

09:36:37 1 commercialization potential of any proposed technology.

09:36:43 2 Q. And the commercialization of any proposed  
09:36:48 3 technology to do what?

09:36:49 4 A. Oh. To generate electricity or some other form  
09:36:52 5 of energy.

09:36:53 6 MR. SNUFFER: Your Honor, in light of that  
09:36:55 7 testimony, I would ask that the witness --

09:36:57 8 THE COURT: Is this an objection?

09:36:58 9 MR. SNUFFER: It is an objection.

09:37:00 10 THE COURT: What is it?

09:37:01 11 MR. SNUFFER: I would ask the witness be excused  
09:37:03 12 because the scope of his testimony is not relevant to the  
09:37:07 13 issues in this case.

09:37:09 14 THE COURT: Overruled.

09:37:13 15 Q. BY MS. HEALY-GALLAGHER: Dr. Mancini, what, if  
09:37:15 16 any, conclusions did you reach?

09:37:19 17 MR. SNUFFER: Your Honor, before he testifies,  
09:37:21 18 could I voir dire the witness for purposes of further  
09:37:27 19 objection?

09:37:28 20 THE COURT: I'm going to let you do it on cross  
09:37:30 21 because it's not a jury trial.

09:37:32 22 Go ahead, Ms. Healy-Gallagher.

09:37:35 23 Q. BY MS. HEALY-GALLAGHER: Dr. Mancini, what, if  
09:37:37 24 any, conclusions did you reach in this case?

09:37:39 25 A. My first opinion was that the solar dish

09:37:46 1 technology of IAS has never produced electrical power or  
09:37:51 2 any other form of usable energy using the sun.

09:37:56 3 Q. And what was your second conclusion?

09:37:58 4 A. My second conclusion was that the solar dish  
09:38:06 5 technology of IAS would never become a commercialized  
09:38:13 6 system providing either electrical power or any other form  
09:38:15 7 of useful energy.

09:38:24 8 Q. Dr. Mancini, before we dive into your conclusions  
09:38:26 9 and the reasons for them, I'd like you to tell us a little  
09:38:30 10 bit about the different kinds of solar energy technology  
09:38:35 11 for power generation. Would you please identify the two  
09:38:42 12 primary kinds of solar energy technology.

09:38:45 13 A. Solar -- concentrating solar power, which is the  
09:38:49 14 type of systems we're talking about here, are  
09:38:53 15 fundamentally two types of architectures. They are either  
09:38:57 16 line focused or they are point focus.

09:38:59 17 Q. And before we get into that, Dr. Mancini, could  
09:39:03 18 you distinguish concentrating solar power from  
09:39:06 19 photovoltaic?

09:39:09 20 A. Yes. When we hear power generation from the sun,  
09:39:12 21 we most often think of photovoltaics because it's far more  
09:39:17 22 common than concentrating solar power systems. In  
09:39:22 23 photovoltaics, the sunlight is converted directly into  
09:39:26 24 electricity, DC electricity, which then is inverted and  
09:39:29 25 put on the grid or used to power a home or whatever.

10:06:27 1 Q. BY MS. HEALY-GALLAGHER: Okay. Let's talk,  
10:06:30 2 Dr. Mancini, about what you did to reach your conclusions.

10:06:33 3 A. Well, I reviewed all of the information on the  
10:06:40 4 RaPower-3 website. I reviewed all the documents that I  
10:06:48 5 was provided by counsel. I reviewed -- I attended the  
10:06:52 6 deposition of Mr. Johnson. I reviewed the depositions of  
10:06:58 7 Mr. -- both Mr. Gregg Shepard and Mr. Matt Shepard, and I  
10:07:02 8 did some independent analysis of the system to determine  
10:07:08 9 how I thought -- if it actually were operated, how it  
10:07:12 10 would perform.

10:07:21 11 Q. And, Dr. Mancini, what, if any, site visits did  
10:07:25 12 you make?

10:07:26 13 A. Oh, yes. I visited the site on two occasions. I  
10:07:31 14 was at the site on January 24, 2017, and that visit was  
10:07:38 15 with the IRS folks. And then I visited the site again  
10:07:44 16 with the Department of Justice on April 4 of 2017.

10:07:51 17 Q. Okay. We're going to hear about each of those  
10:07:54 18 categories of the items that you reviewed. First I'd like  
10:07:59 19 to start with the documents. You mentioned a couple  
10:08:02 20 things; the RaPower-3 website, yes?

10:08:05 21 A. Yes.

10:08:06 22 Q. And you also mentioned documents provided by  
10:08:08 23 counsel. Do you mean documents that I or somebody else on  
10:08:13 24 behalf of the United States sent to you?

10:08:15 25 A. That's correct. You had asked me to provide you

10:08:18 1 with a list of documents that I'd like to see, and I  
10:08:21 2 submitted that and ended up reviewing a lot more than just  
10:08:27 3 that.

10:08:27 4 Q. About how many pages of documents did you review  
10:08:30 5 that we sent you?

10:08:32 6 A. It had to be in excess of 25,000.

10:08:37 7 Q. And are you familiar, Dr. Mancini, with the  
10:08:40 8 concept of Bates numbers?

10:08:42 9 A. I am.

10:08:43 10 Q. Generally, what's the primary Bates number of the  
10:08:48 11 documents that you reviewed?

10:08:49 12 A. RaPower-3.

10:08:54 13 Q. And, Dr. Mancini, if we wanted a list of  
10:08:58 14 absolutely every document you reviewed in the course of  
10:09:01 15 preparing for this case, where could we find it?

10:09:04 16 A. Well, there's references in my report to all the  
10:09:08 17 specific items I looked at and what I used for -- to  
10:09:16 18 generate my -- my opinions from the -- the three main  
10:09:22 19 documents I used from the RaPower-3 website were the Solar  
10:09:32 20 Energy to Compete With Natural Gas document. And there  
10:09:36 21 was another document, a timeline, and then let me see.  
10:09:43 22 Oh, there was a video from the website that I used as  
10:09:46 23 well.

10:09:47 24 Q. Sure. Before we get there, though, Dr. Mancini,  
10:09:50 25 I'd ask you to take a look, please, at what's been marked

10:09:55 1 as Plaintiff's Exhibit 757. Do you recognize,

10:10:20 2 Dr. Mancini, Plaintiff's Exhibit 757?

10:10:22 3 A. I do.

10:10:23 4 Q. What is it?

10:10:24 5 A. It's appendix 2 from my report. This lists all  
10:10:29 6 the documents that I reviewed.

10:10:30 7 Q. And does Plaintiff's Exhibit 757 appear to be a  
10:10:35 8 true and correct copy of the list of facts and data  
10:10:39 9 considered that you provided in your report?

10:10:40 10 A. Yes, Ma'am.

10:10:41 11 MS. HEALY-GALLAGHER: Your Honor, at this time I  
10:10:43 12 offer Plaintiff's Exhibit 757.

10:10:45 13 MR. SNUFFER: No objection to this.

10:10:48 14 THE COURT: Received, 757.

10:10:56 15 (Plaintiff's Exhibit 757 received in evidence.)

10:10:58 16 Q. BY MS. HEALY-GALLAGHER: Dr. Mancini, you  
10:10:59 17 mentioned that you watched videos, where did you get those  
10:11:07 18 videos?

10:11:07 19 A. I downloaded a video from the RaPower-3  
10:11:10 20 website.

10:11:12 21 Q. And you said that you reviewed depositions, and  
10:11:21 22 you mentioned the Neldon Johnson deposition. How many of  
10:11:24 23 his depositions did you review?

10:11:25 24 A. I reviewed the one that I attended, just one.

10:11:30 25 Q. And do you recall Mr. Johnson having given a

10:11:39 1 second deposition as a purported expert in this case?

10:11:43 2 A. Oh, yes, I do. I reviewed his expert witness  
10:11:48 3 report as well.

10:11:49 4 Q. And his deposition after his report?

10:11:58 5 A. Yes.

10:11:59 6 Q. All right. We'll talk -- we'll shift briefly to  
10:12:03 7 your site visits. We'll go into more detail on these  
10:12:07 8 later, but for right now, I'd just like to hear, for  
10:12:11 9 example, how many site visits have you made?

10:12:14 10 A. Two.

10:12:16 11 Q. Why did you make two visits, Dr. Mancini?

10:12:20 12 A. Well, since I have two cases that -- two  
10:12:24 13 contracts, I went with the IRS folks on January 24, and I  
10:12:28 14 went with you on the 27th.

10:12:32 15 Q. On April 4?

10:12:34 16 A. I mean on April 4. Yeah. Sorry about that.

10:12:38 17 Q. In broad generalities, Dr. Mancini, what happened  
10:12:42 18 on your site visits?

10:12:44 19 A. Both site visits were similar. They had some  
10:12:49 20 differences, but they were similar. Initially started at  
10:12:52 21 the manufacturing facility. On the first visit,  
10:12:57 22 Mr. Johnson gave us a briefing at the manufacturing  
10:13:00 23 facility for about 45 minutes and then we toured the  
10:13:04 24 manufacturing facility. And then we went out to the -- I  
10:13:11 25 think we broke for lunch on that day and then met at the

10:13:17 1 test site following lunch, and we then toured the test  
10:13:22 2 site and the adjacent power plant site, construction site.  
10:13:27 3 On the 4th, it was a similar process but a little  
10:13:31 4 different order. We met at the manufacturing facility,  
10:13:36 5 and Mr. Shepard toured us through the manufacturing  
10:13:39 6 facility on the fourth, and then I don't quite remember  
10:13:45 7 the timing on this one, when we went to lunch, but we  
10:13:49 8 grabbed a bite somewhere along the way and then went to  
10:13:52 9 the test site. Actually we went to a house near the test  
10:13:56 10 site where Mr. Johnson, again, provided a briefing that  
10:13:59 11 was about an hour and a half, and then we went out and  
10:14:02 12 toured the test site and looked at the construction site.

10:14:06 13 Q. You have mentioned a couple times something  
10:14:09 14 called the test site. Have you heard it also identified  
10:14:13 15 as the R&D site?

10:14:16 16 A. Yes. I think that would be fair.

10:14:18 17 Q. And you also mentioned that you heard from Neldon  
10:14:22 18 Johnson at various times in the course of your site  
10:14:26 19 visits. What, if any, other role did he have on your site  
10:14:32 20 visits?

10:14:32 21 A. Well, he -- like I said, he provided a lecture,  
10:14:35 22 and he did serve as a tour guide for I think the entire  
10:14:40 23 first one, first visit, and then for everything except the  
10:14:45 24 manufacturing facility on the second visit.

10:14:49 25 Q. So, did you have the opportunity to ask

10:14:51 1 Mr. Johnson questions in the course of your site visits?

10:14:54 2 A. Yes. I asked him quite a few questions.

10:14:57 3 Q. Dr. Mancini, what, if any, testing did you do on  
10:15:00 4 the purported solar energy technology in this case?

10:15:05 5 A. None.

10:15:06 6 Q. Why not?

10:15:08 7 A. You don't walk in and test somebody else's  
10:15:12 8 equipment. You just don't do that.

10:15:17 9 Q. And did the United States ask you to conduct any  
10:15:22 10 testing --

10:15:22 11 A. No.

10:15:23 12 Q. -- on the equipment?

10:15:24 13 A. No. It's also a very expensive thing to do, and  
10:15:29 14 it was never anticipated as part of my contract.

10:15:36 15 Q. Based on your observations of the defendants'  
10:15:40 16 purported solar energy technology, what, if anything, did  
10:15:43 17 you feel like you needed to test?

10:15:45 18 A. Nothing.

10:15:47 19 Q. Why is that?

10:15:51 20 A. The status of the technology and the fact that it  
10:15:57 21 is fundamentally a series of components that really don't  
10:16:01 22 fit together was enough. And the fact that it had never  
10:16:06 23 produced electrical power or any other form of energy were  
10:16:09 24 enough for me to address the issues I needed to address.

10:16:13 25 Q. On either site visit, did you ever see



10:16:17 1 defendants's purported solar technology produce  
10:16:23 2 electricity?

10:16:23 3 A. No.

10:16:23 4 Q. What, if any, representations were made to you  
10:16:26 5 about when the defendants' purported solar energy  
10:16:31 6 technology would produce electricity?

10:16:33 7 A. Mr. Johnson said, during the first visit, that  
10:16:37 8 the -- that the systems would be operating within the next  
10:16:43 9 two months.

10:16:44 10 Q. And that was in January?

10:16:48 11 A. That's correct.

10:16:48 12 Q. And when you visited again in April, what did you  
10:16:51 13 see?

10:16:53 14 A. Fundamentally the same thing I saw during my  
10:16:56 15 January visit, and there were no systems operating.

10:17:05 16 Q. Dr. Mancini, you've already stated your  
10:17:08 17 conclusions for the Court. What, if anything, else do you  
10:17:11 18 need to see in order to reach the conclusion that  
10:17:16 19 electricity was not produced on your site visits?

10:17:19 20 A. Nothing.

10:17:20 21 Q. And what, if anything, else do you need to see to  
10:17:23 22 reach the conclusion that electricity or other useful  
10:17:27 23 energy has never been produced?

10:17:30 24 A. Nothing.

10:17:36 25 Q. Dr. Mancini, what sorts of documents are you used

10:17:42 1 to seeing when you review a concentrating solar power  
10:17:46 2 project?

10:17:46 3 A. Well, as I mentioned before, I asked for a lot of  
10:17:50 4 these same documents, and it's my understanding you  
10:17:53 5 provided a list to the defendants to provide these  
10:17:57 6 documents, so I expected to see detailed analysis of each  
10:18:02 7 of the components. I expected to see computer models of  
10:18:07 8 the different components. I expected to see computer  
10:18:12 9 models of a proposed system, probably multiple proposed  
10:18:17 10 systems, all the results from those. I expected to see  
10:18:21 11 tests that showed the performance of the individual  
10:18:25 12 components, and I expected to see systems tests that  
10:18:29 13 showed the actual power output, solar energy input, what  
10:18:34 14 the issues were and identified all of that.

10:18:37 15 I really expected to see, too, a complete suite  
10:18:43 16 of engineering drawings and interface documents and list  
10:18:48 17 of materials for all of the components and for the system  
10:18:53 18 itself. And then I guess another important thing that I  
10:18:58 19 asked for was the -- the cost estimates because, again,  
10:19:04 20 you need to look at the respective cost of what the  
10:19:09 21 components in the system will be.

10:19:12 22 Q. You mentioned one particular set of documents,  
10:19:17 23 Dr. Mancini, I'd like to revisit, component interface  
10:19:22 24 documents what are those?

10:19:23 25 A. Well, those are documents that define how the two

10:19:27 1 components will go together both mechanically and  
10:19:32 2 thermally in terms of how they fit together and make --  
10:19:36 3 operate, make the system operate. And they are very  
10:19:41 4 important pieces because they -- they help both in the  
10:19:45 5 assembling the system when you build it, but it convinces  
10:19:49 6 you that, in fact, it's going to operate the way you've  
10:19:53 7 predicted it to operate.

10:19:59 8 Q. Why, Dr. Mancini, are these types of documents  
10:20:03 9 important to evaluating the commercial viability of any  
10:20:07 10 solar energy technology?

10:20:09 11 A. Well, ultimately, they are what determine how  
10:20:15 12 you're going to meet that metric of cost per kilowatt  
10:20:21 13 hour.

10:20:21 14 Q. And, Dr. Mancini, did you see any of the kinds of  
10:20:26 15 documents you just listed off in the documents that  
10:20:29 16 defendants produced?

10:20:31 17 A. I did not. I saw a few incomplete engineering  
10:20:38 18 drawings of concentrator assemblies, assets primarily, and  
10:20:44 19 a few other components, maybe a half a dozen, when in  
10:20:49 20 point of fact I expected to see 600 to a thousand  
10:20:54 21 documents and complete with lists of materials and  
10:20:58 22 everything else.

10:21:04 23 Q. Why did you expect to see documents of the list  
10:21:06 24 that you just provided?

10:21:08 25 A. Because I had asked for them, and I assumed that

10:21:12 1 when you ask for them from the defendant, I would have all  
10:21:16 2 this trove of information to review.

10:21:18 3 Q. And what, if anything, about the defendants'  
10:21:21 4 statements about the status of their technology suggested  
10:21:24 5 that you might see these documents?

10:21:25 6 A. I was told it was -- when you read the RaPower-3  
10:21:30 7 website, you have the sense that it's operating or very  
10:21:33 8 near to operating every day, so I was sure they were very  
10:21:38 9 close to having the system operational.

10:21:46 10 Q. So, if a system is close to being operational, is  
10:21:51 11 operational, would someone reviewing the project see the  
10:21:56 12 documents of the kind that you described?

10:22:00 13 A. Yes.

10:22:00 14 Q. And what, if any, explanation, Dr. Mancini, have  
10:22:05 15 you heard for the lack of data and information from the  
10:22:08 16 defendants?

10:22:09 17 A. Mr. Johnson has repeatedly said that he doesn't  
10:22:14 18 keep that kind of information, either test results or any  
10:22:18 19 of the things I asked about.

10:22:22 20 Q. What, if anything, did you find useful, even  
10:22:28 21 marginally, in the documents that you reviewed?

10:22:33 22 A. Well, there were -- there were two documents that  
10:22:38 23 I used, the main one being that Solar Energy to Compete  
10:22:46 24 With Natural Gas document.

10:22:48 25 MS. HEALY-GALLAGHER: Would you please pull up

10:22:50 1 Plaintiff's Exhibit 16.

10:22:52 2 Q. BY MS. HEALY-GALLAGHER: And, Dr. Mancini, please  
10:22:54 3 go ahead and take a look through what's been marked as  
10:22:57 4 Plaintiff's Exhibit 16. And I'm also going to ask you to  
10:23:20 5 take a look at Plaintiff's Exhibit 17.

10:23:44 6 A. Okay.

10:23:45 7 Q. And Dr. Mancini, you have taken a look at  
10:23:50 8 Plaintiff's Exhibit 16 and 17 as two separate documents.  
10:23:53 9 Is that how you saw them originally?

10:23:55 10 A. I saw them as one document, but that's it.

10:23:58 11 Q. So the combination of Plaintiff's Exhibit 16 and  
10:24:01 12 Plaintiff's Exhibit 17 is one of the documents you looked  
10:24:05 13 to in the course of your technical analysis?

10:24:20 14 A. That's correct.

10:24:21 15 MS. HEALY-GALLAGHER: Your Honor, at this time  
10:24:22 16 we'd move for admission of Plaintiff's Exhibit 16 and  
10:24:25 17 17.

10:24:27 18 MR. SNUFFER: No objection to these two.

10:24:28 19 THE COURT: 16 and 17 are received.

10:24:32 20 (Plaintiff's Exhibits 16 and 17 received in evidence.)

10:24:33 21 Q. BY MS. HEALY-GALLAGHER: Dr. Mancini, do you know  
10:24:35 22 who wrote Plaintiff's Exhibit 16 or 17?

10:24:39 23 A. I know now. They are not authored. There is no  
10:24:43 24 author identified on it. During the course of reviewing  
10:24:46 25 all the documents I came across about eight or nine

10:24:49 1 different versions of this document. There is no -- the  
10:24:55 2 document is undated, and the authorship, Mr. Johnson has  
10:25:00 3 taken ownership as the author of this document.

10:25:18 4 Q. What, if any, other contributors to Plaintiff's  
10:25:22 5 Exhibit 16 or 17 have you heard of?

10:25:26 6 A. There are actually referenced in the document  
10:25:29 7 several other experts who purportedly offered input to the  
10:25:34 8 document in terms of reviewing different things or doing  
10:25:38 9 design, but they were not identified by name or  
10:25:42 10 affiliation -- well, I take that back. There may have  
10:25:45 11 been some affiliations with universities and things like  
10:25:48 12 that. And then there was one referred to that appeared to  
10:25:55 13 have had quite a bit to do with the turbine design, and  
10:25:59 14 that was Sierra Engineering.

10:26:05 15 Q. Other than Sierra Engineering, was there any way  
10:26:09 16 for you to identify exactly who these purported experts  
10:26:13 17 were?

10:26:14 18 A. No. And there were no quotations within the text  
10:26:17 19 to indicate how they were -- what they were saying and  
10:26:21 20 what they weren't saying, so I didn't know what was their  
10:26:25 21 position. There were no separate reports submitted  
10:26:30 22 apparently by them.

10:26:36 23 Q. So what, if any, weight did you give these  
10:26:40 24 purported experts' commentary in Plaintiff's Exhibit 16  
10:26:43 25 and 17?

10:26:44 1 A. Well, I mean, I read them, but I -- you know, I  
10:26:48 2 essentially just went on. I ended up having to do my own  
10:26:53 3 analysis anyway.

10:26:56 4 Q. So without knowing these purported experts' names  
10:26:59 5 or CV's or technical experience, could you give any  
10:27:05 6 serious consideration to the comments attributed to them  
10:27:09 7 in 16 and 17?

10:27:10 8 A. Well, they did list -- presumably some of the  
10:27:14 9 background was listed in the documents, but without  
10:27:17 10 knowing who they were or exactly what they said about the  
10:27:20 11 technology, it was pretty hard to for me to give -- to  
10:27:23 12 read it as anything different than just a document.

10:27:31 13 Q. Dr. Mancini, I'd like you to please take a look  
10:27:35 14 at what's been marked as Plaintiff's Exhibit 559. Do you  
10:28:16 15 recognize Plaintiff's Exhibit 559?

10:28:17 16 A. I do.

10:28:18 17 Q. And what is it?

10:28:20 18 A. It's the one I use for -- use to evaluate to use  
10:28:24 19 in my report.

10:28:26 20 Q. And, to your understanding, what's the  
10:28:29 21 relationship between Plaintiff's Exhibit 559 and  
10:28:33 22 Plaintiff's Exhibit 16 and 17?

10:28:35 23 A. I used it because it appeared to be the most  
10:28:40 24 current version of that report. It was submitted along  
10:28:43 25 with some other information that Mr. Johnson submitted in

10:28:48 1 response to inquiries from you.

10:28:51 2 Q. So, to your understanding, Plaintiff's Exhibit  
10:28:54 3 559 is a more recent version of Plaintiff's Exhibit 16 and  
10:28:58 4 17?

10:28:59 5 A. As far as I can tell, yes.

10:29:04 6 Q. And with Plaintiff's Exhibit 559, was there any  
10:29:09 7 clarity with respect to who the purported experts were?

10:29:12 8 A. No. It was the same in that regard.

10:29:21 9 MS. HEALY-GALLAGHER: Your Honor, at this time I  
10:29:21 10 move to admit Plaintiff's Exhibit 559.

10:29:26 11 MR. SNUFFER: No objection to 559.

10:29:32 12 THE COURT: 559 is received.

10:29:34 13 (Plaintiff's Exhibit 559 received in evidence.)

10:29:34 14 Q. BY MS. HEALY-GALLAGHER: Dr. Mancini, I'm showing  
10:29:35 15 you what's been marked Plaintiff's Exhibit 437.

10:29:48 16 THE COURT: Ms. Healy-Gallagher, can I ask where  
10:29:50 17 you're at in your examination. I'm trying to figure out a  
10:29:53 18 break.

10:29:53 19 MS. HEALY-GALLAGHER: This would be a fine time  
10:29:55 20 to take a break.

10:29:56 21 THE COURT: Okay. Let's take a break until  
10:29:58 22 10:45, and then, Dr. Mancini, you will be back on the  
10:30:02 23 stand when we get in the courtroom at 10:45. Anything we  
10:30:05 24 need to take care of right now? We're in recess.

10:41:54 25 (Short recess.)



10:47:29 1 Sorry I'm a little late. We're here to resume  
10:47:32 2 the examination of Dr. Mancini. Go ahead.

10:47:35 3 Q. BY MS. HEALY-GALLAGHER: All right. Dr. Mancini,  
10:47:37 4 before we broke -- Dr. Mancini, before we took the break,  
10:47:47 5 we had just started to look at Plaintiff's Exhibit 437.  
10:47:56 6 Would you please take a look through Plaintiff's Exhibit  
10:47:59 7 437. Do you recognize the document?

10:48:04 8 A. Yes.

10:48:04 9 Q. How do you recognize it?

10:48:06 10 A. It was one of the documents I downloaded from the  
10:48:11 11 website.

10:48:11 12 Q. Well, would you take a look, please, at the  
10:48:14 13 bottom and see the Bates number on the document.

10:48:17 14 A. Yes.

10:48:17 15 Q. Can you read that for the first page.

10:48:20 16 A. Shepard Gregg.

10:48:21 17 Q. What's the number?

10:48:23 18 A. 00378.

10:48:25 19 Q. Thank you. Dr. Mancini, how, if at all, did you  
10:48:33 20 use Plaintiff's Exhibit 437?

10:48:35 21 A. I was looking at the timeline for the development  
10:48:40 22 of the different parts on the system.

10:48:41 23 MS. HEALY-GALLAGHER: Your Honor, we move to  
10:48:44 24 admit Plaintiff's Exhibit 437.

10:48:49 25 MR. SNUFFER: No objection to 437.

10:48:49 1 THE COURT: 437 is received.

10:48:50 2 (Plaintiff's Exhibit 437 received in evidence.)

10:48:50 3 Is it a single page?

10:48:52 4 MS. HEALY-GALLAGHER: No. There are multiple  
10:48:54 5 pages.

10:48:54 6 THE COURT: Okay. Thank you.

10:48:56 7 MR. SNUFFER: Three-page document.

10:48:57 8 THE COURT: Thank you.

10:48:59 9 Q. BY MS. HEALY-GALLAGHER: All right, Dr. Mancini,  
10:49:01 10 you mentioned that you had reviewed some videos. I'd like  
10:49:05 11 to pull up, please, Plaintiff's Exhibit 562.

10:49:14 12 It will automatically play, but please pause it.

10:49:19 13 Thank you.

10:49:21 14 Dr. Mancini, I'm showing you a screen shot at the  
10:49:25 15 beginning of Plaintiff's Exhibit 562. Do you recognize  
10:49:29 16 this?

10:49:30 17 A. Yes.

10:49:30 18 Q. What is it?

10:49:31 19 A. It's a video that shows -- it's a video I used  
10:49:36 20 to -- to make some calculations based on.

10:49:40 21 Q. And where did you get Plaintiff's Exhibit 562?

10:49:43 22 A. I downloaded it from the website, from the  
10:49:47 23 RaPower-3 website.

10:49:49 24 MS. HEALY-GALLAGHER: At this time, I'll ask that  
10:49:51 25 you play, Mr. Moran, the video.

10:50:18 1 (Video played.)

10:50:18 2 Q. BY MS. HEALY-GALLAGHER: Dr. Mancini, having  
10:50:20 3 watched the video, is Plaintiff's Exhibit 562 a true and  
10:50:25 4 correct copy of the video you took off of the RaPower-3  
10:50:28 5 website?

10:50:28 6 A. Yes, Ma'am.

10:50:29 7 MS. HEALY-GALLAGHER: At this time, Your Honor, I  
10:50:30 8 move to admit Plaintiff's Exhibit 562.

10:50:34 9 MR. SNUFFER: No objection to Exhibit 562.

10:50:38 10 THE COURT: 562 is received.

10:50:53 11 (Plaintiff's Exhibit 562 received in evidence.)

10:50:53 12 Q. BY MS. HEALY-GALLAGHER: What about Mr. Johnson's  
10:50:55 13 patents, Dr. Mancini? What, if anything, did you find  
10:51:00 14 helpful in his patents?

10:51:02 15 A. Well, I reviewed the patents that were -- that  
10:51:05 16 pertained to the dish and any of the other solar  
10:51:10 17 components of the system. And patents typically don't  
10:51:15 18 contain anything useful in terms of analysis, design or  
10:51:19 19 any performance variables or anything like that, and I  
10:51:22 20 didn't expect to find anything in them, and I didn't.

10:51:27 21 Q. So, what, if any, impact, Dr. Mancini, did  
10:51:32 22 Mr. Johnson's patents have on your analysis in this case?

10:51:35 23 A. Nothing.

10:51:52 24 Q. All right. Dr. Mancini, would you please remind  
10:51:55 25 the Court of your first opinion in this case.

10:51:57 1 A. My first opinion is that the IAS solar dish  
10:52:06 2 system has not produced any electricity or any other  
10:52:10 3 useful form of energy from sunlight.

10:52:13 4 Q. Why do you think that?

10:52:15 5 A. I never saw anything operating. It's a series of  
10:52:19 6 components that, once I analyzed them, really don't fit  
10:52:24 7 together into a system that will operate efficiently or  
10:52:29 8 effectively at all.

10:52:30 9 Q. What, if anything, in the documents or other  
10:52:33 10 materials you reviewed suggested that electricity or other  
10:52:38 11 usable energy had ever been produced?

10:52:40 12 A. Nothing.

10:52:45 13 Q. In your experience, Dr. Mancini, how would the  
10:52:51 14 event of producing power be reflected in the documents of  
10:52:57 15 a typical concentrating solar power plant?

10:53:03 16 A. Well, when a plant is commissioned, that's a big  
10:53:06 17 deal. Even first production of electricity is a big deal.  
10:53:11 18 It would be -- it would be an event of some sort  
10:53:14 19 typically.

10:53:14 20 Q. And what, if any, data would you typically see to  
10:53:18 21 reflect the production of any power whatsoever?

10:53:22 22 A. Well, it would be a big deal to show power going  
10:53:28 23 on the grid, and they would probably report that.

10:53:30 24 Q. Did you see any such documentation in the  
10:53:34 25 materials you reviewed?

10:53:35 1 A. I did not.

10:53:54 2 Q. All right.

10:53:54 3 I'd like to please pull up what's been marked as  
10:54:00 4 Plaintiff's Exhibit 509.

10:54:01 5 And, Your Honor, Plaintiff's Exhibit 509 is a  
10:54:04 6 collection of video clips, so I'll identify each video  
10:54:08 7 clip for the record when we take a look.

10:54:11 8 THE COURT: Thank you.

10:54:15 9 MS. HEALY-GALLAGHER: All right. Would you  
10:54:17 10 please open up video 12\_4\_00 -- yes, that's the one --  
10:54:25 11 -4 \_23. Pause it please.

10:54:33 12 MR. SNUFFER: I'm sorry. I was calling it up.  
10:54:36 13 Can you repeat which video that is.

10:54:38 14 MS. HEALY-GALLAGHER: 12\_4\_00-4\_23.

10:54:48 15 MR. SNUFFER: Thank you.

10:54:52 16 MS. HEALY-GALLAGHER: All right. And, Mr. Moran,  
10:54:54 17 actually, I will have you play this through once.

10:55:20 18 (Video played.)

10:55:20 19 Q. BY MS. HEALY-GALLAGHER: Dr. Mancini, do you  
10:55:21 20 recognize this video clip?

10:55:22 21 A. Yes.

10:55:23 22 Q. What is it?

10:55:24 23 A. It's a video of the concentrators at the R&D test  
10:55:30 24 site.

10:55:30 25 Q. And how are you familiar with what appears in

10:55:32 1 this video?

10:55:33 2 A. I was there when the video was taken.

10:55:36 3 Q. We see at the bottom of this screen April 4,  
10:55:40 4 2017. Do you see that?

10:55:41 5 A. Yes.

10:55:41 6 Q. That's the date of your site visit with the  
10:55:45 7 Department of Justice; isn't that right?

10:55:46 8 A. That's correct.

10:55:46 9 Q. So, does the video clip, 12\_4\_00-4-23 contain an  
10:55:57 10 accurate representation of a portion of your site visit on  
10:56:00 11 April 4?

10:56:06 12 A. Yes.

10:56:07 13 Q. And, Dr. Mancini, we saw this video pan across a  
10:56:11 14 number of collectors. Were those the only collectors you  
10:56:15 15 saw on your site visit?

10:56:19 16 A. Yes.

10:56:20 17 Q. All right.

10:56:20 18 I'm going to ask, Mr. Moran, to please play the  
10:56:26 19 video again and pause it at 13:1:45. Thank you.

10:56:37 20 (Video played.)

10:56:37 21 So, Dr. Mancini, what are we looking at here?

10:56:42 22 A. This is one of the solar concentrators.

10:56:48 23 Q. Let's take a walk through this slowly. I see, at  
10:56:52 24 the top of the tower four circles. Do you see that?

10:56:55 25 A. Yes, Ma'am.

10:56:56 1 Q. What are those four circles?

10:56:58 2 A. Well, in each of the four circles, they should be  
10:57:01 3 fully populated with lens -- pie shaped lens segments that  
10:57:09 4 would provide the concentration of the solar energy.

10:57:16 5 Q. And coming down --

10:57:22 6 Excuse me, Your Honor. May I take a moment?

10:57:24 7 THE COURT: Yes.

10:57:52 8 MS. HEALY-GALLAGHER: Is the touch screen  
10:57:52 9 enabled for this?

10:57:52 10 THE CLERK: Yes.

10:57:52 11 THE COURT: There's often some lag when you turn  
10:58:01 12 on the annotation features, but this is a little more lag  
10:58:04 13 than normal.

10:58:06 14 THE WITNESS: Here it comes.

10:58:10 15 MR. SNUFFER: I don't have it. Oh, there it  
10:58:12 16 is.

10:58:12 17 THE COURT: There we go.

10:58:16 18 Q. BY MS. HEALY-GALLAGHER: All right, Dr. Mancini,  
10:58:20 19 coming down from the four circles here and here, what do  
10:58:30 20 we see?

10:58:31 21 A. These are support members that it's my  
10:58:38 22 understanding the receiver would be located at the bottom  
10:58:42 23 part of that. So each -- there would be four receivers  
10:58:47 24 located below that last element, I guess right about here,  
10:58:54 25 and one for each of the lens assemblies at the top of the

10:59:02 1 dish.

10:59:03 2 Q. Could you point on the screen to where you  
10:59:05 3 understand the four receivers would be intended to go.

10:59:17 4 A. (Pointing.)

10:59:17 5 Q. Thank you. And, Dr. Mancini, how many, if any,  
10:59:21 6 receivers do you see in this image?

10:59:23 7 A. There are none.

10:59:25 8 Q. How many, if any, receivers did you see installed  
10:59:30 9 on any collector on your site visit?

10:59:33 10 A. None.

10:59:44 11 Q. So, Dr. Mancini, let's walk through this a little  
10:59:48 12 bit. And if you could give us your understanding of how  
10:59:52 13 this system is supposed to work. So let's start with the  
10:59:56 14 sun in the sky. The sun is in the sky. Where does it go,  
11:00:01 15 and what happens first?

11:00:02 16 A. Well, the solar concentrator has a tracking  
11:00:08 17 mechanism up in here that allows it to track in two  
11:00:12 18 directions. It has to track -- or it should track in both  
11:00:16 19 azimuth and what we call elevation. So the, what I'll  
11:00:20 20 refer to as the plane of the solar concentrators has to  
11:00:24 21 move so it is perpendicular to the incoming sunlight.  
11:00:30 22 That allows it to focus the sunlight, then, presumably  
11:00:35 23 down on to the receivers that are supported below.

11:00:38 24 Q. And let me stop you there, Dr. Mancini. If the  
11:00:41 25 plane of the solar concentrators is not perpendicular to



11:00:45 1 the sun, what happens?

11:00:47 2 A. Well, then the image won't fall at the focal  
11:00:50 3 point or at the region where you want it to be, so it  
11:00:54 4 won't be on the receivers.

11:01:06 5 Q. At any time on your site visit, Dr. Mancini, did  
11:01:09 6 you see any of the collectors automatically tracking the  
11:01:15 7 sun?

11:01:16 8 A. No, ma'am. There were only two. On each visit  
11:01:19 9 there was one collector moved. During the first visit it  
11:01:23 10 moved only in azimuth, and during the second visit they  
11:01:27 11 had both an elevation and an azimuth on that collector,  
11:01:31 12 but they were both moved manually. I saw none track  
11:01:35 13 automatically.

11:01:36 14 THE COURT: When you talk about a collector, are  
11:01:38 15 you speaking about a single lens or a group of lenses?

11:01:41 16 THE WITNESS: The group of all four circular  
11:01:43 17 ones. This whole unit makes a collector.

11:01:46 18 THE COURT: Okay.

11:01:48 19 THE WITNESS: Yes.

11:01:49 20 MS. HEALY-GALLAGHER: All right. So, assuming  
11:01:53 21 that the collector plane were perpendicular to the sun,  
11:01:58 22 where would the light and heat from the sun go?

11:02:02 23 A. Well, the receivers would be illuminated,  
11:02:07 24 purportedly, and then you'd have to have I-beam throughout  
11:02:13 25 the field to supply each receiver, four inlet pipes on

11:02:19 1 each receiver, that then has to move and track the sun as  
11:02:23 2 the thing moves.

11:02:24 3 Q. Let's step it through a little bit here. So, the  
11:02:32 4 sunlight would need to hit a lens, correct?

11:02:35 5 A. Yes.

11:02:35 6 Q. And then, once the sunlight hits the lens, what's  
11:02:40 7 the idea of what would happen to it?

11:02:42 8 A. Well, first of all, the concentrators you see  
11:02:46 9 here right now are not fully populated with lenses. There  
11:02:49 10 are a lot of broken ones, and they are missing, but in the  
11:02:54 11 design, purportedly what would happen is, first of all the  
11:02:58 12 sunlight would have to hit it normally, perpendicular to  
11:03:02 13 the lens to be focused at this region down at the  
11:03:06 14 receiver. So it has to track in such a way that it's  
11:03:10 15 facing the sun at all times, and very accurately.

11:03:16 16 Q. All right. So let's assume that sunlight hits a  
11:03:21 17 lens and goes to the receiver. What happens in the  
11:03:27 18 receiver -- or I'm sorry. Let me take that back. What's  
11:03:30 19 the idea of what would happen in a receiver if there were  
11:03:34 20 one installed on this collector?

11:03:36 21 A. Well, the receiver would absorb that sunlight and  
11:03:42 22 heat a fluid passing through the receiver, and then that  
11:03:46 23 fluid -- first of all you have to have a supply line for  
11:03:50 24 the cold fluid and a supply line for the warm fluid to  
11:03:55 25 then take it somewhere in the field to where the power

11:03:58 1 block is located and provide that heat to the boiler.

11:04:08 2 Q. Did you see a power block, Dr. Mancini, at any  
11:04:11 3 time on either one of your site visits?

11:04:14 4 A. No, ma'am. I might add that there were three  
11:04:28 5 trailers on the site, and I was told that there was a heat  
11:04:34 6 exchanger in one of them. I didn't see a condenser. I  
11:04:38 7 didn't see -- I assumed the heat exchanger was a boiler,  
11:04:42 8 but I don't know that. There was no turbine and there was  
11:04:46 9 no generator, and I didn't see any pumps.

11:04:53 10 Q. So where would the working fluid go next?

11:04:57 11 A. After it's collected -- after it comes out of the  
11:04:58 12 receiver?

11:04:58 13 Q. Right.

11:04:58 14 A. It would have to go into a warm header of some  
11:05:02 15 sort and be collected. From my understanding of the way  
11:05:05 16 the this works, is that multiple concentrators will  
11:05:09 17 contribute hot fluid to the hot header, take cold fluid  
11:05:14 18 from the cold header, and each one of them with four  
11:05:17 19 receivers. So, it's kind of -- and then the hot header  
11:05:23 20 would take all of the hot fluid to the boiler heat  
11:05:27 21 exchanger.

11:05:28 22 Q. And what would happen in the boiler heat  
11:05:30 23 exchanger?

11:05:31 24 A. Well, then the water would be circulated through  
11:05:34 25 the boiler heat exchanger, whatever the field working

11:05:38 1 fluid is would heat that water, produce steam, and then  
11:05:42 2 that would go to the turbine generator and then to the  
11:05:46 3 condenser and then back to the generating electrical  
11:05:54 4 power.

11:05:54 5 Q. Did you see any evidence of that actually  
11:05:58 6 happening on either one of your site visits?

11:06:01 7 A. No, ma'am.

11:06:08 8 MS. HEALY-GALLAGHER: Your Honor, at this time I  
11:06:09 9 move for the admission of Plaintiff's Exhibit 509, video  
11:06:15 10 12\_4\_00-4-23.

11:06:22 11 THE COURT: Are you going to eventually use all  
11:06:24 12 of these videos or not?

11:06:26 13 MS. HEALY-GALLAGHER: No.

11:06:26 14 THE COURT: Okay.

11:06:29 15 Mr. Snuffer, as to this single video?

11:06:31 16 MR. SNUFFER: No objection, but, for the record,  
11:06:34 17 it's 12\_4\_00-4\_23,  
11:06:43 18 not -23 but no objection as to it.

11:06:47 19 MS. HEALY-GALLAGHER: I do see that my notes are  
11:06:49 20 incorrect, yes.

11:06:50 21 THE COURT: Okay. It's received.

11:06:57 22 (Plaintiffs' Exhibit 509, Video 12\_4\_00-4\_23 received in  
11:06:57 23 evidence.)

11:06:57 24 MS. HEALY-GALLAGHER: You can take that down,  
11:07:00 25 please.

11:07:01 1 Q. BY MS. HEALY-GALLAGHER: Dr. Mancini, you  
11:07:03 2 mentioned that you had an idea of the design of a larger  
11:07:10 3 field of collectors.

11:07:12 4 Could we please take a look at Plaintiff's  
11:07:15 5 Exhibit 16, page 15, and please highlight the bottom part  
11:07:29 6 there.

11:07:42 7 You can just look at it on the screen. Thank  
11:07:51 8 you. Dr. Mancini, is this image that's on the screen  
11:07:53 9 right now, is this where you got that idea?

11:08:00 10 A. Yes.

11:08:01 11 Q. Okay. And, Dr. Mancini, could you walk us  
11:08:03 12 through here and tell us what's your understanding of what  
11:08:06 13 this diagram is proposing?

11:08:08 14 A. This diagram is proposing to take what's  
11:08:13 15 identified as a molten salt and pass it through 25 of  
11:08:21 16 these collectors that you see on the screen, the circles,  
11:08:25 17 and presumably --

11:08:26 18 MS. HEALY-GALLAGHER: Sorry. Let me interrupt  
11:08:28 19 you there just to make sure we're clear for the record.  
11:08:31 20 So we see a series of, like you said, 25 circles in the  
11:08:37 21 right-hand portion of this image. What does one of those  
11:08:40 22 circles represent to your understanding, Dr. Mancini?

11:08:43 23 A. To my understanding, each one of those represents  
11:08:46 24 a solar collector as we identified it in the video.

11:08:50 25 Q. All right. Please continue.

11:08:51 1 A. So this molten salt would be heated by the 25  
11:08:56 2 collectors, providing all the heat from those 25 to the  
11:08:59 3 molten salt stream. It would then be passed through the  
11:09:03 4 orange circle, which is a boiler, and that's where the  
11:09:06 5 power block occurs, the cold salt that would be then  
11:09:10 6 returned to the field and heated on the next cycle. The  
11:09:14 7 water flows through the boiler, then over to the turbine  
11:09:19 8 generator where electricity would be generated, and then  
11:09:23 9 there is actually a condenser defined here and a pump so  
11:09:29 10 you have a conventional -- what I call a conventional  
11:09:33 11 Rankine cycle.

11:09:34 12 Q. And just to be clear, these black lines like the  
11:09:42 13 one I'm tracing here involve molten salt?

11:09:45 14 A. That's what the -- that's what the diagram says,  
11:09:51 15 and that's what I was led to believe during my first visit  
11:09:55 16 was the working fluid in the system.

11:10:04 17 Q. On either of your site visits, did you ever see  
11:10:10 18 the purported solar energy technology operating according  
11:10:14 19 to this diagram?

11:10:16 20 A. No, ma'am.

11:10:16 21 Q. What, if anything, did you see in the documents  
11:10:19 22 you reviewed to suggest that any of the defendants'  
11:10:22 23 purported solar energy technology operated according to  
11:10:27 24 this diagram?

11:10:28 25 A. Nothing.

11:10:29 1 Q. What, if anything, have you seen to suggest the  
11:10:33 2 purported solar energy technology has ever operated  
11:10:37 3 according to this diagram?

11:10:39 4 A. I saw nothing to indicate that.

11:10:55 5 MS. HEALY-GALLAGHER: All right. Take that down,  
11:10:58 6 please. Next we're going to return to Plaintiff's Exhibit  
11:11:02 7 509, at video 12\_4\_38-5\_15. Please pause it for a moment.  
11:11:23 8 All right. We're going to play this video through and  
11:11:26 9 then I'll ask you some questions.

11:12:07 10 (Video played.)

11:12:08 11 Dr. Mancini, did you recognize the video at the  
11:12:10 12 clip 12\_4\_38-5\_15?

11:12:16 13 A. Yes.

11:12:17 14 Q. How do you recognize it?

11:12:18 15 A. Again, I was there when it was taken.

11:12:22 16 Q. And does this video clip show a true and accurate  
11:12:26 17 depiction of a portion of your site visit to the R&D test  
11:12:31 18 site on April 4?

11:12:33 19 A. Yes.

11:12:35 20 MS. HEALY-GALLAGHER: At this time, Your Honor,  
11:12:36 21 we move to admit Plaintiff's Exhibit 509 at  
11:12:42 22 12\_4\_38-5\_15.

11:12:48 23 THE COURT: Will you just leave that up on the  
11:12:49 24 screen just for a minute so I can get this down.

11:12:56 25 Okay. Mr. Snuffer?

11:13:00 1 MR. SNUFFER: We have no objection.

11:13:01 2 THE COURT: No objection? That exhibit is  
11:13:03 3 received.

11:13:05 4 (Plaintiff's Exhibit 509, Video 12\_4\_38-5\_15 received in  
11:13:05 5 evidence.)

11:13:05 6 And I'm sorry. It's 12-4. Okay. Got it.

11:13:11 7 12-4 -- I'm sorry, 12\_4\_38-5\_15.

11:13:19 8 MS. HEALY-GALLAGHER: That's right.

11:13:21 9 THE COURT: Okay.

11:13:22 10 MS. HEALY-GALLAGHER: All right. Also, would you  
11:13:23 11 play it again and stop at 13:2:23.

11:13:35 12 (Video played.)

11:13:35 13 Q. BY MS. HEALY-GALLAGHER: So, Dr. Mancini, what do  
11:13:37 14 we see in this image?

11:13:43 15 A. We see six -- six solar concentrators. You've  
11:13:50 16 got six -- 3, 4, 5, 6. Yeah, six solar concentrators, all  
11:13:56 17 pointing in different directions.

11:13:57 18 Q. Let's take a look at one that's in the foreground  
11:14:01 19 of this screen shot. So you've used the word "facets," I  
11:14:10 20 believe, to describe portions of the collector apparatus.  
11:14:15 21 What is a facet?

11:14:16 22 A. By facet, I mean the triangular or pie-shaped  
11:14:21 23 piece. It's one of the multiple pie-shaped pieces that is  
11:14:28 24 assembled into the concentrator ring.

11:14:30 25 Q. And have you heard those facets described in this



11:14:34 1 case as a lens?

11:14:34 2 A. Well, they are lenses, yes.

11:14:38 3 Q. Would you please describe the condition of the  
11:14:42 4 facets or lenses in this first concentrator.

11:14:46 5 A. Well, there are a number of them missing. The  
11:14:50 6 one -- and a number broken, which was the case pretty much  
11:14:54 7 on all the concentrators at the site.

11:14:58 8 Q. What, if any, implications do broken lenses have  
11:15:06 9 for the performance of any purported system?

11:15:09 10 A. Well, it certainly isn't going to concentrate the  
11:15:12 11 sunlight if there's not a lens there, so it's going to  
11:15:16 12 compromise the performance.

11:15:24 13 Q. And you mentioned a moment ago that all of the  
11:15:30 14 collectors are facing different directions, yes?

11:15:34 15 A. Yes, I did.

11:15:36 16 Q. What does that mean to you?

11:15:41 17 A. Normally, you have what's called a stow position  
11:15:46 18 where you'd stow them all either like this first one that  
11:15:51 19 we see, probably just horizontally because that presents  
11:15:54 20 the minimum -- for the most part, the minimum profile to  
11:16:00 21 avoid wind loading if you're not using them. But these  
11:16:05 22 seem to be pointing multiple directions, so I'm not sure  
11:16:09 23 what's actually going on.

11:16:10 24 Q. And if the collectors are pointing in multiple  
11:16:14 25 different directions, what, if anything, does that suggest

11:16:16 1 to you about whether they were tracking the sun?

11:16:18 2 A. Oh, they weren't tracking the sun when we were  
11:16:22 3 there, and I didn't see any of these tracking the sun on  
11:16:26 4 either visit.

11:16:27 5 Q. Why, Dr. Mancini, is it important for solar  
11:16:32 6 collectors to track the sun?

11:16:35 7 A. The only part of the solar energy that you can  
11:16:39 8 actually concentrate is the part coming directly from the  
11:16:43 9 sun. We call that direct normal. So it's like a beam.  
11:16:51 10 You can concentrate a beam, but you can't concentrate what  
11:16:56 11 we call the diffuse energy that's scattered by the sky and  
11:17:01 12 kind of illuminates things when the sun is going down and  
11:17:05 13 it's not quite all the way down and it's getting kind of  
11:17:09 14 twilight. So that's why concentrators have to track the  
11:17:13 15 sun.

11:17:13 16 Q. And why, Dr. Mancini, is it important for solar  
11:17:17 17 collectors to track the sun automatically rather than  
11:17:23 18 manually?

11:17:24 19 A. I can't conceive how you would do it manually.  
11:17:30 20 With a field of solar concentrators, you'd have to have  
11:17:36 21 someone manually tracking each solar concen -- it doesn't  
11:17:39 22 make any sense. It's not -- it's not a viable approach.  
11:17:45 23 You need to automate everything you can to reduce costs,  
11:17:50 24 and that's an easy thing to automate. You presumably  
11:17:54 25 would have sensors -- although I didn't see any sensors --

11:17:58 1 to provide automatic tracking on these collectors.

11:18:08 2 Q. Dr. Mancini, in the previous video clip that we  
11:18:11 3 looked at, there was nothing hanging from the supports  
11:18:15 4 from the collector. Do you recall that?

11:18:19 5 A. Yes.

11:18:19 6 Q. Here, I'm circling something. What, if anything,  
11:18:26 7 do we see hanging from this support?

11:18:30 8 A. Well, it's a component that I would call a  
11:18:34 9 secondary concentrator. It's -- it's part of one of the  
11:18:40 10 solar receiver designs that IAS had looked at and is not  
11:18:50 11 currently being used per their -- per Mr. Johnson's  
11:18:57 12 comments.

11:18:58 13 Q. And, Dr. Mancini, is the secondary concentrator  
11:19:00 14 that we see here, is that a receiver?

11:19:02 15 A. No. It's really an optical device. It has --  
11:19:06 16 it's silvered on the inside, and the purpose for it  
11:19:13 17 suggests to me that they were having trouble getting the  
11:19:17 18 sunlight to stay on the receiver, so it gives them a  
11:19:22 19 larger area to work with and it will take a larger image,  
11:19:29 20 solar image and condense it down to a smaller area.

11:19:49 21 MS. HEALY-GALLAGHER: If I can ask one question.  
11:19:51 22 I see the printing icon in the corner. Shall I wait until  
11:19:55 23 that's done?

11:19:56 24 THE COURT: No. You can move on.

11:19:59 25 MS. HEALY-GALLAGHER: Okay. Please take that

11:20:01 1 video down.

11:20:01 2 Q. BY MS. HEALY-GALLAGHER: And I would like to  
11:20:07 3 show -- Dr. Mancini, would you please take a look at  
11:20:10 4 what's been marked Plaintiff's Exhibit 460. 460.

11:20:33 5 A. Yes.

11:20:34 6 Q. Dr. Mancini, do you recognize what's been marked  
11:20:39 7 Plaintiff's Exhibit 460?

11:20:40 8 A. Yes. On both visits, we were taken, while at the  
11:20:44 9 manufacturing facility, to a room that had the lens  
11:20:50 10 materials stacked in these -- on these pallets. I might  
11:20:55 11 note that that room also had a number of those secondary  
11:21:01 12 solar concentrators stacked around.

11:21:03 13 Q. And, Dr. Mancini, who told you what was in these  
11:21:06 14 stacked pallets?

11:21:08 15 A. Well, on the first visit, that would be  
11:21:11 16 Mr. Johnson. On the second visit, it would be  
11:21:16 17 Mr. Shepard.

11:21:16 18 Q. And, Dr. Mancini, is Plaintiff's Exhibit 460 a  
11:21:21 19 true and accurate representation of a portion of your site  
11:21:24 20 visit on April 4?

11:21:25 21 A. Yes, Ma'am.

11:21:26 22 MS. HEALY-GALLAGHER: Your Honor, we move to  
11:21:29 23 admit Plaintiff's Exhibit 460.

11:21:30 24 MR. SNUFFER: No objection.

11:21:32 25 THE COURT: 460 is received.

11:21:36 1 (Plaintiffs' Exhibit 460 received in evidence.)

11:21:36 2 Q. BY MS. HEALY-GALLAGHER: So, Dr. Mancini, you  
11:21:38 3 testified that within these pallets is the lens material.  
11:21:47 4 Did I hear you correctly?

11:21:49 5 A. That's correct.

11:21:49 6 Q. How, if at all, did any defendant explain to you  
11:21:54 7 how lens material would go from this pallet to being on a  
11:21:59 8 tower, for example?

11:22:01 9 A. Well, they showed us some of the pie-shaped lens  
11:22:06 10 pieces that they ostensibly cut from the material stacked  
11:22:11 11 in here on these pallets that were assembled into those  
11:22:34 12 circular concentrator rings.

11:22:37 13 Q. Okay.

11:22:37 14 You can take that down, please.

11:22:39 15 Dr. Mancini, you testified a moment ago that you  
11:22:42 16 saw one collector actually moving while you were on your  
11:22:47 17 site visits. Do you recall that?

11:22:51 18 A. Yes.

11:22:51 19 Q. And I believe you testified that it was moved  
11:22:55 20 manually, right?

11:22:56 21 A. It was moved with a -- yeah, manually, yes.

11:23:01 22 Q. So, someone on the ground was manipulating  
11:23:04 23 controls to move the collector?

11:23:07 24 A. As far as I could tell, yes.

11:23:10 25 Q. Do you know why, Dr. Mancini, the concentrator

11:23:15 1 was manipulated manually?

11:23:18 2 A. I do not know.

11:23:22 3 Q. I will show you, please, Plaintiff's Exhibit 509,  
11:23:29 4 the video at 16\_12\_24-12\_41. We will watch this all the  
11:23:44 5 way through, and then I will ask you some questions.

11:24:05 6 (Video played.)

11:24:05 7 All right, Dr. Mancini, do you recognize this  
11:24:08 8 video clip?

11:24:09 9 A. Yes.

11:24:09 10 Q. Is this video clip a true and accurate depiction  
11:24:13 11 of events and things that happened on your site visit?

11:24:18 12 A. Yes.

11:24:18 13 MS. HEALY-GALLAGHER: Your Honor, we move to  
11:24:20 14 admit Plaintiff's Exhibit 509 at video clip  
11:24:25 15 16\_12\_24-12\_41.

11:24:36 16 MR. SNUFFER: No objection.

11:24:38 17 THE COURT: Received.

11:24:41 18 (Plaintiff's Exhibit 509, Video 16\_12\_24-12\_41 received in  
11:24:41 19 evidence.)

11:24:41 20 Q. BY MS. HEALY-GALLAGHER: All right, Dr. Mancini,  
11:24:42 21 what do we see, actually, in this image right here?

11:24:48 22 A. The man on the left is holding a piece of wood in  
11:24:53 23 or near the focal region of one of whatever part of the  
11:24:58 24 lens is still remaining, and burning it.

11:25:01 25 Q. And to your knowledge, Dr. Mancini, was this

11:25:06 1 concentrator manipulated manually so that the solar image  
11:25:11 2 could be created to burn this board?

11:25:19 3 A. That's correct.

11:25:20 4 Q. Other than what's visible in this image, what, if  
11:25:23 5 any, other examples did you see of lenses generating heat  
11:25:29 6 while you were on your site visits?

11:25:32 7 A. Well, I saw this same thing a couple of times  
11:25:36 8 during the first visit and during the second visit.

11:25:40 9 Q. Okay. So, other than the two examples of wood  
11:25:45 10 burning, did you see any other examples of lenses  
11:25:49 11 generating heat?

11:25:50 12 A. No.

11:25:52 13 Q. Are you familiar, Dr. Mancini, with the concept  
11:25:55 14 called solar process heat?

11:25:58 15 A. Yes.

11:25:59 16 Q. Would you please describe it for the Court.

11:26:03 17 A. Solar process heat is basically a way of taking  
11:26:11 18 thermal energy that you collect and applying it to some  
11:26:16 19 other application, other than generating power, using the  
11:26:21 20 heat. For example, a couple of the examples I'm familiar  
11:26:25 21 with are heat provided to a laundry, for example, to heat  
11:26:30 22 water up so that they wouldn't have to burn natural gas to  
11:26:34 23 do it. Or I actually worked on a project, when I was a  
11:26:39 24 professor, to heat some potash out in eastern New Mexico  
11:26:47 25 as part of a processing step.

11:26:50 1 It's fairly low-grade energy. It's a difficult  
11:26:55 2 thing to do to find area to put collectors where they are  
11:26:59 3 going to be used, and of course you don't have thermal  
11:27:03 4 storage, so you're only operating when the sun shines. So  
11:27:07 5 process heat turned out to be not a very -- not a very  
11:27:13 6 useful way to use solar energy.

11:27:17 7 Q. What, if any, application is heat from the sun  
11:27:21 8 being used for in this image?

11:27:23 9 A. To burn wood.

11:27:26 10 Q. What, if any, other demonstration did you see, on  
11:27:31 11 your site visits, of using concentrated solar radiation  
11:27:37 12 from a lens?

11:27:38 13 A. During our second visit, Mr. Johnson took us out  
11:27:45 14 on the patio after his lecture and set up a lens and held  
11:27:49 15 part of a lens up and put a photo voltaic cell in the  
11:27:56 16 image and showed that it could generate a potential across  
11:28:00 17 the junctions of the cell.

11:28:02 18 Q. What, if anything, have you seen to suggest that  
11:28:07 19 Mr. Johnson is developing a system to use photo voltaic  
11:28:12 20 cells to generate electricity on a commercial scale using  
11:28:16 21 lenses?

11:28:19 22 A. I haven't seen anything.

11:28:21 23 Q. Before that could happen, what would he have to  
11:28:27 24 do?

11:28:28 25 A. Well, you've got to confine the system, design



11:28:31 1 the system, review the cost data. I mean, it's putting a  
11:28:37 2 cell in -- I mean, we've all burned ants, I suppose. I  
11:28:41 3 mean, how are we going to turn that into -- that's all  
11:28:44 4 I've been doing for the last 35 years, figuring out how to  
11:28:50 5 turn burning ants into something that actually produces  
11:28:54 6 something. Boy that didn't sound good, did it?

11:28:59 7 THE COURT: I'm going to make sure that goes into  
11:29:03 8 the findings. That's the sum of your career.

11:29:19 9 MS. HEALY-GALLAGHER: Okay. Would you take that  
11:29:20 10 video down, please, and we'll take a look at Plaintiff's  
11:29:22 11 Exhibit 509, the video 18\_4\_09-4\_25.

11:29:41 12 All right. We'll play this video through and  
11:29:45 13 then I'll ask you some questions.

11:30:08 14 (Video played.)

11:30:08 15 All right. I'll ask you to play it through  
11:30:10 16 again. Pause at 14 Colon 23 Colon 16 on the screen.

11:30:33 17 (Video played.)

11:30:33 18 Q. BY MS. HEALY-GALLAGHER: And before I ask you  
11:30:35 19 questions specifically about this image, Dr. Mancini, do  
11:30:39 20 you recognize what is in this video clip generally?

11:30:43 21 A. Yes.

11:30:44 22 Q. What is it?

11:30:45 23 A. A couple of power poles and Mr. Johnson.

11:30:48 24 Q. Do you recognize what's in this video clip as  
11:30:54 25 having been a portion of your site visit on April 4?

11:30:56 1 A. Yes.

11:30:57 2 Q. And is this a true and accurate representation of  
11:30:59 3 what you saw?

11:31:00 4 A. Yes.

11:31:01 5 MS. HEALY-GALLAGHER: Your Honor, I move to admit  
11:31:04 6 Plaintiff's Exhibit 509 at video 18\_4\_9-4\_25.

11:31:13 7 MR. SNUFFER: No objection.

11:31:14 8 THE COURT: It's received.

11:31:41 9 (Plaintiff's Exhibit 509, Video 18\_4\_09-4\_25 received in  
11:31:41 10 evidence.)

11:31:42 11 Q. BY MS. HEALY-GALLAGHER: Dr. Mancini, you  
11:31:42 12 mentioned that we see some poles in this image, yes?

11:31:47 13 A. Yes.

11:31:47 14 Q. Let's start with the pole on the left-hand side.  
11:31:53 15 What's your understanding of what this brown pole does?

11:31:59 16 A. We were told by Mr. Johnson that that's where the  
11:32:02 17 power from the site would come to go eventually on the  
11:32:09 18 grid.

11:32:09 19 Q. And what, if any, connection do you see from the  
11:32:13 20 brown pole to any other pole?

11:32:15 21 A. There is none.

11:32:16 22 Q. In fact, what do you see at the top of the brown  
11:32:20 23 pole?

11:32:20 24 A. Some wires.

11:32:23 25 Q. Dangling?

11:32:27 1 A. Yes.

11:32:28 2 Q. What do those dangling wires suggest to you?

11:32:32 3 A. Well, it's not connected.

11:32:34 4 Q. Not connected to the electricity grid?

11:32:37 5 A. Well, the way it was put to me was that it would  
11:32:41 6 be connected, and it was suggested that the transformer  
11:32:44 7 over on the other pole would somehow -- or another  
11:32:49 8 transformer could somehow provide a connection to the  
11:32:52 9 grid.

11:32:52 10 Q. Who told you that?

11:32:54 11 A. Mr. Johnson.

11:32:56 12 Q. And what, if anything, do you think of that idea?

11:33:00 13 A. Well, first of all, the amount of power we're  
11:33:03 14 talking about is significant, if a plant is ever built,  
11:33:08 15 from each of those 25 collectors, and if you go by  
11:33:14 16 Mr. Johnson's statements, that group of concentrators  
11:33:18 17 would produce approximately 1 megawatt of power, and he  
11:33:24 18 suggested that there would be at least 200 there. So that  
11:33:29 19 would suggest at least 8 megawatts total, of power. Now  
11:33:33 20 we're looking at a distribution system here that provides  
11:33:36 21 power to houses. That's at 7200 kilovolts.

11:33:42 22 Q. Actually, let me stop you there. When you say,  
11:33:44 23 we're looking here at, what are you talking about?

11:33:47 24 A. I'm talking about the other pole. This is where  
11:33:49 25 the power was coming into the house and the units where we

11:33:55 1 were standing.

11:33:55 2 Q. So do you mean the pole in the middle of the  
11:33:58 3 screen?

11:33:59 4 A. Yes.

11:33:59 5 Q. And/or the pole on the right-hand side?

11:34:02 6 A. I don't -- I don't know what that pole is.

11:34:07 7 Q. Okay. I'm sorry I interrupted you. Please  
11:34:09 8 continue.

11:34:09 9 A. Well, the whole thing is that when you shift  
11:34:11 10 power over high tension lines, you do it at high voltage,  
11:34:16 11 and high tension lines are at hundreds of thousands of  
11:34:19 12 volts potential. And that gets stepped down at  
11:34:23 13 substations and at transformers, and this is on the  
11:34:26 14 distribution line for the local housing and so forth. So  
11:34:31 15 it's bringing in 7200 volts, and it's stepping it down to  
11:34:37 16 two, 120 lines to come into your house to provide 220 and  
11:34:42 17 120 for your appliances. So there's no way you can stick  
11:34:48 18 8 megawatts onto a line like that. That's not what you  
11:34:51 19 do.

11:34:51 20 You would put -- if you have a power plant  
11:34:54 21 generating 8 megawatts of power, you need to provide that  
11:34:58 22 power to a substation where that substation would then be  
11:35:03 23 able to accept that power and condition it so that it  
11:35:07 24 could go out on these distribution lines.

11:35:10 25 Q. So it sounds to me like, Dr. Mancini -- correct

11:35:14 1 me if I'm wrong -- but the power lines that we see on the  
11:35:17 2 two poles on the right-hand side of this image just  
11:35:20 3 couldn't accept the amount of power that Mr. Johnson is  
11:35:24 4 proposing to put on them?

11:35:39 5 A. That's correct.

11:35:43 6 Q. You discussed the need for a substation. Could  
11:35:45 7 you talk a little bit more about what a substation is?

11:35:49 8 A. Well, power projects typically produce large  
11:35:53 9 amounts of power, so you take that into a local  
11:35:56 10 distribution. Now, Mr. Johnson did refer to a substation  
11:36:00 11 down the line that he could potentially connect to, but I  
11:36:05 12 didn't see any -- any efforts to make that connection or  
11:36:08 13 any indication that that had been done.

11:37:14 14 MS. HEALY-GALLAGHER: May I have just one moment  
11:37:19 15 Your Honor?

11:37:20 16 THE COURT: Yes.

11:37:38 17 Q. BY MS. HEALY-GALLAGHER: Dr. Mancini, I'd like to  
11:37:40 18 move on to the reasons that support your second conclusion  
11:37:44 19 in this case. Would you please remind the Court of your  
11:37:46 20 second opinion or conclusion in this case?

11:37:50 21 A. It's my opinion that the IAS solar technology  
11:37:57 22 will never be a commercial solar energy system producing  
11:38:02 23 electrical power or any other form of useful energy.

11:38:04 24 Q. And what are the two primary reasons for that  
11:38:08 25 conclusion?

11:38:08 1 A. The two primary reasons are, first of all, the  
11:38:13 2 components are just a series of components. They don't  
11:38:17 3 really fit together as a system that will -- will make a  
11:38:25 4 commercial grade solar energy system. And the second is  
11:38:29 5 that the -- probably, one of the major underpinnings for  
11:38:34 6 all of my conclusions here are that the resources, both in  
11:38:40 7 intellectual capacity in terms of training and background  
11:38:46 8 and in terms of sheer numbers of people working on this  
11:38:50 9 project are not sufficient to produce or develop a  
11:38:55 10 commercial system.

11:39:07 11 Q. All right. Dr. Mancini, let's talk first about  
11:39:11 12 resources and people. What kind of staff, Dr. Mancini,  
11:39:18 13 does it take to bring a concentrating solar power project  
11:39:22 14 to commercial viability?

11:39:25 15 A. Well, you would have numbers of engineers working  
11:39:30 16 at the manufacturing facility and technicians. You'd have  
11:39:35 17 engineers that are mechanical engineers, that are  
11:39:39 18 structural, focused on dynamic structures. You'd have  
11:39:43 19 electrical engineers and power engineers. You'd have  
11:39:47 20 chemists and metallurgists. You'd have systems engineers  
11:39:52 21 helping you make sure that you address issues relating to  
11:39:56 22 how the system fits together.

11:39:58 23 Then, if you go to the test site, you'd have to  
11:40:00 24 have test engineers testing various pieces of equipment,  
11:40:05 25 and you'd have to have people doing the actual

11:40:10 1 installation that have experience, and you'd have to have  
11:40:14 2 technicians associated with all of these. You'd have to  
11:40:17 3 have manufacturing lines set up at the manufacturing  
11:40:21 4 facility with quality control and other issues. You'd  
11:40:26 5 have to have assembly lines set up to assemble components  
11:40:31 6 that you were building or making into an actual component  
11:40:35 7 like a receiver or -- and so forth.

11:40:38 8           And you'd have to have a project development team  
11:40:43 9 developing the project because this is very specialized.  
11:40:47 10 You'd have to meet state, local and federal regulations  
11:40:50 11 when you put in a power plant, and you have to -- you'd  
11:40:55 12 need a contract, a contract to deliver power so that you  
11:40:59 13 can -- and that's where you'd have this issue of an actual  
11:41:06 14 substation involved.

11:41:07 15           Another thing you'd need to have is a good group  
11:41:11 16 of engineers who were estimating the costs of the  
11:41:15 17 components and what it costs to make them at every step of  
11:41:18 18 the way so that you can see if you're on track to meet  
11:41:23 19 whatever your goal is for the cost per kilowatt energy of  
11:41:28 20 power that you're planning to produce.

11:41:31 21           It's -- I estimate it would take a minimum of 20  
11:41:34 22 to 20-plus engineers of all those different types and  
11:41:40 23 perhaps as many as 75 to a hundred technicians to be doing  
11:41:44 24 a project of this scale.

11:41:47 25           Q.    And, Dr. Mancini, what education level is

11:41:52 1 required for the people who work on these sorts of  
11:41:55 2 projects, the kind of people you just described?

11:41:57 3 A. Well, they could be all over the place.  
11:42:00 4 Education can be offset by experience. I mean,  
11:42:04 5 experienced people are worth gold, and regardless of  
11:42:08 6 education level. So -- but it's likely you'd have a few  
11:42:12 7 advanced degrees, probably a couple of master's degrees,  
11:42:16 8 and hopefully you'd have some experienced people working.  
11:42:20 9 By and large, most of your staff would be B.S.  
11:42:26 10 Engineers.

11:42:26 11 Q. And by B.S., you mean bachelor of science?

11:42:30 12 A. Bachelors of science, yes.

11:42:32 13 Q. Why is it important to have at least a B.S. in  
11:42:36 14 engineering?

11:42:37 15 A. Well, they are -- that's what engineers do.  
11:42:41 16 We -- we're -- the expertise is developed in the  
11:42:47 17 educational system to do these types of things. It's --  
11:42:52 18 what they don't -- if they haven't had a background in  
11:42:56 19 solar, you would probably work with them to help develop  
11:43:00 20 that through other people who did have a background in  
11:43:04 21 solar. But it's very -- it's important to have  
11:43:11 22 engineers.

11:43:11 23 Q. Would these engineers have the kinds of classes  
11:43:15 24 that you taught while you were a professor?

11:43:21 25 A. Of course.



11:43:22 1 Q. Why, Dr. Mancini, is it important to have the  
11:43:25 2 wide range of people that you just listed off?

11:43:27 3 A. Well, because of all the materials issues you  
11:43:29 4 have and the chemical stuff you need to worry about  
11:43:34 5 because engineers tend to specialize a little bit, even at  
11:43:38 6 the undergraduate level. So you'd certainly try to go out  
11:43:41 7 and get experienced people, but then you'd back them up  
11:43:44 8 with people who could do the day-to-day stuff with  
11:43:55 9 supervision.

11:43:55 10 Q. What information, Dr. Mancini, do you have about  
11:43:58 11 the staffing resources that the defendants have for their  
11:44:04 12 purported solar energy technology?

11:44:08 13 A. There was nothing in the documents that I  
11:44:10 14 reviewed that told me anything about that.

11:44:22 15 Q. What, if any, information do you have about  
11:44:26 16 Neldon Johnson's education level?

11:44:30 17 A. Based on his deposition, he's had a couple of  
11:44:34 18 years of classes at B.Y.U. He's had some training in --  
11:44:43 19 in microwave technology when working at AT&T, and he  
11:44:52 20 referred to UTC, which I didn't know what that was, but he  
11:44:57 21 said he took some courses at UTC. But there was no  
11:45:02 22 indication that he had any -- he had any degrees.

11:45:08 23 Q. What's your understanding of whether anyone  
11:45:12 24 working on the purported solar energy technology has a  
11:45:16 25 degree of any kind?

11:45:17 1 A. I didn't review any information that showed me  
11:45:21 2 anybody else's -- any background from anybody.  
11:45:25 3 Mr. Johnson informed me that he was the inventor and the  
11:45:29 4 designer, that he was responsible for overseeing testing,  
11:45:32 5 that he was going to be the EPC building the plant.

11:45:36 6 Q. I'm sorry, EPC?

11:45:39 7 A. Engineering procurement contractor, and that he  
11:45:42 8 could put -- he could just put the power on the grid and  
11:45:48 9 send it to the California market.

11:45:50 10 Q. What, if any, opinion do you have of that  
11:45:53 11 statement?

11:45:53 12 A. Well, even to put the power on the grid and send  
11:45:57 13 it to the California market, there's an incredible amount  
11:46:01 14 of regulation you have to go through and hoops you have to  
11:46:05 15 jump through, so I don't know whether Mr. Johnson has that  
11:46:10 16 background or not.

11:46:11 17 Q. And I just want to clarify your answer a moment  
11:46:14 18 ago when I asked you about what, if any, information you  
11:46:17 19 had about the -- whether anyone working on the purported  
11:46:22 20 solar energy technology had a degree of any kind. I just  
11:46:26 21 want to make sure it's clear. So, nothing in the  
11:46:29 22 materials you reviewed stated that anyone had a degree of  
11:46:34 23 any kind?

11:46:34 24 A. I didn't see any CV's, and I had asked for them  
11:46:39 25 in the materials. I didn't see any CV's of anyone. What

11:46:43 1 I saw on site were a number of what I assumed were  
11:46:47 2 technicians. There were perhaps half a dozen at the  
11:46:51 3 manufacturing facility and another half a dozen or so out  
11:46:54 4 at the test site and at the construction site.

11:46:59 5 Q. Okay. So you did see about half a dozen, ten  
11:47:02 6 people?

11:47:02 7 A. Ten or 12 people doing various things during the  
11:47:06 8 visits.

11:47:06 9 Q. And to your observation, what were they doing?

11:47:11 10 A. There were some people assembling the pie-shaped  
11:47:16 11 lens facets into metal structures to go into the ring.  
11:47:20 12 There was somebody cutting steel. There were people  
11:47:26 13 moving things around out at the test site and at the  
11:47:33 14 construction site.

11:47:33 15 Q. What, if any, information do you have about the  
11:47:36 16 educational background of the people you called  
11:47:40 17 technicians?

11:47:40 18 A. I have no information at all.

11:47:42 19 Q. And what, if any, information have you seen about  
11:47:46 20 their level of experience with anything to do with solar  
11:47:50 21 energy technology?

11:47:51 22 A. I have seen nothing at all.

11:47:56 23 Q. And when you mentioned, you know, half a dozen to  
11:47:59 24 a dozen people, did you see them only in one of the places  
11:48:08 25 you visited or more?

11:48:09 1 A. No. Some of them were at both locations, so it  
11:48:13 2 was a little difficult to get a handle on who was --

11:48:21 3 Q. In your opinion, how many people would it take to  
11:48:25 4 bring something like the purported solar technology in  
11:48:29 5 this case to commercial viability, if that were even  
11:48:34 6 possible?

11:48:34 7 A. Well, I think, as I said earlier, it would take,  
11:48:36 8 in my estimation, in excess of 20 engineers and perhaps 75  
11:48:42 9 to a hundred technicians in support of them.

11:48:45 10 Q. And what, if anything, have you seen in the  
11:48:48 11 materials you reviewed to indicate that the purported  
11:48:53 12 solar energy technology has ever been staffed at that  
11:48:57 13 level?

11:48:57 14 A. I saw nothing to indicate that at all.

11:49:00 15 Q. What, if anything, have you seen in the materials  
11:49:03 16 you reviewed to suggest that the staffing will ever be at  
11:49:07 17 that level?

11:49:07 18 A. I haven't seen anything that suggested that at  
11:49:12 19 all.

11:49:12 20 Q. What, Dr. Mancini, if anything, does the staffing  
11:49:16 21 that you have seen for the purported solar energy  
11:49:21 22 technology tell you about the likelihood that it will ever  
11:49:25 23 reach commercial viability?

11:49:28 24 A. Well, it certainly doesn't support the idea that  
11:49:32 25 it could reach commercial viability.

11:49:38 1 Q. And do the defendants have on staff the people  
11:49:41 2 that they need in order to accomplish that, if that were  
11:49:45 3 even possible?

11:49:46 4 A. No.

11:49:53 5 Q. All right, Dr. Mancini, now I'd like to talk  
11:49:56 6 about how, if at all, the components work together in a  
11:50:04 7 system. Now -- and we've used the word "components"  
11:50:08 8 before. When we say components, can you give us some  
11:50:12 9 examples of what we are talking about?

11:50:14 10 A. I would call the components in this system the  
11:50:18 11 concentrator, the receiver, certainly the distribution  
11:50:21 12 system to get it back and forth, the power block, and then  
11:50:26 13 the components within the power block itself.

11:50:31 14 Q. What are some examples, Dr. Mancini, of how the  
11:50:43 15 components do not work together in a system?

11:50:45 16 A. Well, what I did was, since I didn't have data, I  
11:50:49 17 chose to try to analyze how I thought the system could  
11:50:54 18 perform if it were assembled as a system. So I took the  
11:51:02 19 solar energy coming in and kind of took it through the  
11:51:05 20 system. And I found four -- four fundamental areas where  
11:51:14 21 there are significant errors relative to the design of  
11:51:16 22 this system.

11:51:16 23 The first was with the intercept factor of the  
11:51:24 24 thermal receiver. The second was with the actual  
11:51:28 25 performance of the thermal receiver. The third had to do

11:51:34 1 with the turbine efficiency and how that was misused in  
11:51:40 2 calculating a Rankine cycle efficiency. And the fourth  
11:51:44 3 looked at -- there was -- and actually there is another  
11:51:49 4 issue there having to do with whether the turbine would  
11:51:52 5 operate at all. And then the fourth issue was the balance  
11:52:02 6 of plant to consider and balance of plant issues which I  
11:52:07 7 hadn't seen addressed at all.

11:52:10 8 Q. Before we go into those examples, you mentioned  
11:52:13 9 that you analyzed this -- the purported solar energy  
11:52:19 10 technology as if it were assembled in a system.

11:52:24 11 A. Yes.

11:52:24 12 Q. Did you ever actually see the purported solar  
11:52:28 13 energy technology assembled as a system?

11:52:30 14 A. No.

11:52:34 15 Q. What, if anything, did you see in the materials  
11:52:36 16 you reviewed that suggested the individual components had  
11:52:42 17 ever been assembled into a system?

11:52:43 18 A. I didn't see anything that supported that at  
11:52:53 19 all.

11:52:54 20 Q. Okay. Let's begin by talking about the  
11:52:58 21 incompatibility between the concentrator and the receiver.  
11:53:02 22 What did you see about that in the materials that you  
11:53:06 23 reviewed?

11:53:09 24 A. The issue is the intercept factor, and if you  
11:53:16 25 would visualize a flashlight, and if you stuck your finger

11:53:21 1 in front of it, your finger would intercept a certain  
11:53:25 2 portion of the beam. Now, a solar receiver, you ideally  
11:53:29 3 want it to absorb the whole solar concentrated beam at the  
11:53:35 4 point of concentration. There's a bit of a tradeoff here  
11:53:39 5 because if you make it -- you have to make it really big,  
11:53:42 6 then the thermal losses from it get very large, so you try  
11:53:46 7 to keep it as small as possible.

11:53:48 8 So my first step was to look at the actual  
11:53:54 9 absorption of -- or what the image from the intercept  
11:53:59 10 factor of the receiver would be in the solar concentrator  
11:54:05 11 beam.

11:54:06 12 Q. Well, actually, I'd like to pause you there for  
11:54:09 13 one second and ask, what, if any, documents did you see  
11:54:13 14 that demonstrated the intercept between the concentrator  
11:54:18 15 and the receiver?

11:54:19 16 A. I didn't see any documents that did that. I  
11:54:25 17 took -- I went to that video that we looked at earlier to  
11:54:30 18 characterize the size of the image in the receiver  
11:54:36 19 plane.

11:54:36 20 Q. All right.

11:54:37 21 Could you pull up, please, Plaintiff's Exhibit  
11:54:42 22 562 and video. Just pause it quickly, please.

11:54:56 23 A. Okay, so since I don't have --

11:54:59 24 Q. Actually, hang on one second, Dr. Mancini. Thank  
11:55:03 25 you. So, Dr. Mancini, before we take a look at this video

11:55:09 1 again, you've been talking about the intercept. Can you  
11:55:14 2 describe to the Court where you see the intercept in this  
11:55:18 3 screen shot?

11:55:19 4 A. Well, I guess I could imagine one. You might  
11:55:24 5 imagine that the piece of wood he's holding could  
11:55:29 6 represent a receiver, and the fraction of the solar energy  
11:55:32 7 that's actually hitting that piece of wood -- I assume  
11:55:37 8 it's wood -- and related to whatever the area is of this  
11:55:41 9 image of the concentrated beam would indicate the  
11:55:45 10 intercept factor.

11:55:57 11 THE COURT: And you can move on from this exhibit  
11:56:01 12 if you want. I'm printing it, but that doesn't mean it  
11:56:06 13 has to stay on the screen.

11:56:07 14 MS. HEALY-GALLAGHER: Oh, sure.

11:56:09 15 Q. BY MS. HEALY-GALLAGHER: And actually, also,  
11:56:10 16 Dr. Mancini -- we'll take a look at that in a moment.  
11:56:16 17 Okay. So, what did you take away, Dr. Mancini, from  
11:56:20 18 watching this video?

11:56:22 19 A. Well, this video gave me a piece of information  
11:56:25 20 that I needed to try to estimate what the intercept factor  
11:56:30 21 would be, and that is the region where it's so bright, it  
11:56:35 22 indicates approximately to me that the diameter of the  
11:56:40 23 concentrated beam in the receiver, what's called --  
11:56:42 24 there's no focal point for a lens. It's called the circle  
11:56:47 25 of least confusion. But, at any rate, it's the smallest



11:56:51 1 region that that lens will produce is about a meter in  
11:56:55 2 diameter. So I compared that, then I calculated the area,  
11:56:59 3 one meter diameter.

11:57:06 4 Q. Now, Dr. Mancini, is a video like this the kind  
11:57:08 5 of document that you would typically rely upon to learn  
11:57:13 6 what the intercept is?

11:57:14 7 A. No, not at all.

11:57:16 8 Q. What would you typically rely upon?

11:57:19 9 A. What you would do is you would have a -- you'd  
11:57:24 10 have a way of measuring the actual flux distribution  
11:57:28 11 across that. It could be using optical methods. It could  
11:57:33 12 be using calorimeters where you actually measure the heat  
11:57:38 13 that's being absorbed at different diameters to compute  
11:57:44 14 what the distribution looks like.

11:57:47 15 Q. And in a typical concentrating solar energy  
11:57:52 16 project, in your experience, would there be data about the  
11:57:58 17 size of the intercept?

11:58:00 18 A. Yes. I mean, that would be one of the things  
11:58:02 19 you'd work on right up front because that determines how  
11:58:06 20 big your receiver has to be, and that's how you'd start  
11:58:10 21 getting into that issue of making the receiver work with  
11:58:12 22 the concentrator and the interface documents.

11:58:16 23 Q. And, Dr. Mancini, what, if any, component  
11:58:21 24 interface documents did you see in the materials you  
11:58:24 25 reviewed for this case regarding the interaction between

11:58:29 1 the concentrator and the receiver?

11:58:30 2 A. I didn't see any.

11:58:43 3 Q. So then why, Dr. Mancini, did you use the image  
11:58:48 4 in this video?

11:58:48 5 A. Because I had nothing else.

11:58:50 6 Q. All right.

11:58:51 7 Let's play the video please.

11:59:17 8 (Video played.)

11:59:17 9 Pause, please.

11:59:19 10 Dr. Mancini, what do we see here supporting this  
11:59:23 11 concentrator?

11:59:24 12 A. It's being supported by some tag lines that are  
11:59:28 13 holding it and by a crane. It's not on a solar  
11:59:32 14 concentrator at all.

11:59:33 15 Q. To your understanding, is that how these lenses  
11:59:38 16 and lens assemblies are supposed to work?

11:59:42 17 A. Of course they are supposed to be on the  
11:59:45 18 concentrator, but that's a perfectly valid way to look  
11:59:48 19 at -- to do something quickly if you're trying to do it  
11:59:52 20 quickly, whatever. I have no problem with that.

11:59:58 21 Q. Okay. So we've talked about, and you identified  
12:00:02 22 a moment ago for the Court the approximate size of the  
12:00:07 23 image that could be on the receiver. What, if anything,  
12:00:14 24 did you use in your analysis for the design or operation  
12:00:20 25 of the receiver?

12:00:23 1 A. There was a receiver design that Mr. Johnson had  
12:00:27 2 shown us, and one version of it that he had shown us in --  
12:00:32 3 during our visits that he said was the receiver he was  
12:00:36 4 using.

12:00:37 5 MS. HEALY-GALLAGHER: Would you please pull up  
12:00:49 6 Plaintiff's Exhibit 754 at page 5.

12:00:57 7 Q. BY MS. HEALY-GALLAGHER: Dr. Mancini, what do we  
12:01:00 8 see here in figure 5?

12:01:01 9 A. There are three different concepts for the  
12:01:05 10 receiver that ostensibly were tested or evaluated at  
12:01:11 11 different times, and the one in figure C is the one that  
12:01:16 12 Mr. Johnson said he was using now.

12:01:18 13 Q. And he said he was using it. Did you see any  
12:01:22 14 examples of the receiver at image 5C installed on any  
12:01:28 15 tower on your site visits?

12:01:29 16 A. I did not. In point of fact, I only saw one  
12:01:36 17 version of that receiver, and I saw that on the first  
12:01:39 18 visit. We may have seen it in the manufacturing plant  
12:01:44 19 during the second visit, but I don't recall.

12:01:47 20 Q. And you said one version. Do you mean --

12:01:50 21 A. One unit.

12:01:51 22 Q. One unit?

12:01:52 23 A. Yeah.

12:01:53 24 Q. And, even assuming that receivers were going to  
12:01:59 25 be installed on even a single tower, how many receivers

12:02:04 1 would be required?

12:02:04 2 A. Four.

12:02:11 3 THE COURT: It looks to me, Dr. Mancini, that  
12:02:13 4 that is about a meter square. Is that about right?

12:02:16 5 THE WITNESS: I estimated it 50 by 60  
12:02:19 6 centimeters.

12:02:20 7 THE COURT: Okay. So half?

12:02:21 8 THE WITNESS: Yeah.

12:02:22 9 THE COURT: Okay. What material is it made of?

12:02:25 10 THE WITNESS: There are seven glass tubes in the  
12:02:28 11 receiver. They are painted black on the inside, which is  
12:02:33 12 problematic, and then they are ostensibly filled with  
12:02:38 13 molten salt and then have a copper coil running through  
12:02:42 14 them.

12:02:42 15 THE COURT: Okay.

12:02:43 16 THE WITNESS: Each of them.

12:02:46 17 THE COURT: Do you have an estimate of the weight  
12:02:49 18 of that unit?

12:02:50 19 THE WITNESS: I do not. And that's an issue  
12:02:51 20 also.

12:02:52 21 THE COURT: Okay. Thanks.

12:02:52 22 Q. BY MS. HEALY-GALLAGHER: What's the issue with  
12:02:53 23 the weight, Dr. Mancini?

12:02:54 24 A. Well, they are hanging like pendulums down below  
12:02:57 25 the dish, and they are going to want to move, and you are

12:03:01 1 concerned about what happens both in the wind and just  
12:03:03 2 during the normal tracking of the dish. If they move,  
12:03:07 3 they are not going to be in one place to absorb the  
12:03:11 4 concentrated beam. So there is a tracking issue there.

12:03:14 5 Q. And, in addition to the weight of the receiver  
12:03:17 6 itself, the piping would also be hanging off the receiver  
12:03:22 7 as well, correct?

12:03:23 8 A. There would have to be something. I have no idea  
12:03:26 9 what that would be.

12:03:36 10 Q. So, Dr. Mancini, you just told the Court what you  
12:03:40 11 estimated the area of the top of the receiver to be. What  
12:03:45 12 was your conclusion as to how much of the solar image the  
12:03:51 13 receiver would actually intercept?

12:03:54 14 A. Well, again, as I recall, I estimated, based on  
12:03:59 15 the man's hand, the dimensions to be about 50 by 60  
12:04:04 16 centimeters. And by taking the relative areas of the  
12:04:07 17 image from the lens and the receiver, it would give you 38  
12:04:12 18 percent intercept, that the receiver would intercept 38  
12:04:17 19 percent of the image. And that's not quite fair because  
12:04:20 20 the power distribution within the image is not linear.  
12:04:24 21 It's not straight across. It's a little higher in the  
12:04:28 22 center than it is at the edges. And so what I did was to  
12:04:33 23 increase that to 60 percent, which I thought was a  
12:04:38 24 generous estimate of what the intercept could be of the  
12:04:42 25 actual power.

12:04:42 1 Now, be aware here, I'm not trying to predict the  
12:04:47 2 actual performance of the system. What I'm trying to do  
12:04:50 3 is see if I give it sort of the benefit of the doubt at  
12:04:55 4 every step, what could its performance actually look like  
12:05:00 5 if it did operate?

12:05:05 6 Q. And, Dr. Mancini, if you had had actual  
12:05:09 7 information about the size of the receiver and the weight  
12:05:12 8 of the receiver, the actual composition of the receiver,  
12:05:15 9 what would you have done with it?

12:05:18 10 A. Well, it would have led to a different type of  
12:05:21 11 analysis. I probably would have looked at what the  
12:05:25 12 tracking issues could have been. I could have -- but in  
12:05:30 13 terms of the -- of what I'm trying to do here, which is  
12:05:35 14 set an upper bound on what I think the performance of this  
12:05:40 15 system could be, if it were ever assembled, the best it  
12:05:49 16 could do, that would give me a lot of information.

12:05:51 17 Q. So you just testified that you gave a generous  
12:05:54 18 estimate that the receiver would intercept 60 percent of  
12:05:58 19 the solar image. How does your estimate compare to  
12:06:02 20 Mr. Johnson's estimate?

12:06:02 21 A. Well, he had a table in the Solar Energy Replace  
12:06:08 22 Natural Gas paper that indicated that a hundred percent of  
12:06:13 23 the image was being -- was incident on the receiver.

12:06:18 24 Q. And that was in Plaintiff's Exhibit 16 and 17?

12:06:23 25 A. Yes.

12:06:23 1 Q. And 559?

12:06:28 2 A. Yes.

12:06:28 3 Q. What, Dr. Mancini, if any, support did you see  
12:06:31 4 for Mr. Johnson's estimate?

12:06:33 5 A. There wasn't any.

12:06:37 6 Q. What's the significance of the difference between  
12:06:41 7 your estimate and Mr. Johnson's estimate?

12:06:45 8 A. We are losing 40 percent of the energy that we're  
12:06:49 9 trying to collect, and that's a big number. Receivers are  
12:06:54 10 supposed to be in the 90 percent, 95 percent range,  
12:07:00 11 generally. Receiver tubes for parabolic trough plants are  
12:07:04 12 95 percent intercept.

12:07:05 13 Q. And that's important, isn't it, Dr. Mancini,  
12:07:08 14 because that's the hottest part of the system?

12:07:11 15 A. Actually, that is part of the issue, but the real  
12:07:15 16 issue is that if you don't intercept that energy, you have  
12:07:18 17 no chance ever to use it. So you're losing 40 percent of  
12:07:22 18 your energy at the front end before you even start losing  
12:07:27 19 it elsewhere in the system, which automatically happens  
12:07:34 20 anyway.

12:07:34 21 Q. In the materials you reviewed, Dr. Mancini, did  
12:07:37 22 you see anything about how a receiver would actually be  
12:07:41 23 mounted on a collector?

12:07:42 24 A. I did not.

12:07:51 25 Q. Did you ever hear about that otherwise, from

12:07:55 1 Mr. Johnson or through deposition testimony?

12:07:56 2 A. I may have asked him that question, but to be  
12:08:00 3 honest with you, I don't recall having done that. I mean,  
12:08:06 4 I'm sure I asked him that question, but I don't remember  
12:08:10 5 his answer.

12:08:14 6 Q. If his answer had provided you with data, facts  
12:08:21 7 or other information that you found relevant, would you  
12:08:24 8 have included it?

12:08:25 9 A. Well, I'm sure if I asked him the question, and  
12:08:29 10 I'm pretty sure I did, the answer I got was, I don't save  
12:08:32 11 that sort of thing, or it can be done just easily, you  
12:08:36 12 just do this.

12:08:37 13 Q. Did Mr. Johnson give specific reasons for why it  
12:08:44 14 could be done?

12:08:44 15 A. No. He can just -- no.

12:08:56 16 Q. Okay. So, Dr. Mancini, when you listed the  
12:09:00 17 reasons that the components that you've seen on various  
12:09:06 18 site visits do not work together in a system, you  
12:09:09 19 mentioned the thermal efficiency of the receiver as being  
12:09:17 20 one example. What did you see about that in the materials  
12:09:20 21 you reviewed?

12:09:21 22 A. I didn't -- well, Mr. Johnson reported the  
12:09:25 23 thermal efficiency of the receiver at 90 percent.

12:09:28 24 Q. And did you see that in Plaintiff's Exhibit 16,  
12:09:31 25 17 and 559?



12:09:35 1 A. Yes.

12:09:36 2 Q. And what support, if any, did you see for  
12:09:42 3 Mr. Johnson's 90 percent estimate?

12:09:43 4 A. There was none.

12:09:44 5 Q. So what analysis did you try to do to estimate  
12:09:47 6 the efficiency of the receiver if it were ever placed in a  
12:09:52 7 system?

12:09:52 8 A. I did a first order heat transfer fluid mechanics  
12:09:57 9 analysis of the receiver assuming that it operated at the  
12:10:02 10 400 degree C, which is the maximum operating temperature  
12:10:09 11 that the hot oil, which I was told would be used in the  
12:10:14 12 final design, can operate at. It degrades if the  
12:10:20 13 temperature gets any higher. And so I calculated heat  
12:10:25 14 transfer to the fluid flowing through the receiver from  
12:10:30 15 that 400 degree C temperature at the black painted surface  
12:10:36 16 of the glass and also calculated the convection and  
12:10:41 17 radiation losses from the receiver, and the energy balance  
12:10:45 18 that makes things work defines the final operating  
12:10:51 19 conditions.

12:10:51 20 Q. And what conclusion did you reach?

12:10:53 21 A. I got a 61.8 or 60 -- 61 or 62 percent thermal  
12:11:00 22 efficiency for the receiver.

12:11:03 23 Q. And what's the significance of the difference  
12:11:06 24 between your 60 or 61 percent estimate and Mr. Johnson's  
12:11:10 25 90 percent?

12:11:10 1 A. Again, we're losing 40 percent of the energy  
12:11:14 2 that's actually hitting the receiver. We're putting 60  
12:11:18 3 percent of it into the working fluid flowing through the  
12:11:23 4 pipes, and so that's -- that's significant.

12:11:29 5 Q. Dr. Mancini, you've spoken a lot about the  
12:11:33 6 working fluid. Could we talk about, just generally, what  
12:11:37 7 is a working fluid?

12:11:39 8 A. Well, in this system, there are two working  
12:11:44 9 fluids. There's the steam, the water steam in the power  
12:11:48 10 cycle and the Rankine cycle, and then there's the fluid  
12:11:51 11 that flows through the field. It's a second working  
12:11:54 12 fluid.

12:11:54 13 Q. So let's talk about the field working fluid or  
12:11:58 14 the collector working fluid. What are some common working  
12:12:03 15 fluids for CSP projects in your experience?

12:12:07 16 A. Well, there are really only two that are used,  
12:12:13 17 and during my first visit, Mr. Johnson told me he was  
12:12:18 18 using molten salt.

12:12:19 19 Q. I'm sorry. So which are the two that are used in  
12:12:26 20 CSP systems generally?

12:12:26 21 A. Yes. There two generally ones. There could be  
12:12:29 22 three if you -- if you want to be -- well, obviously water  
12:12:31 23 is one, so that makes three, okay? But the other two are  
12:12:34 24 molten salt and a synthetic oil.

12:12:36 25 Q. And how important is the choice of working fluid

12:12:40 1 to a system design for a CSP system?

12:12:44 2 A. Well, it's one of the earliest decisions you ever  
12:12:48 3 make because it determines a lot about what your other  
12:12:53 4 components will all look like because it defines the  
12:12:57 5 temperature range it can operate over. For example, if  
12:13:03 6 you select molten salt -- by the way, this isn't sodium  
12:13:08 7 chloride. This is a mixture of sodium nitrate and  
12:13:12 8 potassium nitrate, and it's useful because it remains in  
12:13:16 9 the liquid state between 222 degrees centigrade and 565  
12:13:23 10 degrees centigrade. So you can move this liquid around  
12:13:26 11 the system and have a very high temperature, so it's very  
12:13:29 12 attractive.

12:13:30 13 Q. And you just described molten salt, correct?

12:13:34 14 A. The molten salt.

12:13:36 15 Q. And you mentioned that the choice of working  
12:13:38 16 fluid is one of the first choices that you make. And you  
12:13:43 17 mentioned that it determines the working temperature.  
12:13:45 18 What, if any, impact does the choice of working fluid have  
12:13:50 19 on things like the size of the receiver?

12:13:54 20 A. Well, it can affect it substantially. I mean, it  
12:13:57 21 will affect all the things you're dealing with here, the  
12:14:00 22 size of the concentrator as well, because if -- so -- and  
12:14:04 23 the heat exchangers, very much so, the boiler and the  
12:14:11 24 piping. What's the piping going to look like?

12:14:17 25 Q. Why does it impact the piping?

12:14:20 1 A. Well, the molten salt is molten only if it's  
12:14:25 2 above 222, and if it freezes, unlike water, it goes the  
12:14:29 3 other direction, it actually contracts. Well, that's  
12:14:32 4 okay, except in trying to unfreeze it, you're still at  
12:14:35 5 risk for blowing your pipes apart. Plus, can you imagine  
12:14:41 6 having pipes full of a solid salt and trying to melt them  
12:14:45 7 so you can get them to flow? It's a very -- we have had  
12:14:49 8 to do it before, and it's not easy. So you avoid that at  
12:14:51 9 all costs.

12:14:52 10 Q. And how do you avoid molten salt in pipes?

12:14:55 11 A. You heat trace them and you minimize the length  
12:14:58 12 of usage.

12:14:59 13 Q. When you say heat trace, what do you mean?

12:15:01 14 A. You put electrical heaters on all the piping and  
12:15:05 15 anything associated with the molten salt

12:15:08 16 Q. All right. So we talked about molten salt and  
12:15:11 17 you identified the operating temperatures for that. What  
12:15:14 18 are some of the parameters for using synthetic oil as a  
12:15:20 19 working fluid?

12:15:21 20 A. Synthetic oil is an interesting material, but at  
12:15:25 21 400 degrees centigrade, about 750 F, it starts to degrade  
12:15:30 22 and have degradation products. So even if part of your  
12:15:34 23 system gets to 400 degrees, you're going to have this in  
12:15:37 24 there. So it automatically happens in all systems. You  
12:15:40 25 can't avoid it. But what you do is use what's called a

12:15:43 1 Ullage, U-l-l-a-g-e system to actually separate it out  
12:15:50 2 because you can separate it out gravimetrically.

12:16:01 3 Q. Gravimetrically?

12:16:03 4 A. Gravimetrically. I'm sorry. Here I thought I  
12:16:05 5 was being so clever, I spelled Ullage for you. And it  
12:16:09 6 will separate out gravimetrically and you can remove it  
12:16:12 7 from the system to provide make up. And it's a simple  
12:16:15 8 cost of operation.

12:16:18 9 Q. I'm sorry. So synthetic oil has a simpler cost  
12:16:22 10 of operation than molten salt?

12:16:23 11 A. I would say that's true, but then you've got to  
12:16:27 12 weigh that against the advantage of operating at the  
12:16:30 13 higher temperature.

12:16:32 14 Q. So what, Dr. Mancini, if anything, did you see in  
12:16:35 15 the materials you reviewed about which working fluid is  
12:16:39 16 proposed for use in the defendants' purported solar energy  
12:16:44 17 technology?

12:16:45 18 A. During my first visit, he made it very clear that  
12:16:49 19 molten salt would be the working fluid.

12:16:52 20 Q. And who was that that made it clear?

12:16:55 21 A. Mr. Johnson. And during my second visit, he said  
12:17:02 22 he had changed his mind and was going to use the hot oil,  
12:17:05 23 and he confirmed that in his deposition, I believe.

12:17:15 24 Q. What, Dr. Mancini, does that change from January,  
12:17:21 25 2017, to April, 2017, mean to you?

12:17:25 1 A. Well, it means he's still searching for what the  
12:17:28 2 system is going to look like.

12:17:35 3 Q. Which working fluid did you use for purposes of  
12:17:40 4 your analysis?

12:17:41 5 A. Because he confirmed it was the synthetic oil, I  
12:17:45 6 used the synthetic oil.

12:17:47 7 Q. And, again, he is Mr. Johnson?

12:17:50 8 A. Mr. Johnson, yes.

12:18:11 9 Q. Dr. Mancini, where, if anywhere else, did you see  
12:18:16 10 molten salt proposed as the working fluid?

12:18:18 11 A. It was in the diagram we looked at earlier of the  
12:18:22 12 system. It showed molten salt as the working fluid.

12:18:26 13 MS. HEALY-GALLAGHER: Could we take a look,  
12:18:28 14 please, at Plaintiff's Exhibit 16. Could you page down  
12:18:41 15 until we see that image.

12:18:44 16 THE WITNESS: Page 15, I think. There it is.

12:18:54 17 Q. BY MS. HEALY-GALLAGHER: And would you point the  
12:18:55 18 Judge, please, to where you see molten salt.

12:18:58 19 A. There's a molten salt pump right here.

12:19:01 20 Q. And where else?

12:19:02 21 A. There's a molten salt thermal storage identified  
12:19:06 22 up here.

12:19:07 23 Q. And we see it in a few other instances in this  
12:19:11 24 diagram, correct?

12:19:13 25 A. Yes. Another molten salt pump here. And one of

12:19:19 1 the issues about this diagram is, I don't understand how  
12:19:24 2 the molten salt storage will work based on the way the  
12:19:28 3 diagram shows it because it shows only one molten salt  
12:19:33 4 storage tank, and if you dump hot and cold molten salt  
12:19:38 5 into a storage tank, you dilute the temperature you're  
12:19:43 6 trying to get. So typically tank systems that use molten  
12:19:47 7 salt will have two storage tanks, and they will heat the  
12:19:51 8 salt in between the two through the field and then pull  
12:19:56 9 only hot salt out of the hot tank to drive the power  
12:20:01 10 block.

12:20:01 11 THE COURT: Can you show me where you see those  
12:20:04 12 two temperatures of salt being mixed?

12:20:07 13 THE WITNESS: Well, yes, in this red box.

12:20:09 14 THE COURT: Okay.

12:20:10 15 THE WITNESS: He's showing the cold salt going  
12:20:13 16 in, and then he's showing salt being taken out of it to  
12:20:17 17 send to the heat exchanger, and that -- he's showing salt  
12:20:20 18 going in and coming out of the same tank.

12:20:23 19 THE COURT: And it is mixed before it hits the  
12:20:27 20 heat exchanger?

12:20:28 21 THE WITNESS: Well, it's going to be mixed  
12:20:30 22 during -- at any time the system is running, so it  
12:20:32 23 dilutes -- any hot salt you're dumping in is going to be  
12:20:39 24 diluted by this cold salt coming back this way. He's got  
12:20:41 25 two -- this is cold salt right here. Boy, I made a mess.

12:20:45 1 MS. HEALY-GALLAGHER: Let me clear this out.

12:20:45 2 THE WITNESS: Yeah. I've got too many -- he's  
12:20:46 3 got cold salt coming in here and hot salt, and that goes  
12:20:50 4 to the tank. He's got hot salt coming in there going to  
12:20:54 5 the tank. So he's just dumping them both in at once.

12:20:59 6 THE COURT: Okay. Was there any text with this  
12:21:01 7 diagram?

12:21:02 8 THE WITNESS: Yes. There was a paragraph below  
12:21:04 9 it, but it did not go into any detail describing how it  
12:21:08 10 would work.

12:21:09 11 THE COURT: Thank you.

12:21:10 12 Q. BY MS. HEALY-GALLAGHER: And, Dr. Mancini, how --  
12:21:23 13 what, if anything, did you see about assumptions for  
12:21:26 14 operation of the turbine with respect to molten salt?

12:21:30 15 A. Well -- and that was -- that's actually related  
12:21:34 16 to my next issue, which was the turbine. My third  
12:21:40 17 significant issue was the turbine issue in general. It  
12:21:44 18 was designed to operate at a temperature of 1100 degrees  
12:21:50 19 Fahrenheit and 3200 PSI, at a certain flow rate of steam.  
12:21:56 20 And that design point corresponds to about 565 C, which  
12:22:01 21 means that that was designed for molten salt, providing a  
12:22:07 22 565 degree temperature to the steam at the boiler.

12:22:11 23 But when you change that then to hot oil, the oil  
12:22:15 24 can only operate up to 400 degrees C, which is 750 F, and  
12:22:21 25 there's actually a statement that I assume is from Sierra



12:22:29 1 Engineering, who appeared to have done most of the turbine  
12:22:33 2 work, that says that the turbine will not operate below  
12:22:44 3 760 degrees Fahrenheit.

12:22:44 4 Q. So, let's step through that a little bit.

12:22:46 5 Could you go, please, to Plaintiff's Exhibit 17.

12:22:51 6 And then we'll take a look, please, at page 28. And I

12:23:00 7 believe it's the paragraph starting with figure 4.

12:23:04 8 So, before we take a look at this, Dr. Mancini,  
12:23:10 9 to your understanding -- well, actually, let's just take a  
12:23:14 10 look at this. What does this paragraph tell you about the  
12:23:18 11 temperature at which the turbine would have to operate?

12:23:22 12 A. If you take starting at the second sentence, it  
12:23:27 13 is important to note that the minimum steam inlet  
12:23:31 14 temperature is above 760 F. At lower temperatures, the  
12:23:37 15 nozzle exhaust velocity will not be sonic. At that point,  
12:23:41 16 they are going to be blowing -- blowing cold steam through  
12:23:46 17 the nozzles, and the nozzles will not be providing the  
12:23:49 18 power they need to provide to the turbine, and that's why  
12:23:53 19 they are saying that, because they are trying to maintain  
12:23:57 20 sonic velocity in the nozzles.

12:23:59 21 So -- and then they go on to say that actually  
12:24:03 22 efficiency isn't the important consideration here, it's  
12:24:09 23 shaft power to mast flow.

12:24:12 24 Q. So, let me make sure I understand. According to  
12:24:14 25 the analysis in Plaintiff's Exhibit 17, the turbine will

12:24:19 1 only operate at steam inlet temperatures above 760 F?

12:24:27 2 A. That's correct.

12:24:27 3 Q. And which working fluid would one have to use to  
12:24:33 4 achieve at least 760 F?

12:24:35 5 A. Well, it would have to be -- there are two  
12:24:39 6 options, but the main one is the molten salt that we were  
12:24:43 7 discussing earlier. But the other option would be if you  
12:24:46 8 put water through the field as the working fluid, and the  
12:24:52 9 problem there is that steam ducts require very large  
12:25:04 10 diameter piping, and there, it's also very hard to manage  
12:25:09 11 and control steam flow in the field. So it's not an easy  
12:25:15 12 thing to do either. I mean, there are problems with all  
12:25:18 13 the approaches, but that's one of the more higher level  
12:25:22 14 problems.

12:25:22 15 Q. And, Dr. Mancini, on your two site visits, did  
12:25:26 16 you see any evidence of any ducts that would conduct steam  
12:25:31 17 through any system?

12:25:31 18 A. I saw no piping or deducting or anything to even  
12:25:37 19 suggest that a working fluid had been circulated in any of  
12:25:40 20 the test receivers or at the construction site.

12:25:45 21 Q. So what impact does the information that  
12:25:48 22 Mr. Johnson changed his idea about the working fluid from  
12:25:51 23 molten salt to synthetic oil, what does that suggest to  
12:25:55 24 you about whether his turbine will work at all?

12:25:58 25 A. It suggests that the turbine won't work at the

12:26:04 1 conditions that he's gone to.

12:26:05 2 Q. And that is because hot oil does not reach this  
12:26:08 3 temperature, correct?

12:26:09 4 A. It goes to 750 maximum, and it is not even going  
12:26:13 5 to be that hot by the time you get it to the boiler.

12:26:30 6 MS. HEALY-GALLAGHER: Would you take that down,  
12:26:32 7 please.

12:26:36 8 Q. BY MS. HEALY-GALLAGHER: All right, then,  
12:26:37 9 Dr. Mancini, what's the next example of how the components  
12:26:42 10 don't work together as a system?

12:26:44 11 THE COURT: Let me stop and interrupt again, I'm  
12:26:47 12 thinking about a break.

12:26:48 13 MS. HEALY-GALLAGHER: Certainly.

12:26:48 14 THE COURT: Where do you think you're at with  
12:26:50 15 direct on this witness?

12:26:54 16 (Attorney looking at papers.)

12:26:54 17 That's telling me all I need to know. We're not  
12:26:58 18 going to wait that long to go to lunch.

12:27:00 19 MS. HEALY-GALLAGHER: Right. That would probably  
12:27:01 20 be the better idea.

12:27:03 21 THE COURT: Okay. And Dr. Mancini just said  
12:27:05 22 thank you. Okay. So -- but I am going to do this. I  
12:27:12 23 have some questions I want to ask, and it's probably a  
12:27:15 24 good time because then you can adjust them and Mr. Snuffer  
12:27:18 25 can take them into account during his cross or whoever is

12:27:20 1 doing cross.

12:27:20 2 Did you ever count how many lenses were on a  
12:27:24 3 collector tower?

12:27:25 4 THE WITNESS: Let's see. I knew that at one  
12:27:27 5 time, but I don't recall what it is.

12:27:30 6 THE COURT: I'm going to ask you that after  
12:27:36 7 lunch. Other than the one receiver that you saw, did you  
12:27:40 8 see any other receivers?

12:27:42 9 THE WITNESS: No.

12:27:48 10 THE COURT: There was something that was hanging  
12:27:52 11 from the towers that you identified in one of the photos  
12:27:55 12 as being in a place where a receiver would be?

12:27:57 13 THE WITNESS: Yes.

12:27:59 14 THE COURT: What was that again?

12:28:00 15 THE WITNESS: It was a secondary concentrator,  
12:28:03 16 and if you look at receiver B in that cartoon of the three  
12:28:08 17 receivers --

12:28:09 18 THE COURT: Yes.

12:28:11 19 THE WITNESS: -- it has one on top of it. And I  
12:28:15 20 think he's bringing it up here.

12:28:18 21 THE COURT: We're in exhibit?

12:28:20 22 MS. HEALY-GALLAGHER: Page down. Down, down.  
12:28:25 23 There we go.

12:28:25 24 THE COURT: Okay. And we're on page 6 of Exhibit  
12:28:29 25 754 -- 5, page 5, and you're talking about Exhibit B.

12:28:35 1 MR. SNUFFER: Figure B.

12:28:37 2 MS. HEALY-GALLAGHER: Figure B.

12:28:37 3 THE WITNESS: And this is the part of that  
12:28:38 4 receiver that you're seeing.

12:28:40 5 THE COURT: So part of the receiver appeared to  
12:28:42 6 be suspended there?

12:28:43 7 THE WITNESS: Yes.

12:28:43 8 THE COURT: How do you know that this is, that  
12:28:45 9 the figure B is the part that you were seeing suspended?

12:28:50 10 THE WITNESS: Because I recognize it.

12:28:51 11 THE COURT: Okay. What was it made of?

12:28:54 12 THE WITNESS: You know, I don't know. It looked  
12:28:55 13 like it could have been steel, but I think it was probably  
12:28:58 14 tin or aluminum. And it had a reflective surface on the  
12:29:02 15 inside and a white surface on the outside.

12:29:05 16 THE COURT: Have you ever scene a CSP receiver  
12:29:10 17 the size of the one in figure C in this picture? Is that  
12:29:18 18 large, small, ordinary?

12:29:20 19 THE WITNESS: I have seen receivers about that  
12:29:22 20 size, but the aperture through which the energy would go  
12:29:27 21 is maybe only 5 inches in diameter. This has the aperture  
12:29:34 22 as the whole surface of the receiver.

12:29:36 23 THE COURT: So the question I should have asked  
12:29:38 24 is the typical aperture on a receiver?

12:29:41 25 THE WITNESS: It's much smaller, yes.

12:29:43 1 THE COURT: And you said how many centimeters?

12:29:46 2 THE WITNESS: Maybe -- maybe five inches,  
12:29:54 3 maximum.

12:29:54 4 THE COURT: And is that a --

12:29:55 5 THE WITNESS: It's typical.

12:29:57 6 THE COURT: Okay. So five inches in diameter or  
12:30:00 7 five inches square?

12:30:02 8 THE WITNESS: It's round, typically round because  
12:30:03 9 your solar image is typically a round image.

12:30:08 10 THE COURT: Okay. So five inches in diameter?

12:30:10 11 THE WITNESS: Yes. But typically it might be a  
12:30:13 12 big can, like on those dish engine systems, the Stirling  
12:30:24 13 engines, the receivers occasionally they will put some  
12:30:28 14 storage material in there, and it will be big.

12:30:30 15 THE COURT: When you were looking at the  
12:30:34 16 collectors, were the lenses moving individually or in the  
12:30:38 17 collector as a whole?

12:30:39 18 THE WITNESS: No. They are rigidly fixed in the  
12:30:43 19 collector and then the collector tracks, so they are  
12:30:47 20 prealigned. The way they are built, they have to remain  
12:30:50 21 aligned. That's another issue relative to the structural  
12:30:58 22 design.

12:30:59 23 THE COURT: Have you ever seen a collector system  
12:31:03 24 where multiple collectors and receivers are assembled on  
12:31:09 25 one stand or tower?

12:31:11 1 THE WITNESS: I have never seen that before.

12:31:13 2 THE COURT: You said that the literature  
12:31:15 3 described the efficiency of the receiver at issue in this  
12:31:20 4 case at 90 percent?

12:31:24 5 THE WITNESS: Yes.

12:31:25 6 THE COURT: The table in Exhibit 755 lists  
12:31:31 7 various percentages. Can we go to that. Is this a -- no.  
12:31:36 8 That first one. This is a system efficiency number, not a  
12:31:41 9 receiver efficiency number?

12:31:43 10 THE WITNESS: That's correct.

12:31:43 11 THE COURT: Okay.

12:31:44 12 THE WITNESS: And that's where I'm headed.

12:31:46 13 THE COURT: Okay. After lunch?

12:31:49 14 THE WITNESS: No. I'm headed to roll all these  
12:31:52 15 up into a system efficiency.

12:31:53 16 THE COURT: Okay. All right. Thanks.

12:31:55 17 So you can adjust to that. Mr. Snuffer can  
12:31:59 18 adjust to that. I just had to get all those questions off  
12:32:01 19 my mind. After lunch, I'm going to ask you again how many  
12:32:05 20 lenses are in a collector tower.

12:32:07 21 THE WITNESS: I'm going to have to look at the  
12:32:07 22 pictures again.

12:32:07 23 MS. HEALY-GALLAGHER: Your Honor, with that, I  
12:32:08 24 was going to ask -- Dr. Mancini is on the stand, but to do  
12:32:12 25 that, we may show him an image or something from his

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2 P.M. SESSION

3 THE COURT: We're continuing now with the direct  
4 examination of Dr. Mancini.

13:27:13 5 Go ahead.

6 MS. HEALY-GALLAGHER: Thank you, Your Honor. Your  
7 Honor, we had a few questions before we broke.

8 THE COURT: I did.

9 MS. HEALY-GALLAGHER: And I thought we would resume  
13:27:21 10 following up on those.

11 THE COURT: The only one that I had that wasn't  
12 answered was, how many lenses were in a collector tower? In a  
13 collector panel on a collector tower. And there's four  
14 collectors per tower.

13:27:35 15 THE WITNESS: From looking at the pictures there  
16 are 18 pie-shaped facets we often call them gores, on -- in  
17 one circular lens assembly. So there are 72 per tower.

18 THE COURT: Okay.

19 Q. BY MS. HEALY-GALLAGHER: Thank you. Dr. Mancini,  
13:27:55 20 what did you look at to double check that?

21 A. I looked at Figure PLEX 754003.

22 THE COURT: Okay.

23 Q. BY MS. HEALY-GALLAGHER: And while we're on  
24 Plaintiff's Exhibit 754, would you, please, move to Page 5.

13:28:22 25 And let's highlight the C figure.



1           And, Your Honor, one of the questions that you had  
2 was the size of an aperture in a more typical or a general CSP  
3 receiver.

4           And, Dr. Mancini, you testified about 5-inches in  
13:28:49 5 diameter is the max aperture for a typical CSP receiver.

6           A.    Just a typical aperture.

7           THE COURT:   5 centimeters or 5 inches?

8           THE WITNESS:   5 inches.

9           Q.    BY MS. HEALY-GALLAGHER:   And you testified I  
13:29:01 10 believe, Dr. Mancini, that the aperture is therefore typically  
11 much smaller than what we see in 5C; is that right?

12          A.    That's correct.

13          Q.    Why do you want a small aperture in a receiver?

14          A.    Well, there's an engineering tradeoff here.   What  
13:29:18 15 you're trying to do is collect as much of the image as  
16 possible, so you want it to be big enough to accommodate the  
17 image.   But then the bigger it gets the more heat you lose  
18 from the receiver.   And so there's a tradeoff there in how you  
19 design it.   This is very large for a dish receiver.

13:29:40 20          Q.    So what's the heat loss risk in what we see in  
21 Figure 5C?

22          A.    Well, we've already I think calculated that, and it  
23 was, what, 40 percent of the energy, 39 percent, 38 percent of  
24 the energy incident on that receiver is lost.

13:29:57 25          Q.    Would you close out of Figure C and highlight

1 Figure B, please.

2 Your Honor, you also had a question about the  
3 secondary collector, and we looked at this figure in 5B.

4 THE COURT: Uh-huh (affirmative).

13:30:21 5 Q. BY MS. HEALY-GALLAGHER: And, Dr. Mancini, the cone  
6 at the top of this figure, is that the secondary collector you  
7 were talking about?

8 A. Yes. It's there because, I think because this  
9 wasn't described in the document, but I think the -- because  
13:30:41 10 the motion of the receiver structured relative to the  
11 concentrated image that they thought this might be a way to  
12 deal with it, and they put a motor on this to tip it and move  
13 it perhaps to try to counteract the motion of the structure.  
14 That's my guess. I have no idea. To be honest with you, I've  
13:31:01 15 never seen anything quite like this.

16 Q. So do we see -- can you distinguish, I should say,  
17 Dr. Mancini, between the secondary collector and any part of  
18 the figure that we see in B that is the receiver?

19 A. I can only guess, but I think it's a pretty good  
13:31:21 20 guess. The cone is at the top.

21 Q. And that's the secondary collector.

22 A. That's the secondary concentrator. And then this  
23 region would have to contain whatever the heat transfer coils  
24 or whatever else, whatever they might be using to collect the  
13:31:36 25 heat.

1 Q. All right. Please take that down. And I'd like us  
2 to look again at Plaintiff's Exhibit 509 at the video  
3 12\_4\_38-5\_15. And if you could, please, play the video and  
4 pause it at 13:02:26.

13:32:08 5 (Video playing.)

6 MS. HEALY-GALLAGHER: Thank you.

7 Q. BY MS. HEALY-GALLAGHER: So in this image,  
8 Dr. Mancini, please tell the Court, what do we see here? What  
9 are those white cones?

13:32:36 10 A. I think they're the same thing we were looking at  
11 just a minute ago, the cone part of that receiver. But the  
12 other part of the receiver doesn't appear to be there.

13 Q. So let's step that through slowly so that we're  
14 sure. So the white cones, what are they?

13:32:52 15 A. They would be the secondary concentrators.

16 Q. And do you see in the images that are circled on  
17 this screen shot any receiver?

18 A. You know, I've never looked at them before with  
19 that in mind. The cones are obvious. There does appear to  
13:33:13 20 some something underneath, but I can't tell you what it is. I  
21 don't know if that's a receiver or not. It isn't similar to  
22 the picture we just looked at. That's for sure.

23 Q. And it's also not the receiver that Mr. Johnson  
24 told you he was using.

13:33:33 25 A. That's correct.

1 Q. Or at least that he proposed to use.

2 A. That's correct.

3 Q. Go ahead and take that down, please.

13:33:54

4 All right, Dr. Mancini, so we've been looking  
5 through the four general examples that you have of how the  
6 components of the purported solar energy technology do not  
7 work together in a system. What, if any, opinion do you have  
8 about that with respect to the turbine efficiency versus the  
9 cycle efficiency?

13:34:17

10 A. Well, in his calculation --

11 Q. And I'm sorry. "His" is whose?

13:34:39

12 A. In Mr. Johnson's estimate of the Rankine cycle  
13 efficiency, he used the turbine efficiency as the Rankine  
14 cycle efficiency, which is incorrect because the turbine is  
15 only one of four components in the system. And as we just  
16 got, as we just finished discussing, if the turbine worked at  
17 all, I went forward to assume that, all right, let's say we  
18 know that the turbines won't work at the temperatures we're  
19 operating. But what would be the Rankine cycle efficiency  
20 corresponding to the temperature 400C of the operation using  
21 the synthetic oil?

13:34:58

13:35:22

22 And I took the approach of taking an actual  
23 coal-fired power plant actual efficiency and scaling it based  
24 on the ratio of the temperatures on the respective systems and  
25 achieved a 29-percent cycle efficiency for the equivalent

1 Rankine cycle.

2 Q. So let's step through that a little bit more  
3 slowly.

13:35:40

4 What is the Rankine cycle efficiency? What does  
5 that mean generally?

13:36:04

6 A. Well, specifically it's the ratio of the work out  
7 divided by the heat in. Specifically that's how you calculate  
8 it. And so that's determined in a large part by the  
9 temperatures of operation of the system. But since I don't  
10 know any of the components of the system I can't are really do  
11 an analysis on that. So I took an actual coal-fired power  
12 plant efficiency, their actual efficiency, and I divided it by  
13 what their carnot, now I'm going way off the deep end, but by  
14 their theoretical efficiency based on the laws of  
15 thermodynamics. And then I also took -- and I used that ratio  
16 to adjust the carnot, C-A-R-N-O-T, efficiency of a cycle  
17 operating at 400 degrees C and just scaled it.

13:36:30

13:36:54

18 Now, that's going to overpredict the actual  
19 performance of a small turbine because a large power plant  
20 turbine operates in a cycle that has all kinds of extra things  
21 that improve its efficiency substantially. But again, I'm not  
22 trying to predict what the performance of an IAS system if it  
23 were to be built would be. I'm trying to see what an upper  
24 bound maybe on that performance would look like based on the  
13:37:17 25 components if it were actually operable.

1 Q. So what's the importance of the Rankine cycle  
2 efficiency?

3 A. Well, it's lower, the turbine efficiency alone.  
4 That's the first order.

13:37:32 5 Q. Right. But why does the efficiency of the Rankine  
6 cycle matter in any power plant?

7 A. Well, again, it's the result of what temperature  
8 are you operating at and what -- how much of the heat energy  
9 that you're ultimately collecting, this expensive solar energy  
10 that you've collected and gotten it to the cycle, how much of  
11 that is going to be converted to electricity.

12 Q. So the more efficient the Rankine cycle, the more  
13 electricity is produced.

14 A. That's correct.

13:38:07 15 Q. So how if at all does the turbine efficiency factor  
16 into the Rankine cycle efficiency?

17 A. Well, it's one part of the calculation. It's one  
18 part of the equation.

19 Q. What are the implications for equating turbine  
13:38:35 20 efficiency and Rankine cycle efficiency?

21 A. Well, it's wrong. It's -- it's just wrong because  
22 the cycle efficiency is a thermodynamic calculation. It's  
23 based on there being a cycle. It can't be based on one  
24 component of a cycle.

13:39:06 25 Q. All right. Dr. Mancini, you testified a moment ago

1 that -- well, let me start that again.

2 What was Mr. Johnson's estimate for the cycle  
3 efficiency?

4 A. I think it was 43 percent.

13:39:28 5 Q. What, if any, support did you see for Mr. Johnson's  
6 estimate?

7 A. Well, he referred to that as being -- he referred  
8 to the cycle efficiency as being the turbine efficiency. And  
9 he went to the table where it showed the turbine efficiency  
10 being 43 percent.

11 Q. So other than citing to the turbine efficiency,  
12 what, if any, other support did Mr. Johnson have for his  
13 estimate?

14 A. I didn't see any.

13:40:07 15 THE COURT: I need to note for the record  
16 Mr. Johnson is joining us. It's 1:41.

17 Go ahead and continue.

18 Q. BY MS. HEALY-GALLAGHER: Dr. Mancini, what, if any,  
19 data did you see in the materials that you reviewed to show  
13:40:25 20 you what the Rankine cycle efficiency would or could be for  
21 any of the purported solar energy technology?

22 A. I didn't see anything at all.

23 Q. And because you didn't see that data, what -- tell  
24 us what you did to estimate that for yourself.

13:40:45 25 A. The Rankine cycle efficiency?

1 Q. That's right.

2 A. I took an actual power plant Rankine cycle  
3 efficiency that is an actual known number, and I scaled it  
4 based on the maximum operating temperatures to 400C as the  
13:41:02 5 operating temperature since that's the temperature of the hot  
6 oil.

7 Q. So let me stop you there. So a coal-fired power  
8 plant, what typically does it operate at?

9 A. Up around 560 degrees Centigrade.

13:41:19 10 Q. So when you say -- I'm sorry. You adjusted?

11 A. Yeah. It's -- it would say that you were taking  
12 the same plant and operating it at 400 degrees C, then that's  
13 what -- by scaling it.

14 Q. Scaling it, that's right. So you scaled it down to  
13:41:39 15 the operating temperature assuming the working fluid is a  
16 synthetic oil.

17 A. That's correct.

18 Q. So what, Dr. Mancini, was your result for the  
19 Rankine cycle efficiency for what you evaluated?

13:42:10 20 A. 29 percent.

21 Q. What are the implications for the difference  
22 between Mr. Johnson's estimate and your estimate?

23 A. Well, that they're - I predict a lower, it would be  
24 a lower output from the plant.

13:42:26 25 Q. And if the Rankine cycle efficiency is lower, then



1 any even potential ultimate electricity would be far less.

2 A. It would be less, that's correct.

3 Q. So, Dr. Mancini -- and this is also in response to  
4 one of Your Honor's questions earlier -- having gone through  
13:42:49 5 the analysis of each of the components and assuming that they  
6 could all be connected into a system that would produce any  
7 electricity or other useable energy whatsoever, what was your  
8 conclusion as to the solar-to-electricity conversion for the  
9 proposed IAS system as a whole?

13:43:14 10 A. I got a number of 4.7 percent.

11 Q. What does that mean?

12 A. It's pretty low.

13 Q. So does that mean that of all of the solar energy  
14 hitting the collector at the beginning of the process about  
13:43:33 15 4.7 percent of that energy would ultimately be converted to  
16 electricity?

17 A. That's correct.

18 Q. How does your estimate compare with Mr. Johnson's  
19 estimate of the system as a whole?

13:43:45 20 A. Mr. Johnson's estimate was I think pretty close to  
21 24 percent.

22 Q. So what's the impact of the difference between your  
23 two estimates?

24 A. Well, to a first order, it says that if, in fact, I  
13:44:12 25 knew the cost, the life cycle cost of the plant, which I can't

1 even take a shot at to be honest with you, or let's take that  
2 Mr. Johnson has a number for that, then I'm predicting that  
3 the cost per kilowatt hour or the output of the plant would be  
4 five times what he is predicting.

13:44:32 5 Q. So in your mind the cost per kilowatt hour would be  
6 five times as much as what Mr. Johnson might predict.

7 A. That's correct.

8 Q. And the efficiency of the system under your  
9 estimates would be five times less than Mr. Johnson's  
13:44:48 10 predictions.

11 A. That's correct.

12 Q. All right. I'm showing you what we've already  
13 looked at Plaintiff's Exhibit 755 at 1.

14 Dr. Mancini, how does your estimate of the  
13:45:12 15 potential performance of an IAS system, assuming it would  
16 work, compare to CSP systems already on the market?

17 A. It's approximately a third in terms of  
18 solar-to-electric conversion. If it could be produced at the  
19 same cost as one of these systems, it reflects the unit cost  
13:45:40 20 would be three times as much.

21 Q. You can take that down, please.

22 So, Dr. Mancini, what's the last example of how the  
23 components of the purported solar energy technology don't work  
24 together?

13:46:07 25 A. That would be the balance of plant activities.

1 Q. And what can you say about that?

2 A. Well, I haven't seen any of the balance of plant  
3 functions that would include -- we've talked about the piping  
4 being an important issue because there are losses from the  
13:46:23 5 piping. I also haven't seen any instrumentation diagrams or  
6 instrumentation for the plant that would indicate how they  
7 would make flow rate temperature and pressure measurements  
8 around the system.

9 I also haven't seen any operational modes.

13:46:43 10 Typically you'll have documentation, substantial documentation  
11 on how you start up a plant, how you shut it down, because you  
12 can destroy it under either one of those scenarios if you do  
13 it wrong, and how you would operate during normal operation,  
14 how you would operate during intermittent sunlight, for  
13:47:05 15 example. If there were clouds you would operate it  
16 differently.

17 Also there's no controller discussed at all. I  
18 didn't see any information about a controller. During one  
19 stop during our tour was a place where there was some work  
13:47:25 20 going on on integrated circuits, but it was never clear what  
21 their function was or what their control methodology would be  
22 if, in fact, that's what it was for.

23 Q. I'm sorry, Dr. Mancini, when you say controller,  
24 what do you mean?

13:47:42 25 A. I'm talking about there will be component

1 controllers and system controllers, and the system controller  
2 would have hierarchy, sort of like a judge in a courtroom,  
3 whereas you're running your little operation over here and  
4 Mr. Snuffer is running his over here, these gals are doing  
13:47:59 5 what they're doing per some sort of protocols. There's an  
6 oversight protocol to make sure that they all work the way  
7 they're supposed to be. And that's what I'm talking about.

8 Q. What other examples of the balance of plant issues  
9 did you see?

13:48:16 10 A. Well, a great big one is the generator. The only  
11 generators I saw on site were two 7 1/2 kilowatt motor  
12 generators. And as I mentioned earlier, 25 of these systems  
13 form sort of a repeatable unit that you would cookie cutter  
14 across a site. And each one of those would produce one  
13:48:39 15 megawatt, so that the smallest generator you would want to  
16 have is about a megawatt, if, in fact, that's what you were  
17 trying to do.

18 And I saw no generators other than the  
19 7 1/2 kilowatt ones that I saw, and I saw no information about  
13:48:57 20 any being purchased or researched or evaluating or anything  
21 like that.

22 Q. Dr. Mancini, how many kilowatts are in a megawatt?

23 A. A thousand. Sorry.

24 Q. What, if any, information, Dr. Mancini, did you see  
13:49:17 25 about the balance of plant issue involving power conditioning

1 or transfer to the substation?

2 A. You know, apart from the power poles and on the  
3 first visit to the site we were taken behind one of the  
4 trailers and shown a junction box mounted to the trailer and  
13:49:36 5 told that's where the power would be dispatched. Apart from  
6 seeing those types of things, nothing.

7 Q. What, if any, component interface documents did you  
8 see for these balance of plant concerns?

9 A. I saw nothing.

13:49:52 10 Q. Dr. Mancini, what, if any, opinions do you have  
11 about the state of defendant's manufacturing facility?

12 A. Well, it's certainly not equivalent to any  
13 manufacturing facilities I've ever been in. I'm an old farm  
14 boy. When I first walked in it reminded me of a farm shop.  
13:50:18 15 But apart from that, it had -- there were no assembly lines  
16 running, producing components or subcomponents or assemblies,  
17 and there just wasn't that much activity on either visit. And  
18 while they had bins of connectors or different pieces of  
19 metals that they purchased, there was no apparent assembly  
13:50:44 20 process going on at any scale at all.

21 Q. What, if any, quality assurance efforts did you see  
22 going on?

23 A. Yeah. I saw no QA being done at all, and I saw no  
24 plan on how QA would be done. It's very important because you  
13:51:02 25 might be able to build something and make it work one time,

1 but then you've got to repeat that. And so in order to repeat  
2 that you have to be able to make sure you make it the same  
3 way. And beyond that you ask the question, not only do I need  
4 to build it, but here are the things that I can do to make it  
13:51:23 5 less expensive, because this manufacturing process is too  
6 expensive to meet my overall cost goals. But I saw no  
7 analysis where that type of thinking was shown to me at all.

8 Q. How would you compare the defendant's manufacturing  
9 facility to other concentrating solar power projects that  
13:51:47 10 you've been part of?

11 A. It's very different. The normal manufacturing  
12 facility is pretty clean. You're building an optical device,  
13 and you try to keep it clean during manufacturing and you try  
14 to handle things properly. Apart from not doing anything,  
13:52:09 15 although the site might be usable for that it would require  
16 additional work.

17 Q. What, if any, opinions, Dr. Mancini, do you have  
18 about the states of the R&D test site?

19 A. Well, during both visits, I was -- I pretty much  
13:52:31 20 came to the conclusion that they really appeared that they  
21 hadn't been operated in some time. There were a lot of broken  
22 parts laying around on the ground, broken parts with the  
23 facets, we saw the broken facets in the videos, and broken  
24 parts of those cones were laying around. There were also  
13:52:51 25 within the trailers were -- there's quite - they were very

1 dirty. And there were electrical wires lying in pools of  
2 water. Fortunately I don't think they were energized at the  
3 time. But the side just didn't appear that it was really an  
4 active site or had been really used in some time.

13:53:14

5 Q. And how does that compare with other concentrating  
6 solar power projects that you've been a part of that have been  
7 in testing or research development or operation?

8 A. They're very different. They're very different.

9 Q. How so?

13:53:29

10 A. Well, there's a lot of activity. There's things  
11 being tested. You're testing either components because you  
12 had to redesign it to make it more manufacturable, so you're  
13 testing the new components to see if it's going to operate, if  
14 it's going to operate a long time. I didn't see any testing  
15 going on at all. There's just -- it just seemed to be a site  
16 of inactivity to me.

13:53:47

17 Q. Having seen all of these things that indicate the  
18 components, the defendant's components don't work together in  
19 a system, what do they mean to you with respect to whether the  
20 purported IAS solar energy technology is commercially viable?

13:54:09

21 A. Well, certainly as it's currently represented,  
22 it's, in my opinion it will never be a commercial system or  
23 will ever produce electricity or any other useable form of  
24 energy.

13:54:36

MS. HEALY-GALLAGHER: May I take a moment, Your

1 Honor?

2 THE COURT: Yes.

3 (Time lapse.)

13:55:40

4 Q. BY MS. HEALY-GALLAGHER: Dr. Mancini, I'm going to  
5 show you what's been marked as Defendant's Exhibit 1500. We  
6 will watch it through, and then I'll ask you some questions.

7 (Video played.)

8 MS. HEALY-GALLAGHER: We can pause it there.

13:56:52

9 Q. BY MS. HEALY-GALLAGHER: Dr. Mancini, what, if  
10 anything, about Defendant's Exhibit 1500 changes your opinions  
11 in this case?

12 A. Nothing.

13 MS. HEALY-GALLAGHER: Your Honor, at this time I  
14 have no further questions for Dr. Mancini.

13:57:09

15 THE COURT: Okay. I need a minute here.

16 You say that you determined that there was a  
17 29-percent cycle efficiency to the design of this complete  
18 process; is that right?

13:57:32

19 THE WITNESS: Yes, if I assumed that a turbine  
20 could be -- it won't work with the turbine that's there.

21 THE COURT: Okay. So the first assumption you get  
22 to make that assessment is that the turbine could operate with  
23 this -- what did you call it? That's not a coolant. It's a  
24 circulating fluid.

13:57:53

25 THE WITNESS: Yes.



1 THE COURT: You had to make that assumption. This  
2 turbine won't operate at that temperature; right?

3 THE WITNESS: That's correct.

13:58:02

4 THE COURT: With that fluid. But you had to make  
5 that assumption. What other assumptions did you have to make  
6 to achieve that 29-percent cycle efficiency that are contrary  
7 to actual facts?

13:58:22

8 THE WITNESS: Probably the main one is that that's  
9 probably a high number, because I used actual coal-fired power  
10 plant that would have a higher efficiency than a smaller  
11 turbine would have. So that's probably the biggest assumption  
12 I made in that process.

13:58:43

13 THE COURT: Now, you also gave me a figure of I  
14 think 4 percent or 5 percent of -- for the -- let me get back  
15 to that, what you called that number. The efficiency of  
16 solar-to-electricity conversion for the IAS system as a whole  
17 you said 4.7 percent?

18 THE WITNESS: That's correct.

13:59:04

19 THE COURT: Explain the difference between the  
20 cycle efficiency and that number.

21 THE WITNESS: Well, the cycle efficiency just tells  
22 you the efficiency of the heat that went into the cycle --

23 THE COURT: Okay.

13:59:17

24 THE WITNESS: -- versus the electricity that goes  
25 out.

1 THE COURT: Okay.

2 THE WITNESS: And what I'm doing is stepping all  
3 the way back to the sun coming into the concentrator and  
4 saying, what fraction of that produces that amount of  
13:59:30 5 electricity?

6 THE COURT: So if we start with sun on the one hand  
7 and electricity on the other hand, this system has a  
8 4.7-percent efficiency.

9 THE WITNESS: That's correct.

13:59:40 10 THE COURT: Now what segment of the process does  
11 the 29 percent measure? What are the beginning and ending  
12 points?

13 THE WITNESS: The beginning point is the heat put  
14 into the steam cycle of the Rankine cycle, and the ending  
13:59:54 15 point is the electricity coming out. It's the same amount of  
16 electricity. It's just a bigger number on the solar piece  
17 coming in than the amount of heat that eventually got to the  
18 Rankine cycle. If you recall, we lost heat both at the  
19 intercept then again at the receiver. And actually the table  
14:00:16 20 shows a number of other small losses at different places which  
21 are consistent with discussions. But I fundamentally just  
22 used Mr. Johnson's numbers there.

23 THE COURT: And this is the table that you're  
24 referring to here, Exhibit 755, Page 5?

14:00:36 25 THE WITNESS: That's correct.

1 THE COURT: Okay.

2 MS. HEALY-GALLAGHER: Yes, Your Honor. This table  
3 walks through each of the stages of the system. And this is,  
4 of course, assuming that the system worked, which is a major  
14:00:48 5 assumption.

6 THE COURT: Right. But the Rankine cycle  
7 efficiency is shown as one line here.

8 THE WITNESS: That's right.

9 THE COURT: And the end of that line is electricity  
14:00:58 10 produced using the scenario of a larger coal-fired power  
11 plant?

12 THE WITNESS: It's not the amount of electricity.  
13 It's the efficiency, the same efficiency.

14 THE COURT: Okay. So did you just plug into that  
14:01:14 15 29 percent from a larger coal-fired power plant, or were you  
16 applying that to specific components in this design, in the  
17 IAS system?

18 THE WITNESS: No. I didn't know what the other  
19 components looked like so I couldn't do that.

14:01:28 20 THE COURT: Oh.

21 THE WITNESS: So what I did was, I said, okay,  
22 let's assume that they did have a turbine and the rest of it  
23 would work as well as, say, a coal-fired power plant would.  
24 And then I scaled it based on the relatively operating  
14:01:43 25 temperatures of the two cycles. The coal plant operates at

1 1100 degrees Farenheit. This plant operates at 750.

2 THE COURT: Did we review this table and I was just  
3 asleep?

4 MS. HEALY-GALLAGHER: We did not.

14:01:56 5 THE COURT: Okay. I've got more questions about  
6 this.

7 THE WITNESS: Okay.

8 THE COURT: It seems like many of these numbers  
9 are -- well, I want you to explore this table with him because  
14:02:06 10 I think I need to understand this.

11 MS. HEALY-GALLAGHER: Okay. Certainly.

12 Q. BY MS. HEALY-GALLAGHER: Dr. Mancini, we'll just  
13 take a walk through this.

14 A. Do you want to walk through this one, or do you  
14:02:16 15 want to start with the previous one? Because the two tables  
16 kind of go together.

17 Q. Okay. So we have in 755 at Page 4. The title here  
18 is Evaluation of Optical Characteristics of the IAS Solar  
19 Dish; is that correct?

14:02:33 20 A. That's correct.

21 Q. All right. So walk us through here. What's in the  
22 parameter column?

23 A. Okay. So the sunlight hits the dish. The first  
24 thing is the transmissivity of the lens material, how much of  
14:02:47 25 the sunlight will it transmit? And Mr. Johnson's number is

1 90 percent, and I used a number from the people who provided  
2 some detailed numbers at 89 percent. Virtually the same.

3 The lens cleanliness is important. They have to be  
4 kept clean. They have to be kept clean on both the top and  
14:03:11 5 bottom, so I used the same number that Mr. Johnson used for  
6 cleanliness. The lens manufacturing accuracy, he assumed it's  
7 perfectly manufactured. That's a little bit of a reach for  
8 me, so I reduced it a little bit.

9 Then there's the intercept. He assumed the  
14:03:30 10 intercept was 1. I assumed it was .6. But there's a tracking  
11 accuracy number of .9 in there. I was concerned that those  
12 receivers were going to move around a little bit, so I was  
13 going to debit them .9 for that. And that gets us to optical  
14 efficiencies. Mr. Johnson of 84 percent, me at 42.5.

14:03:55 15 THE COURT: That's your overall estimate of the  
16 capture efficiency of this optical system.

17 THE WITNESS: Of the optical system down to the  
18 receiver.

19 THE COURT: Did you see plans or a mechanism or  
14:04:08 20 discuss it for keeping the lenses clean?

21 THE WITNESS: I was just told they won't get dirty.  
22 There's --

23 THE COURT: All right. Let me have you go through  
24 the next table, too. We were on 755, Page 4.

14:04:24 25 THE WITNESS: So here are the two numbers that were

1 the results of the previous table. And Mr. Johnson added a  
2 number of .92 for transient effects. I'm not quite sure what  
3 they were, so I just used his number. I didn't know what he  
4 meant by that. And then here we have the receiver calculation  
14:04:45 5 that I went through earlier. His number is .9; mine is .618.

6 Then Mr. Johnson assumed that there were some  
7 losses in the field from the piping carrying the hot fluid  
8 around. His number was .96. I used .85 because I know that  
9 number is a representative number based on some plants that  
14:05:08 10 I've actually analyzed. For this --

11 THE COURT: You didn't see any piping or any  
12 schematics for piping.

13 THE WITNESS: That's correct.

14 THE COURT: Okay.

14:05:18 15 THE WITNESS: But .85 is a good number, and .96 is  
16 a little high.

17 Then he put in electrical loss efficiency. I'm not  
18 sure what that refers to, so I just used his number. And then  
19 we get to the Rankine cycle piece, which he uses the turbine  
14:05:38 20 efficiency, and I assumed that there's some way to make a  
21 turbine work, and there's a cycle that looks like -- this is  
22 the high end of 29 percent. Then --

23 THE COURT: So if I'm understanding all the numbers  
24 that we looked at previously, they are at least conceptually  
14:05:58 25 feasible, but this one assumes some facts that really won't

1 work in practice with the fluid that they're talking about  
2 using; right?

3 THE WITNESS: That's correct.

4 THE COURT: Okay.

14:06:09

5 THE WITNESS: And then there are two numbers,  
6 generator efficiency and power plant availability. 96 percent  
7 for availability is pretty high, but at this point the number  
8 was low. I wasn't going to quibble with it. So he came up  
9 with 24-percent solar-to-electric conversion, and I get 4.7.

14:06:29

10 THE COURT: Okay. That really helped me a lot.  
11 Thank you.

12 MS. HEALY-GALLAGHER: Any other questions from you?

13 THE COURT: I don't have any more. No.

14 MS. HEALY-GALLAGHER: Thank you.

14:06:43

15 THE COURT: Do you? Thank you.

16 All right. Mr. Snuffer?

17 MR. SNUFFER: Yes.

18 CROSS-EXAMINATION

19 BY MR. SNUFFER:

14:07:25

20 Q. Thank you. I know you've been on the stand a  
21 while, but my examination should be a little more simple. I'm  
22 hoping to ask you questions you can answer yes and no.

23 This case involves certain tax issues. Let me  
24 clarify. You are not a CPA; correct?

14:07:51

25 A. That's correct.

1 THE WITNESS: I do.

2 THE CLERK: Thank you. If you'll, please, take a  
3 seat.

4 DIRECT EXAMINATION

14:21:22 5 BY MR. MORAN:

6 Q. Good afternoon, Mr. Rowbotham.

7 A. Hello.

8 THE COURT: Could you state your full name and  
9 spell it for the record, please?

14:21:53 10 THE WITNESS: Robert Rowbotham.

11 THE COURT: And, please, spell your last name.

12 THE WITNESS: R-O-W-B-O-T-H-A-M.

13 THE COURT: Thank you.

14 Q. BY MR. MORAN: Mr. Rowbotham, do you have a current  
14:22:08 15 employer?

16 A. You have to speak up. I'm sorry.

17 Q. Are you currently employed?

18 A. Yes, I am.

19 Q. And where are you employed?

14:22:14 20 A. Bigger, Faster, Stronger, Incorporated.

21 Q. And what is your position at Bigger, Faster,  
22 Stronger, Incorporated.

23 A. CEO.

24 Q. Thank you. We're going to get back to Bigger,  
14:22:28 25 Faster, Stronger, but before we do that, Mr. Rowbotham, could



1 you, please, describe your primary occupation since graduating  
2 from college up until 1983?

3 A. I graduated from college. I secured a teaching job  
4 at Forest Lake, Minnesota, and taught physical education and  
14:22:49 5 health for approximately 10 years.

6 Q. And then what happened in 1983?

7 A. In 1983 I moved my family out to Salt Lake City,  
8 Utah.

9 Q. And why did you do that?

14:23:05 10 A. To start a full-time position with Bigger, Faster,  
11 Stronger.

12 Q. And can you tell us what exactly Bigger, Faster,  
13 Stronger is?

14 A. We are a company that has been dedicated to helping  
14:23:19 15 athletes succeed. We have been working with young athletes  
16 primarily over the course of the time since 1976, actually.  
17 And in 1981, we secured the strength coaching job with the  
18 Utah Jazz which allowed the partnership to develop in Salt  
19 Lake City, Utah.

14:23:38 20 Q. Okay. Why did you come to work for Bigger, Faster,  
21 Stronger? What was your connection Bigger, Faster, Stronger?

22 A. Dr. Greg Shepard was the founder of Bigger, Faster,  
23 Stronger, and I had seen Dr. Shepard at a clinic and we had --  
24 really we were doing the same things in the classroom that he  
14:24:04 25 was doing at the clinic. And so we over time developed a

1 relationship, partnership, and that blossomed into a business  
2 for all of us.

3 Q. When you say Dr. Greg Shepard, who are you  
4 referring to? Let me ask a better question. Are you talking  
14:24:24 5 about R. Gregory Shepard in the case?

6 A. Yes.

7 Q. Do you see Mr. Shepard in the room?

8 A. Yes.

9 Q. Where is he? Can you point him out?

14:24:34 10 A. He's sitting right over there.

11 THE COURT: He's wearing a green polo shirt; right?

12 THE WITNESS: I'm sorry?

13 THE COURT: He's wearing a green polo shirt?

14 THE WITNESS: That is correct.

14:24:44 15 THE COURT: There's a lot of people sitting over  
16 there.

17 THE WITNESS: I'm sorry.

18 Q. BY MR. MORAN: Thanks, Mr. Rowbotham. So 1983 you  
19 came to Salt Lake City to work with Mr. Shepard at Bigger,  
14:24:55 20 Faster, Stronger; right?

21 A. Yes.

22 Q. And what was your position when you got there at  
23 Bigger, Faster, Stronger?

24 A. We were a partnership, so there was three of us  
14:25:04 25 that were working together as partners.

1 Q. Okay. Was Bigger, Faster, Stronger organized as a  
2 partnership at that time?

3 A. At that time it was. In 1983 we developed as a  
4 corporation, a C corporation.

14:25:20 5 Q. And what were the ownership percentages in Bigger,  
6 Faster, Stronger? Approximately is fine.

7 A. In 1983, again, there is going back a ways, I  
8 believe the partnership agreement was 50-25-25.

9 Q. How was that divided?

14:25:41 10 A. 50 percent for Greg Shepard, 25 percent for me and  
11 25 for Rick Anderson.

12 Q. Did Bigger, Faster, Stronger have any other  
13 associated entities?

14 A. At that time, no.

14:25:59 15 Q. Okay. Did there come a time when Bigger, Faster,  
16 Stronger was associated with MJM Holdings?

17 A. Yes.

18 Q. And what is MJM Holdings?

19 A. It's a limited liability company that held the  
14:26:14 20 ownerships to our buildings.

21 Q. To Bigger, Faster, Stronger buildings?

22 A. Yeah. And Pro Elite's.

23 Q. You just mentioned Pro Elite. What is Pro Elite?

24 A. Pro Elite is our manufacturing facility.

14:26:34 25 Q. Before we move on, when did you meet Mr. Shepard?

1           A.    To the best of my recollection I think it was 1978.  
2    It might have been 1979.  I'm not 100-percent sure.

3           Q.    So you've known him for quite a long time?

4           A.    Yes.

14:26:53 5           Q.    And you met him through the Bigger, Faster,  
6    Stronger business?

7           A.    That is correct, yeah.

8           Q.    Can you tell us a little bit more about Bigger,  
9    Faster, Stronger's business, what does it do, how does it make  
14:27:07 10   its money?

11          A.    We started out primarily with a program and working  
12    at that time mostly with football coaches because they were  
13    the only people that were in the weight rooms and using the  
14    weight room facility.  And we through the period of time  
14:27:24 15   developing the program we also started developing product  
16    lines to facilitate the program.  And then as the program grew  
17    and more schools got involved, the other coaching aspects got  
18    involved and so did the physical education.  And so now we're  
19    in a position where we do a lot of total schools in terms of  
14:27:47 20   their physical education, coaching and our certification  
21    program, work close with those coaches and teachers.

22          Q.    Did you say total schools?

23          A.    When I say total schools, like a total school  
24    district, like you have more than one high school in the  
14:28:03 25    district, we facilitate the needs for safety and liability

1 with instruction for certification for working in the weight  
2 room.

3 Q. Thanks for that clarification. What else does  
4 Bigger, Faster, Stronger do?

14:28:14 5 A. Sell product that goes along with that environment.  
6 You know, for example, benches, squat racks, all kinds of  
7 fitness equipment that would be used in that program  
8 environment.

9 Q. Okay. Does Bigger, Faster, Stronger have any other  
14:28:33 10 aspects to its business?

11 A. No.

12 Q. What about presentations to schools?

13 A. Yes. The clinics, that's the program part I was  
14 talking about.

14:28:48 15 Q. Okay.

16 A. That's our -- we go to schools and do presentations  
17 for the schools. The schools hire us and bring us in. And we  
18 basically have two levels now, one is the certification for  
19 the teachers and the coaches and then the other is the clinic  
14:29:04 20 presentation for the student athletes.

21 Q. Is there a magazine?

22 A. Yes, there is. It's an online magazine now. Yes.

23 Q. How long has it had a magazine?

24 A. The first issue was 1980.

14:29:22 25 Q. And does that -- what does that magazine discuss?

1 What's in the magazine?

2 A. Program related articles, a lot of success stories,  
3 and at that time a lot of knowledge about how to train  
4 athletically.

14:29:39 5 Q. Okay. You mentioned clinics.

6 A. Yes.

7 Q. How do the clinics work?

8 A. Well, a school will call us up and ask for a date  
9 and we will have available dates, of course, based upon  
14:29:56 10 clinicians. So at that point the clinician works with the  
11 school to set up the presentation. We go to the school and do  
12 the presentation. And most times it's on a weekend, and it's  
13 basically one day. It's an eight-hour clinic. But we have  
14 two- and three-day clinics, also.

14:30:20 15 Q. How long have these clinics been going on with  
16 Bigger, Faster, Stronger?

17 A. Since probably before I moved out. '77. Yeah.

18 Q. So this has always been what Bigger, Faster,  
19 Stronger has done?

14:30:34 20 A. Uh-huh (affirmative).

21 Q. Can you tell me exactly who runs these clinics?

22 A. Who runs these clinics?

23 Q. Yes.

24 A. As I said, the school calls us up and just one  
14:30:46 25 clinician goes to the school for a presentation. And we have

1 information that is sent to the school and, of course,  
2 communication over the phone to help them set up the  
3 presentation area correctly, and do the necessary setup before  
4 we get there.

14:31:02 5 Q. Is the clinician an employee of Bigger, Faster,  
6 Stronger or are they independent contractor?

7 A. Independent contractor for most part, except, of  
8 course, for the people in the office like myself.

9 Q. Okay. The people in the Bigger, Faster, Stronger  
14:31:15 10 office?

11 A. Yes.

12 Q. How do you recruit these independent contractor  
13 clinicians?

14 A. For the most part they have been recruited based  
14:31:29 15 upon meeting them at a clinic and their inquiry about being a  
16 presenter.

17 Q. So would they typically be either a teacher or  
18 coach at the school district where you're giving the  
19 presentation?

14:31:44 20 A. That is correct.

21 Q. Are you familiar with a gentleman by the name of  
22 Roger Freeborn?

23 A. I am.

24 Q. How do you know Mr. Freeborn?

14:31:56 25 A. He was one of the clinicians for Bigger, Faster,

1 Stronger.

2 Q. How long was he a clinician for Bigger, Faster,  
3 Stronger?

14:32:15

4 A. He probably started in probably '88, if I correctly  
5 remember.

6 Q. Okay. And we understand that Mr. Freeborn is now  
7 deceased. But when did he cease being a clinician?

8 A. I don't remember the exact date, but probably 2013,  
9 2014, somewhere around there.

14:32:36

10 Q. Okay. The independent contractors who make these  
11 presentations, do they only make presentations in their own  
12 school district or do they travel elsewhere?

13 A. They travel almost always. They do, of course, do  
14 stuff in their own environment because they believe in the  
15 program, but they do the presentations as a whole in a  
16 different area.

14:33:04

17 Q. Okay. So is it fair to say they go wherever you  
18 send them?

19 A. Correct.

14:33:15

20 Q. Mr. Rowbotham, we talked earlier about the business  
21 structure at Bigger, Faster, Stronger. How if at all did it  
22 change particularly up until the early 2000s?

23 A. How did it change up to the year 2000?

24 Q. There about, yeah.

14:33:50

25 A. The biggest single change would be the development



1 of the manufacturing facility that we took on in 1995 where we  
2 controlled the development of our own product line. Other  
3 than that, the sales environment relative to clinics and  
4 product at Bigger, Faster, Stronger remained pretty much the  
14:34:09 5 same.

6 Q. What about the ownership structure? I think you  
7 testified earlier you were a C corporation. And did that  
8 change subsequently?

9 A. That is correct. I don't remember the exact day.  
14:34:18 10 We weren't a C corporation, way too long, but we did change to  
11 an S Corp. And at the time we changed to an S Corp., again,  
12 the percentages were 50-25-25, and that over time changed when  
13 we started talking about buy/sell agreements.

14 Q. So the 50-25-25 split, those ownership percentages  
14:34:49 15 started to change?

16 A. I don't remember the exact date, but as we  
17 progressed in time and went through in 2008 a legal encounter  
18 with my partner Rick Anderson, then our percentages between  
19 Greg and I changed, yes.

14:35:06 20 Q. So I know that Mr. Shepard was 50 percent and you  
21 were 25 percent and Mr. Anderson was 25 percent?

22 A. That is correct.

23 Q. And you said the ownership percentages started to  
24 shift?

14:35:18 25 A. When we -- when we went through, I think it was

1 2008, we had the legal encounter with Rick Anderson.

2 Q. I understand.

3 A. And then it was just Greg and me. So the  
4 percentages started to change.

14:35:31 5 Q. Okay. So was Mr. Anderson's share bought out?

6 A. Yes.

7 Q. By you and Mr. Shepard?

8 A. Yes.

9 Q. Okay. And then what were the ownership  
14:35:42 10 percentages? Approximate is fine.

11 A. It was close to 50-50, but it wasn't quite 50-50.  
12 I forget exactly.

13 Q. How did it change after you assumed Mr. Anderson's  
14 ownership share?

14:35:58 15 A. That's what I mean. It was between Greg and I  
16 approximately 50-50.

17 Q. Okay. Did it stay that way between you and  
18 Mr. Shepard?

19 A. I think till 2013 when I bought Greg out.

14:36:09 20 Q. Okay. What was happening between the 2005 and 2012  
21 time period?

22 A. In respect to Greg and my relationship relative to  
23 his working at the solar lenses, by the Department of Justice  
24 a raid took place on the Bigger, Faster, Stronger office.

14:36:39 25 Q. We'll get back to the raid.

1 A. Okay.

2 Q. But I'd like to round up the ownership changes.

3 Did there come a time when you took over?

4 A. At 2013, sir, yes.

14:36:50 5 Q. And you bought Mr. Shepard out?

6 A. Yes.

7 Q. Okay. Who was primarily managing day-to-day  
8 activities during that time?

9 A. That was my job responsibility.

14:37:03 10 Q. What was Mr. Shepard doing with respect to Bigger,  
11 Faster, Stronger?

12 A. He was mostly in charge or he was in charge of the  
13 magazine and the marketing aspect of the magazine.

14 Q. Is it fair to say that he was phasing himself out  
14:37:19 15 of Bigger, Faster, Stronger?

16 A. Yes.

17 Q. Mr. Rowbotham, about how many hours a week do you  
18 currently spend working at Bigger, Faster, Stronger?

19 A. 30 to 40 for sure.

14:37:37 20 Q. What about during that 2005 to 2012 time period?

21 A. In excess of 40 consistently.

22 Q. Do you recall about how many in excess of 40?

23 A. If you count travel and the clinics because we do  
24 those on weekends, then it was easily 60 to 70.

14:37:59 25 Q. 60 to 70 hours a week?

1 A. Yeah.

2 Q. Between 2005 and 2012?

3 A. Yeah.

4 Q. And did you have an added workload because

14:38:14 5 Mr. Shepard was phasing himself out of Bigger, Faster,  
6 Stronger?

7 A. I wouldn't say I had a -- you know, at that point I  
8 was pretty much doing the same thing, and what was happening  
9 was our sales was going down so the workload was not that much  
14:38:29 10 different. So in that case, it hadn't changed that much  
11 because of the total sales volume.

12 Q. Okay. When was it first made clear to you that  
13 Mr. Shepard was going to leave Bigger, Faster, Stronger?

14 A. That was our long-term plan. But the actual time  
14:39:03 15 that that decision was made was probably around 2012.

16 Q. Mr. Rowbotham, what business would you consider  
17 yourself to be in?

18 A. I would say the fitness industry.

19 Q. Is that your only business?

14:39:25 20 A. Yes.

21 Q. Okay. You wouldn't consider yourself to be in the  
22 solar lens business?

23 A. No.

24 Q. Mr. Rowbotham, I'm going to direct your attention  
14:39:57 25 to Plaintiff's Exhibit 90. Mr. Rowbotham, you're looking at

1 Q. Okay. Thank you.

2 Go back to the first page.

3 Before we go any further, United States offers  
4 Plaintiff's Exhibit 94.

14:57:10 5 MR. GARRIOTT: No objection.

6 THE COURT: 94 is received.

7 (Whereupon, Plaintiff's Exhibit 94 was received.)

8 Q. BY MR. MORAN: Mr. Rowbotham, directing your  
9 attention to the bottom of Page 6 and going on to the top of  
14:57:31 10 Page 7. Whose signature appears on behalf of MJM Holdings?

11 A. Gregory Shepard.

12 Q. Okay. Again, Mr. Shepard purchased lenses in 2006  
13 on behalf of MJM Holdings?

14 A. That's correct.

14:57:51 15 Q. Do you know why Mr. Shepard was purchasing these  
16 lenses for your partnership?

17 A. We thought it was a sound investment and a good way  
18 to help get more money for Bigger, Faster, Stronger.

19 Q. Mr. Rowbotham, why did you think that buying solar  
14:58:22 20 lenses was a good investment for Bigger, Faster, Stronger?

21 A. Because over time we thought we were going to be  
22 able to make money off the purchase.

23 Q. You thought that in 2005-2006?

24 A. Yes.

14:58:42 25 Q. You said, we thought that. Who told you that?

1 A. All my information was direct from Greg.

2 Q. So is it fair to say that buying these lenses was  
3 Mr. Shepard's idea?

14:58:59

4 A. Yes. We agreed to it, but it was his idea to start  
5 with, yes.

6 Q. Thank you. Mr. Rowbotham, showing you what's been  
7 marked for identification as Plaintiff's Exhibit 95. Do you  
8 recognize Plaintiff's Exhibit 95?

9 A. Yes, I do.

14:59:26

10 Q. What is it?

11 A. It is again an equipment purchase agreement between  
12 KBR. And KBR is my estate planning environment.

13 Q. Can you tell us a little bit more about what KBR  
14 is?

14:59:43

15 A. It's my wife and myself, an LC.

16 Q. It's an LLC?

17 A. Yes, sir. A liability company.

18 Q. Is it a limited liability company?

19 A. Yes.

14:59:58

20 Q. And it's owned by you and your wife?

21 A. Yes.

22 Q. Okay. Does anyone else have an interest in KBR?

23 A. No.

15:00:18

24 Q. Okay. So in Exhibit 95 instead of MJM I see KBR;  
25 is that correct?

1           A.    I am purchasing the lens.  We went over the  
2 purchase agreement, the equipment lease purchase agreement I'm  
3 paying for.

4           Q.    That MJM is buying?

15:10:08 5           A.    No.  This would be -- yeah.  I guess that would be  
6 the MJ one, yes.  Yes.

7           Q.    Thank you.  Directing your attention to Plaintiff's  
8 Exhibit --

9                    Before we do that, Your Honor, the United States  
15:10:24 10 offers Plaintiff's Exhibit 91 into evidence.

11                   MR. GARRIOTT:  No objection.

12                   THE COURT:  91 is received.

13                   (Whereupon, Plaintiff's Exhibit 91 was received.)

14           Q.    BY MR. MORAN:  Mr. Rowbotham, directing your  
15:10:35 15 attention to Plaintiff's Exhibit 91, page 2.  If we could blow  
16 up the quote.

17                   On Page 2 of Exhibit 91 there's a quote attributed  
18 to you.  It says:  I really think the IAUS tax credit program  
19 is a no brainer.  Instead of paying the IRS, I lease and  
15:11:06 20 sublease the IAUS solar energy equipment and make a  
21 substantial profit while getting a dollar for dollar tax  
22 credit.  Where else can you make an investment like that?

23                   Did I read that correctly?

24           A.    Yes.

15:11:22 25           Q.    Mr. Rowbotham, what caused you to make that

1 statement?

2 A. Marketing with the idea of trying to sell these  
3 things helping Greg through that process.

4 Q. Mr. Shepard?

15:11:37 5 A. Yes, sir.

6 Q. Who told you that by leasing a lens entitled you to  
7 a dollar-for-dollar tax credit?

8 A. Greg.

9 Q. Greg Shepard?

15:11:50 10 A. Yes.

11 Q. Thank you.

12 Mr. Rowbotham, you testified earlier that you  
13 understood your solar lenses were supposed to generate  
14 electricity; is that true?

15:12:19 15 A. Well, the first that I understood it was to  
16 generate heat and then over time generate electricity.

17 Q. And you got that information from Greg Shepard?

18 A. Yes, sir.

19 Q. Okay. Anybody else?

15:12:34 20 A. Not directly.

21 Q. Who indirectly?

22 A. Probably Neldon Johnson through Greg.

23 Q. About how many times did you meet Neldon Johnson?

24 A. Over the years probably no more than four or five  
15:12:52 25 times.



1 Q. Okay. And where did you meet him?

2 A. The one picture was at the BFS office, and then I  
3 don't recall where else I met him.

4 Q. Okay.

15:13:06 5 THE COURT: Mister --

6 MR. MORAN: Moran.

7 THE COURT: -- Moran, I'm trying to figure out  
8 where a break is. How much longer do you have with this  
9 witness, do you think?

15:13:19 10 MR. MORAN: Now is a good time for a break, Your  
11 Honor.

12 THE COURT: Okay. Let's do it. We'll break until  
13 3:30. We're in recess.

14 (Recess.)

15:28:51 15 THE COURT: We're back in session. Mr. Rowbotham  
16 is on the witness stand continuing with direct.

17 Q. BY MR. MORAN: Mr. Rowbotham, directing your  
18 attention to Plaintiff's Exhibit 93. Do you recognize  
19 Plaintiff's Exhibit 93?

15:29:14 20 A. Yes, I do.

21 Q. What is it?

22 A. It's an e-mail.

23 Q. Is this an e-mail you received?

24 A. Yes.

15:29:22 25 Q. You received it from Greg Shepard?

1 A. Yes.

2 Q. On Friday, November 10th, 2006?

3 A. Yes.

4 Q. And what is Exhibit 93 discussing?

15:29:32 5 A. Explaining how the IAS solar system will work.

6 Q. I think it's talking about how it's transitioning  
7 from the lease to the program?

8 A. Yes.

9 MR. MORAN: Your Honor, the United States offers  
15:29:52 10 Exhibit 93.

11 MR. GARRIOTT: No objection.

12 THE COURT: Received, 96 -- excuse me. 93.

13 (Whereupon, Plaintiff's Exhibit 93 was received.)

14 Q. BY MR. MORAN: Mr. Rowbotham, before the break we  
15:30:23 15 were talking about the intended purpose of your solar lenses.  
16 Do you recall that?

17 A. Yes.

18 Q. Okay. And your understanding was that these lenses  
19 would produce heat, they would somehow eventually produce  
15:30:35 20 electricity?

21 A. That is correct.

22 Q. Okay. And you got that information from  
23 Greg Shepard?

24 A. Yes.

15:30:42 25 Q. When if at all did your lenses start producing

1 electricity?

2 A. I don't know. I'm not aware of the timeline on  
3 that.

15:30:55

4 Q. Okay. You've never been told that your lenses are  
5 producing electricity?

6 A. Not at this point.

7 Q. Okay. Do you know anything that your lenses have  
8 been used for?

9 A. No. I'm not -- no.

15:31:11

10 Q. Have you done anything to complain about the lack  
11 of electricity generation?

12 A. No.

13 Q. Do you know where your lenses are?

14 A. In Delta, Utah.

15:31:29

15 Q. And what makes you think that?

16 A. That's what I've been told.

17 Q. And who told you that?

18 A. Greg.

19 Q. Greg Shepard?

15:31:37

20 A. Yes, sir.

21 Q. Okay. Can you be any more specific as to where  
22 your lenses are?

23 A. No. I've never been down there.

24 Q. You say down there. You mean in Delta?

15:31:58

25 A. Delta, yes.

1 Q. So your knowledge -- to your knowledge, your lenses  
2 are somewhere in Delta, Utah?

3 A. That is correct.

4 Q. You don't know where?

15:32:07 5 A. No.

6 Q. You've never seen your lenses?

7 A. No.

8 Q. And you said that your information on this topic  
9 comes from Greg Shepard; right?

15:32:14 10 A. That is correct.

11 Q. So that's all Mr. Shepard has told you is that your  
12 lenses are in Delta, Utah, and sometime they'll generate  
13 electricity?

14 A. Yes.

15:32:23 15 Q. And that time has never occurred?

16 A. As far as producing electricity?

17 Q. Yes.

18 A. Not to my knowledge.

19 Q. Mr. Rowbotham, what income, if any, have you  
15:32:35 20 received from your lenses?

21 A. I have received a monthly check from RaPower3 for  
22 the last three, four or five years.

23 Q. And what's that check for?

24 A. The distribution of sales based upon the RaPower3  
15:33:00 25 multilevel marketing system.

1 Q. Okay. You testified about the multilevel marketing  
2 system earlier. And you described a commission based payment  
3 scheme?

4 A. Yes.

15:33:15 5 Q. Okay. Would it be fair to say that you get  
6 commissions from your downline?

7 A. Yes.

8 Q. Okay. Who is in your downline?

9 A. The only person I know that was in my downline is  
15:33:34 10 Roger Freeborn.

11 Q. And why is that?

12 A. I don't pay any attention to it.

13 Q. Well, why is Mr. Freeborn in your downline?

14 A. That's the way it was set up, to my knowledge, I  
15:33:49 15 guess.

16 Q. Is that because you were one of the first people to  
17 purchase lenses back in 2005?

18 A. That is correct, yes.

19 Q. Okay. And is it fair to say that if Mr. Freeborn  
15:34:01 20 is in your downline that means that anyone in Mr. Freeborn's  
21 downline is also in your downline.

22 A. To a certain level, yes.

23 Q. And you said for the last three or four years?

24 A. It may be longer than that. Again, I don't  
15:34:17 25 recollect exactly.

1 Q. Okay. But for some period of time you've been  
2 getting monthly commission checks --

3 A. That is correct.

4 Q. -- from RaPower3?

15:34:28 5 A. Yes.

6 Q. All right. You testified that you received  
7 commissions. About how much are those commissions?

8 A. They vary from month to month.

9 Q. Can you give us an approximate range?

15:34:50 10 A. I've had them as high as \$2,000 and as low as \$17.

11 Q. But you still get those commission checks as  
12 recently as this year?

13 A. Yes. Yes.

14 Q. What income have you received from your solar  
15 lenses besides commission checks?

16 A. Nothing.

17 Q. What impact, if any, did the solar lenses have on  
18 Bigger, Faster, Stronger's relationship with Greg Shepard?

19 A. Nothing except that we bought them.

15:35:34 20 Q. Okay. Was Mr. Shepard's relationship -- withdrawn.

21 Did the solar lens have any negative impact on  
22 Mr. Shepard's association of Bigger, Faster, Stronger?

23 A. In the beginning there was a period of time that  
24 some of the list management system was used at Bigger, Faster,  
15:36:01 25 Stronger to try and sell the lenses. And, yes, it had an