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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ARKEMA FRANCE,
Petitioner

v.

HONEYWELL INTERNATIONAL INC.,
Patent Owner

Case: IPR2015-00915, IPR2015-00916, IPR2015-00917
U.S. Patent No. 8,710,282

Continued Video Deposition of LEO E. MANZER, Ph.D.
Volume II

(Taken by the Patent Owner)
Durham, North Carolina
Friday, January 8, 2016

Reported by: Marisa Munoz-Vourakis -
RMR, CRR and Notary Public

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1 Continued Video Deposition of LEO E.
2 MANZER, taken by the Petitioner, at Brinks, Gilson &
3 Lione, 4721 Emperor Boulevard, Suite 220, Durham, North
4 Carolina, on the 8th day of January, 2016 at 9:01 a.m.,
5 before Marisa Munoz-Vourakis, Registered Merit
6 Reporter, Certified Realtime Reporter and Notary
7 Public.

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I N D E X

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Examination of:

Page

13

LEO E. MANZER

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EXAMINATION BY MR. ROSE 178

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

2 THE VIDEOGRAPHER: This is the
3 beginning of volume number two in media
4 number one in the deposition of Dr. Leo
5 Manzer.

6 Today's date is January 8, 2016. The
7 time on the video monitor is 0901.

8 Will the court reporter please swear
9 in the witness and we can proceed.
10 Whereupon, LEO E. MANZER, having
11 been first duly sworn, was examined
12 and testified as follows:

13 EXAMINATION BY COUNSEL FOR PETITIONER
14 BY MR. ROSE:

15 Q. Good morning, Dr. Manzer.

16 A. Good morning, Mr. Rose.

17 Q. I'd like to start out today talking about
18 the Harrison reference and today we will be focusing
19 largely on your declarations in the 916 and 917 cases.
20 The Harrison reference is Exhibit number 1006 in both
21 of those cases.

22 A. All right. I have it.

23 Q. And what do you generally understand the
24 Harris reference to disclose?

25 A. It's an invention related to process for

1 calcium fluoride production from industrial waste
2 treatment, more specifically waste production of
3 calcium difluoride from waste water streams by lime
4 precipitation and carbonation. So essentially a way of
5 removing fluoride from industrial waste streams.

6 Q. And the process that's shown or disclosed
7 in Harrison, that's a batch process, correct?

8 MR. BEAUPRE: Objection, form.

9 BY MR. ROSE:

10 Q. You understand what a batch process is?

11 A. I certainly do. I'm just trying to
12 remember, see if it relates to a batch process or not.
13 If you'd like to point me to somewhere to save a little
14 time here.

15 Q. I've looked through examples. I don't see
16 anything other than a batch process, and I'm wondering
17 if you've seen anything other than a batch process.
18 The examples I will tell you those, and you can tell me
19 or determine if those are anything but a batch process.

20 A. They do appear to be batch processes.

21 Q. And going back to the summary of the
22 invention, which is column two, and I'm reading the
23 paragraph that begins at line 30, it says that the
24 invention is based on the discovery that a commercially
25 pure calcium fluoride product can be obtained from

1 aqueous solutions by precipitation using essentially
2 stoichiometric or slightly higher stoichiometric amount
3 of lime and neutralization and with carbon dioxide.
4 What is meant by stoichiometric amount in that
5 sentence?

6 A. It would mean that the amount of potassium
7 hydroxide would be equal molar amounts relative to the
8 amount of fluoride present.

9 Q. And what does it mean when it says or
10 slightly higher than stoichiometric amount of lime?
11 Does that mean that it discloses the option of putting
12 in additional lime to make sure you've put in enough?

13 A. Yes.

14 Q. To neutralize the hydrogen fluoride?

15 A. That's correct, the fluoride.

16 Q. The fluoride?

17 MR. BEAUPRE: Please make sure counsel
18 finishes his question before you answer.

19 THE WITNESS: Sorry.

20 BY MR. ROSE:

21 Q. And what's disclosed in Harrison is --
22 strike that.

23 I'm looking down to the detailed
24 description of the invention, and in particular at line
25 64. There's reference to 63 to 64, the waste waters

1 contain a considerable quantity of HF, hydrogen
2 fluoride. What do you understand that to mean by a
3 considerable quantity?

4 MR. BEAUPRE: Objection, form.

5 A. Yeah, it's not defined.

6 Q. And then reading the next paragraph, the
7 disclosure states this HF tar is thin with a solvent.
8 Do you see that?

9 A. Yes.

10 Q. Is the solvent water?

11 MR. BEAUPRE: Objection, form.

12 A. Once again it's not clear.

13 Q. Continue on to the next sentence, the
14 disclosure reads this aqueous solution. Does that not
15 suggest that the solvent is water because it's aqueous?

16 A. It suggests that there is certainly water
17 present.

18 Q. Do you have any understanding as to where
19 the water could come from if not by the solvent?

20 MR. BEAUPRE: Objection, form.

21 A. Once again it's not defined, but it could
22 come from any source.

23 Q. But the only source that's disclosed is the
24 solvent, correct?

25 MR. BEAUPRE: Same objection.

1 THE WITNESS: Would you please repeat
2 that question?

3 (Record read.)

4 A. It does not say the solvent is water. It
5 says it can be thinned with solvent. Additional water
6 could be added from some source.

7 Q. Right. All I'm saying is that it doesn't
8 disclose any other source other than the mention of a
9 solvent, correct?

10 MR. BEAUPRE: Objection, form.

11 A. Well, it does say that potassium fluoride
12 solution. It says that the HF tar is mixed with a
13 solvent and mixed with excess potassium hydroxide, and
14 potassium hydroxide solution is likely aqueous.

15 Q. Okay. And then starting at line three of
16 column three, Harrison discloses this aqueous solution
17 contains 15 to 20 weight percent of potassium fluoride.
18 Do you see that?

19 A. Yes.

20 Q. And then it says three to five percent
21 unreacted potassium hydroxide. Do you see that?

22 A. Yes.

23 Q. Did those concentrations -- were those
24 considered by you when you reached your opinion of
25 combining Harrison with Masayuki and Smith?

1 MR. BEAUPRE: Objection, form.

2 A. I did not look specifically at the
3 concentrations in combining those two references.

4 Q. And similarly, the examples that are shown
5 disclose a percent, a weight percent of fluoride
6 combined as potassium fluoride as 4.42 percent and 4.47
7 percent. Those are the only concentrations that are
8 disclosed in the examples, correct?

9 A. I see the 4.42 percent.

10 Q. Yes. I can give you direction. Referring
11 to column four, line 25, for example one, and then
12 example two at line 51, it says the same waste as in
13 example one. Example three, column four at line 16
14 refers to 4.47 weight percent. Example four refers to
15 the same waste as in example one, that's at line 49,
16 and then example five refers to the procedure of
17 example four.

18 So 4.42 and 4.47 weight percent were the
19 only concentrations shown in the examples, correct?

20 A. Correct.

21 MR. BEAUPRE: Objection, form.

22 BY MR. ROSE:

23 Q. And you did not give any consideration to
24 those concentrations when you reached your conclusions
25 or your opinion to combine, sorry, Harrison with

1 Masayuki and Smith, correct?

2 MR. BEAUPRE: Same objection.

3 A. I didn't form an opinion based on the
4 concentrations.

5 Q. And you didn't consider them whether the
6 concentrations would have an effect on the combination,
7 correct?

8 MR. BEAUPRE: Same objection, form.

9 A. I did not form an opinion on the
10 concentrations and the effect of the concentration.

11 Q. If excess calcium hydroxide is used, as we
12 discussed, the dissolved disclosure suggests possibly
13 using a slightly higher than stoichiometric amount of
14 lime in the combination with Smith and Masayuki, what
15 would happen to that excess calcium hydroxide in the
16 overall process?

17 MR. BEAUPRE: Objection, form.

18 A. Which process are you talking about?

19 Q. When you -- in your opinion, you combined
20 Smith with Masayuki with Harrison to recover and
21 recycle KOH. If excess lime is used, what happens to
22 that in the recycling back to the reactor?

23 MR. BEAUPRE: Same objection.

24 BY MR. ROSE:

25 Q. In that combination?

1 A. It would be insoluble and be removed by
2 centrifugation, the use of a centrifuge in that case.

3 Q. I want to talk a little bit about the
4 Masayuki reference so we can go ahead and get that out,
5 which is Exhibit 1005 in the 916 and 917 proceedings.
6 Masayuki is directed to a process for the manufacture
7 of chlorine, correct?

8 A. That is correct.

9 Q. And it's manufactured starting with
10 3,4-dichloro-butene-1?

11 A. I think it's 3,5-dichloro-butene, maybe
12 it's 3,4, let me see, dichloro-butene-1, yes.

13 Q. Yes, sir. If you'll look at page two, line
14 12, it's 3,4 dichloro-butene-1?

15 A. Yes.

16 Q. And so this process disclosed in Masayuki
17 does not involve a fluorocarbon chemistry, correct?

18 MR. BEAUPRE: Objection, form.

19 A. The Masayuki patent does not involve
20 fluorocarbon chemistry, that's correct.

21 Q. And chloroprene, the product of the
22 Masayuki process, is a molecule that has two double
23 bonds, correct?

24 A. That's correct.

25 Q. And are there issues raised by that fact

1 that it has two double bonds as far as how the reaction
2 proceeds compared to reactions involving a result in
3 molecule with only a single double bond?

4 MR. BEAUPRE: Objection, form,
5 incomplete.

6 BY MR. ROSE:

7 Q. For example, are there issues regarding
8 polymerization?

9 MR. BEAUPRE: Same objections.

10 A. Chloroprene is a reactive molecule and
11 rises rapidly.

12 Q. Are there safety concerns in the
13 manufacture of chloroprene that would not be present in
14 the manufacture of 134, for example?

15 MR. BEAUPRE: Objection, form.

16 A. I haven't considered that.

17 Q. I want to walk through the process of
18 Masayuki and see if I'm understanding it correctly.

19 If you would turn to page six of Masayuki,
20 and beginning at line 14, the process begins with a
21 description of subjecting 3,4-dichloro-butene-1 to
22 dehydrochlorination in an aqueous solution, correct?

23 A. Yes.

24 Q. And it refers to doing this at a relatively
25 high concentration of hydroxide at 25 to 55 percent

1 weight of alkali metal hydroxide, right?

2 A. Correct.

3 MR. BEAUPRE: Objection, form.

4 BY MR. ROSE:

5 Q. And the alkali metal hydroxide disclosed in
6 Masayuki is sodium hydroxide, correct?

7 A. That is the base that's used throughout the
8 experimentation, but they also refer to the use of
9 other hydroxides, such as potassium, lithium for
10 example.

11 Q. And the reaction described in Masayuki on
12 page six also is conducted in the presence of an
13 organic catalyst. Do you see that reference at page
14 six, lines 18 to 19?

15 A. I do, yes.

16 Q. What is the role of the catalyst in this
17 reaction?

18 MR. BEAUPRE: Objection, form.

19 A. The catalyst is specifically a phase
20 transfer catalyst and added to speed up the chemical
21 reaction.

22 Q. Similar to the phase transfer catalyst we
23 discussed yesterday?

24 A. Exactly.

25 MR. BEAUPRE: Same objection.

1 BY MR. ROSE:

2 Q. And then the Masayuki on that same page
3 goes on to discuss gas evaporation to remove the
4 chloroprene product. I'm reading from line 20, down to
5 about line 28.

6 A. Yes, he discusses removal of chloroprene in
7 addition to other products.

8 Q. Right. At the gas top of the reactor,
9 correct?

10 A. At the top of the reactor, which is line
11 14.

12 Q. And then beginning at line 28, Masayuki
13 discloses some water is evaporated away at a
14 temperature of 95 to 100 degrees C from the water phase
15 primarily containing an aqueous solution of alkali
16 metal hydroxide and alkali metal chloride, correct?

17 A. Correct.

18 Q. And so the alkali metal hydroxide that is
19 the unreacted sodium hydroxide that's discussed in the
20 examples, but as you said, could be potassium hydroxide
21 or lithium hydroxide.

22 MR. BEAUPRE: Objection to form.

23 BY MR. ROSE:

24 Q. Correct?

25 A. It would be unconverted.

1 Q. Right. It was in the reactor but didn't
2 react?

3 A. That's correct.

4 Q. Okay. And then the alkali metal chloride,
5 that would be the resultant material that did react.
6 You would have the alkali metal, for example, sodium,
7 and then the chloride that had been removed from the
8 3,4-dichloro-butene-1?

9 MR. BEAUPRE: Objection to form.

10 BY MR. ROSE:

11 Q. Correct?

12 A. That is correct.

13 Q. And so that solution is concentrated by
14 removal of some of the water in that solution, correct?

15 MR. BEAUPRE: Objection, form.

16 A. Which solution are you talking about?

17 Q. Yes, where it says: The resulting material
18 is concentrated to recover an aqueous solution
19 containing alkali metal hydroxide as a concentration of
20 15 to 55 percent by weight. I'm on page six, lines 29
21 to 36.

22 A. That's correct.

23 Q. Masayuki then actually says that the alkali
24 metal hydroxide for the present invention typically is
25 sodium hydroxide, right, for economic reasons?

1 A. Yes, that's what it says.

2 Q. And then he goes on to say that the
3 concentration of the alkali metal hydroxide is
4 typically between 25 and 55 percent by weight, correct?

5 MR. BEAUPRE: Objection, form.

6 A. That's how it reads, yes.

7 Q. So the reaction or the process starts with
8 a concentration of alkali metal hydroxide of about 25
9 to 55 percent weight is reacted, and then after the
10 reaction, it reconcentrated by evaporation to bring the
11 concentration up to 15 to 55 percent by weight,
12 correct?

13 MR. BEAUPRE: Objection, form.

14 A. Yes, fresh alkali and concentration are
15 used to maintain the concentration in that range.

16 Q. Right. So the fresh alkali coming in at 25
17 to 55 percent is reacted, which causes the alkali metal
18 hydroxide concentration to drop as some of it is
19 reacted, and then it is concentrated back up to 15 to
20 55 percent, as described on page six at lines 34 to 38,
21 correct?

22 MR. BEAUPRE: Objection, form.

23 A. Well, the process is run continuously.
24 It's not clear to me whether the sodium hydroxide level
25 drops in the reactor when they have the option of

1 adding additional sodium hydroxide.

2 Q. Well, what's coming out of the reactor is
3 concentrated, right?

4 MR. BEAUPRE: Objection, form.

5 A. Well, you'd have to define the word
6 concentrated, as it comes out.

7 Q. No. It gets concentrated after it comes
8 out. Masayuki talks about that at page six, starting
9 at line 33. The resulting material is concentrated to
10 recover an aqueous solution containing alkali metal
11 hydroxide as a concentration of 15 to 55 percent by
12 weight, which is reused in the reaction?

13 A. Yes.

14 Q. So if it it's concentrated to get to 15 to
15 55 percent by weight, it had to have been somewhere
16 lower in order to be concentrated, correct?

17 MR. BEAUPRE: Objection, form.

18 A. Concentration implies that the
19 concentration is being raised. I don't know what those
20 levels are.

21 Q. Right. Thank you.

22 And Masayuki indicates that the
23 concentration of alkali metal hydroxide going into the
24 reactor should not be less than 25 percent, because the
25 speed of reaction would be produced and a byproduct

1 would be increased. Do you see that at lines five to
2 seven on page seven of Masayuki?

3 MR. BEAUPRE: Objection to form.

4 A. I think you said produced, but I think you
5 meant reduced. Reaction rate would be reduced, but
6 that's fine.

7 Q. I'm not sure what I said.

8 A. That's what I thought I heard.

9 Q. I'll restate my question to make sure it's
10 clear.

11 So Masayuki indicates that you should use
12 at least 25 percent weight concentration, because if
13 you don't, the speed of reaction would be reduced and a
14 byproduct, one chloro butadiene 1-3 would be increased
15 if you go below 25 percent, correct?

16 MR. BEAUPRE: Objection, form.

17 A. That's what it says.

18 Q. And then Masayuki goes into a discussion
19 regarding the distilling the chloroprene, which that
20 would be a discussion of the gaseous product coming out
21 of the top of the reactor, correct? I'm looking at
22 line 14 of page seven.

23 A. Correct.

24 Q. Then going on to the next paragraph that
25 starts at 21, Masayuki discusses a quaternary ammonium

1 compound and other options to be used as an organic
2 catalyst. Is that, again, a reference to the phase
3 catalyst mentioned earlier?

4 MR. BEAUPRE: Objection, form.

5 A. Yes, those are examples of phase transfer
6 catalysts.

7 Q. And then on page eight at line three,
8 Masayuki discussed the desire to avoid further reaction
9 of chloroprene. Is that a reference to the
10 polymerization that I had asked about earlier?

11 MR. BEAUPRE: Objection, form.

12 A. He doesn't say specifically whether that is
13 related to the polymerization of chloroprene, or it
14 could be further dehydrochlorination of the remaining
15 chloride as well. So it's not clear.

16 Q. But he also does say in that sentence: The
17 reaction can be preferably carried out following the
18 addition of a polymerization inhibitor, such as
19 phenothiazine. So does that suggest that
20 polymerization is at least one of the potential results
21 of further reaction?

22 MR. BEAUPRE: Objection, form.

23 A. Yes, it does.

24 Q. And then beginning at line 13, Masayuki
25 discusses maintaining a vapor pressure lower than

1 atmospheric to increase the speed at which the
2 chloroprene is produced, I'm sorry, at which the
3 chloroprene which is produced evaporates.

4 So, again, is it the idea that if we can
5 remove it before it reacts further, we can reduce
6 polymerization?

7 MR. BEAUPRE: Objection, form.

8 BY MR. ROSE:

9 Q. Is that your understanding?

10 A. That's the general idea, yes.

11 Q. Okay. And then beginning at line 19,
12 Masayuki discusses water is included in the organic
13 phase separated along with the aqueous phase from the
14 mixture. Does that mean that there is water that's
15 also included in the gaseous phase going out of the top
16 of the reactor?

17 MR. BEAUPRE: Objection to form.

18 A. He does state that, yes.

19 Q. I'd like to turn to page nine, and
20 beginning at line nine, Masayuki discusses some of the
21 water is removed via evaporation from the water phase
22 containing primarily an aqueous solution of alkali
23 metal hydroxide and alkali metal chloride, which in
24 turn contains solid alkali metal chloride separated
25 from the organic phase.

1 So am I understanding that correctly that
2 we're talking about now the aqueous phase that's drawn
3 out at the bottom of the reactor?

4 MR. BEAUPRE: Objection, form.

5 A. Yes, aqueous phase is withdrawn from the
6 reactor 19.

7 Q. And that aqueous phase includes some solid
8 alkali metal chloride, for example, sodium chloride in
9 the examples of Masayuki, right?

10 A. Yes, it does say that.

11 Q. And then again at lines 13 to 14, Masayuki
12 says that the resulting material is concentrated to
13 recover alkali metal hydroxide?

14 MR. BEAUPRE: Objection, form.

15 BY MR. ROSE:

16 Q. Is that correct?

17 A. Please repeat the question again.

18 (Record read.)

19 A. This section is related to describing the
20 problem that he's trying to solve. So there is a
21 discussion of temperatures and concentrations and
22 polymerization being an issue of production of
23 chloroprene, and as he noted in line 15 in the
24 conventional process, the conventionally -- that
25 conventionally precipitation of dissolved alkali metal

1 chloride accompanying the evaporation of this water as
2 well as the precipitation of polymer due to small
3 amounts of 3,4 dichloro-butene-1, chloroprene and
4 polymer contained in the aqueous phase are problematic.

5 So I think in the context of your question,
6 he's referring to describing the overall general
7 conventional processes.

8 Q. So he mentions conventionally precipitation
9 being a problem, starting at line 15, that's the next
10 paragraph of Masayuki. So you don't understand that
11 what he's talking about in lines 9 through 14 of page
12 nine to be describing Masayuki's process?

13 MR. BEAUPRE: Objection, form.

14 A. It's certainly part of Masayuki's process.

15 Q. And then as you note, beginning at line 15,
16 the next paragraph, Masayuki discusses possible
17 problems with precipitation of polymer due to
18 additional 3,4 dichloro-butene-1 and chloroprene and
19 polymer being in that aqueous phase that's coming out
20 the bottom of the reactor, isn't that correct?

21 A. That's correct.

22 Q. And then in the next paragraph, beginning
23 at line 28, Masayuki says that they were able to solve
24 that problem by running -- performing the operation at
25 a temperature of 95 degrees C or greater, that avoids

1 the problem caused by the polymer, right?

2 MR. BEAUPRE: Objection. Sorry,
3 objection, form.

4 A. It avoids the formation of the polymer that
5 is formed in this "the standard apparatus used" in the
6 conventional processes.

7 Q. Right. And then beginning at line 32, he's
8 talking about the concentration step. He said: If
9 concentration is performed at a temperature lower than
10 95 degrees C, within a short period of time disassembly
11 of the apparatus is required due to deposition of
12 polymer into the apparatus. So he's talking about the
13 concentration step?

14 MR. BEAUPRE: Objection, form.

15 BY MR. ROSE:

16 Q. Right?

17 A. Please repeat that again.

18 (Record read.)

19 A. I believe he's referring to the reaction
20 step.

21 Q. What do you understand that language to
22 mean at line 32 of page nine of Masayuki, where he
23 says: If concentration is performed at a temperature
24 lower than 95 degrees C, what do you understand him to
25 mean by the word concentration?

1 MR. BEAUPRE: Objection, form.

2 A. Concentration is the increase in
3 concentration.

4 Q. Right. So we discussed previously that
5 concentrating a solution means increasing its
6 concentration?

7 A. That's correct.

8 Q. So what he's talking about here is the step
9 of increasing the concentration being performed at a
10 temperature lower than 95 degrees C?

11 MR. BEAUPRE: Objection, form.

12 A. Yes.

13 Q. And then he says that performing that step
14 at higher than 150 degrees C is not energy efficient.
15 So he recommends doing it in a range between 95 and 150
16 degrees C, correct?

17 MR. BEAUPRE: Objection, form.

18 A. Correct.

19 Q. Then on page ten, Masayuki describes an
20 example of performing this process, starting at line
21 20. And in this example, Masayuki utilizes sodium
22 hydroxide as the alkali metal hydroxide, correct?

23 A. Correct.

24 Q. And he utilizes a solution of sodium
25 hydroxide that is 50 percent by weight sodium hydroxide

1 aqueous solution, that's at line 25 to 26, isn't that
2 right?

3 A. That's correct.

4 Q. And he talks about conduits in various
5 numbers in reference to the drawing that's shown on
6 page 13 of Masayuki. So it may help to refer to that
7 as we go through this discussion. But the reaction
8 takes place in stirring machine equipped reactor 19,
9 correct?

10 MR. BEAUPRE: Objection, form.

11 BY MR. ROSE:

12 Q. That's 19 in the drawing?

13 A. That's where the reaction takes place, yes.

14 Q. And the aqueous phase is showing as
15 withdrawn through the conduit number four at the bottom
16 of the reactor, as shown in the drawing, right?

17 A. That's correct.

18 Q. And he mentions at line 36 -- 35 to 36, a
19 slightly mixed lipid and aqueous phases. What is
20 lipid?

21 A. That is phase transfer catalyst.

22 Q. And so the aqueous phase withdrawn through
23 conduit four then goes to decanter, which is number 20,
24 correct?

25 A. Correct.

1 Q. And from there -- what is decanting? What
2 does that mean?

3 MR. BEAUPRE: Objection, form.

4 A. Decanting is the separation of two phases.

5 Q. And in an aqueous and lipid mixture, the
6 lipid would be the lighter of the two phases?

7 MR. BEAUPRE: Objection, form.

8 A. Well, it's not clear that it's the lighter
9 phase, but the diagram shows it coming off the top of
10 the decanter. That's the reactor.

11 Q. The decanter allows liquids to settle, so
12 it allows two liquids to separate, is that what happens
13 in the decanter?

14 MR. BEAUPRE: Objection, form.

15 A. Two or three phases.

16 Q. Okay. In this case, the lipid phase is
17 shown being withdrawn out the top of the decanter
18 through conduit five, is that correct?

19 A. That's correct.

20 Q. And then the drawing shows and the
21 discussion going on to page 11 shows that the aqueous
22 phase comes out the bottom of the decanter through
23 conduit six, correct?

24 MR. BEAUPRE: Objection, form.

25 A. The aqueous phase and some of the

1 precipitated sodium chloride.

2 Q. So that aqueous phase coming out at six
3 would include water, sodium hydroxide, dissolved sodium
4 chloride and some precipitated sodium chloride,
5 correct?

6 MR. BEAUPRE: Objection to form.

7 A. Yes, that's correct.

8 Q. And then that goes into the enricher, which
9 is number 21 of the drawing, is that right?

10 A. Yes.

11 Q. And then it says, Masayuki says at page 11,
12 line 4: Concentration was carried out such that NaOH
13 over NaOH plus H₂O equals 0.5.

14 So that's an indication of returning or
15 concentrating the sodium hydroxide to a 50 percent
16 concentration, is that right?

17 A. That's correct.

18 MR. BEAUPRE: Objection, form. Please
19 have a pause there so I can lodge my
20 objection.

21 THE WITNESS: I'm sorry.

22 BY MR. ROSE:

23 Q. And Masayuki describes using the heat
24 exchanger, which is number 22, to heat solution after
25 circulated into the enricher via conduit ten -- well,

1 strike that.

2 So Masayuki then at line six shows passing
3 from the enricher the solution through conduit nine
4 from conduit eight to a heat exchanger, which is 22,
5 correct?

6 MR. BEAUPRE: Objection, form.

7 A. Yes.

8 Q. So the material that's been concentrated,
9 if I'm understanding this correctly, leaves the
10 enricher at conduit eight, goes to conduit nine through
11 the heat exchanger 22 to heat it up and then back
12 through conduit ten and into the enricher at a hotter
13 temperature, is that a correct understanding?

14 MR. BEAUPRE: Objection, form.

15 A. Well, a sidestream is showing being taken
16 from conduit eight.

17 Q. Right. So as material comes out of the
18 enricher, some of it is heated up and returned back to
19 the enricher, and some of it is drawn off from conduit
20 8 by conduit 11, correct?

21 MR. BEAUPRE: Objection, form.

22 A. That is correct.

23 Q. And then that portion that comes off
24 through conduit 11, which has been concentrated up to a
25 50 percent concentration, as described at line nine on

1 page 11, that goes into the slurry tank, which is 24,
2 correct?

3 MR. BEAUPRE: Objection, form.

4 A. Yes, that's correct.

5 Q. And so what goes into the slurry tank has a
6 weight percent of 50 percent sodium hydroxide and 50
7 percent water plus whatever residual organics might be
8 in there?

9 MR. BEAUPRE: Objection to form.

10 A. It has a 50 percent ratio of sodium
11 hydroxide over sodium hydroxide plus water.

12 Q. And then precipitation occurs in the -- so
13 after the slurry tank, which is 24, that solution goes
14 to the centrifuge, which is 25, correct?

15 A. The mixture goes to the centrifuge 25.

16 Q. And, okay, so the mixture has -- just to
17 make sure I'm understanding correctly, the mixture has
18 a sodium hydroxide to sodium hydroxide plus water
19 makeup of 50 percent -- strike that. That was poorly
20 worded.

21 The percentage of sodium hydroxide to
22 sodium hydroxide plus water that's going into the
23 slurry tank is 50 percent, is that correct?

24 MR. BEAUPRE: Objection, form.

25 A. It doesn't state whether that is a molar

1 ratio or a weight ratio, I don't believe. I presume
2 it's a weight ratio.

3 Q. All the other percentage concentrations
4 described are in terms of weight percent, right?

5 A. Yes.

6 Q. And so after the -- so what goes in there
7 may also include some precipitated sodium chloride,
8 correct?

9 A. Almost definitely does.

10 Q. And then from the slurry tank, it goes from
11 the centrifuge, which is 25, and in the centrifuge, the
12 solid sodium chloride is removed and discarded, right?

13 A. It's removed.

14 Q. Right, and it's removed through conduit 12?

15 A. That's correct.

16 Q. We don't know what happens after that, but
17 it's removed?

18 A. That's right.

19 Q. Thank you. And then conduit 13 takes the
20 sodium hydroxide and water mixture that has that ratio
21 of 50 percent sodium to sodium hydroxide plus water
22 through conduit 13 back up to conduit two and is
23 returned to the reaction tank 19, correct?

24 MR. BEAUPRE: Objection, form.

25 A. I don't know whether it has that ratio or

1 not. It returns recovered aqueous sodium hydroxide.

2 Q. So is there any procedure or step in the
3 process shown between what goes into the slurry tank 24
4 and then what happens in the centrifuge and what comes
5 out at conduit 13 that would change the ratio of sodium
6 hydroxide to sodium hydroxide plus water?

7 MR. BEAUPRE: Objection, form.

8 A. I haven't formed an opinion on that.

9 Q. The sodium hydroxide in water at that ratio
10 50 percent, that would all be soluble, correct?

11 MR. BEAUPRE: Objection, form.

12 A. I don't know for a fact, but I expect it
13 would be.

14 Q. And something that's dissolved in water
15 wouldn't come out in the centrifuge 25?

16 A. No.

17 Q. That would be solids coming out, correct?

18 A. That's correct.

19 Q. An then Masayuki discloses another example
20 on page 12, although not walking through all of the
21 steps, but also indicates that a similar procedure, as
22 we just discussed, was performed, except that the
23 concentration of the sodium hydroxide aqueous solution
24 was set at 30 percent by weight. Do you see that at
25 lines 5 through 7?

1 A. Yes, I do.

2 Q. And he indicates that good separation of
3 the lipid and aqueous phases was achieved as well as no
4 trouble with the enricher being observed, correct?

5 A. That's correct.

6 Q. So if Masayuki were combined with Smith and
7 used in a process that involved a stream coming out of
8 the reactor that included dissolved potassium fluoride
9 and potassium hydroxide, there would not be any
10 appreciable difference between the solubility of
11 potassium fluoride and potassium hydroxide, is that
12 correct?

13 MR. BEAUPRE: Objection, form.

14 A. There are differences in solubility in
15 water between potassium fluoride and potassium
16 hydroxide.

17 Q. Are they appreciable enough to cause a
18 separation, as described in Masayuki?

19 MR. BEAUPRE: Objection, form.

20 A. I don't recall specifically what those
21 concentrations are, and the temperatures may have to be
22 adjusted if you were to follow that to a procedure.

23 Q. And you don't disclose in your declaration
24 any such changes in the temperatures to compensate for
25 that?

1 MR. BEAUPRE: Objection, form.

2 A. I don't believe I did.

3 Q. Well, wouldn't the enrichment step of
4 Masayuki cause problems in combination with the Smith
5 disclosure, if concentrations of KOH at 15 percent or
6 greater are used?

7 MR. BEAUPRE: Objection, form.

8 A. You're asking me about concentrations of
9 KOH and KF?

10 Q. KOH of 15 percent.

11 MR. BEAUPRE: Same objections.

12 A. I don't know what would happen in the
13 enricher under those conditions, under the conditions
14 of Masayuki.

15 Q. And then using lime to drop -- to
16 precipitate out the -- strike that.

17 Using lime to convert potassium fluoride to
18 calcium fluoride to precipitate that out, would that
19 not result in an inefficient reaction at those
20 concentrations?

21 MR. BEAUPRE: Objection, form, and
22 incomplete hypothetical.

23 A. I haven't formed an opinion, but not
24 necessarily.

25 Q. If Smith were combined with Masayuki, in

1 the Smith reaction, potassium hydroxide would start at,
2 given my example of 15 percent concentration, and some
3 amount of that potassium hydroxide would be used so
4 that the concentration would be below 15 percent
5 potassium hydroxide when it left the reactor, and the
6 enricher would be used to bring potassium hydroxide
7 back up to 15 percent, as that's done, would that not
8 remove enough water to cause the calcium hydroxide
9 reaction to form calcium fluoride to be inefficient and
10 eventually become bogged down?

11 MR. BEAUPRE: Objection, form and
12 incomplete hypothetical.

13 A. Yeah, I have formed no opinion as to
14 whether it's efficient or not.

15 Q. Now, Smith doesn't disclose -- we discussed
16 this yesterday -- Smith doesn't disclose the fact that
17 unused or unreacted potassium hydroxide comes out of
18 the reaction, is that correct?

19 MR. BEAUPRE: Same objection or
20 objection, form.

21 A. He doesn't disclose what happens to any
22 unreacted KOH.

23 Q. It doesn't disclose indeed that there even
24 is unreacted KOH, correct?

25 MR. BEAUPRE: Objection, form.

1 A. He doesn't discuss whether there is or is
2 not any unreacted KOH.

3 Q. So based on Smith, it's possible it's not
4 disclosed one way or the other, but it's possible that
5 all the KOH reacts, and what comes out in the aqueous
6 phase is primarily or entirely potassium fluoride with
7 little or no potassium hydroxide, correct?

8 MR. BEAUPRE: Objection, form.

9 A. It doesn't indicate one way or the other.

10 Q. I'd like to turn to your declaration.

11 MR. BEAUPRE: The 916 declaration?

12 MR. ROSE: Yes, sorry, talking about
13 the 916.

14 A. Okay.

15 Q. And in particular paragraph 68.

16 A. Yes.

17 Q. Starting at the fourth line from the bottom
18 of page 39, you state that a POSITA would be motivated
19 to try to recover and recycle as much valuable
20 material, e.g., dehydrohalogenating agent as possible
21 from the reactions described in Smith. Do you see
22 that?

23 A. Yes.

24 Q. So if the material coming out in the
25 aqueous phase of the reactor from Smith didn't have any

1 dehydrohalogenating agent in it, would the POSITA
2 nonetheless be motivated to try to recover
3 dehydrohalogenating agent?

4 MR. BEAUPRE: Objection, form and
5 incomplete hypothetical.

6 A. Yeah, it is a hypothetical situation.

7 Q. Sure. You're an expert --

8 A. It's not present.

9 Q. Right. So there would be no motivation to
10 recover any unused dehydrohalogenating agent if it was
11 all reacted, correct?

12 MR. BEAUPRE: Same objections.

13 A. You can't recover it if it's not there. If
14 it were in excess, and it was present in the effluent,
15 you would be motivated to recover it.

16 Q. And if the material coming out of the
17 reactor in Smith was primarily potassium fluoride,
18 wouldn't the POSITA be motivated to look for
19 alternative uses or markets for potassium fluoride?

20 MR. BEAUPRE: Objection, form and
21 incomplete hypothetical.

22 A. That's not stated at all. They would be
23 motivated to recover the potassium fluoride.

24 Q. Right.

25 A. Certainly.

1 Q. And perhaps sell that on the market rather
2 than convert it back to KOH?

3 MR. BEAUPRE: Objection, form and
4 foundation.

5 A. That's certainly something one would
6 possibly consider, but it's not stated that they're
7 selling potassium chloride.

8 MR. BEAUPRE: Counsel, if we're at a
9 breaking point, we've been going for about
10 an hour.

11 MR. ROSE: Yeah, that's fine.

12 THE VIDEOGRAPHER: We're off the
13 record, the time is 10:02.

14 (Recess.)

15 THE VIDEOGRAPHER: We're back on the
16 record, the time is 10:16.

17 BY MR. ROSE:

18 Q. Dr. Manzer, one thing I want to confirm
19 before we get going again is we've been talking about
20 your declaration in the 916 proceeding. I just want to
21 confirm that your declarations are the same as between
22 the 916 and the 917, correct?

23 A. Yes, I believe they're identical.

24 Q. Now, we were talking about the Masayuki
25 reference earlier, and we walked through the example

1 one that is disclosed and discussed in Masayuki from
2 pages ten to twelve, and I just want to confirm that in
3 Masayuki the reaction -- strike that.

4 The Masayuki, in the example, the sodium
5 hydroxide aqueous solution that is introduced to the
6 reactor by conduit two is 50 percent by weight sodium
7 hydroxide, correct? And that's on page ten at lines 25
8 to 26.

9 MR. BEAUPRE: Objection, form.

10 A. It says the conduit two contains 50 percent
11 of the weight sodium hydroxide, aqueous sodium
12 hydroxide.

13 Q. And then we also discussed that after
14 concentration in the enricher, the concentration of
15 sodium hydroxide was brought back to 50 percent by
16 weight sodium hydroxide compared to sodium hydroxide
17 plus water?

18 MR. BEAUPRE: Objection, form.

19 BY MR. ROSE:

20 Q. Correct, and then I can direct you to page
21 11, line 5 for that.

22 MR. BEAUPRE: Same objection.

23 A. Yes.

24 Q. So the only disclosure in Masayuki that
25 shows the concentration of sodium hydroxide in water

1 shows that what goes into the reactor through conduit
2 two is the same as what is then later taken out of the
3 enricher at conduit eight, correct?

4 MR. BEAUPRE: Objection, form.

5 A. I have not formed an opinion on that.

6 Q. Can you identify any other disclosure in
7 Masayuki that shows any instance in which the
8 concentration of sodium hydroxide introduced into the
9 reactor is different than the concentration of sodium
10 hydroxide that is withdrawn from the enricher?

11 MR. BEAUPRE: Objection, form.

12 A. It does provide a variation in the
13 concentration of caustic sodium hydroxide on column --
14 page six, line 17, which says relatively high, which
15 could be 25 to 55 percent.

16 Q. Right. And the only example, however --
17 strike that.

18 He does not show any other percentage
19 within that range and discuss it being reacted and
20 taken through the Masayuki process, including the
21 enricher, in which some different concentration of
22 sodium hydroxide leaves the enricher, correct?

23 MR. BEAUPRE: Objection, form.

24 A. That's one example only. Once again on
25 page -- column -- page six, line 36, it says, the

1 hydroxide concentration could be 15 to 55 percent,
2 which is used in the reaction.

3 Q. Are there any other examples that you're
4 aware of?

5 MR. BEAUPRE: Objection, form.

6 A. There are three examples in the Masayuki
7 reference.

8 Q. Right. And in those other examples, other
9 than example one, Masayuki does not disclose the
10 concentration of sodium hydroxide coming out of the
11 enricher, does he?

12 MR. BEAUPRE: Objection, form.

13 A. I don't believe that's true. And example
14 two, line seven, it says: The concentration was set to
15 30 percent by weight.

16 Q. Do you understand that to be the
17 concentration going into the reactor?

18 A. It's not specific, but 30 percent by weight
19 concentration going into the reactor falls within that
20 range that he describes.

21 Q. And then is that the percentage by weight
22 coming out of the enricher?

23 MR. BEAUPRE: Objection, form.

24 A. It does not state that.

25 Q. Right. So the only example in which

1 Masayuki discloses the concentration going into the
2 reactor and the concentration coming out of the
3 enricher is example one in which they are the same
4 concentration, correct?

5 MR. BEAUPRE: Objection, form and
6 misstates prior testimony.

7 MR. ROSE: I didn't state any prior
8 testimony.

9 MR. BEAUPRE: And assumes facts not in
10 evidence.

11 MR. ROSE: I didn't make an assumption
12 either. I merely asked a question.

13 THE WITNESS: Please repeat that
14 question.

15 (Record read.)

16 MR. BEAUPRE: Same objections.

17 A. That's what's described in example one.
18 Example two he says the same procedure was used as in
19 example one with the hydroxide solution set to 30
20 percent. It does not say where that 30 percent is
21 derived from.

22 Q. So example two doesn't provide a comparison
23 of what went into the reactor and what came out of the
24 enricher, correct?

25 MR. BEAUPRE: Objection, form.

1 A. I don't see anywhere that it does.

2 Q. I'd like to turn back to your declaration
3 in 916 and 917 proceedings.

4 In paragraph 72, you state -- I'll wait
5 until you get there.

6 A. I'm there.

7 Q. A POSITA would be motivated to apply the
8 withdrawing step of Masayuki to the dehydrohalogenation
9 process of Smith, thereby resulting in withdrawing an
10 aqueous phase, i.e., a reaction stream comprising spent
11 KOH and byproduct KF from the dehydrofluorination
12 reactor as recited in step B of claim 21. Do you see
13 that?

14 A. Yes.

15 Q. However, we've already confirmed that Smith
16 doesn't disclose whether any unreacted KOH comes out of
17 the reactor in a reaction stream, isn't that correct?

18 MR. BEAUPRE: Objection, misstates
19 prior testimony and form.

20 A. I haven't formed an opinion on that.

21 Q. Smith is silent as to whether any unreacted
22 KOH remains and therefore nothing about Smith would
23 motivate a POSITA to look to Masayuki, correct?

24 MR. BEAUPRE: Objection, form.

25 A. No, that's not correct.

1 Q. Well, it's not correct that Smith is silent
2 on whether any unreacted KOH comes out of the reactor?

3 MR. BEAUPRE: Same objection.

4 A. There's no discussion in Smith about the
5 concentration of KOH exiting the reactor.

6 Q. And there's no discussion in Smith about
7 any KOH coming out of the reactor, isn't that correct?

8 MR. BEAUPRE: Same objection.

9 A. No, but combining Masayuki with Smith,
10 Smith would -- it would be logical to include higher
11 concentrations of KOH, because as Masayuki says, the
12 dehydrohalogenation action goes faster in the presence
13 of excess KOH.

14 Q. But Smith is the primary reference,
15 correct?

16 MR. BEAUPRE: Objection, form.

17 A. Smith is a reference for the production of
18 halo alkanes, primarily.

19 Q. You don't have anything in your declaration
20 that suggests that Masayuki's mention of using higher
21 concentrations of alkali metal hydroxide gives rise to
22 the motivation to combine Smith and Masayuki, do you?

23 MR. BEAUPRE: Objection, form.

24 A. Masayuki makes the point that higher
25 concentrations of hydroxide preferred increase the rate

1 of the hydrodehalogenation step. Excuse me, therefore,
2 if you are Smith, you're looking for a good
3 dehydrohalogenation step, you would be inclined to look
4 at Masayuki.

5 Q. You don't cite in your declaration to
6 Masayuki's suggestion of using higher concentrations of
7 alkali metal hydroxide as a motivation to combine the
8 references, do you?

9 MR. BEAUPRE: Objection, form.

10 A. The POSITA is looking at all prior art as a
11 way to make 1234 using KOH and recovering all valuable
12 materials. And in looking at the prior art, it covers
13 Masayuki, which is -- looks like a great starting point
14 for recovering and recycling spent dehydrohalogenation
15 agent in recovering fluoride value by using the method
16 of Harrison.

17 So combining those three references, one
18 would -- a POSITA would think there would be a high
19 probability of success in a more efficient
20 cost-effective process.

21 Q. Where in Masayuki are you relying on for
22 the testimony that Masayuki teaches using excess alkali
23 metal hydroxide?

24 MR. BEAUPRE: Objection, form.

25 A. All right. Let's go to page six, line 17.

1 It discusses the present invention in which he uses
2 high concentration of alkali metal hydroxide 25 through
3 55 percent, and he goes on to page 7, line 5, it says:
4 If the concentration is less than 25 percent, not only
5 is the speed of the reaction reduced, but byproducts
6 are increased. The implication is that the
7 concentration of base should be relatively high.

8 Q. Is there any other area of Masayuki that
9 you're relying on for that opinion?

10 MR. BEAUPRE: Objection, form.

11 A. On page four, line 21, the reaction is run
12 so as to leave a final hydroxide concentration of at
13 least 25 percent, and the method for the production,
14 said method for the production following on there
15 provides for a fast reaction speed.

16 Q. Is there anywhere else that you're
17 referring to?

18 A. I don't seem to be able to find anything
19 else. There may be additional examples, but I can't
20 find them right now.

21 Q. And just to be clear, 25 percent
22 concentration is the absolute lowest concentration that
23 Masayuki describes for the alkali metal hydroxide being
24 introduced into the reactor, correct?

25 MR. BEAUPRE: Objection, form.

1 A. He prefers the 25 to 55 percent range.

2 Q. And do you cite to those excerpts from
3 Masayuki anywhere in your declaration as providing
4 motivation for a POSITA to combine Masayuki with Smith?

5 MR. BEAUPRE: Objection, form.

6 A. Let's go to page 0000040, paragraph 68,
7 line 11 of paragraph 68: To make the
8 dehydrohalogenation process of Smith even more
9 efficient and cost effective, POSITA would be motivated
10 to increase the amount of KOH recovered and recycled to
11 the dehydrohalogenation reaction to make productive use
12 of the KF byproduct.

13 Q. Anywhere else?

14 MR. BEAUPRE: Objection, form.

15 (Pause.)

16 A. Without taking a lot more time, I'm not
17 uncovering any additional examples. They may be in
18 there, but I haven't seen them.

19 Q. And to go back to the portion that you just
20 referenced, page 40, beginning at the 11th line from
21 the top, where you state: To make the
22 dehydrohalogenation process of Smith even more
23 efficient and cost effective, a POSITA would be
24 motivated to increase the amount of KOH recovered and
25 recycled to the dehalogenation reaction and to make

1 productive use of the KF byproduct salt. And after
2 that you state: To that end, Harrison teaches a method
3 for converting byproduct KF back to KOH using CaOH_2 .

4 So the excerpt that you cited, that's a
5 motivation to use Harrison, correct?

6 MR. BEAUPRE: Objection, form.

7 A. Motivation is to increase the amount of KOH
8 to the dehydrohalogenation reactor, as stated, offers
9 benefits by Masayuki. And then by increasing the
10 amount of KOH fed, the reaction would produce KF as a
11 byproduct salt, and that's when Harrison enters into
12 the picture as a way to recover the KF byproduct salt.

13 Q. That excerpt that you cited to me does not
14 include any statement about increasing the amount of
15 KOH fed to the reactor, does it? Instead, it says
16 increase the amount of KOH recovered and recycled.

17 MR. BEAUPRE: Objection.

18 BY MR. ROSE:

19 Q. Isn't that correct?

20 A. A POSITA would look at Masayuki and
21 understand that increasing base concentration increases
22 the rate of the reaction and likely the conversion
23 reaction, depending on conditions. And, therefore,
24 there would be excess KOH fed to the reactor, and any
25 unreacted KOH would exit the reactor, as stated in

1 line -- in paragraph 68, along with that spent KOH
2 would be KF, the byproduct from the reaction or
3 co-product from the reaction, and then in order to make
4 the process more cost efficient, then you look at
5 Harrison as a method of removing KF and regenerating
6 KOH.

7 Q. Where in paragraph 68 do you state that the
8 POSITA would be motivated to increase the amount of KOH
9 being fed into the reactor? Isn't paragraph 68 about
10 motivation to recover as much KOH as possible?

11 MR. BEAUPRE: Objection, form.

12 A. I think that's reading it too narrowly. I
13 mean, you're applying the teachings of Masayuki, which
14 are numerous to the process.

15 Q. To focus on my question, where in paragraph
16 68 do you say that a POSITA would be motivated to
17 increase the amount of KOH going into the reactor?

18 MR. BEAUPRE: Objection, form.

19 A. I hadn't formed an opinion on that.

20 Q. And going back to the citations that you
21 gave from Masayuki, you first identified the statement
22 on page six at line 17 regarding a high concentration
23 25 to 55 percent by weight of alkali metal hydroxide,
24 do you see that?

25 A. Yes.

1 Q. That doesn't mention that the alkali metal
2 hydroxide should be excess, does it? It just says a
3 high concentration.

4 MR. BEAUPRE: Objection, form.

5 A. Well, it says that the KOH concentration
6 should be in that range of 25 to 50 percent, and it
7 also indicates that there's excess for spent DHA
8 exiting the reactor. Therefore there would be likely
9 an excess of KOH.

10 Q. Right, but at no point does Masayuki
11 recommend using excess KOH, correct?

12 MR. BEAUPRE: Objection, form.

13 A. He recommends the use of high
14 concentrations of KOH to speak of the reaction, and his
15 examples show that using high concentrations of sodium
16 hydroxide result in spent DHA from the reactor. That
17 would imply to me that there is an excess of sodium
18 hydroxide added.

19 Q. But you didn't find any place in Masayuki
20 where he recommends using an excess of KOH, correct?

21 MR. BEAUPRE: Objection, form.

22 A. I haven't studied it enough to make an
23 opinion on that.

24 Q. I want to go back to your declaration at
25 paragraph 77 on page 45.

1 A. Okay.

2 Q. Starting at line five of paragraph 77, you
3 state: Smith describes dehydrofluorinating 245EB using
4 an aqueous solution of KOH to produce 1234YF and KF
5 with unreacted KOH and water being present in the
6 reaction mixture.

7 Do you see where you said that?

8 A. Yes.

9 Q. Okay. But Smith does not describe that
10 reaction with unreacted KOH being present in the
11 reaction mixture, correct?

12 MR. BEAUPRE: Objection, form.

13 A. Would you rephrase that, please?

14 Q. Yes. Well, we've already discussed that
15 Smith doesn't describe any unreacted KOH coming out of
16 the reactor, isn't that correct?

17 MR. BEAUPRE: Objection, form and
18 misstates prior testimony.

19 A. Well, I will have to go back and read
20 Smith.

21 Q. Okay.

22 (Pause.)

23 A. Let's go in the Smith reference to the page
24 number 13 in the bottom right, second paragraph from
25 the bottom, the line starting: The basis typically

1 present in an amount from one to 50 percent based on
2 the total.

3 Q. I'm on the wrong page. I'm sorry. Okay,
4 go ahead.

5 A. It's on page 12 -- page 13 I guess where it
6 says --

7 Q. Yes, I'm there now.

8 A. The base is typically present in an amount
9 from -- of from one to 50 percent based on the total
10 weight of the components, which make up steps B and C,
11 which are the dehydrohalogenation steps. Preferably
12 the base is present in an amount from five to thirty
13 percent. There's not enough information in that
14 statement to determine whether there's an excess of
15 base relative to 236 or 245.

16 Q. Okay.

17 (Pause.)

18 A. Are you waiting for me?

19 Q. Yeah, I didn't know if you had anything
20 more to add to your answer.

21 A. Oh, I'm sorry, no.

22 Q. So why don't you go back to our discussion
23 with Masayuki and the combination of Masayuki with
24 Harrison. We've discussed that in the example of
25 Masayuki, the concentration of the KOH that goes into

1 the reactor is 50 percent, and then the concentration
2 of KOH -- strike that.

3 In the combination of Masayuki, Smith and
4 Harrison, the concentration -- strike that again.

5 Using Masayuki with potassium hydroxide
6 instead of sodium hydroxide going into the reactor,
7 then coming out of the reactor and going into the
8 enricher, and then using -- strike that again.

9 MR. BEAUPRE: That's three strikes,
10 counsel.

11 MR. ROSE: Three strikes. I knew you
12 were counting.

13 Q. If Masayuki is used in connection with
14 Smith and potassium hydroxide is the
15 dehydrohalogenating agent in the production of 1234YF,
16 what comes out of the reactor is a combination of KOH
17 and KF in the aqueous phase, correct?

18 MR. BEAUPRE: Objection, form.

19 BY MR. ROSE:

20 Q. As well as other things, but certainly KOH
21 and KF, correct?

22 MR. BEAUPRE: Same objection.

23 A. Those would certainly be two of the
24 components.

25 Q. Okay. And then following the teachings of

1 Masayuki, that aqueous solution would go into the
2 enricher, and the concentration of KOH would be back --
3 brought back up to its original concentration using,
4 for example, the 50 percent of Masayuki's example,
5 correct? So that what leaves the enricher has the same
6 alkali metal hydroxide concentration as what went into
7 the reactor. That would require a KOH concentration of
8 50 percent coming out of the enricher, correct?

9 MR. BEAUPRE: Objection, form.

10 A. Well, it doesn't state that specifically.
11 It says there's a preferred range of concentration of
12 base.

13 Q. I'm using the only example that we
14 discussed that shows the concentration going into the
15 reactor and also shows the concentration coming out of
16 the enricher.

17 A. And once again, that's one example, based
18 on a range of preferred examples, and it relates to the
19 dehydrohalogenation of chloroprene. When one considers
20 Smith over Masayuki, then some of the conditions may be
21 changed.

22 Q. We'll get to that in a minute, but I'm
23 following the example using 50 percent into the reactor
24 and 50 percent of alkali metal hydroxide coming out of
25 the enricher, that's the only example that Masayuki

1 shows both the incoming concentration and the outgoing
2 concentration, correct?

3 MR. BEAUPRE: Objection, form.

4 A. You asked me to consider a specific case
5 where you've got 50 percent KOH plus KF and potentially
6 other materials and that aqueous treatment being fed to
7 the reactor. And you're asking me to assume that the
8 50 percent KOH that's fed is concentrated back up to 50
9 percent KOH in the enricher. It does provide the
10 possibility for the addition of additional component --
11 additional KOH. But let's consider your example.

12 Q. Right. What goes into the reactor is 50
13 percent KOH. What comes out of the reactor is some
14 concentration of KOH that's less than 50 percent. That
15 aqueous stream goes into the enricher, and it is
16 enriched back up to 50 percent KOH using Masayuki's
17 example, okay?

18 A. Yes.

19 Q. So that's going to increase the
20 concentration of KOH and also increase the
21 concentration of KF coming out of the enricher,
22 correct?

23 MR. BEAUPRE: Objection, form.

24 A. That's correct.

25 Q. And then going into the slurry tank and the

1 addition of calcium hydroxide into that mixture would
2 convert the KF to KOH, correct?

3 MR. BEAUPRE: Objection, form.

4 A. At least some portion of it, depending on
5 the amount that was added.

6 Q. And that would increase the KOH
7 concentration to above 50 percent, correct?

8 MR. BEAUPRE: Objection, form.

9 A. Well, it's unclear. It depends on how much
10 water was added along with the lime. I think it says
11 the lime was added as a slurry. So additional water is
12 added along with the KOH to the slurry tank.

13 Q. You don't know how much that is?

14 MR. BEAUPRE: Objection, form.

15 A. I don't think it states how much water is
16 added.

17 Q. Wouldn't the concentration of KOH coming
18 out of the slurry tank and out of the centrifuge be
19 higher than the concentration of KOH that originally
20 went into the reactor?

21 MR. BEAUPRE: Objection, form.

22 A. There's not enough information to draw that
23 conclusion. The enricher could be run differently.

24 Q. I'd like to turn to your declaration,
25 paragraph 75. You state: In the combined process of

1 Smith, Masayuki and Harrison, a POSITA would understand
2 that the dehydrofluorination reaction of Smith would
3 take place in the reactor 19 of Masayuki. The
4 remainder of the process of Masayuki would operate
5 substantially, as taught in Masayuki, with a small
6 modification to the slurry tank 24 for introduction of
7 CAOH_2 into the slurry tank 24 to convert KF to KOH and
8 CAF_2 .

9 Do you see where you wrote that?

10 A. Yes.

11 Q. So you don't describe or opine on any
12 changes being made to the enricher of Masayuki in order
13 for that process to work commercially, correct?

14 MR. BEAUPRE: Objection, form.

15 A. I do state the remainder of the process of
16 Masayuki would offer a substantially, as taught in
17 Masayuki, one small variation modification of the
18 slurry tank, but it doesn't say that is the only
19 modification to the Masayuki process.

20 Q. But that's the only modification you
21 identify, isn't that right?

22 MR. BEAUPRE: Objection, form.

23 A. That's the only one that was written in the
24 declaration at that point.

25 Q. At what point would the concentration of

1 the KOH and subsequently the KF get to a point at which
2 precipitating calcium fluoride using lime would be too
3 high?

4 MR. BEAUPRE: Objection, form.

5 THE WITNESS: Yes, please repeat that
6 question for me.

7 (Record read.)

8 A. I haven't formed an opinion on that at all.

9 Q. And the concentrations disclosed in
10 Harrison of the KOH are only about 15 to 20 percent --
11 I'm sorry, the weight percentage of KF are only 15 to
12 20 percent potassium fluoride and three to five percent
13 unreacted KOH, isn't that correct?

14 MR. BEAUPRE: Objection, form.

15 A. Those are the concentrations specifically
16 used by Harrison.

17 Q. Wouldn't utilizing the concentrations
18 disclosed by Masayuki be significantly higher than
19 that?

20 MR. BEAUPRE: Objection, form.

21 A. That would be a cost-efficient way to run
22 the process, could potentially be higher.

23 Q. So Masayuki discloses using concentrations
24 higher, significantly higher than those concentrations
25 shown in Harrison, correct?

1 MR. BEAUPRE: Object to form.

2 A. I read Harrison directly, use his examples,
3 that's true. The chemistry is still the same.

4 Q. Right. And you state additionally -- I'm
5 referring to paragraph 77 of your declaration on page
6 46, last sentence of that paragraph, you state:
7 Additionally, a POSITA would consider applying the
8 converting step of Harrison to Masayuki to be
9 straightforward with little to no disruption in the
10 process of Masayuki, correct?

11 A. Yes.

12 Q. And so have you done any modeling to see
13 what happens if you follow the teaching of Masayuki in
14 using the enricher to bring the KOH concentration back
15 up to 50 percent and then using Harrison to convert KF
16 to KOH to increase the KOH concentration coming out of
17 the slurry tank and thus out of the centrifuge, how
18 that would affect the overall continuous operation of
19 the process going forward?

20 MR. BEAUPRE: Objection, form.

21 A. Yeah, I have not done any modeling.

22 Q. Did you consider any difficulties that
23 might arise with an increasing concentration of KOH as
24 higher and higher concentrations are circulated back to
25 the reactor via conduits 13 and 2?

1 MR. BEAUPRE: Objection, form.

2 THE WITNESS: Please read that

3 question again.

4 (Record read.)

5 A. A POSITA would not have seen any
6 difficulties that could not be overcome by further
7 modeling or further evaluation of the components of the
8 process.

9 Q. But you didn't do any modeling, correct?

10 MR. BEAUPRE: Same objection.

11 A. Correct, I did not do any modeling.

12 Q. And what do you base that opinion that a
13 POSITA would not see any difficulties that could not be
14 overcome?

15 MR. BEAUPRE: Objection, form.

16 A. Well, a POSITA would look at that process
17 of Masayuki and understand that from a variety of
18 concentrations down to very low concentrations, the
19 addition of lime would effectively precipitate calcium
20 fluoride.

21 Q. Right, and I'm talking about the addition
22 of -- strike that.

23 What I'm talking about is the increase of
24 concentration of KOH by use of the enricher in
25 combination with the conversion of KF into KOH in the

1 slurry tank that would occur, and as the process
2 repeats itself, would occur again and again and again?

3 MR. BEAUPRE: Objection, form.

4 A. Well, once again, I have not modeled it,
5 but as I said previously, one could adjust the
6 concentration in the enricher to maintain a desired
7 level of KOH fed to the reactor.

8 Q. But that would be contrary to what you said
9 in paragraph 77 and 75 that no other changes would need
10 to be made to the Masayuki process other than just some
11 changes to the slurry tank to add the lime?

12 MR. BEAUPRE: Objection, form and
13 mischaracterizes.

14 A. I did not say that. I said the process of
15 Masayuki would operate substantially as taught, but
16 other changes could be made.

17 Q. That you don't identify, correct?

18 MR. BEAUPRE: Objection to form.

19 A. I have not outlined any additional changes
20 or formed an opinion on those.

21 Q. And you also stated in paragraph 77 that a
22 POSITA would consider applying the converting step of
23 Harrison to Masayuki to be straightforward, causing
24 little to no disruption to the process of Masayuki. So
25 that doesn't identify any changes to the enricher, does

1 it?

2 MR. BEAUPRE: Objection, form.

3 A. No, it says the process of Harrison could
4 be applied with little disruption to the process.

5 Q. Little to no disruption?

6 A. Little to no, but little is fine.

7 Q. But, again, you don't identify any changes
8 to the operation of the enricher of Masayuki in that
9 comment, do you?

10 MR. BEAUPRE: Objection, form.

11 A. Yeah, I've not formed any opinions on that.
12 As I said, I haven't looked in detail or modeled it,
13 but I did not anticipate any significant changes at
14 all.

15 MR. ROSE: Why don't we take a quick
16 break. We may be about to wrap up. Let me
17 talk with my colleagues.

18 MR. BEAUPRE: Sure.

19 THE VIDEOGRAPHER: We're going off the
20 record, the time is 11:28.

21 (Recess.)

22 THE VIDEOGRAPHER: We're back on the
23 record, the time is 11:41.

24 BY MR. ROSE:

25 Q. I just have a couple of follow-up questions

1 Dr. Manzer.

2 You had testified earlier when we were
3 asking about the water, the concentration in the slurry
4 tank after the lime is added, and you had said it's
5 unclear, because you thought that the lime was added as
6 a slurry. Will you take a look at the Harrison
7 reference, which is, again, Exhibit 1006, and I'd like
8 to direct your attention to column three, starting at
9 line six. Harrison indicates that basic potassium
10 chloride solution is then mixed with solid hydrated
11 slate lime in a stirred vessel.

12 So the lime that is added to the aqueous
13 solution of Harrison is actually added as a solid, as
14 opposed to a slurry, is that correct?

15 A. That's what it says, correct.

16 MR. ROSE: I have no further questions
17 at this time.

18 MR. BEAUPRE: We have no questions for
19 Dr. Manzer.

20 THE VIDEOGRAPHER: This concludes the
21 deposition of Dr. Leo E. Manzer. The number
22 of tapes used were three. Going off the
23 record, the time is 11:42.

24 (Whereupon the deposition was
25 concluded at 11:42 a.m.)
 (Signature reserved.)

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SIGNATURE PAGE

LEO E. MANZER

SUBSCRIBED AND SWORN to before me this _____
day of _____, 2016.

NOTARY PUBLIC

My Commission expires:_____

1 C E R T I F I C A T E

2 I, Marisa Munoz-Vourakis, RMR, CRR and Notary Public,
3 the officer before whom the foregoing proceeding was
4 conducted, do hereby certify that the witness(es) whose
5 testimony appears in the foregoing proceeding were duly
6 sworn by me; that the testimony of said witness(es) were
7 taken by me to the best of my ability and thereafter
8 transcribed under my supervision; and that the foregoing
9 pages, inclusive, constitute a true and accurate
10 transcription of the testimony of the witness(es).

11 I do further certify that I am neither counsel for,
12 related to, nor employed by any of the parties to this
13 action in which this proceeding was conducted, and
14 further, that I am not a relative or employee of any
15 attorney or counsel employed by the parties thereof, nor
16 financially or otherwise interested in the outcome of the
17 action.

18 IN WITNESS WHEREOF, I have hereunto subscribed my name
19 this of , 2016.



20
21 MARISA MUNOZ-VOURAKIS

22
23
24 Notary #20032900127

25

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