIGNATURE

WITNESS NAME: David A. Simpson

DATE OF DEPOSITION: September 11, 2019

JOB NO.: 25987

PAGE/LINE	CHANGE	REASON
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I, DAVID A. SIMPSON, have read the foregoing deposition and hereby affix my signature that same is true and correct, except as noted herein.

DAVID A. SIMPSON, P.E.

REPORTER'S CERTIFICATION

I, SUSAN PERRY MILLER, CSR-TX, CCR-LA, CSR-CA-13648, RDR, CRR, CRC, Notary Public in and for the State of Texas, hereby certify that the witness was duly sworn and that this transcript is a true record of the testimony given by the witness;

That signature of the witness was not reserved by the witness or other party before the conclusion of the deposition;

I further certify that I am neither counsel for, related to, nor employed by any of the parties or attorneys in the action in which this proceeding was taken. Further, I am not a relative or employee of any attorney of record in this cause, nor am I financially or otherwise interested in the outcome of the action.

Subscribed and sworn to by me this day, the 18th day of September, 2019.

Susan Perry Miller
CSR-TX, CCR-LA, CSR-CA-13648
Registered Diplomate Reporter
Certified Realtime Reporter
Certified Realtime Captioner
NCRA Realtime Systems Administrator
Notary Public, State of Texas
My Commission Expires 03/30/2020

A				
ability 100:5 163:5	achieve 103:20	127:5 156:3	270:25 274:11	aside 101:5,7,14
163:14,25 172:19	achieved 104:14	158:21 159:8	289:14 290:15,20	129:1,6
174:2 185:8	105:11,14	201:9 215:21,24	applying 138:18	asked 114:25 120:5
187:15 193:12	acting 209:2,15	225:18 238:17	146:7 162:1,9	121:13 127:19
229:19 233:17	action 296:10,12	239:2 246:7	183:8 197:8,15,16	132:14 134:2,7
263:7	actual 269:23,25	247:21 257:21	197:18 275:25	135:12 140:17
able 111:16 128:14	273:14	266:4,6,8,9,11	290:7	155:21 156:23
132:5 141:16	address 126:18,21	268:11	approach 112:12	162:23 166:19
169:19 170:6	227:3	answered 115:1	approximated	167:8 183:21
171:17,18 198:24	addresses 126:19	127:20 132:15	175:12	189:9 191:22
202:2 235:11	addressing 268:9	135:13 140:18	approximately	193:11 198:21
273:4	Administrator	155:22 156:24	193:18	206:18 257:13
above-styled 92:3	296:20	166:20 167:9	approximates	260:5 275:5,25
absence 205:9	advantage 170:24	183:22 189:10,25	140:10	281:12 291:5
absolutely 146:18	affix 295:19	205:5 206:18,20	area 112:12 129:24	292:2 293:20
158:4 225:16	ago 97:21 116:23	257:14 276:3	129:25 138:22	asking 116:19
245:17 246:7	133:5 197:23	answering 118:6	140:15,19,20,24	125:13,20 132:7
absorb 193:13	214:25 215:17	275:15 276:13	141:24 142:5,21	134:9 153:1 154:5
198:24 202:2	agree 141:18	280:3	143:4 144:13	154:9,10 158:7,8
absorbing 192:24	147:16 217:3	answers 284:24	156:18,20 162:1	168:2 179:4
accelerate 157:16	230:16 232:20	anybody 97:13,16	210:22 211:16,18	192:16 200:22
acceleration 157:19	allow 146:25	Anyplace 170:22	236:7 237:6,9,25	205:6 206:16
accept 203:3,19	allows 181:24,25	APPEAL 91:1	238:20 262:7,13	212:24 214:6
212:25 213:1	286:24 288:14	appearance 160:3	262:16,18 263:3	225:10,11 226:17
access 185:5	289:13	160:5,6	267:4,4,17,19,21	237:4 238:4,5
accessories 177:5	alter 287:15	APPEARANCES	267:21 268:1,2	268:7,12 279:11
accessory 177:7	289:13	93:1	277:4	284:21 286:8
195:20 196:20	amazingly 222:17	appears 220:8	arithmetic 290:21	ASME 177:24
accomplish 133:21	Amoco's 189:21	applicability 214:5	arrival 234:11	180:4
250:25 251:22	amount 114:4	applications 226:3	arrow 156:12	assign 159:21
accumulate 102:17	132:4 141:7	applied 150:25	art 102:6,10 109:5	associated 272:8
102:18 184:10,12	172:18 222:17	153:25 199:7	109:10 127:4,8,9	assume 151:12
184:14	225:13 226:24	200:15 203:8	127:13 128:8,12	160:25 212:24
accumulated 121:7	230:2 264:6	272:22 285:17	128:15,24 160:23	238:9 266:17
259:24	265:17,18	288:15 289:9	163:4,13 165:23	270:11,19 280:23
accumulates	analysis 134:22	290:2	166:3,14 167:6,24	assumed 137:9,17
139:16 286:23	137:6 230:22	applies 149:15	168:5,20 169:3	238:7 275:6
accumulating	231:1,13 257:18	291:16	189:23 192:19	assuming 278:16
141:1 184:22	270:3 280:23	apply 104:18 148:9	196:12,15 199:13	292:7,20
227:25	analyze 109:23	149:14,18 150:3,4	228:13 229:8,17	attachment 94:10
accumulation	angles 248:6	152:1,5,20 153:11	232:14 242:8,12	attempting 159:25
121:5 184:8	annotate 131:2	153:12 154:4,10	254:4 255:16	attorney 296:11
186:16	annular 195:3,5,6	161:23 181:7	257:2 267:24	attorneys 296:10
accurate 95:23	answer 99:2 101:15	199:13,14 200:4	268:15 271:11,16	August 98:17
96:11 192:3	111:16,18 117:1	200:24 204:2	272:12,15 280:25	automatic 190:11
	120:15 123:24	212:19 213:10,14	281:3 284:10	available 172:8
	124:3 125:6,8,10	214:17 218:20	285:19	264:8 268:2,2

Avenue 93:15	207:5 210:8 219:8	154:21,22,23	201:3,5,11,13	B31 177:24
average 137:9,16	221:1 224:20	248:24,25 252:11	202:19,25 203:19	
137:18,21 138:2	226:14 227:10	254:15 263:3	212:17,19 214:15	C
139:7 169:8	255:21,25 256:1	277:4	216:7 217:7,16	c 95:3 253:23
208:14	260:11 261:3,12	beneficial 108:19	218:20 233:21	Cabello 92:9 93:5
aware 115:16	262:3 263:7 265:2	benefit 181:20,22	235:19 236:6	calculate 161:19
120:17 281:18,20	265:4 266:23	184:1,6 200:19	237:17,21,25	calculating 153:17
282:6 283:12,13	271:1 280:6 290:2	230:23,25	238:15,19 240:4	calculation 149:6,7
283:21	290:4	benefits 99:23	242:23 243:2,8	153:8,9
awful 180:16 252:7	basically 275:24	184:24 185:3	261:13 262:4	calculations 154:4
a.m 91:15 92:5 95:1	basis 145:5 203:25	best 95:23 96:11	271:1 272:2 284:2	154:15,18 177:23
162:15,15	255:23 260:8	280:6	284:16 286:16	180:9 186:7
	290:12,15	better 103:21	294:5	call 197:2 204:9
B	batch 134:23 225:3	108:14 109:17	Book's 232:16	220:1,3,20
b 209:25 252:10	225:5 250:11,12	170:5 181:14	234:4 286:10	called 185:22 189:3
253:23	250:20	185:5,15 228:22	bottom 118:21	calling 176:13
back 95:12 99:6	batch-clean 270:17	268:17 272:10	130:20 132:1,10	204:4
115:21 120:3,22	becoming 117:18	277:23 279:10	137:5 145:3,25	calls 202:4,5,19
121:12,14 125:19	126:10 142:18	beyond 162:2 171:9	148:22 156:12	cap 250:6 258:17
128:4 132:1 150:9	144:6 293:17	290:2	181:3 205:13	capabilities 235:10
163:9 174:9 187:9	begins 243:14,21	big 172:16,19	206:2 256:13	capable 100:4
194:18,19 196:7	244:10,12,14	bigger 147:20	285:5,8 292:6	capacity 165:19,25
205:5 208:13	245:3,10,18 246:9	164:5,6 169:5	boulder 144:23	166:7,16 168:24
215:14 217:6	293:2	173:1,2,15 230:2	146:12,14,21	169:4,14,16 170:2
218:3 226:8	believe 100:20,25	236:1,1,6,16	147:2,12,16,18,24	171:9 174:20
238:10,11 246:1	104:3 105:21,24	237:9 240:3	148:10,14,16,20	175:15 181:15
247:16 278:4,10	106:4 111:21,25	black 139:3	149:10,23,24	228:3,4,5 229:2,3
284:16	112:4 118:12	blocks 206:4	150:3	231:2,15 261:14
bad 155:24 230:13	123:2 145:11	blow 190:8 205:11	boundaries 149:21	265:3,8 266:1,9
barrels 269:5	146:9 147:15	blowing 205:12,13	272:17,18	266:10,22 267:1
barrier 220:12	148:8 158:20	BOARD 91:1	boundary 157:10	270:23 273:1
277:3,5,13 278:6	161:25,25 163:4	body 147:2 157:6,6	break 162:14	Captioner 91:24
292:12	163:12,25 166:17	boiler 175:18	215:12,12 255:9	296:19
based 102:13,22	168:23 189:25	177:22 178:9,19	breaking 231:3	care 143:8,10,11,20
103:11 107:9	192:15 199:7	book 96:25 101:21	bring 144:9	233:18
108:3 109:24	203:6 220:19	162:19 174:20,24	broadest 261:7	careful 282:10
114:12,16 116:3,3	225:7 226:12	177:1 178:14,23	brought 293:23	carried 134:5 143:3
122:13 127:11	227:16 249:13,17	178:24 179:1,7,12	Building 93:14	carries 133:12
128:6,11 138:10	259:3,8 260:2,6	179:13 180:6,10	built 177:8 178:19	carry 133:7
138:13,16 151:6	261:17 273:1	181:1,6,9 183:9	178:19 189:2,17	case 91:7 101:9,13
154:18 156:1,4	275:23 281:14	185:1,10,13,14,15	191:1 280:15	112:15 144:16
157:2 162:18	288:14,19,21	188:21,22 191:23	bulk 137:9,16,18	154:16
163:19 166:12,18	291:20 293:23	192:18,23 193:2,7	137:21 138:1	cases 184:15
166:21 168:9	294:2	195:11 196:16,17	139:13 140:12	catch 264:14
172:19,22 190:5	belly 108:9,15,24	197:4,16 198:4,8	143:19 293:2	catcher 168:6
190:13,15,17,22	117:10 124:11,14	198:12 199:7	buoyant 146:24	185:20,23 186:8
193:3,7 202:8	151:14,17 152:18	200:3,4,24 201:1	burst 224:23 225:1	187:4,12 188:2,17

189:1,5,8,16 190:4 192:11 193:20 195:10 197:6 198:3,17,22 199:2,5,5 201:5,7 201:19,20,23,24 202:9,16,19,20,24 204:4,4,9 206:10 206:10,17,23 207:1 208:10 209:15 210:25 212:17,20 215:5 215:23 216:24 217:7,15 218:6,12 218:21 232:24 234:4 235:19,24 235:25 236:9,14 236:20 237:17,21 237:24 238:14,19 240:4 281:22 284:3 286:14 287:2 catchers 183:24 185:5,18 188:9,10 188:20 191:1 192:23 232:16 233:22 236:20 237:15 286:11,15 294:1,3 catching 209:23 cause 92:4 102:25 131:22 141:20 159:16 189:22 218:3 296:11 caused 133:2 171:7 174:12 causes 135:11 causing 113:22 136:16 160:13 271:23 CCR-LA 91:22 92:6 296:3,18 center 131:23 141:2 certain 221:8 certainly 149:12 178:8 282:4 283:9	CERTIFICATI... 296:1 Certified 91:23,24 296:19,19 certify 296:4,9 chance 142:17,18 144:6,7 170:6 251:17,18 change 214:6 275:14,18 276:12 278:19 279:23 292:12 295:5 changed 281:23 changes 152:15 214:5 256:20 295:1 changing 103:12 143:25,25 185:22 256:25 channel 135:1 channels 133:18 275:21 chaos 159:13 chaotic 113:19 159:17 Chapter 180:20,20 197:10 chara 243:7 characteristic 202:12 204:5,8 characteristics 138:24 characterize 171:22 choice 218:5 230:13 259:9 choices 193:4 choose 98:24 230:14 chose 232:6 252:9 churning 114:5 circular 211:2 circumstance 205:1 circumstances 178:4 cite 246:25 cited 167:18	citing 168:17 claim 106:1 107:1,3 241:15 242:2,7,23 244:3 247:3,4,6,9 247:9,19,19,22,24 247:25 248:3,4,20 248:22 249:7,10 254:19 257:17 261:6 claiming 105:13 293:15 claims 246:22,25 259:13 clean 103:5 185:8 cleanout 103:2 254:10 clear 158:7 196:13 239:17 245:24 270:24 clearer 99:9 197:21 198:15 clearly 226:20 close 241:22 closed 204:19 208:18 217:17 closer 103:5 141:25 closure 251:13 263:8 coal 107:12 223:23 268:21 270:21 271:6 code 175:18 177:8 177:22 178:10,13 178:20 179:5 180:4 codes 177:24 178:10 coined 196:20 collect 261:14 262:8,16 collected 224:4 collecting 173:22 174:1 collection 221:22 223:6 collects 206:3,7 262:13	colloid 145:21 colloidal 147:18 column 99:11,14 104:20,21 105:16 105:19 108:3 164:14 175:10 206:1 221:16,18 221:20,21 224:2 225:21 269:14,16 combines 101:17 101:20 combining 116:13 come 103:1 124:9 167:25 218:3 222:2,4 223:16 224:14,18 225:12 226:8 comes 117:9 122:17 171:9,19 205:18 206:9 209:4,17,24 217:20,20,20 218:3 219:16 222:8,17,18,19 225:8 227:5,6,6 231:23 286:22,24 comfortable 162:1 199:22 coming 100:17 111:21 112:1,5 129:14 145:7 171:6 205:15,20 205:21,24 206:16 206:22 207:1,12 207:12 208:21 209:18 222:13 225:11 227:23,23 227:24 235:24 236:13 270:11,20 273:12 comma 255:16 commercial 153:6 Commission 296:21 common 196:8 197:1 communication 197:22	compact 174:25 company 189:3,14 compared 210:19 262:8 complete 103:15,21 completely 116:10 171:16 component 195:24 components 195:15 196:22 compressor 171:14 179:9 compressors 179:25 Computer 92:9 concede 254:14 concentration 118:25 concept 213:14 214:11 245:18 246:8 283:6,12,21 concepts 154:5 concern 231:8 concerned 169:11 169:13 174:5,14 268:1 concerns 231:11 conclusion 291:16 296:7 condensation 207:8 condition 218:24 219:1 conditions 152:22 153:10 158:2,3 221:8 227:17 231:6 269:24 conduit 211:1,2 235:24 conference 245:22 configuration 185:23 248:3 272:10 conform 244:24 confused 284:22,23 consequently 236:2 consider 167:16,17 200:23 231:4
---	---	---	--	--

249:15,25 253:6,6 253:10,18 254:19 255:4 257:17,20 257:25 258:21 259:15,25 267:16 269:1,23 270:2 considerable 141:7 141:9 considered 172:9 249:17 271:11,13 282:16 considering 268:18 268:19 270:13,16 270:25 constant 149:1 constantly 143:25 constructing 133:20 construction 239:6 246:21 249:7,15 254:19 255:5 257:18 261:7 contain 281:13 container 244:24 containing 118:23 195:24 contention 245:9 continually 225:11 continue 164:17 continuous 134:23 195:25 224:23 270:14 continuously 222:14 control 164:5 184:13 187:13,15 190:10 217:11 219:6,7 220:9,10 220:12 273:15 286:20,25 287:9 controlled 256:14 controls 171:11 196:24 197:1 287:1 copy 179:18 correct 98:6,7 101:14 112:2	113:10 131:15 140:6,11,14 141:22 153:1,2 168:18 174:16 202:4 208:7 218:16,18 242:10 246:23 250:21 262:21 264:17 270:3 275:19 283:4,5 284:19 285:7 287:13,14 288:15 293:19 295:20 cost 230:23,23,24 230:25 231:3 cost-benefit 230:21 231:1,13 cost-effective 232:7 counsel 97:6 111:13 131:1 275:4,24 288:24 290:13 293:21 296:9 counsel's 276:13 counting 219:13 couple 149:22 214:25 215:16 course 225:12 court 96:3 cover 120:8 248:5 249:11 covered 172:13 covering 172:15 CRC 92:6 296:3 create 182:21 183:2 183:16 184:4,5 211:22 220:24 237:8 created 232:23,25 233:18 234:17 239:13,14 creates 192:10,19 211:25 213:15,16 237:5,25 238:19 creating 119:10 194:10 233:13,14 creep 161:21	cross-sectional 210:22 211:16,17 236:7 237:6,8,25 238:20 CRR 92:6 296:3 CSR-CA-13648 91:22 92:6 296:3 296:18 CSR-TX 91:22 92:6 296:3,18 cubic 269:6,21 270:8 <hr/> D D 95:3 damage 104:11 Daniel 93:12 daniel@radip.com 93:18 dark 248:14 data 96:25 101:21 162:19 174:20,24 177:1 178:14,23 178:24 179:1,7,12 179:13 180:6,10 181:1,6,9 183:9 185:1,9,13,13,14 191:23 192:18,23 193:2,7 195:11 196:16,17 197:4 197:16 198:4,8,12 199:7 200:3,4,24 201:1,3,5,11,12 202:18,25 203:19 212:17,18 214:14 216:7 217:7,15 218:20 225:19 232:15 233:21 234:4 235:19 236:6 237:17,21 237:25 238:14,19 240:4 242:23 243:2,8 261:13 262:4 270:25 272:2 284:2,16 286:10,16 294:5 date 167:7,10,15	188:25 191:11,11 280:24 281:2,8,9 281:14,23 284:11 295:3 dated 167:15 282:7 282:11,15 David 91:12 92:1 94:3 95:4 123:23 252:17 295:2,18 295:25 Davis 96:23 101:18 115:8,12,17,20 116:3 117:20 118:9,11,15 120:6 120:12,17 121:1,4 121:18 122:13,19 122:23,25 123:2 126:9,11,14 127:1 128:20 132:21,24 133:10,15 134:3,8 134:16 135:5,7,9 135:14,17,17,25 136:1,11,14,17,22 138:1,3,14,18,24 140:10 146:6,10 147:8,13 148:6,13 149:14,18,20 150:2 151:21 152:2,21 153:25 154:10 161:23 162:1,9 274:4,7 274:14 275:7,8,11 275:16,25 288:9 288:11,13,15,19 288:20,22,24 289:9,14 290:2,7 290:14,15,19,25 291:9,14,15 day 107:15,15 221:23 222:10,14 223:5 224:5,12,13 224:13,18 225:12 225:14 226:10 227:1,1 269:5,22 270:9 296:13,14 days 97:12 day's 225:18	de 99:19 dead 138:23 139:8 139:20 140:9 deal 122:20 132:22 132:25 165:25 186:20 dealing 167:2 169:10 170:11 186:17 decades 282:4 decide 178:21 deciding 253:7 273:18 decision 203:24 declaration 98:17 99:1 111:8,14 117:23 127:11,17 128:6,16 167:22 168:4 192:6,13,14 192:17 210:17 215:10 216:11,14 228:11 229:12 230:11 240:21 241:7 245:15 246:4 248:15,16 249:7 255:13 260:14,21 261:6 261:20,21 264:19 269:8,10,13 274:21 276:5,19 278:25 280:20 282:25 285:25 289:2,3 290:10 291:18,19,21 292:3 declarations 167:18 192:9 287:12,16,22 288:4 291:8 decrease 261:14 decreased 265:4,9 266:23 deep 156:19 defer 203:23 define 208:14 235:12 defined 198:4
--	--	--	--	---

212:12,18 213:3 245:2 defines 145:9 197:4 197:6 272:7 definition 145:6,7 146:7 148:5 176:19 195:22,23 196:23 197:3,10 198:17,22 199:4,8 199:21,23,24 200:1 201:10,12 201:22,24 202:6,8 202:11,13,20,23 202:24 212:25 294:4 definitions 196:8 197:8,15,16,18,21 199:14,15,21 200:4,5,24,25 201:3,4 203:4,8 203:19 204:1 degrees 193:3 demonstrate 259:20 demonstrated 100:5 275:22 density 147:21,22 depend 137:8 231:5 depending 155:11 287:9 depends 139:15 174:3 207:25 219:25 268:6,6 depict 160:16 161:5 258:10 depicted 204:13 deposition 91:12 92:1 95:14 96:14 96:16 97:16 295:3 295:19 296:7 depth 164:15 165:5 desander 100:10 107:20 109:24 112:16,17 175:3 226:3 231:2 252:12 267:25 desanders 91:5	226:14 273:12 desanding 224:23 224:23 descending 156:13 182:22 describe 175:2,5 208:19 244:10 258:4 described 139:9 158:9 170:10 252:11 describes 231:22 253:24 describing 164:20 164:24 176:2,5 189:7,8,16 257:16 293:7 description 107:21 109:25 145:16 226:17 227:10,15 252:20 253:1 254:11 255:25 257:6 258:20 design 189:2 193:4 198:24 199:9 229:19 236:19 281:22 designate 115:4 designed 181:11,13 189:17 237:15 designing 178:15 Despite 201:22 details 161:19 179:9 determination 152:19 determine 122:10 152:17 191:15 230:19 281:3 290:1 determines 212:16 251:10 determining 258:1 280:25 develops 119:8,9 device 99:20,21 102:16 107:17	109:15 180:19 182:22 187:18 195:9 210:21 212:14 248:21 253:16,20 258:16 286:20 287:1 devices 133:21 181:12 193:2 272:23 diagram 190:4 diameter 148:19,25 175:13,13 228:23 228:24 230:1,18 230:24 236:1,21 264:4 difference 113:8 177:6 186:23 219:19 286:13,18 different 119:10,16 146:5 152:14,15 153:8 159:20 168:6 171:4 176:21 177:14,21 186:22 191:19 211:3 212:3 214:14 235:23 239:5 248:6 263:12 272:10 283:19 differentiate 124:21 126:6 167:12 differently 101:12 difficult 177:20,25 214:10 254:12 dimensions 263:5 Diplomate 91:23 296:18 direction 137:10,22 137:24 139:6 245:10 277:20 292:12 discharge 193:22 194:13 256:16 discharges 256:17 disclosed 99:23 179:2	disclosing 214:15 disconnect 217:9 discuss 108:8,13,17 discussed 95:17 185:1 278:17 285:16 292:9 discussing 99:23 248:3,4 discussion 115:13 115:16,19 200:16 251:19 distal 141:11,14,17 144:1 155:10 256:15 distinct 118:24 distracted 163:8 divide 148:23 document 96:15 98:5,8 101:16 104:2 108:10,20 118:20 134:15 136:7 137:4 164:13 168:9,17 179:22 190:16,18 192:21 196:21 199:13,15 215:8 215:25 247:14 252:24 256:10 263:6 275:1 279:21 286:5 289:4 documents 96:19 97:10 167:18,25 190:20 200:15 260:11 291:3 doing 141:8,10,14 177:23 249:7 270:3 280:6 dots 129:22 dotted 129:13 downcomer 220:15 220:23 downstream 104:11,24 105:6 106:3,7 107:18 139:4 170:5 207:25 251:21	downwardly 220:22 draftsman 160:15 160:16 drag 149:6 277:19 drawing 153:3,5 156:13 190:1 250:23,24 251:22 253:11,19,19 254:2,12 258:15 263:6 265:21 266:2,23 267:23 drawings 99:4,5,7 99:8 160:10,11 252:8 drawn 162:7 252:8 drew 208:12 drill 167:2 drop 207:4 235:25 dropped 219:14 dropping 198:14 218:2 due 206:3 duly 92:3 296:4 duration 223:10 dynamic 119:25 138:17 143:25 207:3
<hr/>				
E				
<hr/>				
E 95:3,3 earlier 162:18,23 232:22 235:18 252:5 284:12 early 230:5 easier 103:6 164:11 197:22 easily 114:6 economic 231:19 economically 230:6 effect 106:13,15,18 138:2 180:14 effective 99:20 137:7 180:19 186:4 effectively 107:18 effects 104:23				

105:5 106:3,8 170:13,17 173:20 206:3 efficiency 108:18 109:6,11 110:3 273:10 effort 128:18 187:20 either 96:2 143:2 155:10 163:19 190:20 243:8 255:17 257:3 264:19 291:5,8 electronic 164:11 elevation 244:13 eliminating 104:8 elimination 103:15 187:13 eluded 235:10 Empire 93:14 employed 296:9 employee 296:11 encompassing 100:11 encroach 164:16 165:6 169:16 encroaches 169:18 ENERCORP 91:3 engineer 254:12 engineering 252:7 258:22 enhance 134:25 enhanced 133:17 147:1 275:21 enhancing 274:9 enter 118:1 entered 122:8 entering 172:7 234:22 235:14 enters 112:10 153:7 entire 98:22 130:5 151:1 172:16 222:1 224:5 246:18 254:9,18 254:25 entirety 97:19 98:11 158:19	entrained 218:1 entrainment 256:16 environment 140:10 186:18,22 186:24 187:2,3 188:1 207:10 equation 148:19,21 148:22 275:11 equipment 104:24 105:6 170:2,5 228:21 erosion 107:18 erosive 104:23 105:5 106:3,8,13 106:15,18 especially 133:19 Esq 93:4,12 establishing 248:23 estimation 254:8 267:6 evaluating 118:7 200:3,25 evaporation 207:7 218:2 219:9 event 134:16,23,23 135:15,16 144:3,4 148:12 163:23 165:4 169:22,23 170:1,3,5 171:22 172:5 205:9,14,18 206:12,17 209:17 225:4,5 234:23,25 235:2 243:8 events 190:8 eventual 256:15 evidence 108:22 246:21,22 exact 172:6 234:3 239:3,8 exactly 104:6 193:16 232:16 233:2,8,15,22 234:6,14 236:24 237:4,14,22 238:15 239:18 240:9	EXAMINATION 94:3 95:8 274:2 288:7 example 172:5,14 176:12 178:3 195:3 220:11 221:10 222:23 265:3 269:21 272:25 278:5 examples 104:16 104:17 175:9 exclude 101:1 197:3 excluding 112:15 excuse 99:6 191:17 exhibit 235:7 244:25 284:3 exhibits 94:10 exist 197:24 287:1 exists 133:20 exit 109:24 142:21 143:18 173:14 exiting 112:13 142:18 143:15 144:2 235:16 256:22 292:15 expect 102:19 129:13,19,21 131:19,25 132:3 152:6,7 156:14,20 156:22 161:13 201:2 208:12 222:13,16 223:15 280:8,14 285:18 285:19 293:15 expected 161:17 230:5 expecting 152:16 155:8 expects 227:19 experience 107:5,9 107:10 108:4,23 147:23 151:2 166:21,24 182:5 184:8,17 185:4,17 185:19 190:1,6,13 190:19 199:18,20	205:4 223:19 229:9 236:21 255:24 256:1 260:9 268:20,25 269:3 271:20 272:22 282:13,14 experiments 290:17 Expires 296:21 explain 103:14 178:17 200:14 277:8 explains 193:2 explicit 184:7 254:15 explicitly 167:20 291:11 extend 215:2,19 244:18 extended 255:18 256:4 257:4,10 extending 244:15 extends 244:19 262:19,24 extension 163:19 extent 130:7 extra 239:20 eyeball 263:22 <hr/> F <hr/> F 153:4 face 105:20,22 231:12 facilities 104:12 facing 220:22 fact 119:6 214:14 239:23,24 252:10 259:24 fails 202:11,23,24 failures 103:13,13 103:16,17 fair 99:22 122:1 123:15,20 166:16 166:17 259:6 272:3 273:21 fairly 151:18 fall 147:4,22 148:1	277:3,17,24 292:13,13,16,17 292:18 falling 277:15 278:12,15 292:7 292:19 293:16 falls 117:10 163:25 277:19 278:1 293:6 far 197:25 258:14 282:13 293:12 farther 129:21 fast 122:21 142:15 143:5,8,11,21 149:10 286:25 292:13 faster 113:22 210:1 faster-falling 119:9 feature 137:6 February 280:24 282:8,15 284:11 feel 157:3,4 159:1 199:22 feeling 158:25 feels 251:10 feet 230:3 269:6 270:8 fiction 219:23 field 108:4 109:16 Fifth 93:15 figure 111:6,9,20 111:25 113:2 118:18 119:13,14 119:16,19 120:22 123:20 124:5 129:4,9,12,17,19 130:9,10,17 131:8 141:1 150:9 153:4 154:25 155:7,13 155:18 156:1 158:13,17,18 159:4,14,20,21,22 159:22,24,24,24 160:1,18 163:21 166:3,9,10,12 168:23,24 169:1,4 171:5 173:19
---	---	--	--	--

175:12 183:1,15 184:25 185:10 191:14 192:18 193:7 196:17 204:14 208:10 211:22 213:5,9,10 213:11,15 214:3 214:18,21 216:7 221:10 236:5 243:10,13,24 244:8 249:11,15 249:17,20 250:3 250:18,19,23 251:24 252:3,3,5 252:10,21 253:1,7 253:23,25 254:3,6 254:16 257:16,17 257:20,21,22,24 257:25 258:7,17 258:21 259:3,15 259:19 261:23 262:5 264:16 265:2,4 266:12,13 266:18 267:14 278:5 284:7,10,17 284:18 285:6 figures 160:3 249:23 252:6 253:3,6,15 254:6 254:7 258:10 files 189:21 fill 112:8 239:11 240:1 263:7 filled 171:16 174:12 195:1 fills 163:24 208:18 239:15 262:20 financially 296:11 find 117:17 129:11 134:7 136:11 175:7 215:10 finding 136:8 fine 131:12 187:4 fingertips 191:11 191:12 finished 172:6 first 111:8 115:15	134:8 166:4 168:3 174:21 175:22,24 185:19,24 192:14 192:15 222:24 255:15 fit 228:15 263:16 267:4 fittings 180:14 five 222:24 223:5 226:13 236:13,15 237:12,13 238:1 238:20 239:12 flabbergasted 245:17 246:8 flash 149:24 150:3 flip 159:4 floating 116:22 flood 149:24,25 150:3 flow 100:16,17,23 101:1 102:25 104:1,4 113:16 132:5 136:24,25 137:24 138:14 139:3 151:22 152:3,6,6,8,18 153:13 154:1,11 154:12,17,20 155:1,7,19 156:8 156:11,14,21 158:4,24 159:3,6 159:18,21 160:7 160:11 161:21 163:1,6,14 166:1 168:24 169:10,11 170:4 171:17,19 173:8 174:8 180:11 193:1 195:3,5,6,25 206:4 207:3,10 218:15 220:12 223:23 228:4 229:20 231:15 235:5,9 236:1,2 239:19 255:24 268:3,17 269:1,2 269:4,23,24,25	270:6,10 275:7,9 275:12,22 277:5 277:20 278:6 281:18,21,22 282:3 284:18 285:5 286:20 288:15 289:10,14 289:19,19,21,24 290:2,7,15,17,18 290:20,22,23 291:17 292:11,12 flowing 138:17 139:2 182:9 230:5 flows 157:5 174:5 flow-back 226:23 227:4 fluctuating 192:24 193:13 fluid 104:22 112:19 115:13,14 120:1,1 122:16,16 123:3 124:7,23 129:14 137:7 138:17,19 139:2,3,4,17,21 139:25 140:3,12 145:20 147:21 153:4 155:9,11,13 160:1,2 161:18,18 169:8 175:15 180:16,18 187:15 187:20 210:9,10 210:11 214:22 218:3,12 219:2,11 234:21,22 235:4,7 235:14 239:6,9,10 239:25 241:17,21 242:15,15,17 243:6,6,11,14 244:5,9,15 248:22 248:25 249:2 250:14 253:1 256:16,17,18,21 256:22,24 258:22 259:9 277:3 278:1 280:5,7,9,14,17 281:18,21 282:2 293:3,4,5	fluids 126:12 136:18,22 137:2 159:2,23 177:13 179:10,10,11 180:12 195:24 235:23 244:23 251:9 277:13 focus 285:16 followed 207:8 following 121:14 128:4 163:9 194:19 215:14 238:11 246:1 247:16 follows 95:7 foot 242:20 force 145:17 forces 146:24 foregoing 295:19 forget 101:5 form 100:19 101:10 102:14 103:9 104:15 105:12 106:16,19,24 107:4 109:1 110:7 110:23 111:11 112:3,24 113:15 114:15 115:23 116:6,18 117:13 118:5 119:5,18,24 120:9,14,20 121:3 121:21 122:2,14 123:1,11,16,21 124:6,19 126:4,17 127:14 128:10 133:4,24 134:13 135:6 136:13 137:23 138:4,21 139:11,14 142:9 143:13 146:2,13 149:5 150:6,13 151:23 152:23 153:16 154:2 156:10 157:8,21 158:1,16 159:7 160:8 161:3,12,24 162:6,12 165:7,14	167:14,19 171:24 172:21 173:4,21 174:15 177:18 178:5 180:23 182:8 183:11 188:3 191:25 193:9 194:7,24 195:14 197:17 199:16,19 200:6 200:13 202:22 203:5,12 205:16 206:2,13 207:22 208:6,11,24 209:6 209:11,20 211:6,9 211:20 212:7,21 213:12,23 217:18 218:17 219:24 221:3,12 222:3,11 222:15 223:1,7,18 223:22 225:2,15 227:8,11,18 228:6 232:8 233:10 234:5,10,15,24 235:3,22 236:8,18 237:1,7 238:2 239:4,22 240:12 240:16 241:23 242:3,9,25 243:16 245:4,11,16 246:6 246:16 247:5,20 248:10 250:22 251:4,16 252:14 252:16,23 253:9 254:20,23 255:7 258:13 259:4,7,17 261:9,16 262:10 263:4,18 264:13 264:25 265:6,20 266:15,19 268:4 271:3,7,19 272:4 273:6,13,22 276:9 276:15 277:10,25 278:7,22 279:7,25 280:11 287:18,25 291:10,23 293:18 293:22 formation 107:12
---	---	--	---	--

116:21 formed 248:25 forming 282:16 formula 145:14 forth 128:14 168:13 196:7 forward 277:14 found 103:3 136:11 184:16 185:4 199:1 fourth 221:21 frac 107:12 226:8 226:23,24 227:4 fraction 137:8 fracturing 225:23 free 198:20 201:14 203:10 213:4 freeboard 129:25 151:16 152:10 156:21 163:19,22 163:23 164:6,17 165:6 171:21,25 172:7 173:1 181:24,25 182:2,7 182:12,21,23 183:2,5,10,12,16 183:20 184:4,5 188:7 192:11,20 193:8,14,24,25 194:2,6,10,15,21 194:25 195:4 208:9,15,20 210:7 211:8,22,25 213:20 214:20,21 214:24 215:1,18 220:16,25 221:1 232:23,24 233:3 233:13,14,18,19 234:11,16,17 240:7,11 249:2 252:12 262:18 264:7 268:17 284:22 285:1 293:4 frequency 224:21 frequently 184:19 friction 180:9	front 101:16 full 112:17 140:19 164:2,2,25 165:1 165:9,10 222:14 253:15 function 131:20 147:21 193:13 195:5 253:11,24 254:1,5,6 255:17 256:4 257:3 258:16 259:21,21 functioning 258:5 258:10 functions 253:20 255:4 funny 196:6,7 further 273:24 288:6,7 294:7 296:9,10 <hr/> G G 95:3 256:17 gallons 221:23 222:1,8 223:5,9 223:12 224:4,11 224:12,17,18 225:19 227:1 gas 100:6,18,20,23 107:10 109:16 112:19 150:25 152:8 153:6 157:5 157:10,11,15,16 157:18,19 159:14 173:17 187:16 190:8 192:25 195:1 198:19 199:1 201:7,13,17 202:13 203:10 204:6 205:7,12,12 206:4 207:14,16 208:5,13 213:3 219:17,18 235:13 235:16 256:16,22 267:5 269:6 277:6 285:15,17 gases 100:11 112:13	gas-free 201:18 202:15 204:7 gas-liquid 158:14 211:3 241:20 gas/liquid 241:16 243:21,25 244:4,7 244:22 252:21 262:23 263:13 267:3,18 gathering 199:1 general 108:3 109:18 152:13 154:5,5 166:24 174:21 190:1 268:11 274:11 282:13,14 generalize 154:6 generalized 154:16 generally 145:15 151:11 193:3 274:7,8 getting 162:10 213:13 214:10 226:22 270:12 give 95:23 96:11 139:6 164:3,3,4 166:22 173:15,17 179:13 222:21 226:15,16,18 231:6 258:15 261:6 269:18 given 171:2 207:11 296:5 gives 185:5 214:21 214:24 220:16 222:20 giving 166:22 194:16,22 go 99:11 100:1 104:20 125:19 127:1 128:20 129:21 130:13 131:19,22 132:1,1 132:11 133:2 140:20 171:19 174:9 177:2 185:12,13 196:7	198:6 199:24 207:14 208:5 216:20 221:16 225:21 228:10 229:11 230:22,23 232:11 240:11,20 241:6 260:14 261:19 269:14 273:25 284:3 285:24 286:24 287:9 293:8 goal 105:7,10 251:2 goals 250:25 goes 171:10,13 199:25 205:18,21 277:20 286:23 going 97:25 98:1 101:4 107:24 112:22 113:17,18 120:22 122:19 135:23 139:9 140:15 141:18 142:7,12,21,25 143:17,21 144:9 155:1,7 158:14 159:15 161:20 164:4 166:22 175:6 179:13 184:14 186:8 198:21 205:9,10 209:5,7 211:15,17 212:25 213:1,2,5 215:9 216:10 217:22 219:7,8,12 219:19 220:3 222:20 225:11 226:5,7 227:3,17 237:9 241:21 263:16 278:4,10 293:7,10,11 good 95:10,11 166:8 215:11 277:22 gotten 124:3 grain 115:2,5 116:21,22 gravitate 193:21	194:12 gravity 137:10 145:18 147:22 210:22 277:19 greater 267:17,19 ground 95:16 101:17,20 162:17 grounds 101:13 gut 157:3,4 159:1 159:12,13 161:2,4 <hr/> H H 93:4 halfway 216:16,20 262:24 Hall 92:9 93:4,5 94:5 100:19 101:10 102:11,14 103:9 104:15 105:12 106:16,19 106:24 107:4 109:1 110:7,23 111:11,13 112:3 112:24 113:15 114:15,21,25 115:23 116:6,18 117:13 118:5 119:5,18,24 120:9 120:14,20 121:3 121:21 122:2,14 123:1,11,16,21,23 124:6,19 125:4,23 126:4,17 127:14 127:16,23 128:10 131:1,11 132:14 133:4,24 134:13 135:6,12 136:13 137:23 138:4,21 139:11,14,23 140:4,17 142:9 143:13,22 146:2 146:13 149:5 150:6,13 151:23 152:23 153:16 154:2,13 155:3,21 156:5,9,23 157:8 157:21 158:1,16
--	--	--	--	---

159:7 160:8 161:3 161:8,12,24 162:6 162:12 164:22 165:7,14 166:19 167:8,19 171:24 172:10,21 173:4 173:21 174:15 177:18 178:5 179:18,20 180:23 182:8 183:11,21 188:3 189:9 191:17,25 193:9 194:7,17,24 195:14 197:17 199:16,19 200:6 200:13 202:22 203:5,12 205:16 206:13,18 207:22 208:6,11,23 209:6 209:11,20 211:6,9 211:20 212:7,21 213:12,23 214:8 217:18 218:17 219:24 221:3,12 222:3,11,15 223:1 223:7,18,22 224:25 225:2,15 227:8,11,18 228:4 228:6 232:8 233:10 234:5,10 234:15,24 235:3 235:22 236:8,18 237:1,7 238:2,7 238:10,23 239:4 239:22 240:12,16 241:10,12,23 242:3,9,25 243:16 245:4,11,16,21,24 246:16 247:5,11 248:10 250:22 251:4,16 252:14 252:16,23 253:9 254:20,23 255:7 256:7 257:13 258:13 259:4,7,17 261:9,16,24 262:10 263:4,18	264:13,25 265:6 265:10,20 266:15 266:19,24 267:11 268:4 271:3,7,19 272:4 273:6,13,22 273:25 274:3,19 275:3 276:11,17 277:16,18,21 278:3,9,23 279:9 279:22 280:2,18 281:7 282:5,12,21 283:10,18 284:1 285:14,23 286:7 287:3,11,20 288:2 288:6 291:10,23 293:18,22 hand 118:9 192:13 200:16 215:9 216:10 245:6 handed 98:5 handle 163:5,14 164:7 171:17 172:16,19 173:3,8 174:2 193:12 229:20 230:2,5 233:17 240:3 268:17 handled 171:23 172:3 handles 234:3,6 235:20 handling 100:4 172:9 174:6 happen 195:6 217:16 happened 189:20 happening 170:7,9 170:18 happens 149:12 153:7 195:7 220:2 hard 213:13 harder 177:17 harm 231:20 harp 201:20 harp-style 232:16 233:22 234:4 236:20 237:21,24	238:14,18 287:2 head 155:9 213:13 214:10 245:20 246:10 hear 96:6 heaviest 112:23 height 286:21 help 121:1,19 122:20 126:14 134:3 135:9 helped 273:4 helps 220:12 Hemstock 96:20 97:19 98:6,12,20 98:25 99:5,24 101:18,21 102:7 102:10,16,22 103:4,12 104:10 104:13 105:23 106:1,4 107:21,24 108:8,13,17,24 109:7,12,24,25 110:4,6 111:5 114:7,12 116:2 117:4,5,8 120:22 129:4,9 138:17,22 150:5,12,16,21,23 150:25 151:3,6,8 151:18 152:2,3,8 152:21,22 154:1 154:11 157:25 158:9,11,17,18,19 158:21 161:22 162:9,18,24 163:3 163:6,11,15,18,24 164:9 165:17,24 165:24 167:3 168:20,23 170:23 170:25 171:5,16 171:22,23 172:1,2 172:9 173:8,19 174:12 175:2 176:17,17,24,25 181:7 182:12,14 182:19,20 183:5,9 183:20 184:21 185:9 186:20	187:19 189:24 191:15 211:22 212:20 213:11,15 213:25 214:5,16 214:18,19 218:22 220:7 221:17,18 222:2 223:16 224:22 225:7,17 227:10 228:2 229:8 231:2,16,21 231:25 232:2,15 232:23 233:21 234:2,9,21,22 236:24 237:5,22 238:1,16,21 240:5 243:9,10,13,24 244:8 253:22 261:12,23 262:3,9 262:17 264:17 267:25 268:16 271:1,16,21 272:2 272:6,9 273:1,5 273:17,19,20 276:1 278:4,5 279:6,12 285:16 285:17 286:10,16 287:2 293:16 Hemstock's 214:19 229:18 231:23 235:14 hey 166:14 high 131:22 147:4 151:10,12 174:4 higher 207:16 high-pressure 186:24 187:1,3,6 188:1 high-velocity 104:12 151:12 hinge 184:20 hits 292:12 hold 178:18 264:8 270:17 holding 251:11 holds 177:12 honestly 269:20 hooking 151:4	hopefully 171:11 horizon 219:25 horizontal 182:6,25 186:13 210:20 211:1,5 212:6 264:7 285:9 horizontally 208:13 215:2,19 244:15 hour 222:7,18 223:21,24 227:5,6 227:6,23,23,24 hours 220:3 Houston 91:14 92:10 93:7 huge 264:9 huh 185:15 hundreds 282:3 hypothetical 158:8 226:18 231:7 266:17 <hr/> I <hr/> idea 160:23 224:10 identical 205:10 identifiable 177:12 identified 186:20 identify 150:11 192:17 232:1 282:14 ignore 106:22 200:4 203:3,18 ignoring 203:25 II 91:13 Imagine 149:13 immediately 126:7 274:15 277:5 278:8,16 280:7,9 280:13,16 292:8 292:21 immobile 123:4 126:10 136:16 143:1 144:7,8 145:1 207:5 impact 251:18,21 implicitly 291:13 implies 206:5
---	---	--	--	---

important 95:22 174:1 177:22 253:24 268:9	133:17 187:4,6 188:12 189:5 193:3,20 210:20 261:23 262:8 263:14 264:8,12 264:17,22 265:15 265:19 275:21	indeterminate 116:10,12 122:17 INDEX 94:1 indicate 118:24 221:13 223:10 225:17	intend 160:16 275:14 276:12 278:19 279:23 287:15,21	inventor 224:3 252:9
impression 159:1	inclining 121:4 135:1,23 146:11 146:19 147:6 148:6 169:5,7 181:10,20 232:25	indicated 265:24	intended 101:1 221:13 224:22	investigation 252:5
improve 102:6,10 102:22 109:5,10 109:19 110:3,6,13 110:22 115:9 117:17 119:3 122:12 126:14,24 128:20 133:11 134:3,17 135:18 135:23 136:3,19 140:23 141:13,20 142:4 162:24 163:5,14 165:18 165:25 173:7 176:25 178:25 179:6 180:5 183:13 185:8 229:19 267:25 272:2 273:9,20 293:16	includes 114:19 116:16 117:9 120:24 121:17 125:1,19 138:8 199:11 250:18 258:17 269:7 291:18,19	individuals 127:10 industry 107:11 109:16 184:18 283:11,20	intending 275:18 interact 179:10,11 180:12	investigations 118:22
improved 117:5,6,9 132:18	included 146:1	inflow 131:21,21 131:22 198:24 206:6 219:9 287:10	interested 296:11	investigators 289:15
improvement 102:23 103:3,19 110:14	includes 125:16,22 126:2 288:14	inflows 202:2	Interesting 165:8	IPR2018-01748 91:7
improving 108:17 116:2 118:12 120:6 121:1,19 141:23 186:20 231:2	incoming 153:4	influx 133:1,6,12 133:23 134:5,9,12 135:5,7,11 136:17 270:14,14	interface 157:10 158:5,14 211:3,5 241:16,20 243:14 243:21,25 244:4,7 244:22 245:2 246:21 248:9,16 248:24 249:16 250:19 251:15,25 252:6,22 253:1,7 255:5 256:14 257:18 258:1 262:24 263:13 265:15,19 267:3 267:18	irregular 198:25
inadequate 108:25 146:25	inconsistency 204:3	information 158:21 175:1 188:19 291:20	interior 119:11	issue 227:3
inch 242:20	inconvenient 102:20	initial 126:12	intermediate 136:15	issues 231:11
inclination 184:22 184:24 194:3,10 212:1 233:14 234:3	incorrect 108:3	inlet 117:9 130:24 131:7,9,15 138:18 151:10 169:9,11 169:16,19 186:6,7 201:21 202:17 204:11 219:12,18 219:19 221:8 235:4 236:7,9,15 254:25 267:9,14	intermittent 174:5 222:17	<hr/> J <hr/>
incline 136:3 183:3 183:17 187:2 188:2 189:24 210:6 211:2 239:14 261:12 262:3 268:16	increase 110:18 114:11 146:11,20 147:5,6,9 148:7 149:4 165:25 166:7,15 169:3 171:1 173:9 174:19 178:7,8 188:7 193:8 228:3 229:1,3 231:15 261:13,17 268:16 289:17	inside 122:9 186:9	interpret 204:1 213:5 253:14 261:6	James 93:4 James@CHZfir... 93:9
inclined 111:9	increased 103:16 168:24 193:23,25 194:5 213:16,19 213:20,21,22 265:3,8 266:22	insignificant 147:25	interpretation 242:6,18 250:18 285:7	job 91:25 186:9 272:12 295:4
	increasing 213:25 214:2	install 187:17	intervals 198:25	jumped 166:10
	incredible 175:1	installed 164:18	introduction 240:22 241:3	jumping 256:11
		instance 92:2 136:12 209:14	invented 178:16	<hr/> K <hr/>
		instant 207:11	inventing 266:4	keep 218:2
		instructed 280:23	invention 99:23 167:7,10,16 168:14 175:11 190:23,24 191:2,4 191:7,8 259:2	Kesack 93:12 94:4 95:9 98:10 100:22 101:11 102:12,21 103:18 104:19 105:15 106:17,21 107:2,6 109:3 110:10 111:1,16 111:19 112:6 113:1,20 114:18 114:22 115:7 116:1,11 117:2,15 118:8 119:1,12,20 120:4,11,16,21 121:8,10,12,24 122:4,18 123:6,13 123:17 124:1,8,24 125:7,25 126:13 126:22 127:15,19 127:24 128:2,13 131:5,13 132:16 133:9 134:1 135:2 135:4,8,20 136:9 136:21 137:13,25
		Instructions 261:4		

138:5,25 139:12 139:19 140:1,7,22 142:11 143:16 144:11 146:4,15 149:8 150:8,15 151:25 152:25 153:20 154:8,19 155:5,23 156:6,17 157:1,13,23 158:6 158:18,22 159:9 160:12 161:6,9,14 162:3,8,14,16 164:8,19 165:3,11 165:16 166:23 167:11,21 172:4 172:12,24 173:6 173:24 174:17 178:1,11 179:19 179:24 180:24 182:11 183:14 184:3 187:22,24 188:5 189:12 191:20 192:2 193:5,10 194:8 195:2,16 197:12 197:14,19 199:17 200:8,17 203:1,7 203:14 205:19 206:15,20,24 208:1,8,16 209:1 209:9,13,22 211:7 211:11,24 212:9 212:23 213:18,24 214:12 215:11 216:3 218:4,19 220:5 221:5,15 222:6,12,22 223:3 223:11,20 224:1 225:1,9,20 227:9 227:14,21 228:5,9 232:10 233:5,7,12 234:8,13,19 235:17 236:4,11 236:23 237:3,11 238:4,9 239:1,16 240:6,14,18 241:11,14,25	242:5,11 243:3,18 245:5,13,23 246:13,19 247:7 248:7,13 251:1,6 251:23 252:19 253:2,13 254:21 255:2,9,11 256:9 257:15 258:25 259:5,11 260:1 261:11,18,25 262:2,12 263:10 263:20 264:15 265:1,7,12,22 266:16,21 267:7 267:12 268:13 271:5,9,25 272:19 273:8,16,24 274:17 276:9,15 277:10,25 278:7 278:22 279:4,7,25 280:11 281:5,12 281:25 282:9,18 283:8,15,23 284:21 285:13,21 286:8,17 287:6,17 287:25 288:8 289:6 291:12 292:1 293:24 294:7 Kesack's 279:24 key 137:6 kills 171:12 kind 231:16 232:1 268:18 285:9 know 96:2,7 99:2 101:6 103:11,11 103:17 107:23 109:4,14 112:25 115:2,4 116:7 122:15 125:6,8,10 126:1 127:8 133:25 139:5 144:8,13 145:15 147:14 150:19 151:19 152:1,2,4 152:12,13 153:15 153:17,24,25	154:3,6,10,12 158:23 160:9,9 161:4,7,10,17 168:12 171:6 177:20 180:11 181:11 185:11,11 190:25 191:3,7 193:16 199:23 214:9,23 222:17 225:16 228:14,16 228:20 241:1 242:2,21 243:4,5 243:5 247:8,24 254:24 257:24 264:3,9 265:11,13 265:23,25 266:6,7 266:8,11 274:24 281:15 283:22 286:3 knowing 161:17,19 242:7 263:19 272:3 knowledgeable 259:9 known 192:24 knows 157:22 224:6,7,8 <hr/> L L 130:8,10,15,16 130:18,19,21,23 131:3,6,14,15,18 132:1,8 laid 294:4 lake 147:3 laminar 136:24 150:17 151:1,8,18 151:21 152:3,6,8 152:18,22 153:13 154:1,11,12,17,20 155:1,7,11,19 156:8,11,14,22 158:4,23 159:3,6 159:18,21 160:7 161:7,10,21 275:7 275:9,11,22 289:10,18,19,24	290:2,7,18 291:17 lands 145:2 language 204:12 242:21 288:14,17 lapsed 146:25 large 144:3 147:24 148:20,23,24 163:22 173:17 181:11 185:23 198:25 199:2 largely 202:17 204:11 larger 172:1 181:14 210:21 211:12,14 211:16 219:18 236:21 237:5,8,25 238:19 240:2 273:2 large-capacity 170:3 large-diameter 186:12 large-volume 170:1 laughable 207:13 Laughing 196:5 launch 206:8 law 145:8,9,12,13 148:19 lawyer 261:4 lead 225:7 227:16 228:17 leading 274:17 276:2 280:12 281:5 282:1,9,18 283:8,15 285:13 285:21 leads 104:3 163:3 163:12 leave 163:21 205:8 leaves 112:10 206:10 209:25 leaving 104:7,8 113:12 129:4,8 208:21 217:23 234:21 277:7 293:5 led 135:15 168:23	288:19,20 left 171:21 206:1 263:17 265:15 267:18 left-hand 216:16 262:19 276:23 leg 138:23,23 139:8 139:21 140:9 length 171:1 255:18 256:4 257:4 let's 101:5,6 111:5 130:25 162:14 192:13 215:12 255:9 261:19 266:17 274:20 280:19 level 155:12,13 156:2 160:1,2 169:8 171:11 187:13,15,15,20 190:10 196:24,25 214:22 217:12 218:2,6,12 219:2 219:5,6,6,11,16 220:9,13 221:2,7 243:6 256:14,18 256:20,24 273:15 281:3 286:20,21 286:25 287:1,5,8 287:8 lexicographer 212:11 light 230:17 261:7 272:17 lightest 112:23 limit 287:21 limitation 242:8,13 242:24 243:2,2 249:11 257:18 258:12 limitations 246:22 248:9,16,19 249:16 250:19 251:15,25 253:8 255:6 258:2 limited 145:19
---	---	---	--	---

151:21 153:13 154:1,11 158:17 228:14 233:20 275:7,9,11 limiting 178:3,6 limits 208:14 line 99:12,14 100:1 104:20,21 164:14 175:19,21,22 206:9 207:7 208:12 221:21,21 225:21 263:17 linear 245:19 246:9 lines 269:14 285:9 292:6 liq 164:2 liquid 108:18 109:6 109:11 110:4,14 110:21 111:2 112:19 114:13 117:10,11 126:19 130:1,4,6 131:21 131:22,22 132:3 133:1,6,7,12,23 134:5,9,12 135:5 135:7,11,22 136:2 137:15,19 138:14 141:2,4 142:25 144:3,17,18,19 145:2,17 152:11 154:25 155:6,9 156:2,7,19 157:11 157:11,15,16,17 157:19 159:6,15 160:4,7,14,17,23 160:24 163:24 171:13,16 173:14 174:5,7,12 182:10 182:14,15 187:15 187:18 190:7,8 192:25 193:1,12 193:13,20 195:1 196:23,25 198:19 198:25 201:8,14 201:18 202:14 203:9 204:7,18,19 204:21 205:8,11	205:15,20,21,24 205:25 206:3,6,6 206:9,11,16,22 207:1,12,21,23,24 208:18,18 209:5,7 209:25 213:4 217:16,17,20,20 217:21 218:1,6 219:2,5,5 220:12 221:2,6 235:21 248:23 254:15 256:15,18,20 265:14,17 267:4,8 267:13,17 273:10 274:12,16 277:4,6 278:12,16 279:13 280:13,15,16 285:8 286:20 287:5,7,8 292:7 292:13,14,20 liquids 100:12 108:9,14,24 112:10,13 134:21 134:24 145:19,24 190:11 207:3,4,4 256:21 263:9 278:8 287:10 liquid-free 201:17 202:14 204:6,24 205:3,11 liquid-gas 217:22 liquid-starved 168:7 169:21 215:6,23 216:25 217:10,13 218:11 218:23 219:17 list 187:10 199:10 199:11 listed 199:15 liter 173:1,2 literature 189:4,7 189:14 197:25 little 218:1 240:24 258:14 LLP 93:13 location 104:18 136:6 185:12	locations 228:15 long 135:22 136:3 140:19 142:24 longer 112:16 139:2 143:5 171:17,18 226:10 228:21,23 231:4 longer-duration 170:4 longitudinally 244:13 look 110:5,21 111:5 141:1 148:18 152:16 166:3,14 177:4 178:13 180:5,13 183:24 183:25 185:9,14 189:15 191:14 197:10 199:24 202:7 205:24 211:21 253:22,25 254:3,5,9 257:24 259:19 262:4 263:21 271:20 272:9,17 274:20 276:4,18 278:24 279:15 280:19 282:24 284:2,6,17 looked 97:3 166:5 167:14 168:10 228:20 260:12 272:6 290:13 looking 99:4,5 103:10 150:9 154:16 158:13 166:12 168:20 171:5 173:7 178:22,23,24,25 179:5,7,8 180:18 185:12 214:20 228:16 241:4 246:14 257:21 267:25 271:24 272:16 285:4 288:23 looks 159:25 202:3 209:18	losing 277:14 lot 164:11 166:6,14 173:17 179:9 180:12,16,20 252:7 286:23 low 149:20 150:2 206:7 lower 144:5,7 193:22 194:13 207:17,18,20 231:9 236:3 lowering 186:5 lower-capacity 170:4 low-pressure 186:18,23 Ls 131:8 ludicrous 230:3 L's 131:11 <hr/> M <hr/> Machine 92:8 main 101:8,23 maintain 163:18 219:4 286:21 maintained 221:1 maintaining 214:22 making 142:6 169:5 182:24 187:20 191:18 225:18 230:4 251:20 manage 187:20 managing 187:18 manifold 199:3 manned 171:8 manner 232:17 233:2,9,23 234:14 237:22 238:15 239:8,18 240:10 260:3 286:10 293:7 manual 189:13 manufacturers 228:21 march 109:18	marked 113:3 267:3 mass 147:24 236:2 material 176:5,8,14 matter 135:21 136:2 142:15 147:12 169:18 234:18 264:5 274:14 287:13 matters 234:17 maximum 164:15 165:5 256:14 mean 100:9 104:17 105:2 124:14,15 139:15 178:17 180:15 189:6,11 212:10 220:8,16 222:4 240:7,17,19 241:19 242:19 244:1,12 248:19 249:22 251:7 254:24 264:22 270:5 287:4 290:18 292:10,17 293:4 meaning 220:23 242:18 258:1 259:13 269:22,25 meaningless 245:20 246:11 means 105:3 106:15 218:9 220:7 241:20 242:20,21 244:16 245:10 249:5 251:25 253:8 277:12 290:22 meant 211:17,19 224:12 277:8 measurable 226:24 measure 267:6 mechanical 187:18 286:25 mechanics 180:16 180:19 210:9,10 210:11 239:7,9,10 239:25 258:23,23
---	--	---	---	--

259:10 282:2 mechanism 118:19 290:19 mechanisms 134:18 212:3 meet 97:13 111:10 177:17,19,20 178:4,12 179:4 180:4 242:13,23 243:10 294:4 meets 107:21 242:8 243:1,2 253:20 memorized 247:6 247:21 memory 98:3 280:6 mention 104:5,6 167:24 252:25 254:15 289:21,24 mentioned 96:18 97:11 105:7 messing 196:9 met 242:2 meters 269:21 method 221:14,14 248:4 methods 274:8 middle 195:4 244:19 mile 242:20 Miller 91:22 92:6 101:4,5,6,14 296:3,17 million 116:23 269:5 270:8 milliseconds 220:2 mind 118:2 166:5 257:22 258:18 271:17 minimum 147:20 148:14,15,17 minute 222:7 minutes 197:23 222:24 223:6 226:13 missed 175:20 misstates 125:4 139:23 140:4	143:22 154:13 156:9 164:22 238:3 mist 187:12 mistake 249:15 Mister 276:13 mitigate 171:18 mixed 100:11 mixed-phase 198:18 201:13 mixture 100:11 134:17,21,24 135:15,15,16,18 136:18,19 145:24 231:10 mixtures 152:16 161:18 mobile 114:6 115:15 116:8,9,25 116:25 122:7 124:22 126:10,19 126:20,21 133:6,7 136:16 142:18 144:6,17,18,19 149:25 207:5 mobilized 114:8 mode 216:24 217:15 218:8,10 218:14,22 219:22 221:11 226:21 255:18 257:4,6,10 model 159:17 253:15 modify 229:18 moment 133:5 274:21 moment's 207:5 month 224:16 225:25 226:6,9,25 227:2,4 270:12,18 270:22 morning 95:10,11 232:1 motivated 228:13 229:8,18 268:16 mound 141:3 267:2 move 103:4 119:9	121:8 135:2 137:9 137:17 145:17 187:23 197:12 233:5,5 moved 144:24 movement 139:4 moves 121:5 moving 115:6 136:23 139:7,17 140:3 149:10,25 277:12 293:2 multiphase 100:4 100:16,17 103:25 103:25 104:4 170:4 184:2 207:3 207:9 235:5,9 255:24 multiple 103:13 236:17,21 multiple-pipe 208:10 mushy 242:14 m3 269:23 <hr/> N <hr/> N 95:3 NAME 295:2 narrow 156:19,19 242:16 252:4 natural 102:25 222:19 nature 160:13,17 160:24 NCRA 91:23,23,24 296:20 near 131:7,9,15 156:12 242:15 nearly 184:17 necessarily 114:1 157:9 193:21 210:21 211:16,21 216:17 253:18 need 98:1 108:13 117:16 125:14,15 125:21 133:20 165:18 166:15 170:20 183:2,19	270:23 needed 179:4 186:9 needs 104:3 105:17 106:22,25 114:14 117:4,6,8,11 132:18 165:24 228:17 249:11 273:1 negative 173:20 neither 177:24 296:9 net 139:25 157:18 never 109:15 114:2 115:6,14 116:24 126:20 152:7 189:18,18 219:21 269:12 291:1,4 new 93:16,16 215:9 228:10 292:3 next-to-last 279:16 nominal 186:6 nonautomatic 212:15 nonliquid-filled 169:14,15 170:25 nonmanual 190:11 nonresponsive 121:9 135:3 187:23 197:13 233:6 nontechnical 199:8 nonuniform 120:1 non-coagulating 118:23 non-colloidal 147:14,17,19 non-inclined 210:20 234:9 262:17 non-laminar 289:14 290:15 non-sloped 184:11 184:13 non-slug 190:8 205:14,17 206:17 218:15 normal 190:7	208:17 215:8,25 216:23 217:12,14 218:8,10,14,22 227:16 Notary 92:7 296:3 296:20 Note 94:9 noted 295:20 not-inclined 262:9 262:14 nozzle 163:20 nozzles 177:23 no-flow 157:9 number 115:4 118:24 148:21,23 148:23,24 149:22 150:1,2 151:13 161:20 179:12 181:12 231:6,7 235:9 numbered 92:4 numbers 149:1,21 149:23 150:14,18 151:11,20 153:11 154:6,9 159:11 181:2 241:2 248:12 <hr/> O <hr/> O 95:3 oath 95:5,13 objection 100:19 101:10 102:11,14 103:9 104:15 105:12 106:16,19 106:24 107:4 109:1 110:7,23 111:11 112:3,24 113:15 114:15,21 114:25 115:23 116:6,18 117:13 118:5 119:5,18,24 120:9,14,20 121:3 121:8,21 122:2,14 123:1,11,16,21,24 124:6,19 125:4,23 126:4,17 127:14
---	---	--	--	---

127:15,21,23	240:16 241:23	200:21,23 203:2	260:16,22,23	operational 243:7,7
128:10 132:14	242:3,9,25 243:16	212:16 259:12	262:1 263:11	operations 164:17
133:4,24 134:13	245:4,11,16 246:6	260:2,5	268:14 269:17	operator 251:9
135:6,12 136:13	246:16 247:5,11	offices 92:9	270:10,19 272:1	operators 102:20
137:23 138:4,21	247:20 248:1,10	oh 175:8 179:19	273:17 275:2	operator's 104:23
139:11,14,23	250:22 251:4,16	198:23 241:1	276:6,22 278:4,10	opinion 102:2,5
140:4,17 142:9	252:14,16,17,23	260:22	279:3,3 280:19,21	105:23 106:22
143:13,22 146:2	253:9 254:20,23	oil 100:6,18,20,23	283:1,6 286:1,6	108:2 109:9
146:13 149:5	255:7 257:13	107:10 109:16	288:12 289:5	110:12 111:9
150:6,13 151:23	258:13 259:4,7,17	150:25 152:8	292:5,11,19	113:21 114:10
152:23 153:16	259:18 261:9,16	153:6 231:8	old 282:4	115:8 116:2,12,13
154:2,13 155:3,21	262:10 263:4,18	256:21 285:15,17	once 116:21 139:1	116:16 117:4,5,8
156:5,9,10,23	264:13,25 265:6	okay 96:20 98:4,9	143:4 224:13,16	117:16,20 118:3
157:8,21 158:1,16	265:10,20 266:15	100:2 104:9,21	270:18	119:2 120:24
159:7 160:8 161:3	266:19,20,24	108:8 109:23	ones 168:7 248:14	121:16,25 122:19
161:12,24 162:6	267:11 268:4	110:11 111:5,7	252:11	123:9,18 124:5,18
162:12 164:22	271:3,7,19 272:4	112:7,15,22 113:2	one's 131:9	124:20 125:1,15
165:7,14 166:19	273:6,13,22	113:7,21 114:3,4	one-time 119:7	125:16,21,22
167:8,19 171:24	274:17 276:9,15	114:10 115:8	oOo 110:25 115:25	126:2,5,11 129:3
172:10,21 173:4	277:10,25 278:7	117:16,22 118:10	223:25 283:25	129:8 130:14
173:21 174:15	278:22 279:7,25	118:15 119:8	291:25	132:9,17,19,21,24
177:18 178:5	280:11 281:5,25	120:23 121:22	open 190:6 204:18	133:10 135:9,21
180:23 182:8	282:9,18 283:8,15	123:14 127:24,25	204:21 205:5,7,8	138:7,10,13,16,20
183:11,21 187:22	283:23 285:13,21	129:23 130:25	207:24 208:4	139:1 145:3,5,23
188:3 189:9	286:17 287:6,17	132:24 133:15,23	224:13,16	146:19 147:8
191:25 193:9	287:25 291:10,23	140:2 141:2	opened 224:15	150:16 152:20
194:7,17,24	293:18,22	147:22 148:24	opening 102:18	155:2 156:18
195:14 197:17	objections 277:18	149:13 150:10	103:2,5 268:23	157:24 158:14
199:16,19 200:6	observed 270:22	158:10 159:5	opens 102:19	162:21 164:20
200:13 202:22	obvious 124:20	165:22 169:2	251:12 286:20,24	165:4,22 166:13
203:5,12 205:16	173:8 291:22	174:23 176:23	operate 233:22	166:18 167:15,25
206:13,19 207:22	obviousness 101:9	177:10 179:15	257:10	168:12 169:2
208:6,11,23,23	101:13,24 102:4	180:13,18 181:5	operated 107:20	171:15 173:25
209:6,11,20 211:6	113:21 121:25	187:8,16 192:13	232:16	174:11,18 177:2,4
211:9,20 212:7,21	123:9,18 124:4,18	192:16 196:14	operates 234:4	181:7 183:1 185:2
213:12,23 214:8	125:1,14,16,22	198:16 200:2	237:21 238:15	187:1,25 190:3
217:18 218:17	126:2 132:18	201:4 207:6,14	240:9 259:2	191:13 192:5,8
219:24 221:3,12	138:10,13,19	209:17 213:8	operating 102:16	194:9,16,22 199:5
222:3,11,15 223:1	162:17 214:4	214:25 215:9,16	112:16 152:21	200:2 202:18
223:7,18,22 225:2	272:21 291:7	216:12,15 221:16	186:5 227:16	203:3,15,19 204:2
225:15 227:8,11	occupy 239:20	227:5 228:10	233:8,15	204:19 205:14,17
227:18 228:6	occur 192:25	229:11,15 232:6	operation 164:16	206:12 208:17
232:8 233:5,10	occurred 269:12	232:12 240:19	190:7 208:18	210:8 213:1
234:5,10,15,24	occurs 172:5	241:13 242:16	215:8 216:1,24	214:15 217:14
235:3,22 236:8,18	ocean 116:22	244:6 245:7	217:15 218:15,15	219:21 220:6
237:1,7 238:2	odd 152:24	248:17 251:2	218:23 226:21	231:14,21 234:20
239:4,22 240:12	Office 91:1 200:20	252:1 255:14	256:4 286:10	236:5 242:1,12

247:3,9,18,24	133:8 138:18,23	owner's 275:4,24	281:24 282:25	277:2
248:18 249:10,14	139:2,5,10 140:16	276:13	285:24 286:3,9	parties 296:10
250:3,17 251:14	140:21 141:5,7,10		289:1 290:6,8	party 296:7
252:2 253:5 257:1	142:1,8 143:3,3	P	292:3	pass 159:14,24
259:1 260:4,8	143:21 155:12,14	P 95:3	paragraphs 246:20	patent 91:1,1,6,8
268:14 271:10	155:15,16,17,20	package 250:24	276:5	92:2 93:11 99:20
279:18 283:12	155:20 156:2,3,16	page 94:2 118:17	parameter 268:8	101:25 111:10
289:8 290:22	162:2,5,11 169:17	118:21 133:16	parameters 228:16	113:8 178:18
opinions 101:6,8,23	169:20 172:13,15	134:9 137:5	231:12 269:18	188:25 200:20,21
102:5 118:7	182:1,3,6,14,15	164:14 175:9	270:3,4 271:1	200:23 203:2
128:14 167:5	182:16,17,18	180:21,22,25	272:3,8	212:16 220:18
191:10 200:9	187:16 190:9	184:25 189:22	parenthetical	226:18,20 227:15
272:21 281:10,13	201:16,19,20	192:18,22 193:7	292:23	227:19 245:6,9,12
282:7,16 287:16	202:3,13,14,16	193:19 195:11	part 113:2 116:21	246:15,18 249:12
287:21 291:7	203:9,10 204:10	196:17 198:6,9,12	116:22 118:3	249:23 250:25
ORAL 92:1	204:10,16,18,20	198:13,16 204:14	120:1 123:9	251:20,25 253:14
order 149:23 203:2	204:20,21,23	205:25 206:1,1	124:17 125:21	253:21 254:11
ordinary 102:5,9	205:2,3,7,8	210:16 212:17	130:5 137:14	256:1,3,8 259:12
109:5,10 110:12	207:15,18,21,21	214:18 216:9,13	139:17 140:2	260:2,5 269:16
127:3,8,9,12	207:23,24,24	228:10 229:14	141:9 143:1	275:4,23 276:13
128:8,11,15,23	208:13,18,22	232:11 240:20,23	150:16 153:4	291:22
160:22 163:4,13	209:5,8 212:15	240:23,25 241:2,4	154:22 155:6	patentable 178:22
165:23 166:2,13	214:22 215:2,18	241:6 248:8,11,12	158:24 162:4	patentee 220:6
167:6,24 168:5,19	217:17,21,25	248:15 255:12	165:12 170:8	259:2
169:3 174:13,19	218:7,13 219:2,12	256:13 260:15,15	178:23 179:1	patently 204:12
176:16 189:23	219:13,17 241:17	260:15,21,22,23	180:10 181:6	patent's 252:20
191:7 192:9,19	241:21 242:15,15	260:23 261:19,24	195:25 291:8,14	penultimate 279:16
196:12,15 199:12	242:17 243:6,11	274:24 276:19,23	292:14	people 174:24
228:12 229:7,17	243:15 244:5,9,15	278:25 279:2	partially 174:12	181:13 190:9
232:14 255:16	248:23,25 249:3	284:4,7,16 288:9	particle 116:8	269:23
257:2 267:24	255:1 256:16,17	288:10,13,19,20	118:25 134:6	people's 190:1
268:15 271:11,15	256:18,21,22	290:14,16 294:5	147:13,21 150:1,4	perfectly 150:22
272:11,15 281:3	262:25 267:5	PAGE/LINE 295:5	particles 112:23,23	perform 253:11
284:9 285:19	273:12 276:2	paper 229:15	119:9 133:19	254:4,6 255:3
original 241:8	280:5,7,10,14,17	paragraph 99:12	137:8,17 147:19	258:16
260:14,21 261:21	293:5,8,11	99:15,17,22	147:20 165:5	performance 154:7
263:3 276:4	outlets 190:7 202:7	106:20,23 111:14	221:23 222:2	181:14
280:19	203:10 204:13,22	138:8,11 192:22	274:12,15	performing 257:17
outcome 277:14	205:9	193:6 218:8	particular 139:6	performs 254:1
296:12	outlet/flow 277:3	229:11,13 232:13	153:18 198:23	period 103:14
outflow 219:10	outside 245:22	237:20 238:13	226:21,22 231:12	222:5,8 223:9,16
outlet 103:11	254:2	240:22 241:9,10	235:7 268:10	224:4,19 257:10
107:25 111:21	overwhelming	255:13 260:17,18	269:1 271:17	268:22
112:1,5,12,20	170:1	260:25 261:3,22	288:24 293:13,14	periodic 270:14
113:12 121:6	overwhelms 171:12	274:21 275:19,20	particulate 277:12	Perry 91:22 92:5
130:14 131:19	owner 91:6 92:3	276:19 278:10,24	particulates 164:15	296:3,17
132:2,6,11 133:3	93:11 227:19	279:17 280:20	165:9 276:24	person 102:5,9

109:4,9 110:12 127:3,8,9,12 128:7,11,15,20,23 160:22 163:4,12 165:22 166:2,13 167:6,23 168:4,19 169:3 174:13,18 176:16 178:12 185:7 189:23 191:7,14,15 192:9 192:18 196:11,11 196:15 199:12 228:12 229:7,17 232:14 255:16 257:2 259:9 267:24 268:15 271:10,15 272:11 272:12,14 284:9 285:18 personal 190:13 Pesco 189:3 petition 96:16 petitioner 91:3 93:3 96:17 phases 198:19 201:14 phenomenon 289:16 phrase 283:3 physical 242:17 pick 231:18 picture 181:18,19 181:22 191:24 257:22 262:23 263:21 264:11 267:1 284:4 picturing 171:5 pile 131:23 258:21 258:24 pipe 175:3,5,17 176:8,14 177:2 178:13,19,22,23 178:25 179:7,17 180:11,13,16 181:10 182:1,3,4 182:6 183:3,17 184:11,13 193:8	195:7,8,13,15,20 205:2,15 206:7 208:13,21 209:14 209:18,19 210:24 211:5,25 232:25 235:8,15,16 236:7 236:13,15 237:9 237:16,18 239:12 250:7 284:22 285:1,2 pipeline 171:14 177:5,7 195:19 196:19 206:4 207:10 pipes 177:1,15 181:20,23 186:2,4 199:3 207:9 236:14,17,22 237:12,13 238:1 238:20 239:12 pipng 104:11 105:6 178:10 185:22 193:1 251:21 place 129:16 131:17 148:13 174:21 places 149:22 PLA-9 185:22 please 95:20 96:2 121:13 123:23 126:1 128:1,3 136:6 146:3 153:2 163:7 180:25 241:9 247:8,15,23 255:12 261:22 274:22 279:20 288:9 PLLC 92:10 93:5 plug 143:2 plugging 165:1 plumbing 183:25 plus 137:10 236:21 267:16 point 104:6 118:11 120:2 121:5 132:8 136:5 139:16	142:12 157:12 165:8 175:19 176:15 183:24 206:8 217:21,25 220:15,24 231:3 244:18,23 245:8 277:22 pointed 134:8 290:14 pointing 130:11 131:7,9,18 132:8 pool 193:21 194:12 portion 108:10,15 108:18,24 109:6 109:11 110:4,14 112:19 117:10 121:15 124:12,14 128:5 129:14 130:19,20 139:9 139:21 140:9 141:19 142:2,23 142:25 143:9,12 143:18,20 150:5 151:8,14,17 152:10,11,18 154:21,22,23 156:7,21 163:3,10 163:11 164:17 165:6 170:25 172:8 173:2 182:2 182:7,12,23 183:3 183:6,8,10,12,16 183:20 184:4,5 188:7 189:22 191:22 192:11,20 193:8 194:15,20 194:22,25,25 195:4 208:9,20 211:8 215:1,15,18 232:23,24 235:14 238:12 246:2 247:17 248:24 252:12 253:19,23 253:25 263:3 265:14 268:17 273:11 277:4 portions 130:4	150:11 155:8 161:22 167:22 252:12 253:16 254:16 position 245:2,3,19 246:9 288:25 possibility 206:22 285:1 possible 126:5 144:8 204:23 229:19,25 230:8,9 230:10,11 243:7 284:25 Possibly 179:8 potential 106:7 143:15 144:2 227:12 231:20 253:11 267:21 pounds 223:14,15 227:2 270:12,17 preceding 121:15 128:5 163:10 194:20 215:15 238:12 246:2 247:17 predetermined 286:21 predicated 275:6 prefer 217:10,12 253:10 preferred 216:23 217:14 218:8,10 218:22 220:9 221:14 Preliminary 118:22 prepare 96:13 preparing 281:10 282:7 present 175:11 pressure 175:18 177:7,12,22 178:9 178:13,18,19 179:5,6 180:4,5 186:6,22 188:8,10 189:8,15 207:17 207:17,18,20 225:5 230:2 270:1	pressures 186:5 195:25 230:5 pressure-velocity... 207:6 pretty 156:19,19 178:6 prevent 169:24,25 170:7,8,12,14,17 172:14 223:2 preventing 162:10 276:1 previous 97:16 99:21 156:3 186:5 previously 127:22 134:2 primary 102:15 174:9 principles 281:18 281:21 282:2 prior 125:5 139:24 140:5 143:23 154:14 156:10 164:23 238:3,5,23 242:7,12 254:4 280:25 probably 97:20 139:5 178:7 223:14 277:3 problem 102:15 122:20 186:15,16 186:16,19,19 268:8,9 271:21,22 271:23 272:7,8,15 272:16 problematic 184:15 problems 171:7 272:13,24 273:18 proceeding 95:24 296:10 Proceedings 294:8 process 100:10 114:5 115:3 117:17 118:1 119:7,25 132:4 133:18 136:15,15 144:1 170:6 171:2 184:2 193:1 197:1
--	---	---	---	---

222:19 250:20 251:5,7 produce 225:24 produced 92:2 107:11 226:13,25 produces 107:14,24 152:22 producing 226:6,7 product 189:13 production 100:4 143:24 144:10 150:25 properly 170:6 properties 137:7 proportion 219:18 proportions 175:12 proposed 214:11 provide 170:20 190:10 240:5 provided 204:5,8 287:16 provides 234:11,16 providing 170:19 Public 92:7 296:3 296:20 published 189:18 189:19 purported 254:9 purporting 176:19 purpose 104:9,14 141:23 174:9 188:16 200:10,12 200:14 254:11 purposes 280:23 put 101:4,6,13 115:21 150:20,21 229:10 266:2 269:9,13 putting 129:1,6 235:9 P.E 95:4 295:25 p.m 92:5 215:13,13 245:25,25 255:10 255:10 274:1,1 294:8	question 96:1,6 109:8 110:9 111:17 116:19 117:1 121:13,16 125:11,24 127:20 127:25 128:6 129:5 142:6 146:5 155:24 158:17,21 163:11 171:4 176:22 193:11 194:18,21 201:9 205:6 212:22 215:16,22 228:12 229:17 238:8,10 238:13,18 239:2 241:5 246:3 247:15,18,23 260:6 263:12 266:5 275:6,25 276:2 277:23 279:10 questioning 275:5 275:24 279:4 questions 98:2 118:6 127:21 196:11 214:25 215:17 235:23 268:11 273:24 275:5,15 276:14 279:24 280:4 284:21,23 288:6 292:2 293:20 294:7 quick 263:8 quiesce 156:15 quiescent 155:10 quite 113:18 269:20 quote 288:24 289:9	range 127:10 147:13 151:15 175:1 rapidly 133:22 143:25 rarely 153:5 rate 107:14 110:18 110:22 114:11 121:6 126:15,24 131:20,21 134:25 136:17 138:3 141:13,24 142:4 146:12,20 147:25 148:7 149:2,4 174:8 219:8,9,9 221:22 224:20 225:8,10 236:2 269:1,2,4,24,24 269:25 270:7,10 289:17 rates 160:11 raw 129:14 RDR 92:6 296:3 reach 217:24 reached 120:2 132:1,8,10 164:16 165:5 291:16 reaches 217:21 256:18,20 reaching 276:1 read 96:15,16 98:22,25 99:15 102:13 104:2 106:10 108:15,20 121:12,14 128:2,4 136:14 137:20 151:7 163:9 165:10 175:24 194:17,19 215:14 217:6 224:2 225:17 238:10,11 245:12 246:1,18 247:8,16,23 257:7 274:22 279:20 286:2 290:14 291:6,15 295:18 readback 121:20	128:9 163:16 194:23 216:2 238:22 246:12 248:2 reading 103:4,12 105:16,19,20 158:11,19 165:23 176:16,24 196:16 199:4,13 231:25 273:17 real 171:11 reality 220:4 really 149:21 174:3 214:9 219:25 222:16 269:22 Realtime 91:23,24 92:8 296:19,19,20 real-world 272:14 reason 96:10 100:25 102:2,4 110:2,20 142:4 212:19 213:9,14 214:17,23 226:12 258:23 272:25 273:9 295:5 reasonable 230:7 230:18,20 231:4 250:1 261:7 reasons 102:9 162:23 reassessing 118:7 rebuttal 96:15,17 216:11,14 241:8,9 261:5 274:20 276:18 278:25 282:24 285:24 recall 117:24 120:10 138:9,12 165:21 191:5,6 230:15 274:4 279:4,11 281:15 286:11 288:18 290:11 Recess 162:15 215:13 245:25 255:10 274:1 recessed 294:8	recollect 108:12,16 recollection 115:24 record 121:15 128:5 131:3 163:10 194:20 215:15 238:12 246:2 247:17 273:25 296:5,11 reds 175:23 reduce 104:11 105:5 171:1 reduced 106:9,11 106:12 reduces 106:3 reducing 104:7 121:6 reentrained 113:17 113:18 114:13 117:11 124:16 126:7 207:4 256:22 277:6 278:18 292:9,15 292:25 293:1,8,17 reentrainment 159:16 refer 99:5,8 291:2 reference 111:17 116:20 138:8 153:12 175:11 188:22 204:1,2 205:23,24 210:13 269:25 274:5 references 96:18,21 96:23 97:1,3 110:5,22 116:14 178:20 referencing 284:11 referred 162:18 215:7,25 291:4 referring 99:6 111:15 130:22,23 130:24 131:4 181:2 200:15 238:24 regard 281:21 285:15 287:4 regarding 167:5
---	--	---	---	--

Q**R****R** 95:3
RADULESCU

93:13

rain 207:9,9**random** 99:3**randomly** 272:13

275:15	removed 104:4,22 105:3,18 106:2,5 249:24 250:4 251:10	rest 222:24 223:6 225:13	122:25 125:3 126:16 127:22 128:17,22 132:2 132:12 133:3,13 135:24 136:5,12 138:20 139:22 140:3,10,13 141:19,21 142:8 142:10,13 143:6,7 146:17 147:17 148:2,11 149:11 150:17 151:3,5,7 151:22 152:12 153:9,13,21 156:20 160:4 161:2,7,11 162:11 162:13,19 163:1 165:13 167:3 168:10,17 169:12 170:13,15,16 172:20,25 173:3,9 174:14,20 175:22 175:25 176:1,3,6 176:14,24 177:3 177:15 179:17 180:1,21 181:7,18 183:6,9,17,20 184:11,22 185:10 186:21 187:7 188:23 190:20 191:9,24 194:6 195:8,13 196:10 197:4,6 200:10,22 202:1,7,8 203:4 203:16,20 204:16 204:20 208:22 209:3,5,19 212:2 212:6 214:1,2 215:3,20 216:8,10 216:21,22 217:8 218:24 219:3,22 220:17,18,20 221:2,7,11 222:14 222:23 224:2 226:6,10 227:7,17 228:23 229:2,24 230:8 232:4,5	234:14 236:25 237:12,18,19,22 238:1,16,21 241:6 242:13 243:20,21 244:3,5 245:3,15 246:5,15 247:1 249:8,16 250:5 252:13 253:3,8,17 254:22 255:12 257:8 258:5 259:14 260:4,9 261:22 262:25 263:13 264:12,23 265:18 267:9,14 267:19 269:8 271:18 285:5 289:19,22,23,24 289:25 290:7 291:5,9 292:22 293:6,12,17
regardless 239:25	removes 107:18	restate 281:19	right-hand 262:20	rise 221:7
regime 207:6 285:5	removing 103:24 103:25 104:10 105:8 174:10 250:8 251:3,5,11	restriction 150:2	risk 107:18,19	Roman 240:24
regimes 275:22	repeat 95:19 96:2,3 127:25 146:3 163:7 247:15	result 157:17,18 175:14 185:16	room 166:4,6,15,15	roughly 175:11
284:18 289:10,14	repeated 96:7 180:17	resuspended 116:4 116:17 117:18 118:13 119:4,22 120:7,25 121:18 122:24 123:8 125:2,17 126:3,16 126:25 128:21 129:2,7 133:2	roughness 180:13	rules 95:16
regions 119:10,16 151:17	replace 186:2	review 97:10,25 98:8,20 118:20 134:15 136:7 137:4 164:13 179:22 192:21 247:14 252:24 256:10 275:1 279:21 286:5 289:4	run 268:23	runs 277:13
Registered 91:23 296:18	reply 282:24	reviewed 97:18 98:11 108:11		
regular 207:9	report 189:11	reviewing 284:10	S	
regularly 177:19	reported 91:21 92:8 289:17	Reynolds 149:20 149:22,23 150:1,2 151:12 161:20	S 95:3 113:3 164:15 165:5	
related 296:9	reporter 91:23,23 95:2 96:3 121:14 128:4 163:9 194:19 215:14 238:11 246:1 247:13,16 296:18 296:19	Rhinesmith 286:19 293:21,23 294:1,3	safe 251:11	
relation 128:19 251:15	represents 148:15 250:24	right 95:14 98:12 98:18 99:15 101:9 101:25 102:7 104:6,25 105:8,9 105:11,16,25 106:6,9,10,11,12 106:13,14,18 107:25 109:12 110:14,18 111:10 111:22 112:17,20 113:5,9,12,14,22 113:25 115:22 116:5,13,14 117:5 117:6 119:23 120:5,8,18 121:2 121:19 122:1,13	sag 206:3,7	
relative 233:24 296:10	required 146:25 161:19 178:12 254:10 255:3 291:21	right 95:14 98:12 98:18 99:15 101:9 101:25 102:7 104:6,25 105:8,9 105:11,16,25 106:6,9,10,11,12 106:13,14,18 107:25 109:12 110:14,18 111:10 111:22 112:17,20 113:5,9,12,14,22 113:25 115:22 116:5,13,14 117:5 117:6 119:23 120:5,8,18 121:2 121:19 122:1,13	sags 206:8	
relatively 198:20 201:14,17,18 202:14,15 203:10 204:6,7,24 205:3 205:10 213:4	reporting 178:9	right 95:14 98:12 98:18 99:15 101:9 101:25 102:7 104:6,25 105:8,9 105:11,16,25 106:6,9,10,11,12 106:13,14,18 107:25 109:12 110:14,18 111:10 111:22 112:17,20 113:5,9,12,14,22 113:25 115:22 116:5,13,14 117:5 117:6 119:23 120:5,8,18 121:2 121:19 122:1,13	sampling 224:20	
relevant 258:11 269:12 280:24	represent 148:16 253:20	right 95:14 98:12 98:18 99:15 101:9 101:25 102:7 104:6,25 105:8,9 105:11,16,25 106:6,9,10,11,12 106:13,14,18 107:25 109:12 110:14,18 111:10 111:22 112:17,20 113:5,9,12,14,22 113:25 115:22 116:5,13,14 117:5 117:6 119:23 120:5,8,18 121:2 121:19 122:1,13	sand 91:3 100:5 103:4,10,21,21 104:3,7,8,10,22 105:3,8,17 106:2 106:2,5 107:12,12 107:23,24 109:24 111:21 112:1,5,9 112:10,17,18,22 113:3,3,5,6,7,9,11	
relied 291:1	requirements 178:7,9	right 95:14 98:12 98:18 99:15 101:9 101:25 102:7 104:6,25 105:8,9 105:11,16,25 106:6,9,10,11,12 106:13,14,18 107:25 109:12 110:14,18 111:10 111:22 112:17,20 113:5,9,12,14,22 113:25 115:22 116:5,13,14 117:5 117:6 119:23 120:5,8,18 121:2 121:19 122:1,13		
relies 291:13	reserved 296:7	right 95:14 98:12 98:18 99:15 101:9 101:25 102:7 104:6,25 105:8,9 105:11,16,25 106:6,9,10,11,12 106:13,14,18 107:25 109:12 110:14,18 111:10 111:22 112:17,20 113:5,9,12,14,22 113:25 115:22 116:5,13,14 117:5 117:6 119:23 120:5,8,18 121:2 121:19 122:1,13		
rely 180:22 252:3 264:21	reservoir 107:14 124:11 222:20,20 226:15,16	right 95:14 98:12 98:18 99:15 101:9 101:25 102:7 104:6,25 105:8,9 105:11,16,25 106:6,9,10,11,12 106:13,14,18 107:25 109:12 110:14,18 111:10 111:22 112:17,20 113:5,9,12,14,22 113:25 115:22 116:5,13,14 117:5 117:6 119:23 120:5,8,18 121:2 121:19 122:1,13		
relying 191:23 236:17,19 291:8	resistance 147:24 147:25	right 95:14 98:12 98:18 99:15 101:9 101:25 102:7 104:6,25 105:8,9 105:11,16,25 106:6,9,10,11,12 106:13,14,18 107:25 109:12 110:14,18 111:10 111:22 112:17,20 113:5,9,12,14,22 113:25 115:22 116:5,13,14 117:5 117:6 119:23 120:5,8,18 121:2 121:19 122:1,13		
remain 118:25	respect 124:5	right 95:14 98:12 98:18 99:15 101:9 101:25 102:7 104:6,25 105:8,9 105:11,16,25 106:6,9,10,11,12 106:13,14,18 107:25 109:12 110:14,18 111:10 111:22 112:17,20 113:5,9,12,14,22 113:25 115:22 116:5,13,14 117:5 117:6 119:23 120:5,8,18 121:2 121:19 122:1,13		
remaining 249:23	responses 279:24	right 95:14 98:12 98:18 99:15 101:9 101:25 102:7 104:6,25 105:8,9 105:11,16,25 106:6,9,10,11,12 106:13,14,18 107:25 109:12 110:14,18 111:10 111:22 112:17,20 113:5,9,12,14,22 113:25 115:22 116:5,13,14 117:5 117:6 119:23 120:5,8,18 121:2 121:19 122:1,13		
remember 95:16 97:4,5,23 101:17 101:20 125:12 168:3 179:14 216:4,6 232:22 235:18 286:8 288:23 289:11 293:21		right 95:14 98:12 98:18 99:15 101:9 101:25 102:7 104:6,25 105:8,9 105:11,16,25 106:6,9,10,11,12 106:13,14,18 107:25 109:12 110:14,18 111:10 111:22 112:17,20 113:5,9,12,14,22 113:25 115:22 116:5,13,14 117:5 117:6 119:23 120:5,8,18 121:2 121:19 122:1,13		
removal 106:2 184:14 190:11 225:3 250:11,12 254:5		right 95:14 98:12 98:18 99:15 101:9 101:25 102:7 104:6,25 105:8,9 105:11,16,25 106:6,9,10,11,12 106:13,14,18 107:25 109:12 110:14,18 111:10 111:22 112:17,20 113:5,9,12,14,22 113:25 115:22 116:5,13,14 117:5 117:6 119:23 120:5,8,18 121:2 121:19 122:1,13		
remove 100:5 102:19 107:19 225:6 250:20 259:24		right 95:14 98:12 98:18 99:15 101:9 101:25 102:7 104:6,25 105:8,9 105:11,16,25 106:6,9,10,11,12 106:13,14,18 107:25 109:12 110:14,18 111:10 111:22 112:17,20 113:5,9,12,14,22 113:25 115:22 116:5,13,14 117:5 117:6 119:23 120:5,8,18 121:2 121:19 122:1,13		

113:14,22,24	267:13,16,22	scales 264:2	147:1 148:7,12	separating 112:9
114:1,2,5,7,12,16	268:21 270:10,14	scenario 207:3	149:2,4,7 274:9	separation 103:22
114:19 115:2,5,9	270:15,20 273:10	226:22	274:10 275:21	108:9,14,23
115:13,20 116:3	273:12 276:1	scenarios 150:20	281:22 282:3	126:12 133:22
116:16,21,22	278:11,15 279:5,6	150:22	289:17	273:10
117:9,17 118:12	279:12 280:4,9,14	schedule 175:8,14	see 99:13 100:7	separator 170:24
119:21 120:24	280:15 292:7,19	schedules 175:17	102:15 113:2	171:3,11 180:10
121:17 122:5,7,8	293:6,16	school 199:9	119:13 129:16,18	187:10,11,14,14
122:8,9,11,12,16	sander 100:4	scope 125:14	130:8,11,21	187:17 190:4
122:16,20,23	sands 103:24	172:10 214:8	131:11 134:14	196:2,4,18,22,23
123:3,7,15,19	sand's 142:7	247:4,10,11,12,19	136:14,17 176:15	197:2,3,4,11,11
124:4,7,9,13,15	227:17	247:25 248:1,5	183:23 184:1	197:24 198:3,24
124:17,21 125:1	sand-filled 143:2,4	252:4 259:18	189:15 197:25	199:6,8,9,10,23
125:16,20 126:2,6	155:7	266:20 268:5	210:19 214:19,21	199:24 200:1
126:7,8,8,15	saw 130:16,23	277:11,25 278:7	216:18 217:1,9,11	201:5,10,12,16,23
128:20 129:1,3,6	185:24 256:6,11	280:11 281:25	217:12 218:11	202:1,4,5,6,9,10
129:8,10,11,19	saying 105:10,13	282:19 283:16	221:24,25 225:6	202:11,13,19,20
130:13 131:17,19	106:1,4 110:11	286:17 287:6,17	225:21 229:21	202:21,24 204:4,6
131:23,25 132:4,5	123:10 134:17	287:25	232:18 241:15	204:8,12 209:2,10
132:7,9,11,17,25	142:24 153:3	scrubber 187:12	248:8,15 253:23	209:12,15 210:20
133:2,6,7,11	164:24 213:7	searching 164:11	253:25 254:3	212:6,10,14,18,18
134:4,5 135:10	218:7 223:4 224:3	272:13	255:19 260:17,24	213:1,2,3 214:16
139:8,15,16	233:21 239:23	second 101:5 144:9	263:12 265:14	214:16 283:3,7,13
140:15,20 141:8	240:3,10 288:18	162:17 192:14	276:25 278:11,14	283:22 284:13
141:18 142:17,20	288:25 291:13,15	212:24 240:21	279:17 280:22	286:19,19 287:7
142:22 143:2,5,8	293:9	255:15	284:6,17 290:4	294:4
143:10,11,14,17	says 100:3,10	seconds 223:17	seeing 181:12	separators 173:16
143:20 144:1,5,7	104:22 105:24	section 130:19	seen 109:15 184:8	177:6 180:11
144:12,13 162:4	106:7,13,20,23	133:16 151:16	223:23	273:14 286:16
162:10,25 163:25	118:21 133:18	159:1 165:20,21	selling 189:19	separator's 193:22
167:2 221:23	154:16 164:1,10	171:21 172:1	sense 142:6 152:13	September 91:15
222:1,8,13 223:5	193:25 194:1,9	177:2,3 178:14	191:18 213:6	92:4 95:1 295:3
223:10,12,15	201:25 202:1	179:7,9,16,17,25	sentence 100:3,9	296:14
224:4,10 225:3,6	206:2,5,6 216:23	180:6,11,17,17	101:1 105:20	seriously 254:13
225:24 226:6,8,12	220:7 221:13,22	181:25 182:1	106:10 119:15	258:19
226:23,24 227:4,5	222:10 225:18,22	185:14 210:22	134:8 194:9	service 251:8
227:5,6,7,12,19	226:5,20,25 227:3	249:6	216:21 217:3	set 128:14 153:10
227:23,23,24,24	235:13 241:15	sections 98:24	224:9 226:14	218:5,6 221:8
249:21,23 250:2,4	248:22 255:16	176:25 179:12	232:13 233:20	231:12 256:15
250:8,11,12,13,20	256:13 259:2	sedimentation	240:21 255:15,21	272:7
251:3,5,8,10,13	271:22 277:2	110:5,18,22 114:2	276:24 278:11	setting 141:24
254:5 258:21,23	278:11,15 279:17	114:11 115:12,16	279:15,16 286:9	149:21 168:13
259:23,25 260:3	280:22 292:7,11	118:16 119:3,7,17	289:8,13 290:3,4	settle 113:17,18,22
261:14 262:8,13	292:23	133:17,18 134:18	separate 163:25	114:14 116:9
262:17 263:12,16	scale 265:4,21,24	134:25 135:1,14	187:16 198:18	117:12 127:1
264:8 265:3,8,18	266:2,3,4,12,18	135:18,24 136:3	201:7	135:10,11 141:4
266:22 267:1,2,8	266:25 267:23	136:20 146:11,20	separates 201:13	141:18 142:12,17

142:22 143:6 149:11 227:7,13 227:17,20 260:3 267:8,13,22 278:16 292:8,20 settled 113:14,25 114:1,6,8,13,20 114:24 115:5,10 115:20 116:4,17 118:13 119:4,22 120:7,25,25 121:17,18 122:12 122:24 123:8,15 123:19 124:15,21 125:2,16,20 126:3 126:15,25 128:21 129:2,2,7,10,20 131:18 132:9 133:1,8,12 134:4 144:5 145:25 settlement 122:1 settles 115:10 116:4 116:17 117:10 118:13 119:4,22 120:8 123:8 125:2 125:17 126:3,16 128:21 129:7 142:5,16 143:21 251:9 settling 108:18 109:6,11 110:3,13 110:21 115:9 117:17,18 119:8,8 120:6 122:21 126:15,24 132:4 132:18 133:11 134:3 137:11 138:3 140:24 141:13,20,21 142:2 143:6,9,12 162:25 268:2 severely 169:20 shaded 285:9 shape 244:24 shell 175:14 shift 169:8 shifts 173:14	short 224:4 225:13 shorten 148:14 Shorthand 92:8 short-duration 170:3 shovels 251:13 show 129:22 133:15 137:3 159:25 160:3,5,24 160:25 250:4 252:6 253:15 291:21 showed 160:17 288:24 showing 160:2 249:23 252:11 shown 253:16,19 259:2 shows 210:13 243:14 249:21 250:19 shut 190:12 207:23 shuts 171:13 251:12,12 sic 124:20 side 216:17 243:19 243:21 262:19,20 276:23 signature 295:1,19 296:6 significant 179:12 206:21 similar 201:21 219:13 simple 133:21 201:9 simply 229:16 Simpson 91:12 92:1 94:3 95:4,10 125:13 274:4 295:2,18,25 single 136:12 199:2 204:10 212:15 single-phase 177:5 182:23 187:19 190:2,4 196:4,21 197:1,24 212:14	214:4,15,16 283:3 283:7,13,21 284:13 286:15,15 287:7 sir 247:13 279:2 site 103:12 186:6,7 sites 171:8 sitting 153:24 221:6 290:12 situation 132:10,25 134:4 149:9,13,14 149:15 150:24 155:18 172:18 187:6 215:5,22 227:22 situational 219:20 268:7 situations 112:4,7 158:8 206:25 six 292:6 size 152:17 173:9 210:4,5 235:15,16 236:15 239:25 sizes 147:14 skill 102:6,10 109:5 109:10 110:12 127:3,8,9,13 128:8,11,15,24 160:22 163:4,13 165:23 166:2,13 167:6,24 168:5,20 169:3 174:13,19 176:16 189:23 191:8 192:9,19 196:12,15 199:12 228:12 229:7,17 232:14 255:16 257:2 267:24 268:15 271:11,16 272:12,15 281:3 284:9 285:19 slick 229:15 slight 178:7 slightly 214:13 263:11 slip 137:10 slope 182:3 185:15	186:11,13 190:2 sloped 181:13 183:25 184:1,19 185:18,20 191:1 192:23 205:2 sloping 181:15,23 182:24 184:2 185:5,6 213:15 214:23 sloppy 204:12 slow 133:19 157:15 slowed 149:3 slower 149:2 234:21 slowing 157:18 235:20 slows 210:3 217:24 236:3 slug 100:23 101:1 144:3 163:1,5,14 163:23 164:6,21 164:25 165:4,18 166:7,16 168:6,23 169:4,10,22,23,25 170:1,3,12 171:6 171:7,8,12,17,18 171:22,23 172:2,3 172:5,6,9,13,14 172:16,19,25 173:8 174:8,11,19 183:24 184:20 185:5,18,20,23 186:8 187:3,11 188:1,9,10,17,20 189:1,5,8,16 190:3 191:1 192:11,23 193:20 195:10 197:6 198:3,17,22,23 199:2,4,5 201:5,7 201:19,20,22,24 202:9,16,19,20,23 204:4,4,9 205:9 206:10,10,12,17 206:23 207:1,12 208:10 209:4,14 209:17,23,24	210:24 212:17,20 215:5,23 216:24 217:7,15 218:6,11 218:21 228:3,5 229:1,3 231:2,8 231:15 232:16,24 233:18,22 234:4 234:18,22,25 235:2,19,24,25 236:9,14,19,20 237:15,17,21,24 238:14,18 239:11 239:15,19 240:3,4 240:11 268:3,17 273:1 281:22,22 282:3 284:3 286:11,14,15 287:2 294:1,3 slugging 231:8,9 232:7 slugs 164:3 165:12 165:15 166:1,4 170:11,14 174:2,6 186:17,21 192:25 193:13 206:2,8 231:16,17,18,22 232:2 233:20,24 233:25 234:3,12 234:17 235:20 239:20 273:2 285:20 slug-carrying 181:14 small 118:23 133:20 148:21,23 173:23 smaller 148:25 230:3 237:9 solid 116:8 119:3 120:6 136:16 145:2,17 258:23 277:13 293:13 solids 100:12 102:17,19 103:1 103:25 104:12 107:11,15 108:9 108:14,18,24
---	---	---	---	--

109:6,11 110:4,13 110:20 111:2 112:11,13 113:6,7 113:9 121:6 123:3 123:4 124:22 126:8,8,10,12,19 126:24 134:21,24 136:18 137:8 140:20 141:1,3,25 144:16 145:24,24 173:22 174:1,10 184:8,10,12,14,15 184:19,22 185:6,9 186:16 219:14 251:20 263:8 268:20,21,24 271:21 292:12 293:14 solid-filled 154:24 solid-liquid 133:21 solutions 91:3 272:13,17 solve 186:15,17 272:9,23 solved 290:21 somebody 109:17 185:12 228:17 sorry 123:25,25 131:1 161:8 179:19 198:15,23 212:13 241:1,5 248:15 252:18 270:6 288:18 289:19 sort 182:22 184:18 219:6 sound 180:16 source 174:25 space 140:25 141:16 159:23 166:7 172:22 208:19 228:15 229:9 236:1 239:11,11,12,13 239:14,15 264:6 285:2 spatial 267:6	speak 97:6 123:5 126:9 SPECIALIZED 91:5 species 118:24 235:7 specific 100:16 111:14,17 115:19 116:13,20 117:3 118:17 136:5 154:6,9,18 168:17 180:10 268:10 269:2 271:23 specifically 114:19 121:22 126:9,18 192:16 251:2 252:25 255:13 289:1 specification 99:13 175:17,18 189:20 261:8 specifications 178:22 189:18 spend 177:23 splashing 159:16 splitting 213:3 spot-looking 96:17 spraying 159:16 stabilized 225:24 stable 118:22 stand 276:7 288:3 standard 177:8 269:24 270:8 standards 177:15 178:20 start 215:1,18 272:16 started 110:11 starting 99:11 starts 216:21 262:24 276:24 startup 225:22 state 92:7 93:14 134:16,18,21 135:22 136:2 215:8 216:1 217:8 217:12 219:22	220:1,7 221:11,14 255:4 256:3,12,13 256:17,20,24 257:4,6,10 261:3 296:4,20 stated 127:16 269:20 statement 106:25 108:2 118:19 193:23 232:20 255:23 257:2 263:6 269:21 states 91:1 168:6 232:14 station 185:21 stay 284:15 stayed 219:14 steadier 174:7 steady 215:8 216:1 217:7,12 219:22 220:1,7 221:10,14 225:8,10 256:3,12 256:13,17,20,24 257:4,6,10 steady-state 255:18 step 136:15 stimulated 225:23 stimulating 225:23 stirred 120:3 122:9 Stokes 145:8,9,12 145:13 148:19 stop 198:21 stopped 114:5 115:6 stops 112:9 story 99:9 straight 144:20 straightaway 149:11 stream 100:11 104:23 144:23,25 146:12,14,20 147:3,6 148:10 149:4,9,24 151:1 151:10,12 152:14 152:15 153:7,18 161:20 175:15	196:1 198:19 201:13,17,18,21 201:21 202:16,17 204:10,11 217:23 219:12,13 235:10 250:15 292:11 streams 100:6,18 100:21,23 Street 92:10 93:6 strict 196:8 197:2 strike 102:3 115:17 121:9 135:2 138:6 148:4 155:24 162:21 168:21 175:23 180:25 187:23 191:3 197:12 233:6 241:5 striking 276:24 277:2 stringent 178:2 strong 230:4 studied 289:15 stuff 271:24 submerged 147:3 submitted 287:12 Subscribed 296:13 subsequent 135:16 subsequently 207:8 subset 293:14 substance 97:15 113:13 substantiated 107:3 Subzero 148:3 suggesting 185:7 Suite 92:10 93:6,15 superficial 235:6 235:13 support 246:14 290:6 supported 190:19 288:25 supporting 245:15 246:4 supports 245:9 257:1,9 289:8	supposed 254:16 sure 95:21 110:8 111:24 113:14 130:21 151:19 158:2 168:1 172:15 179:1,21 183:15 191:21 222:7 239:17 243:12 245:23 259:21 270:23 281:13 surface 159:15 161:1 244:25 surge 164:5 170:19 170:20 Susan 91:22 92:5 296:3,17 suspect 259:25 suspended 274:12 274:16 suspension 115:20 115:21 119:11 137:7,12 143:14 144:1,12,13,15,16 144:21,24 145:3,6 145:10,21 146:1,7 146:16 148:5,7,11 149:16,19 279:6 279:12 280:5,9,15 suspensions 118:23 289:16 sustained 198:24 202:2 switch 241:3 sworn 92:3 95:2 296:4,13 system 107:17 138:17 151:1 199:3 216:4 systems 179:11 199:1,2 296:20
T				
take 98:1 105:20,21 111:18 112:13 162:14 170:24 215:12 230:3				

246:17 254:12 255:9 258:19 267:2 268:24 274:20,21 276:4 276:18 278:24 279:15 282:24 284:2,6 290:17 taken 92:3 95:5 296:10 takes 148:12 171:2 talk 97:15 103:12 120:3 130:25 134:20,22 136:22 167:23 177:11 202:3 235:5 239:7 280:7 talked 149:22 162:24,25 168:4 177:14 talking 99:19 100:15,17,20 111:3 112:18 113:11,24 115:17 118:16 119:6,15 119:19,21,25 122:1,5,6,6 123:2 123:14,19 124:4 124:22 126:11 130:15,17 131:2 131:14 133:17,25 134:16 135:17,17 137:14 138:24 140:8,8 146:6,8 147:19,20 149:20 153:19 156:1 165:9,12,15 168:25 175:16 179:14,16,17 195:8,9,10 207:2 210:24 211:1 216:6 218:14,21 223:5,8 225:5 230:4 231:16,17 231:23 232:2 239:5,7,8,19,19 240:25 242:14 244:20 248:20	250:8,13 256:8,19 256:23,24 280:4 talks 112:8 115:13 118:15 134:19,23 135:14 136:18,24 147:13 163:24 175:6,7 180:12 256:12 275:20 290:16 taught 122:25 181:16 teach 104:13 114:7 115:9 117:20 120:6 132:21 136:1 138:1,3 181:9,17,22 256:3 274:7 teaches 118:12 120:12,18 121:4 132:24 133:10 135:25 136:17 148:6 151:3,7 152:9 165:18 181:16,19 192:18 201:1 236:6 241:15 242:16 244:4 274:8 teaching 99:18 119:2 146:10 147:9 148:13 151:10 183:2,16 218:21 226:3 261:13 262:4 274:11 290:19 teachings 213:11 technique 234:7 technology 109:18 tell 95:5 99:9 144:14 148:9 151:9 159:12 160:20,21 208:2,5 211:4 224:14 285:6 telling 241:24 258:9 tells 159:13 161:2,4 202:6	temperature 270:1 temporal 116:20 tend 102:17 113:17 116:8 140:20 141:4 143:1 147:22 155:10 157:15,16 159:2 169:19 174:8 292:15 293:10 tended 197:22 tendency 174:4 tendered 94:10 tends 112:8 157:18 173:15 195:6 term 197:23 212:5 269:23 283:14,22 284:13 terminal 147:4,5,7 147:9,11 terminology 196:20 terms 225:3 233:17 235:12 242:14 252:4 terrain 206:3 terribly 177:25 testified 95:6 123:7 125:9,12 127:17 127:22 131:6 136:10 139:20 142:20 143:17 146:16 151:22 168:22 215:1,17 229:23 235:19 238:25 275:23 283:2 288:13 289:7 testifying 195:17 195:19 232:22 testimony 95:23 96:11 125:5 139:24 140:5 143:23 154:14 156:10 164:23 200:23 217:5 238:3,5,24 255:6 275:14,19 276:8 278:20 279:23	287:23 288:3 290:13 296:5 Texas 91:14 92:7 92:11 93:7 296:4 296:20 text 99:10 texture 180:9 Thank 128:25 163:17 Thanks 179:20 theory 290:16 thing 98:22 105:24 119:8 166:10 170:10 173:8 177:12 178:21 220:18 235:8 241:4 248:19 249:5 things 167:14 177:21 184:9,18 187:10,12 195:6 199:10 239:5 think 100:15 105:17 110:2 112:25 119:15 124:3 127:3 131:5 135:25 136:14 137:18 145:9 146:10 150:24 154:17 157:20 162:25 165:18,21 166:2 174:3 176:19 181:19 205:5 213:10 220:11 223:4 224:3,6,7,8,9 226:2 234:2 242:20 243:13 244:14,14,19 249:22 251:19 252:6 254:1 256:6 257:25 263:2,16 268:1,21 271:15 276:2 thinking 165:20 252:7 258:22 268:24	thinks 225:7 226:8 thought 118:1 166:5 279:3 thousands 150:1 three 131:11 168:6 175:22,24 188:11 198:10 three-quarters 276:22 throw 144:23 tilt 102:25 191:15 time 95:17 97:18 98:1,14 103:14,16 115:15 146:25 148:13,14 149:12 168:13 171:1 172:6 177:23 190:22,24 191:4,6 191:8 213:13 214:10 215:11 218:12 219:25 220:2 222:2,5,8 222:25 224:5,15 225:13 227:25 246:18 255:18 256:5 257:4,11 268:22 times 115:4 236:15 title 147:14 240:23 284:18 today 96:11 107:19 167:7 168:14 190:22 191:12 287:16,22,23 today's 96:13 toe 184:19 told 124:25 125:18 top 113:16 130:8 130:10,16,18,19 131:23 132:5 148:20 153:4 157:6 182:1,3,7 182:15,15,16,17 193:19 205:12 248:8 264:7 topic 115:16 torch 250:1
--	--	--	--	--

total 251:20	255:12 284:16	293:25	161:18	172:20,23 173:1,2
tougher 178:3	288:9 292:4	understood 128:16	velocity 120:2	173:9 174:9 175:3
TRADEMARK	turned 173:19	191:8 192:10	137:9,10,11,15,16	175:9,10,14,18,25
91:1	turning 173:13	232:15 284:12	137:18,19,21	176:2,6,10,13,18
trained 210:11	twice 124:25	uniform 118:25	138:2 139:6,13,22	176:20 177:3,7,12
transcript 296:4	125:18	119:7	139:25 140:12	177:22 178:9,13
Translation 92:9	twist 152:24	UNITED 91:1	143:19 147:4,6,7	178:15,18,20,25
transmission 193:1	two 101:8,12,23	units 160:10	147:9,11 149:3	179:1,5,6 180:5
trap 201:20	116:14 130:4,18	unquote 289:10	151:10,16 157:12	180:17 181:15
traveling 144:20	131:8 167:13,18	unsettled 114:23	186:9 209:24,25	182:23,24 184:21
travels 207:16	168:7 176:25	115:10	210:2 234:20,21	185:12,24 186:3
Travis 92:10 93:6	204:14,15,22	unstable 290:17,18	235:4,6,6,8,9,13	186:11,13 187:2,5
treat 106:25 137:6	235:23 239:5	290:20,22	235:15,20,25	187:19,21 188:1
treating 245:18	287:12 288:4	unsubstantiated	236:2 277:14	188:16 189:5,8,15
246:9	two-phase 192:25	107:1	293:2	190:10 195:7,18
TRIAL 91:1	199:1 217:22	upstream 156:13	version 164:11	195:21,22,23
triangle 263:2	284:18 286:14,18	usage 196:8 197:2	versus 163:21	198:18 199:3
tried 261:10	two-thirds 262:21	use 141:16 173:16	186:24 225:4	210:4,5 214:4
true 116:7 168:16	type 100:16	187:5 193:16,18	239:6 251:18	219:15 222:9
187:14 217:19	typical 127:7 175:9	199:20 201:2	vertical 137:11	223:16 224:13,22
295:20 296:5	175:10,25 221:22	202:10 204:12	173:11,13,16,16	224:23,24 228:2
truth 95:5,6,6	225:22	225:4 233:3	182:24 245:2,3,10	228:13,18,18,19
try 117:3 198:15	typically 235:5	269:22 282:10	vertically 244:16	228:25 229:24
214:13		useful 192:24	vessel 102:17	230:1,17,22,24
trying 103:19	U	usually 198:25	107:24 108:10,19	235:14 237:10
109:17 118:18	Uh-huh 157:14	U.S 91:8	109:7,12 112:8,9	239:6 243:20,22
126:23 141:20,20	176:9 177:9 197:5		114:17 121:4	244:19 245:19
152:5 153:12	229:14,22	V	122:7,9,9 126:6,8	246:10 248:4,24
154:4 159:14	unable 232:1	v 91:4	129:4,8 130:19,20	249:21,24 250:2,4
160:23,25 161:5	unclear 131:3	valid 150:22	130:24 133:1	250:7,14,20,24
163:18 169:24,25	understand 95:13	validity 258:18	135:23 139:21	251:3,8,11,12,17
172:14 180:3	95:22 96:1,4,8	value 105:21,22	141:2,12,14,17,24	251:19,21 253:23
186:15,17 251:24	109:8 125:14,15	231:19 253:15	142:3,19,21,23	253:25 254:4,9,18
259:12,20,22	125:22 127:20	valve 207:25	143:1,9,12,15,18	254:25 255:17
turbulence 124:16	131:14 134:10	286:20,24	143:20 144:2,3	257:3,9 258:5,11
turbulent 112:12	142:3 165:24	valves 208:4	146:11 148:6	258:15 259:20,25
112:18 136:24	168:1,5 176:17	vapor 182:16	151:15 152:17	262:8,9,14,17,21
150:5,12,21,23	196:16,19 203:9	204:20,22,23	153:8 154:1	263:8,14 264:3,4
151:13 152:6	212:22 213:7	205:2 207:14,18	157:25 159:2	264:7,9,12,17,22
153:6 155:11	237:2 255:17	207:20,24 208:22	161:22 162:2	265:15,19 270:11
156:21 157:5,7	257:3 259:13,19	209:5,7 285:2,11	163:20 164:1,10	270:16,20 277:7
161:21 288:15	264:22 271:16	variable 107:15	164:18,25 165:1	279:5,6,12 281:19
289:18,19,21	272:1	variety 289:16	165:10,24 168:20	285:17 287:5
290:23	understanding	vary 282:3	169:5,6,7,14,16	292:15
turn 170:2 173:10	110:8 167:23	vector 139:7	170:23,25 171:6	vessels 173:16
174:20,22,24	213:8 245:1 261:2	velocities 151:15	171:10,10,12,19	177:1,5,11,15
180:21,25 216:13	274:9 275:8	153:18 160:10	171:20 172:1,7,16	180:4 188:8,10

190:2 219:22 220:23 225:5 viewpoint 127:12 128:7 viscosity 148:18,21 149:1 viscous 147:23,25 void 129:24 172:1 172:22 173:15,17 213:20 239:11,11 239:12,13,14,15 239:24 240:1,2,5 240:7 volume 91:13 137:8 144:3 159:14 164:5,6 170:19,21 171:1,2 172:2 173:15,17,22 174:1 210:7 213:16,19,20 239:20,24,24 240:1,2,5,7 volumes 198:25	wasn't 109:17 118:3 124:17 168:9 179:2 189:19 211:12 220:22 wasted 140:25 142:23 water 131:21 147:2 157:6,6 231:10,17 231:18,22 232:6 269:5 285:19 286:22,23,23 wave 285:5 waves 157:20,25 158:3,15 wavy 160:3,5,6,13 160:17,24 161:1,1 way 110:17 112:25 115:9 117:17 119:3 122:10 137:20,21 141:19 145:16 151:9 152:24 162:7 182:22 191:19 213:5 214:14 218:11 219:4 223:9 225:16 229:19,25 230:10 230:11,18 233:16 234:3 239:3 241:24 242:1,4,7 242:21 249:21 250:1 252:8 258:24 259:20,23 262:20 263:19 267:9,14 272:5 276:23 283:19 285:6 286:13 ways 179:6 244:20 Wednesday 91:15 92:4 95:1 weighs 157:17 weight 258:15 weir 156:14 159:15 160:1,2 163:20 182:20,21 211:23 220:17,20,21,24	221:6 228:7 232:24 233:14 239:13 welcome 95:12 weld 250:6 258:17 welding 250:1 wellhead 170:23 207:10 wells 107:11 154:3 164:3 166:21,25 173:17 268:19,20 268:24 269:3 271:2,6,12,14 272:22 273:2,11 285:15,17,20 well-by-well 152:19 went 166:5 170:24 weren't 168:17 178:24 205:6 275:18 we'll 96:7 111:18 we're 123:14,18 131:14 140:8 151:4 179:14 195:8,9,10 200:3 207:2 213:5 225:4 228:14 239:17 242:14 251:24 270:12 we've 124:3 177:14 184:16 270:22 white 139:4 285:10 wide 127:9 242:16 willing 220:1 268:23 wishful 252:7 258:22 witness 92:2 95:2 98:8 118:20 123:25 134:15 136:7 137:4 163:17 164:13 179:22 192:21 247:14 252:18,24 256:10 275:1 279:21 286:5	289:4 295:2 296:4 296:5,6,7 word 199:8,23 202:10 216:17 words 152:24 175:24 190:15,17 191:18 193:17,18 198:13 199:14 223:13 225:4 230:13,14 244:2 244:11 258:14 264:14 work 179:10 251:17,18 253:17 272:10 273:19,20 worked 187:4 271:2 273:18 working 107:11 271:14 273:2,11 works 213:2 286:14 world 183:24 184:1 worried 143:5 worth 225:19 230:23,25 wouldn't 127:7 144:14 149:11 176:18 203:11 229:4,23 273:19 280:17 293:15 write 98:20 117:22 189:11 230:12 write-ups 99:6 writing 98:23,25 191:10,13 written 188:24 238:6 wrong 161:2 241:4 260:23 wrote 98:17 111:9 200:9 224:9 261:5 265:5 289:7	175:8 176:15 181:4 182:13 190:14 192:22 211:10 218:10 222:7 224:17 226:4 229:1 246:17 260:22 269:2,3 276:21 year 107:15,16 years 116:23 184:17 282:4 Yep 176:4 195:12 201:6 284:5 yesterday 97:9,11 York 93:16,16
W				Z
wait 123:23 252:17 wall 293:12 want 98:2 102:10 109:5,10,19 110:5 110:13,15 114:11 118:11 126:25 140:23 141:13,16 141:25 142:2,4,22 144:7 145:14,14 162:24 163:5,13 166:15 169:15 172:15 176:25 180:5 184:10 185:8 187:2 196:12 220:20 231:15 233:19 245:8,12 273:9,20 284:3 285:6,16 wanted 102:6 174:19 270:17 284:15,23 wanting 110:3				zero 103:13 106:8 120:2 148:2 151:15 213:21,22 214:1 Zinda 92:10 93:5
				0
				03/30/2020 296:21
				1
				1 149:23 193:3 224:18 225:21 227:1,5,23 240:20 240:23 247:3,9,19 247:24 248:3,20 248:22 254:6 1b 254:3 1-liter 172:25 1.5 221:23 222:1,8 223:5,9,12 224:4 224:11,12 225:19 1:09 215:13 1:46 245:25 1:47 245:25 10 118:21 175:9 193:3 227:6,24 241:15 242:2,7 244:3 246:25 255:12 269:5 270:8
				Y
				yeah 109:9 113:6 129:21 142:14 147:18 158:12 164:14 165:8

10-minute 224:19	282:15 284:11	244:8 254:7 258:7	45 224:17	71-foot 228:18
10:48 162:15	2019 91:15 92:4	258:10,17 260:15	47 278:25 279:2,3	77002 93:7
10:56 162:15	95:1 295:3 296:14	260:15 278:5		
100 184:17 269:5	209 241:10	294:5	5	8
1008 284:3	211 241:9,11,12	3A 252:3,10 254:16	5 175:10 223:16	8 256:13 260:15,21
10118 93:16	246:20	257:20	227:6,23 240:25	260:22,23,23
11 91:15 92:4 95:1	214 246:20	3B 252:3 254:16	5,000 227:2	8,945,256 91:8
175:10 295:3	217 255:13	257:20	5-millisecond	8-inch 175:13,13
12 260:17,19,25	23 290:16	3rd 280:24 282:8	222:5	801 92:10 93:6
261:3	24-hour 222:5	282:15	50 269:21	832.631.9990 93:8
12:11 215:13	223:8	3:15 92:5 294:8	51 216:13	852 101:24
15 270:12	247 276:19 278:10	30 118:21 133:16	57 228:10 229:14	
16 99:12,14	292:3	137:5 164:17	269:14,16	9
160 175:14	25 104:20,21	198:11 225:21		9 164:14 246:25
1610 92:10 93:6	223:14,15 270:17	30-pound 186:7	6	247:4,6,9,19,22
167 276:5	256 101:25 111:10	300 116:23 229:11	6 99:11,14 104:20	247:25 248:4
168 276:5	188:25 243:8	229:13	104:21 105:16,19	9:09 91:15 92:5
17 133:16 134:9	245:6 254:5 256:8	306 232:13 285:24	108:3 175:13	95:1
179:16 180:6,20	269:16 287:1	286:3	221:16,18,20,21	90 192:22 193:19
288:9,11,13,19	291:22	31 276:19	224:2 248:8,11,14	210:16 260:23
290:14	25987 91:25 295:4	32 100:1 156:12	248:15 269:14,16	261:24
17-14 284:17 285:6	265 274:21 275:19	256:14	6-inch-diameter	94 188:15
17-21 204:14	289:1,3	33 256:15	264:3	95 94:4 261:22
208:10 213:15	274 94:5	350 93:15	60 232:11 279:2	98 188:15
214:3,21 284:7	280 278:24 279:1	36 284:16	61 216:13 232:11	
170 192:22	279:17	36-inch 230:22	248:14 274:24	
18 280:20,21	284 282:25	264:4	276:20 278:25	
281:24	288 94:4	37 279:3	62 164:14	
18th 296:14	29 225:21	39 274:24	646.502.5950 93:17	
19 137:5			65 175:21,22	
1992 186:1 189:4	3	4	269:14,16	
2	3 111:6,9,20,25	4 133:16 164:14	69 192:22	
2 119:13,16,19	120:22 123:20	253:3,6	69-foot 228:18	
250:3 252:3,5	124:5 129:4,9,12	4a 159:4,14,20,22	6910 93:15	
253:3,6 254:7	129:17,19 130:9	159:24,24 163:21		
257:17,21,22,24	130:10,17 141:1	253:23	7	
258:10,17,21	150:9 153:4	4C 163:21	7 180:20 197:10	
259:3,15,19	154:25 155:7,13	4.1 275:11	241:6 249:15,17	
2a 253:25	155:18 156:1	41 180:21,25	250:18,19,23	
2:05 255:10	158:13,17,18	184:25 189:22	251:22 252:21	
2:11 255:10	159:21,22,24	192:18 193:7	253:1,7	
2:40 274:1	160:1,18 166:3	195:11 196:17	70 193:19 210:16	
2:46 274:1	169:1,4 171:5	204:14 205:25	230:3	
20 220:2 241:10	173:19 175:12	206:1,1 212:17	70-foot 228:2,13,18	
200-pound 186:6	198:6,12,13,16	214:18 216:9	228:24 230:17,24	
2012 280:24 282:8	211:22 221:10	284:4,7	70-foot-diameter	
	243:10,13,24	43 261:19,24	228:25 229:24	