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Transcript of Mitchel Bowman

Date: October 11, 2024

Case: Affordable Wire Management, LLC -v- CCABH, Inc. (PTAB)

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WORLDWIDE COURT REPORTING & LITIGATION TECHNOLOGY

Affordable Wire Management, Exhibit No. EX1047

Case No.: IPR2024-00139

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Transcript of Mitchel Bowman
Conducted on October 11, 2024

1 (1 to 4)

1	3
1 UNITED STATES PATENT AND TRADEMARK OFFICE	1 A P P E A R A N C E S:
2 BEFORE THE PATENT TRIAL AND APPEAL BOARD	2
3 -----X	3 ON BEHALF OF PETITIONER:
4 AFFORDABLE WIRE MANAGEMENT, LLC,	4 MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND
5 Petitioner,	5 POPEO, PC
6 -against-	6 1 FINANCIAL CENTER
7 CAMBRIA COUNTY ASSOCIATION FOR THE BLIND AND	7 BOSTON, MA 02111
8 HANDICAPPED, INC.,	8 EMAIL: RCSWEENEY@MINTZ.COM
9 Patent Owner.	9 BY: ROBERT C. SWEENEY, ESQ.
10 -----X	10 ON BEHALF OF PATENT OWNER:
11 Case IPR2024-00139	11 ECKERT SEAMANS CHERIN & MELLOTT, LLC
12 U.S. Patent No. 10,177,551	12 TWO INTERNATIONAL PLACE, 16TH FLOOR
13 and	13 BOSTON, MA 02110
14 Case IPR2024-00178	14 EMAIL: CSHEA@ECKERTSEAMANS.COM
15 U.S Patent No. 11,349,291	15 BY: CARSON M. SHEA, ESQ.
16 DEPOSITION OF	16
17 MITCHEL BOWMAN	17
18 REMOTE LOCATION	18 ALSO PRESENT:
19 October 11, 2024	19 ZOOM TECH, PAUL KAMINSKI
20	20 MINTZ, KEVIN ADMENDT
21 REPORTED BY: KIARA MILLER	21
22 FILE NO.: 554265	22
2	4
1 UNITED STATES PATENT AND TRADEMARK OFFICE	1 MR. KAMINSKI: Thank you to everyone
2 BEFORE THE PATENT TRIAL AND APPEAL BOARD	2 for attending this proceeding
3 -----X	3 remotely, which we anticipate will run
4 AFFORDABLE WIRE MANAGEMENT, LLC,	4 smoothly.
5 Petitioner,	5 Please remember to speak slowly, and
6 -against-	6 do your best not to talk over one
7 CAMBRIA COUNTY ASSOCIATION FOR THE BLIND AND	7 another. Please be aware that we are
8 HANDICAPPED, INC.	8 recording this proceeding for back up
9 Patent Owner.	9 purposes. Any off the record
10 -----X	10 discussions should be had away from
11 Case IPR2024-00139	11 the computer, please remember to mute
12 U.S. Patent No. 10,177,551	12 your mic for those conversations.
13 and	13 Please have your video enabled to help
14 Case IPR2024-00178	14 the reporter identify who is speaking.
15 U.S Patent No. 11,349,291	15 If you are unable to connect to the
16	16 video and are connecting via phone
17 Deposition of MITCHEL BOWMAN, taken on behalf	17 please identify yourself each time
18 of PETITIONER, at REMOTE LOCATION, commencing	18 before speaking.
19 at 9:31 a.m., October 11, 2024, before Kiara	19 We will provide a complementary
20 Miller.	20 unedited recording of this deposition
21	21 with purchase of a transcript.
22	22 I apologize in advance for any

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Conducted on October 11, 2024

2 (5 to 8)

<p>5</p> <p>1 technical related interpretations. 2 Thank you. 3 MITCHEL BOWMAN, after having first been 4 duly sworn by a Notary Public of the State of New 5 York, was examined and testified as follows: 6 COURT REPORTER: Please state your 7 name and address for the record. 8 THE WITNESS: My name is Mitchel 9 Frederick Bowman. My address is 10 408 Roberta Avenue, Pleasant Hill, 11 California 92345. 12 EXAMINATION BY 13 MR. SWEENEY: 14 Q Good morning, Mr. Bowman, my name is 15 Robert Sweeney. I'm counsel for petitioner 16 in these matters, Affordable Wire Management, 17 in IPR2024-00139 regarding US patent 18 No. 10,177,551 and IPR2024-00178 regarding US 19 patent No. 11,349,291. 20 You're here today for your deposition 21 relating to the declaration you submitted in 22 both IPR matters on behalf of patent owner</p>	<p>7</p> <p>1 A I do. 2 Q Please let me know if you need a break 3 at any time. However, if I have an 4 outstanding question or if I'm in the middle 5 of a line of questions, I will ask that you 6 finish providing answers before we take that 7 break. 8 Does that sound good? 9 A Yep. 10 Q Have you ever been deposed before? 11 A First time. 12 Q So you understand that you just took an 13 oath to tell the truth today, right? 14 A I do. 15 Q Great. And that's the same oath that 16 you would take if you were in court in front 17 of a judge and jury. 18 Do you understand that? 19 A I do. 20 Q Since we're taking this deposition 21 remotely, could you please describe your 22 surroundings for me?</p>
<p>6</p> <p>1 Cambria County Association for the Blind and 2 Handicapped. 3 Do you understand that? 4 A I do. 5 Q And I'm going to be asking you a series 6 of questions today regarding your declaration 7 Exhibit 2028 in both the 0178 IPR as well as 8 the 0139 IPR. 9 Do you understand that? 10 A I do. 11 Q And I understand you have a printed copy 12 of your declaration, Exhibit 2028, in front 13 of you; is that right? 14 A Correct. 15 Q Is that copy annotated or written on in 16 any way? 17 A No. 18 Q Great. Please let me know if you don't 19 understand any of my questions or can't hear 20 me clearly; otherwise, I will assume that you 21 heard and understood my question. 22 Do you understand that?</p>	<p>8</p> <p>1 A In a conference room with Ed and Carson. 2 It's wood-paneled, pretty nice. There's two 3 monitors on the screen. I can see myself on 4 one of them. It's a little awkward. 5 Q Do you have any chat screens or other 6 forms of communication available to you right 7 now? 8 A I don't. 9 Q And where are you located 10 geographically? 11 A I'm at the end of the table. At the 12 head of table, if you will. 13 Q Sorry, by geographically where in the 14 United States are you located? 15 A Pittsburgh. The offices in Pittsburgh 16 on the 45th floor, I guess. 17 Q Do you understand that I'll be asking 18 you questions; you'll be answering those 19 questions truthfully and completely, correct? 20 A Correct. 21 Q And if your counsel objects to one of my 22 questions, you still have to answer that</p>

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<p>9</p> <p>1 question unless they specifically direct you 2 not to answer. 3 Do you understand that? 4 A I do. 5 Q Are you taking any medication or other 6 substances that might make it difficult for 7 you to understand or answer my questions 8 today? 9 A No. 10 Q Is there any reason why you cannot give 11 full, complete and accurate testimony today? 12 A No. 13 Q Great. Where did you work from 2008 to 14 2012? 15 A At that time I was at SolFocus. 16 Q What is SolFocus? 17 A They were a solar start-up company that 18 had a concentrating photovoltaic solar 19 technology. At the time, and even today, it 20 produced the world's most efficient solar 21 module. 22 And it kind of worked like a telescope.</p>	<p>11</p> <p>1 today than normal PV systems? 2 MR. SHEA: Objection. Form. 3 Relevance. 4 A They're less common. 5 Q Why is that? 6 A The cost of manufactured silicon dropped 7 from about a hundred dollars, KG, to where it 8 stands today about ten, which really 9 benefited the traditional poly- and 10 mono-silicon solar panels. Also benefited 11 anybody that owns a computer or cell phone, 12 but... 13 Q Did the cable management demands of CPV 14 systems differ from PV systems? 15 MR. SHEA: Objection. Form. 16 Relevance. 17 A No. Pretty similar. 18 Q In Paragraph 12 of your declaration, you 19 say, "I worked extensively in the field with 20 customers to build out solar energy power 21 plants." 22 What do you mean by "build out"?</p>
<p>10</p> <p>1 It can only see about a degree of the sky 2 magnified, 500X magnification on these solar 3 cells. And as a result, it required 4 dual-axis trackers to work to point at the 5 sun as it made its arc across the sky 6 throughout the day. 7 Q How are concentrator photovoltaic 8 systems different than regular PV systems? 9 A They use about a thousandth of the 10 active solar cell material. And back during 11 that time frame, solar cells were pretty 12 expensive to manufacture. And so by using a 13 lot less of one of the most expensive 14 materials in the solar panel, being, you 15 know, the solar cell itself, the value prop 16 was that we could produce not only a cheaper 17 module but a more efficient module. 18 Q And those are referred to CPV systems, 19 correct? 20 A That's correct. 21 Q Why are CPV systems -- withdrawn. 22 Are CPV systems more or less common</p>	<p>12</p> <p>1 A The construction of the power plant. So 2 everything from, you know, fencing and 3 de-grubbing the site to, you know, initial 4 foundation install, the mechanical assembly 5 of the systems and, you know, all the way 6 through, you know, the connection of the 7 system to the grid. 8 Q What customers did you help to build out 9 solar energy power plants? 10 A A wide variety. The California 11 utilities PG&E and Southern California Edison 12 were customers. We did a really big project 13 for Victor Valley Community College. We did 14 some projects for some farmers that were 15 turning previously farmland into solar 16 fields. A bunch of different IPPs. 17 Q What are IPPs? 18 A Independent power producers. 19 Q Approximately how many solar energy 20 power plants did you help build out? 21 A At SolFocus, approximately a dozen. 22 Q And where geographically were those</p>

<p>1 energy power plants that you helped build 2 out? 3 A We had a good chunk in California. 4 Central Valley, Southern California, Northern 5 California. We had a few sites in Chile, 6 Santiago. We had a site in the outback in 7 Australia at an airport, and a few project 8 sites in Spain. 9 Q Why not any other areas of the United 10 States? 11 MR. SHEA: Objection. Form. 12 A At the time the projects chased 13 government-sponsored incentives. California 14 was one of the first states to adopt a 15 feed-in tariff that helped benefit solar 16 power producers in the state. Similarly, 17 Spain, Chile, Australia had similar-type 18 programs which financially incentivized the, 19 you know, construction and production of 20 solar power. 21 Q What cable management methods did these 22 energy power plants employ?</p>	<p>13 15 1 fraction of the sky, making sure the array of 2 modules on each tracker were aligned so that 3 they all pointed the same direction was 4 really important to make sure those systems 5 operated efficiently. But to get that level 6 of alignment in the field on a construction 7 site was pretty labor intensive. 8 So, I provided a lot of the feedback 9 from these installers to our engineering team 10 on how to make improvements, things we could 11 do in the factory in a more controlled 12 environment versus in the field. And that 13 feedback, you know, spurred us to develop a 14 second generation product that was much, much 15 easier to install. 16 Q What years were you leading the 17 development of the second generation SolFocus 18 tracker? 19 A Approximately 2010 to 2012. 20 Q How did the second generation SolFocus 21 tracker work? 22 MR. SHEA: Objection. Form.</p>
<p>14 1 MR. SHEA: Objection. Form. 2 A Most trenching, 100 percent underground. 3 Q Earlier you mentioned trackers. What 4 does the term "trackers" mean in the solar 5 industry? 6 A The mechanical device that points the 7 solar modules, whether it be CPV or, you 8 know, standard crystalline, at the sun. 9 Q You mentioned in your declaration that 10 you lead the development of the second 11 generation SolFocus tracker; is that right? 12 A That's correct. 13 Q What do you mean by "lead the 14 development"? 15 A With all of the time I spent in the 16 field with our EPCs building our system, our 17 first generation system at SolFocus, I 18 received a lot of feedback from these 19 installers on how to improve the system for 20 mechanical assembly. 21 Because each of these concentrated 22 photovoltaic modules can only see a small</p>	<p>16 1 Relevance. 2 A Each tracker, dual-axis tracker held 3 28 modules, and each of those 28 modules 4 would have to be, in the first generation 5 product, physically put on by the installer 6 and then aligned. 7 The second generation product, we 8 shipped seven sets of these 4-module mega 9 modules, is what we called them. So instead 10 of having to install and align 28 individual 11 modules, installer would only have to install 12 seven of these mega modules on the system 13 that were factory-aligned and, you know, put 14 together. 15 Q Do solar trackers improve the capacity 16 of a solar plant? 17 MR. SHEA: Objection. Relevance. 18 A Could you define "capacity"? 19 Q Sure. How much energy that particular 20 power plant can generate. 21 A Yeah, if you're defining "capacity" as 22 energy, trackers help boost the energy</p>

<p>17</p> <p>1 production on a day-to-day basis over an 2 alternative fixed-tilt system.</p> <p>3 However, name plate capacity, you know, 4 the rating of that power plant, you know, 5 doesn't change tracker to fixed-tilt. One 6 megawatt DC power plant in fixed-tilt could 7 be viewed as the same capacity as a one 8 megawatt DC tracker.</p> <p>9 Q Does the use of trackers increase cable 10 management demands?</p> <p>11 MR. SHEA: Objection. Form.</p> <p>12 A Trackers are typically installed in a 13 bigger spacing than a fixed-tilt system, 14 because they're moving, the self-shading 15 between modules needs to be considered, and 16 trackers need a little more space than a 17 fixed-tilt system. As a result, yes, you can 18 say trackers require more cable management in 19 that a one megawatt site of trackers is on 20 more land than a one megawatt site at 21 fixed-tilt.</p> <p>22 Q How are cables managed in power plants</p>	<p>19</p> <p>1 A They had a very robust and rich feed-in 2 tariff program that spurred a lot of solar 3 power projects in that country. And if you 4 looked at, you know, megawatts installed or 5 megawatts, you know, constructed and 6 operational, Spain, I think, was 10X any 7 other country in the world for a period of 8 time.</p> <p>9 Q Is Spain still one of the largest 10 markets in solar today?</p> <p>11 MX. ATTY: Objection. Relevance.</p> <p>12 A No.</p> <p>13 Q When did Spain stop being one of the 14 largest markets in solar?</p> <p>15 MX. ATTY: Objection. Relevance.</p> <p>16 A It is my understanding -- and I'm not, 17 you know, necessarily an expert in global 18 market share, but it's my understanding that 19 when the feed-in tariff programs dried up 20 and, you know, there was no more financial 21 incentive from the government available is 22 when that market cooled.</p>
<p>18</p> <p>1 you worked on that used the gen 2 SolFocus 2 tracker?</p> <p>3 MR. SHEA: Objection. Form.</p> <p>4 A I wouldn't know because SolFocus went 5 out of business before we were able to build 6 any gen 2 power plants.</p> <p>7 Q You mentioned earlier that SolFocus had 8 installations in Chile and Spain and that 9 around this time you were overseeing these 10 two international markets in your 11 declaration.</p> <p>12 Were Chile and Spain large markets for 13 solar at that time?</p> <p>14 MR. SHEA: Objection. Form.</p> <p>15 A Spain was one of the largest markets in 16 the world during that time frame because of 17 their feed-in tariff policy. Chile was just 18 kind of getting started.</p> <p>19 Q What do you mean when you say Spain was 20 one of the largest markets in the world?</p> <p>21 MR. SHEA: Objection.</p> <p>22 Mischaracterizes the testimony.</p>	<p>20</p> <p>1 Q Do you know if the market in Chile is 2 bigger today than it was when you were 3 overseeing that market for SolFocus?</p> <p>4 MX. ATTY: Objection. Form.</p> <p>5 Relevance.</p> <p>6 A Again, I don't -- I'm not an expert in 7 global solar demand across the world. So my 8 answer would be speculation. Generally 9 speaking, solar continues to grow, especially 10 from, you know, way back in the, you know, 11 2010 time frame. So I would assume it's 12 bigger today than it was back then.</p> <p>13 Q In Paragraph 14 of your declaration, you 14 state, "I developed a deep understanding and 15 working knowledge of the solar market."</p> <p>16 What do you mean by "a deep 17 understanding and working knowledge"?</p> <p>18 A I think if you read that entire 19 paragraph of 14, the following sentences that 20 are -- specified that.</p> <p>21 And so to paraphrase that, the deep 22 understanding and working knowledge of the</p>

<p>21</p> <p>1 solar market, I'm really referring to 2 products available in the market, the 3 technologies and, you know, where there are 4 deficiencies in existing technologies and 5 where there's room for innovation. 6 Q In that same paragraph you allude to the 7 key players in the market. Who are the key 8 players in the market that you're referring 9 to? 10 MR. SHEA: Objection. Form. 11 Q Back in that time frame, the key players 12 would have been First Solar that had a -- you 13 know, a unique solar module and product 14 offering versus standard crystalline or CPV. 15 SunPower was a key player in the model 16 crystalline module space. 17 There were a variety of Chinese 18 manufacturers coming online producing poly 19 silicon modules. And there were a wide 20 breadth of new technologies in the power 21 electronics space coming online, central 22 inverters, string inverters.</p>	<p>23</p> <p>1 our customers at the time had a wide variety 2 of options to choose if they're deciding to 3 invest in a solar power plant. 4 Understanding -- having a deep 5 understanding of that landscape when the 6 solar history was very young and new was 7 important to make sure that we understood our 8 company, being SolFocus, as value prop, and 9 how we compared apples to apples with the 10 other technologies available to our 11 customers. 12 Q Where did you work after leaving 13 SolFocus? 14 A I joined SunEdison. 15 Q What is SunEdison? 16 A SunEdison was a global renewable energy 17 company that developed solar energy projects. 18 Developed, produced and sold products in the 19 solar energy space. And designed, 20 constructed and operated solar power plants. 21 Q What do you mean by "renewable energy"? 22 A Energy that can be produced without the</p>
<p>22</p> <p>1 Q What are the technological innovations 2 you're referring to in Paragraph 14 of your 3 declaration? 4 A There's a wide variety, one of those 5 being the company I was working for in the 6 CPV space. We weren't the only player in the 7 CPV space at that time. So the -- you know, 8 what we were doing with the dual-axis 9 trackers in CPV, other customers were doing, 10 there were a wide variety of triple-junction 11 cells, which are basically three solar panels 12 layered one on top of the other, each 13 responsive to a different spectrum of light, 14 which is why they can get such high 15 efficiencies. 16 So was very knowledgeable and up to 17 speed on the world of CPV. But it also 18 required us to be very knowledgeable on what 19 was happening in the world of thin film with 20 companies like First Solar as well as, you 21 know, the silicon players, you know, 22 SunPower, the Chinese manufacturers. Because</p>	<p>24</p> <p>1 use of fossil fuels. 2 Q What portion of SunEdison's business was 3 solar energy? 4 MX. ATTY: Objection. Form. 5 A I never managed the financials at 6 SunEdison, so I am speculating here, but it 7 was 95 percent. 8 Q Paragraph 16, of your declaration you 9 say that you initiated and managed an organic 10 innovation program. What was the organic 11 innovation program? 12 A I was part of the design and engineering 13 team at SunEdison and within that team my 14 boss, the VP of engineering at SunEdison, 15 recognized the need to have some engineers 16 focused on how to make power plants better. 17 Instead of focused on designing and 18 supporting the power plants in the pipeline. 19 I was hired at SunEdison to lead that 20 role. 21 Q Approximately how many people were a 22 part of the organic innovation program?</p>

<p>25</p> <p>1 A In the beginning there were four of us, 2 so that would have been in the 2013 time 3 frame. Towards the end of my tenure at 4 SunEdison the team was about 12. 5 Q What were the backgrounds of those team 6 members? 7 MR. SHEA: Objection to form. 8 Relevance. 9 A Everyone had a very technical 10 background. Some were licensed and trained 11 engineers, others were like myself 12 physicists. But primarily tech. 13 Q What was the goal of SunEdison's organic 14 innovation program? 15 MR. SHEA: Objection to form. 16 A To reduce the cost of solar power plants 17 upfront CapEx, to improve the yield of solar 18 power plants and the efficiency, anything we 19 can do to squeeze more kilowatt hours out of 20 a kilowatt was an important lever. Improving 21 the reliability of our power plants. And 22 improving the execution and installability of</p>	<p>27</p> <p>1 trenching and going underground, it was 2 viewed as potentially a huge win. However, 3 we didn't know how to do that. So it was an 4 area that we were looking for alternatives. 5 And one of the alternatives was similar to 6 systems they deploy on rooftops where you 7 can't trench cause you're on a roof. So 8 snake tray was an alternative we looked at. 9 And eventually, in that early 2014 time 10 frame, CAB systems came across our radar. 11 Q Which snake tray products did you look 12 at? 13 A I can't quote the exact product models 14 off the top of my head, it was 10 years ago, 15 but if you've ever been in a data room or 16 something like that, there's these kind of 17 metal corrugated corridors that they run 18 cables through, it was a similar solution to 19 that. It was basically a metal box that, you 20 know, would carry the cables in a protective 21 manner. 22 Q Besides CAB, did your -- withdrawn.</p>
<p>26</p> <p>1 the power plants. Those were our four key 2 KPIs, key performance indicators. 3 Q Were aboveground cable management 4 systems one of the cost reduction measures 5 that SunEdison was exploring? 6 MR. SHEA: Objection. To form. 7 A Eventually through the course of the 8 innovation program, yes, we did look at 9 aboveground cable management systems. 10 Q Which aboveground cable management 11 systems did you look at? 12 A If you refer to my declaration, I think 13 I cover some of that investigation, but one 14 of the -- one of the challenges we set to 15 solving was exploring the idea of getting 16 away from trenching. And this is highlighted 17 in Paragraph 28 of my declaration. 18 Trenching was expensive and inefficient 19 and the expense of trenching and the 20 efficiency of trenching was highly variable 21 to soil conditions encountered at the site. 22 And if we could figure out a way of avoiding</p>	<p>28</p> <p>1 you 2 Did SunEdison -- withdrawn. 3 Paragraph 17 of your declaration you 4 state that you were awarded a lean black belt 5 certification. 6 What steps did you take in order to be 7 awarded this certification? 8 MR. SHEA: Objection. Form. 9 A The last paragraph of -- the last 10 sentence of Paragraph 17, provides an 11 overview of that, but there was an 12 educational classroom component of that 13 certification that then had to be turned into 14 a real world field improvement and associated 15 report that was submitted to the 16 certification board. 17 Q What prompted you to take this course? 18 MR. SHEA: Objection. Form. 19 A Just skill and career improvement. 20 Q Was it to learn about lean 21 manufacturing? 22 A Yes.</p>

<p>29</p> <p>1 Q You state in Paragraph 17, that this 2 program applied lean manufacturing concepts. 3 What type of concepts -- withdrawn. 4 You state in Paragraph 17 of your 5 declaration, that this program applied lean 6 manufacturing concepts. 7 Which manufacturing concepts were 8 applied in this program? 9 MR. SHEA: Objection. Form. 10 A The focus was really on, as is the focus 11 of any kind of lean, the overall kind of lean 12 program is how to reduce waste and 13 efficiency. 14 Q Is it a concept in lean manufacturing to 15 explore solutions in other industries and 16 then apply them in your industry? 17 MR. SHEA: Objection. Form. 18 A I'm not sure I understand the question. 19 If you can repeat it. 20 Q Is it a concept in lean manufacturing to 21 explore solutions from other industries and 22 try to apply those solutions in the</p>	<p>31</p> <p>1 among other things, a drop in oil prices; is 2 that right? 3 A Yes. 4 Q How did the drop in oil prices 5 negatively impact SunEdison? 6 MR. SHEA: Objection. Form. 7 Relevance. 8 A I was not SunEdison's chief financial 9 officer. But my understanding is that the 10 solar industry was a competitor of the oil 11 industry, energy is energy. So when oil 12 drops, you know, the value of solar energy 13 also drops. SunEdison had quite a bit of 14 debt and when oil prices dropped, SunEdison's 15 stock price fell in accordance and as a 16 result one of our biggest levers for paying 17 debt in selling stock went away. 18 Q You mentioned that there was a 19 significant decline in growth of new solar 20 energy at this time. How significantly did 21 solar energy growth decline. 22 MR. SHEA: Objection. Form.</p>
<p>30</p> <p>1 industries that are relevant to you? 2 MR. SHEA: Objection. O form. 3 A Not to my knowledge. 4 Q What lean manufacturing concepts did you 5 learn while taking this course? 6 A There was a lot of case studies that 7 were presented, a lot of it centered around 8 Toyota, who was kind of the founder and the 9 originator of the lean concept. And 10 basically it's what you're taught is any time 11 somebody's idle, it could be for a variety of 12 reasons, that's inefficient and that's waste 13 and bringing out waste to reduce idle time, 14 you know, whether it's on a manufacturing 15 line producing cars or whether it's on a 16 solar power plant constructing a solar power 17 plant, that was really the main take away 18 from that educational program. 19 Q You mentioned that SunEdison went 20 bankrupt in 2016; is that correct? 21 A Yes. 22 Q You attribute SunEdison's bankruptcy to,</p>	<p>32</p> <p>1 A I don't have a specific number, but the 2 energy industry is very -- there's not a lot 3 of margin in projects and with the 20 percent 4 drop in oil prices you'd probably see 5 approximately a 20 percent drop of new solar 6 power plants being built. 7 Q How did the solar energy industry 8 respond to this contraction in the market? 9 MR. SHEA: Objection. O form. 10 Foundation. 11 A I'm not a solar economist. I don't 12 really know. 13 Q Where did you work after SunEdison went 14 bankrupt? 15 A FTC Solar. 16 Q Was one of the goals of FTC Solar to 17 lower the cost of starting a solar plant? 18 MR. SHEA: Objection. O form. 19 A Yeah, you could say that. 20 Q What is the Voyager tracker? 21 A The Voyager tracker is a two-module in 22 portrait. So a solar module is a like a</p>

<p>33</p> <p>1 window pane, it's longer on one side, shorter 2 on the other, it's a big rectangle. Portrait 3 refers to the long side pointing up. Our 4 tracker was a two-module portrait tracker. 5 Two-module in portrait single access tracker. 6 The single access referring to it only 7 tracked east to west. 8 Q How did the Voyager tracker differ from 9 the SolFocus tracker? 10 MR. SHEA: Objection. To form. 11 A As I previously mentioned, the SolFocus 12 tracker was a dual access tracker. In a dual 13 access tracker not only can track east to 14 west but also north to south. Whereas the 15 Voyager tracker is single access tracker, it 16 only tracked east to west. That would be the 17 biggest difference. 18 Q Why didn't FTC solar work on a dual 19 access tracker? 20 MR. SHEA: Objection. Relevance. 21 A You get about a 20 percent efficiency 22 bump with the single access tracker over a</p>	<p>35</p> <p>1 leading ease of installation, performance and 2 reliability"? 3 MR. SHEA: Objection. To form. 4 A So in single access tracker space 5 there's a few market leaders that were used 6 as kind of the benchmark to assess 7 installation, performance, and reliability 8 metrics. So when that statement -- so that's 9 what that statement is in reference to. 10 Q What market leaders are you referring 11 to? 12 A At that time it was Nextracker, ATI, 13 GameChange, and Array Technologies. 14 Q So what did Voyager do to have better 15 installation than those market leaders? 16 MR. SHEA: Objection. Form. 17 A Can you ask that again I didn't quite 18 follow the middle of your question. 19 Q What did Voyager do to provide ease of 20 installation that doe better than what those 21 market leaders were offering? 22 MR. SHEA: Objection. Form.</p>
<p>34</p> <p>1 fixed-tilt system. You get about a 2 25 percent efficiency bump with the dual 3 access tracker over a standard fixed-tilt 4 system. So there is a 5 percent benefit with 5 that second axis. 6 However, it comes with a lot of extra 7 cost and complication. The industry in 8 general, realized this and probably a large 9 majority of the market share in the tracker 10 industry is lead by single access tracking 11 solutions. 12 So the Voyager tracker in FTC's decision 13 to develop a single access tracker in the 14 Voyager was to jump into the pond of the 15 biggest market share. 16 Q Second to last sentence of Paragraph 21 17 of your declaration, you say, "The Voyager 18 was developed to be the next generation of 19 single access tracker to provide industry 20 leading ease of installation, performance, 21 and reliability." 22 What do you mean by provide "industry</p>	<p>36</p> <p>1 A There were a couple of very important 2 attributes. One, we because of the 3 two-module and portrait nature of Voyager we 4 were actually able to reduce the pile 5 quantities versus those leading competitors, 6 so we had approximately half the foundations 7 needed on a Voyager project site versus a 8 Nextracker project site. So that was a huge 9 installation advantage. 10 The other key aspect of the Voyager 11 tracker was our module installability. The 12 majority of the alternatives out there rely 13 on nut and bolt -- nuts and bolts to 14 mechanically install the modules. We had a 15 mechanical clip that required no tools to 16 attach the modules to our structure. In 17 addition, we had some installation aids 18 designed into our module rail to where you 19 could effectively hang the solar module like 20 you would a picture frame on a wall and that 21 would temporarily secure the module to the 22 structure while you put on the mechanical</p>

<p>37</p> <p>1 clips that permanently attached it. 2 As a result our module installation 3 rates, which is one of the biggest labor 4 costs, were about half the competition. So 5 half the piles, twice as quick to install 6 modules. 7 Q How are cables managed using the Voyager 8 tracker? 9 MR. SHEA: Objection. Form. 10 A At FTC we sold the Voyager tracker and 11 helped support aspects of the structural 12 design for our customers. We also provided 13 out-of-the-box cable management options to 14 our customers with our tracker, but they were 15 options. It was our customer's decision on 16 how to engineer the electrical system used on 17 Voyager. 18 Q What were the cable management options 19 that you gave your customers? 20 A There were a couple. There were, you 21 know, solutions to address the string wiring 22 on Voyager in the form of a clip, a metal</p>	<p>39</p> <p>1 account for that in our pile design, in the 2 design of the foundations for that system, 3 for that Voyager tracker on that project 4 cite. The other cable management options, 5 you know, because on a solar power plant 6 there's a wide variety of cable management 7 needs, we had much less visibility to. 8 Q What were the structural considerations 9 that you needed to account for in your pile 10 design if your customer chose the CAB system? 11 A If the customer was deciding to use CAB, 12 the information we needed was the tension of 13 that cable, which necessitated the need to 14 kind of know maximum conductor weight between 15 span and the environmental loading conditions 16 for that particular cite, that would, you 17 know, impart force on that maximum kind of 18 cable quantity. 19 With that information we would then 20 derive the appropriate, you know, loads that 21 needed to be accounted for in our pile 22 design. Effectively design of the</p>
<p>38</p> <p>1 clip to help manage the string wires. Again, 2 that was a decision of our customers, but 3 that was an option provided. In addition, 4 for inter array or between trackers we 5 provided adequate mechanical clearance as 6 well as attachment location for a CAB system 7 between tracker rows. But again, it was, you 8 know, an option that our customers had to 9 make a decision around as they engineered 10 their project. 11 Q Did you have any insight into which of 12 these options your customers would choose? 13 MR. SHEA: Objection. To form. 14 A Yes. 15 Q What insight did you have into which 16 option your customers would choose? 17 A So the option that we had the most 18 insight into was whether or not they are 19 using a CAB system for in a row cable 20 management. The reason we had visibility to 21 that is because if they were choosing to use 22 a CAB system structurally, we needed to</p>	<p>40</p> <p>1 foundations. 2 Q What are the different foundational 3 designs that you offered at this time? 4 A There were three pile types on the 5 Voyager tracker. 6 There was the drive pile, it was called 7 the dry pile because that housed the actuator 8 that moved the tracker and that was the most 9 robust pile because that's where all the load 10 basically gets derived to, that's like the 11 main fixed point. 12 There were then what we called typical 13 piles, those were the most common type of the 14 foundation on a Voyager row. They were 15 typically the smallest pile sizes. 16 And then there were the damper piles. 17 The Voyager tracker deployed a damper to help 18 with resonance issues and those piles saw a 19 little more load as a result of the damper 20 than the typical pile. 21 Q How deep into the earth would you 22 typically drive the typical piles?</p>

<p>41</p> <p>1 MR. SHEA: Objection. Form. 2 Relevance. 3 A It's soil condition dependent. But I 4 would say on average the typical piles saw a 5 six to eight foot embedment. 6 Q What was the embedment for drive piles? 7 MR. SHEA: Objection. Form. 8 A Again, soil condition dependent, but I 9 would say on average eight to 10 foot of 10 embedment. 11 Q What was the embedment for damper piles? 12 MR. SHEA: Objection. Form. 13 A They soil condition dependent, but they 14 typically were the same embedment as the 15 typical piles. 16 Q How often were typical piles embedded 17 more than six to eight feet? 18 MR. SHEA: Objection. Form. 19 Relevance. 20 A The soil conditions of the project site 21 dictated that. It was uncommon. 22 Q How did the soil conditions impact how</p>	<p>43</p> <p>1 happens once a year. 2 During that conference FTC had on 3 display the Voyager tracker, and that's 4 effectively when FTC started marketing the 5 Voyager tracker's availability. 6 Commercial launch in the form of first 7 sales was spring of 2019. 8 Q Was the Voyager tracker commercially 9 successful? 10 A From -- in my opinion, yes, we did 11 500 megawatts in our first year of business, 12 which is a pretty big number. And then in 13 our second year of business, we did 14 2 gigawatts. So I would -- "commercially 15 successful" is a pretty vague term, but I 16 would define that as a commercial success. 17 Q Approximately what percentage of those 18 sales of the Voyager tracker did the customer 19 opt for the CAB system for cable management? 20 MR. SHEA: Objection. Form. 21 Foundation. 22 A I don't know the exact number. My guess</p>
<p>42</p> <p>1 deep each of these piles had to be embedded? 2 MR. SHEA: Objection. Relevance. 3 Beyond the scope. 4 A I'm not a licensed structural engineer, 5 so take this with a grain of salt, but very 6 loose soil, you know, sand, for instance, 7 doesn't offer a lot of structural support. 8 And so you have to go really deep to get that 9 structural support versus a site that's -- 10 call it granite, you know, if you're building 11 on a mountain or something, has a lot of 12 structural support, so you don't have to go 13 very deep. You can get that rigidity from 14 the soil, that structural support from the 15 soil with a very shallow embedment. 16 Q When did FTC commercially launch the 17 Voyager? 18 A In the fall of 2018, FTC attended the 19 SPI conference, which may be -- it may have 20 been named the RE Conference. They switched 21 names, but effectively it's the largest solar 22 industry trade show in the United States that</p>	<p>44</p> <p>1 would be approximately 80 percent. 2 Q Did the Voyager tracker make an economic 3 case for installing solar power plants in 4 territories that previously were not feasible 5 for solar power? 6 MR. SHEA: Objection. Form. Beyond 7 the scope. 8 A We marketed the Voyager tracker as, you 9 know, a single-axis tracking solution that 10 was going to help our customers lower cost, 11 improve yield and improve reliability. To 12 what extent that helped customers get into 13 new markets, I don't know. I'd be 14 speculating. 15 Q Did the Voyager tracker help your 16 customers lower cost, improve yield and 17 improve reliability? 18 MR. SHEA: Objection. Form. 19 Foundation. Beyond the scope. 20 A I can't speak to our customers' metrics, 21 but because our customers chose to use our 22 solution over alternatives, I would speculate</p>

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<p>45</p> <p>1 they have good reasons for doing so.</p> <p>2 Q In Paragraph 24 of your declaration, you</p> <p>3 mention a pile testing business. What does</p> <p>4 that mean?</p> <p>5 A As I previously mentioned, the soil</p> <p>6 conditions on a project site are critically</p> <p>7 important to the foundation design on that</p> <p>8 project site.</p> <p>9 There are a few ways of qualifying the</p> <p>10 soil conditions. One of them is through a</p> <p>11 geotechnical investigation. The other is</p> <p>12 through pile testing, where effectively you</p> <p>13 mobilize the site, you drive a whole bunch of</p> <p>14 piles in different locations to different</p> <p>15 depths, and then you pull on those piles with</p> <p>16 a force gauge, both laterally and in tension</p> <p>17 to qualify the strength of those soils.</p> <p>18 Q What do you mean by "mobilize the site"?</p> <p>19 A Locate the equipment and the personnel</p> <p>20 to the project site to conduct those</p> <p>21 activities.</p> <p>22 Q Was FTC testing different pile materials</p>	<p>47</p> <p>1 "standard steel H-piles"?</p> <p>2 A They were standard for solar.</p> <p>3 Q You left FTC Solar in 2023; is that</p> <p>4 right?</p> <p>5 A Correct.</p> <p>6 Q Why did you leave FTC solar?</p> <p>7 A I was let go as part of a reduction in</p> <p>8 force.</p> <p>9 MR. SWEENEY: I think now is probably</p> <p>10 a good time for a short break.</p> <p>11 (Whereupon, a recess was taken</p> <p>12 from 10:42 a.m. until 10:53</p> <p>13 a.m.)</p> <p>14 Q Welcome back, Mr. Bowman.</p> <p>15 In Paragraph 26 of your declaration, you</p> <p>16 stated you were required at SunEdison to be</p> <p>17 educated about and aware of the latest</p> <p>18 innovations, inventions and discoveries in</p> <p>19 the solar industry, correct?</p> <p>20 A That's correct.</p> <p>21 Q What do you mean by "innovations"?</p> <p>22 A Anything new to the industry as it</p>
<p>46</p> <p>1 in its pile testing business?</p> <p>2 MR. SHEA: Objection. Form.</p> <p>3 Relevance.</p> <p>4 A What do you mean by "pile materials"?</p> <p>5 Q The composition of the pile.</p> <p>6 MR. SHEA: Same objection.</p> <p>7 A We used -- there are standard H-piles</p> <p>8 in, you know, the construction steel</p> <p>9 industry. Those H-piles are pretty</p> <p>10 ubiquitous. We would test standard steel</p> <p>11 H-piles. I am not aware of any material</p> <p>12 variance of those. They were steel.</p> <p>13 Q I see. So the H-piles could be used in</p> <p>14 a variety of different industries; is that</p> <p>15 right?</p> <p>16 MR. SHEA: Objection. Relevance.</p> <p>17 A I'm not an expert on where H-piles are</p> <p>18 used, but my understanding is there's H-piles</p> <p>19 available. I know they're used in the solar</p> <p>20 industry. I don't know about their</p> <p>21 application in other industries.</p> <p>22 Q So why did you refer to them as</p>	<p>48</p> <p>1 related to the solar modules themselves,</p> <p>2 their efficiencies. As it related to the</p> <p>3 different structure products in the form of</p> <p>4 single-axis trackers, fixed-tilt systems,</p> <p>5 dual-axis trackers, the associated components</p> <p>6 necessary to support those systems, such as</p> <p>7 foundations.</p> <p>8 A lot of stuff in the power electronic</p> <p>9 space, inverters, transformers. Solar</p> <p>10 produces DC; we use AC on the grid. So those</p> <p>11 are pretty important components.</p> <p>12 Design softwares that would help better</p> <p>13 evaluate prospective sites, that would help</p> <p>14 better design projects when it came time to</p> <p>15 design and build a solar power plant.</p> <p>16 Devices that purportedly would help</p> <p>17 improve the efficiency of solar power plants,</p> <p>18 either through reducing temperature</p> <p>19 degradation on the modules, cleaning the</p> <p>20 modules to reduce soiling losses.</p> <p>21 So, you know, anything that would impact</p> <p>22 those four kind of key metrics I previously</p>

<p style="text-align: right;">49</p> <p>1 discussed: The cost of the solar power 2 plant, the yield or the efficiency of the 3 solar power plant, the reliability of the 4 solar power plant or the installability of 5 the solar power plant. Any technology being 6 developed to move any of those levers, it was 7 important I knew about. 8 I was basically the funnel for the 9 innovation team, but, you know, SunEdison was 10 a global company. We had hundreds of 11 engineers. Those hundreds of engineers were 12 instructed to feed me those ideas, whether 13 they're organic to SunEdison and it was an 14 engineer's idea or whether it was something 15 they came across at a conference, at a trade 16 show, et cetera, in the form of a third-party 17 new technology. They fed me those ideas; I 18 turned the crank. 19 Q Did any of those engineers propose to 20 you using a messenger wire for cable 21 management? 22 MR. SHEA: Objection. Form.</p>	<p style="text-align: right;">51</p> <p>1 Q Using a messenger wire to hang conductor 2 cable. 3 MR. SHEA: Same objections. 4 A When CAB's aboveground cable management 5 system was first introduced to me, it took 6 about a year and a half to qualify the 7 approval of use of that system on a solar 8 power plant due to a wide variety of factors 9 that are discussed in my paper. 10 I forget. What do we call this again? 11 This is the -- I forget the legal name for my 12 paper. 13 Q Your declaration. 14 A My declaration. 15 Q But just stepping back and asking you 16 personally, don't you think it's kind of a 17 simple idea to hang the wires aboveground? 18 MR. SHEA: Objection. Form. 19 Foundation. Beyond the scope. Asked 20 and answered. Calls for expert 21 testimony. 22 A I would not define it as simple</p>
<p style="text-align: right;">50</p> <p>1 A If you reference my paper, one of our 2 senior engineers -- he was a director -- he 3 was the first person to highlight the cable 4 management system that used a messenger wire 5 in, you know, the late 2013 time frame. 6 Q Prior to this engineer, no one at 7 SunEdison had proposed to you using a 8 messenger wire for cable management? 9 MR. SHEA: Objection. Form. 10 A That's correct. 11 Q Had any engineers, prior to the one you 12 just alluded to, proposed hanging wires for 13 cable management purposes? 14 MR. SHEA: Objection. Form. 15 A No. 16 Q It's a pretty simple solution, wouldn't 17 you say? 18 MR. SHEA: Objection. Form. Calls 19 for expert testimony. Beyond the 20 scope. 21 A I don't know what you're referring to as 22 a solution.</p>	<p style="text-align: right;">52</p> <p>1 personally. 2 Q You think that that's a complex concept? 3 MR. SHEA: Objection. Form. 4 Mischaracterizes the testimony. 5 Beyond the scope. Calls for expert 6 testimony. 7 A I mean, knowing what I know now, yeah, 8 you could say, oh, that system seems simple. 9 It was my job, it was my team's job to 10 improve solar power plants through different 11 cable management systems, through new 12 technologies, et cetera, et cetera. It 13 wasn't something that anybody on my team of 14 hundreds of engineers, thought of. 15 Q In Paragraph 29, you say that you led 16 your innovation department in investigating 17 alternative cable management solutions, what 18 time frame are you referring to here? 19 A So approximately in, call it early 20 summer of 2013, you know, it was apparent 21 that underground cable routing was expensive, 22 challenging, complicated. So that led our</p>

<p>53</p> <p>1 team to start investigating potential 2 alternatives to underground cable routing. 3 So I would say early summer of 2013, is when 4 we started evaluating alternatives in seeing 5 if we could improve underground cable 6 routing. 7 And then you know, all the way through 8 2015, you know, is kind of when we were able 9 to go to market with an alternative. So, you 10 know, close to two years. 11 Q What alternatives to underground cable 12 management were you investigating? 13 A So one, there's a wide variety of ways 14 to put cables underground. There's your 15 traditional cables and conduit. So you dig a 16 trench you put in a bunch of the PVC pipe, 17 you bury that trench, and then you can pull 18 your cables through that pipe, that was our 19 standard practice, but it was expensive and 20 time consuming and complicated. There was a 21 direct burying. Where basically you dig the 22 trench you install the cable and then you</p>	<p>55</p> <p>1 for a solar power plant because you have a 2 bunch of shady structures up that are 3 impeding the yield of your solar power plant. 4 So that wasn't really viewed as a viable 5 alternative in our industry. 6 Snake Tray was an option that we 7 previously discussed here today. It was 8 probably used on rooftop, but we did look at 9 its application on a ground-mount 10 utility-scale project. There were a variety 11 of challenges in cost associated with that, 12 so that wasn't really viewed as a viable 13 alternative. 14 I think that pretty well sums it up, in 15 terms of some of the activities going on at 16 that time. 17 Q So you mentioned that utility run cables 18 aboveground and that the problem with that 19 for solar was that it would shade the PV 20 panels; is that right? 21 A Correct. 22 Q No one on your team had the idea to put</p>
<p>54</p> <p>1 bury those cables in the trench. A lot more 2 cost effective, but also with its challenges 3 and there's a lot of concern within the 4 SunEdison community at the time of those 5 cables being damaged by, you know, rocks or 6 sharp objects that get backfilled adjacent to 7 those cables. 8 There were different technologies 9 available at the time for doing either or of 10 those underground utility options in the form 11 of equipment. For instance, there was a 12 really interesting kind of tractor-esque 13 piece of equipment that would dig the trench, 14 have the big reel of cables on it, lay the 15 cables and then backfill that trench in one 16 pass. So you know, that was something we 17 were looking at. 18 And then in terms of aboveground, we 19 were kind of combing the industry for 20 different options, right. Utilities run 21 cables aboveground all the time on utility 22 poles. That is something that's problematic</p>	<p>56</p> <p>1 the cables underneath the panels, but still 2 aboveground. 3 MR. SHEA: Objection to form? 4 A Not at that time. 5 Q You mentioned in your declaration that 6 cable trays were not as effective. 7 What do you mean by effective? 8 A The -- again, we were looking at 9 alternatives to underground cable routing so 10 that was predominantly between tracker rows 11 or throughout the site. The cable trays -- 12 when I say not effective, the original 13 concept of cable trays were to sit on a 14 rooftop and that rooftop would provide the 15 structural support. In the solar power plant 16 when your talking 20 feet between tracker 17 rows, you can't just put those cable trays on 18 the ground for a variety of reasons, so you 19 need a support structure and that support 20 structure between rows to support those cable 21 trays was really what was viewed as not 22 effective.</p>

<p>57</p> <p>1 Q Why was the support structure between 2 the rows not effective for cable tray? 3 MR. SHEA: Objection. Form. 4 A Again, cable tray was designed initially 5 for commercial rooftops. Where that rooftop 6 would provide the structural support. We had 7 to engineer that structural support between 8 the rows because we didn't have that rooftop 9 to provide the structural support. So that 10 was viewed as just not effective to provide 11 additional support structure to then be able 12 the use a cable tray. 13 Q I see. So using cable tray would 14 necessitate the need for an additional pile 15 between those rows; is that fair? 16 A Yeah. 17 MR. SHEA: Objection. Form. Beyond 18 the scope. 19 Q And without that additional pile, would 20 that cable tray sag too much to be effective? 21 MR. SHEA: Objection. Form. Beyond 22 the scope. Calls for technical</p>	<p>59</p> <p>1 power cables to power various devices on the 2 site, most common being the tracker itself. 3 And communication data cables to communicate 4 data from the smart devices on the solar 5 power plant. In addition to the grounding 6 cables that are needed to ground the site. 7 So the cable trays as I mentioned, were used 8 for rooftop applications that had a lot less 9 kind of cable requirements than what we 10 needed on a utility scale solar power plant 11 with jumpers. 12 Q Sorry. What was the specific cable you 13 just mentioned that's part of the tracker 14 itself? 15 MR. SHEA: Objection to form. 16 A I mentioned five different cable types 17 that are commonly seen on a utility scale 18 solar power plant with trackers. There's 19 auxiliary AC power needs for the tracker as 20 well as other devices on the site. There are 21 data cables. There are varying forms of DC 22 cables, the string wire and the combinable</p>
<p>58</p> <p>1 opinion. 2 A Yeah, I can't answer that because we 3 never prototyped it. We never kind of took 4 it to that step. It was just viewed as too 5 much work for us to also design the structure 6 just to support cable tray. 7 Q Does the messenger system need an 8 additional pile between the rows to support 9 the conductor cables? 10 MR. SHEA: Objection. Form. Beyond 11 the scope. Calls for a technical 12 analysis opinion. 13 A In my experience, when I've seen the CAB 14 system used, no. 15 Q In that same Paragraph 29, the last 16 sentence, you say the cable trays provided 17 for less flexibility in managing the various 18 kinds of cable, what do you mean by that? 19 A There are a variety of types of cables 20 required on a solar power plant in the form 21 of DC string wiring, in the form of DC 22 combinable runs, in the form of auxiliary AC</p>	<p>60</p> <p>1 runs, and then there's grounding cables. 2 Q Which of those cables are specifically 3 attributable to the use of a tracker? 4 MR. SHEA: Objection. Form. 5 A It varies depending on the type of 6 tracker, but commonly auxiliary AC, as well 7 as data. 8 Q So auxiliary AC and data cables create 9 an additional cable management need when 10 using a tracker; is that fair? 11 MR. SHEA: Objection. Form. Beyond 12 the scope. 13 A It very much depends on the timing and 14 the type of tracker. Timing is important 15 because this industry evolved pretty rapidly 16 and so the solutions that were available 17 in 2010 are quite a bit different than the 18 solutions that were available in 2015 and 19 what's currently available now. And the type 20 of tracker matters a lot, too. In terms of 21 the manufacturer and what they require. So 22 it's a hard question to generally answer</p>

<p>61</p> <p>1 without more specifics.</p> <p>2 Q In Paragraph 32, of your declaration you</p> <p>3 mention prior to 2014 bids for solar projects</p> <p>4 primarily used direct bury trenching for</p> <p>5 cable management with cable trays being used</p> <p>6 in a very limited circumstances. When you</p> <p>7 say that these projects primarily used direct</p> <p>8 bury are you speaking about -- withdrawn.</p> <p>9 What do you mean by "primarily" in</p> <p>10 Paragraph 32?</p> <p>11 A I mean, the majority of projects we had</p> <p>12 quoted from EPCs would quote a means of</p> <p>13 direct bury cabling for inner array</p> <p>14 electrical.</p> <p>15 Q What did the minority of projects that</p> <p>16 you had quoted from EPCs include for cable</p> <p>17 management?</p> <p>18 MR. SHEA: Objection. Form.</p> <p>19 A The minority of the projects referenced,</p> <p>20 I believe were sites with a lot of -- with</p> <p>21 challenging soil conditions where digging a</p> <p>22 trench was going to be very prohibitive in</p>	<p>63</p> <p>1 MR. SHEA: Objection. Form.</p> <p>2 Relevance. Beyond the scope.</p> <p>3 A Would you define system?</p> <p>4 Q Sure. I can rephrase it. Was this the</p> <p>5 only instance in which SunEdison ever tested</p> <p>6 and evaluated a new component in the field?</p> <p>7 MR. SHEA: Objection. Form. Beyond</p> <p>8 the scope.</p> <p>9 A No. It was very common for us to</p> <p>10 prototype new technologies at that facility</p> <p>11 we had, it was specifically designed to test</p> <p>12 new technologies.</p> <p>13 Q By very common, how many times a year</p> <p>14 would you approximate SunEdison did this?</p> <p>15 MR. SHEA: Objection. Relevance.</p> <p>16 Beyond the scope.</p> <p>17 A I personally would be out there six</p> <p>18 times a year. There were a lot of tests</p> <p>19 happening independently of the design and</p> <p>20 engineering teams innovation program.</p> <p>21 Q Why did SunEdison test and evaluate</p> <p>22 prototypes of new components?</p>
<p>62</p> <p>1 that you would have to be effectively</p> <p>2 blasting rock. For some of those</p> <p>3 applications we would receive quotes for</p> <p>4 alternative solutions defined by the EPC to</p> <p>5 go in underground.</p> <p>6 Q What were those alternative solutions?</p> <p>7 A At the time, because it was the only</p> <p>8 option we viewed as, you know, where there</p> <p>9 was technology available was cable trays.</p> <p>10 Q At the time there were no other</p> <p>11 alternative solutions beyond cable tray for</p> <p>12 aboveground cable management?</p> <p>13 MR. SHEA: Objection. Form.</p> <p>14 Foundation. Beyond the scope.</p> <p>15 A Not that we were aware of.</p> <p>16 Q In 2014, SunEdison tested and evaluated</p> <p>17 a prototype of the CAB system; is that right?</p> <p>18 A That's correct.</p> <p>19 MR. SHEA: Objection. Form.</p> <p>20 Q Was this the first time that SunEdison</p> <p>21 had tested and evaluated a prototype of a new</p> <p>22 system?</p>	<p>64</p> <p>1 MR. SHEA: Objection. Form. Beyond</p> <p>2 the scope.</p> <p>3 A It was a common part of the vetting</p> <p>4 process for new technologies, new products.</p> <p>5 Q What types of things were you vetting?</p> <p>6 MR. SHEA: Objection. Form.</p> <p>7 A It very much depended on the product and</p> <p>8 technology we were testing, but again, those</p> <p>9 four metrics of cost, reliability,</p> <p>10 efficiency, installability, were, you know,</p> <p>11 the big metrics we looked at for any new</p> <p>12 technology.</p> <p>13 Q Would SunEdison ever employ a new</p> <p>14 product or technology without performing this</p> <p>15 testing?</p> <p>16 MR. SHEA: Objection. Form. Beyond</p> <p>17 the scope. Relevance.</p> <p>18 A There were times where a real world</p> <p>19 commercial project would be deemed a test</p> <p>20 facility if the risks were deemed tolerable.</p> <p>21 So I can't say that every new technology</p> <p>22 developed by SunEdison was prototyped at</p>

<p>65</p> <p>1 Solar Tech, but in general, before investing 2 millions of dollars into a power plant with a 3 new technology, there was an AVL process, 4 which is short for approved vendor list. And 5 we could not procure new technologies, new 6 parts from new vendors without going through 7 that AVL approval process. Sometimes that 8 AVL approval process necessitated 9 prototyping, other times it did not. That 10 was kind of the frame work in which SunEdison 11 would approve new vendors, new technologies, 12 you know, et cetera.</p> <p>13 Q I see. So it's fairly common for 14 SunEdison to perform these types of tests and 15 evaluations; is that fair?</p> <p>16 MR. SHEA: Objection. Form. 17 Mischaracterizes the testimony. 18 Beyond the scope.</p> <p>19 A That's correct.</p> <p>20 Q Who paid for the 2014 SunEdison CAB 21 system prototype?</p> <p>22 MR. SHEA: Objection. Form.</p>	<p>67</p> <p>1 Q Were all those at Solar Tech?</p> <p>2 A The majority were at Solar Tech. 3 Sometimes just to shipping or geographical 4 constraints we would go to an alternative 5 site.</p> <p>6 Q How did SunEdison determine which 7 products to prototype at an outdoor testing 8 and demonstration facility?</p> <p>9 MR. SHEA: Objection. Form. 10 Relevance. Beyond the scope.</p> <p>11 A There were, you know, hundreds of new 12 ideas and innovations at any given time. The 13 ones that were deemed to have the most impact 14 would have more detailed studies done. If 15 those studies showed that there was enough 16 opportunity, then the VP of engineering would 17 give approval to conduct prototyping.</p> <p>18 Q Did SunEdison test and evaluate a 19 prototype of the CAB system because it 20 believed that the CAB system would work?</p> <p>21 MR. SHEA: Objection. Form.</p> <p>22 A When we were first introduced to the CAB</p>
<p>66</p> <p>1 A SunEdison.</p> <p>2 Q How much did SunEdison pay for that 3 prototype?</p> <p>4 A I'm not an accountant so what I'm saying 5 is kind of speculation, but it was in the 6 tens of thousands, especially if you include 7 the SunEdison engineering labor components.</p> <p>8 Q If you included the SunEdison 9 engineering and labor components would it be 10 more than tens of thousands?</p> <p>11 MR. SHEA: Objection. Form. 12 Foundation.</p> <p>13 A I'm not aware of everybody's salaries 14 involved, so I'm speculating with my answer, 15 but you know, it was substantial labor 16 investment. A week of half a dozen people's 17 time.</p> <p>18 Q While you were at SunEdison, how many of 19 these prototypes did you oversee?</p> <p>20 MR. SHEA: Objection. Relevance. 21 Beyond the scope.</p> <p>22 A Dozens.</p>	<p>68</p> <p>1 system, it was viewed as novel and a 2 potential good solution to underground 3 utilities that would have a big impact on 4 those levers I mentioned of cost, 5 reliability, installability and yield 6 efficiency. You know, that initial 7 evaluation, which basically took place 8 between January of 2014 and that summer of 9 2014, is what lead SunEdison to invest in, 10 you know, doing prototyping.</p> <p>11 Q Did SunEdison propose any modifications 12 to the CAB system after this prototype?</p> <p>13 MR. SHEA: Objection. Form.</p> <p>14 A No. You know, we defined, you know, our 15 need of the system, and, you know, the CAB 16 team designed a product to suit that need. 17 And when I refer to "need," I mean cable 18 requirements.</p> <p>19 Q What were the cable requirements that 20 you gave CAB?</p> <p>21 A So, again, this is time relevant, so, 22 you know, 2014 time frame as well tracker</p>

<p>69</p> <p>1 relevant. At that time we were using our 2 AP90 tracker as well as the Nextracker 3 system. 4 And so the needs were defined by those 5 two systems as they were specked in that 2014 6 time frame. And so we had a need for 7 auxiliary AC cable, data cable and a variety 8 of DC conductors to be routed in an array 9 between trackers. 10 Q Did CAB provide all of the materials 11 used in that prototype? 12 MR. SHEA: Objection. Form. 13 A They did not. CAB provided their 14 system. SunEdison provided all the other -- 15 all the cable, all the combiner boxes, all 16 the conduit to conduct the prototype as -- as 17 the design of experiment required. 18 Q What components did CAB provide for that 19 prototype? 20 MR. SHEA: Objection to form. 21 A They provided their system, which 22 consisted of structural brackets that</p>	<p>71</p> <p>1 Q Was the need for an equipment grounding 2 conductor factored into SunEdison's testing 3 evaluation of the CAB system. 4 MR. SHEA: Objection. Form. 5 A No. The CAB system we were evaluating 6 was in the scope of an alternative to 7 underground electrical utilities. 8 Q Did SunEdison evaluate any third-party 9 components besides SunEdison and CAB 10 components in this mock-up? 11 MR. SHEA: Objection. Form. 12 A The mock-up included the CAB system; 13 various cables that were required on our 14 project sites at the time that were provided 15 by third parties; various electrical 16 components, such as combiner boxes, that were 17 provided by third parties. 18 Q If it included an equipment grounding 19 conductor in this prototype, would that have 20 increased the cost of using the CAB system? 21 MR. SHEA: Objection. Form. Beyond 22 the scope. Calls for technical</p>
<p>70</p> <p>1 affixed, you know, our tracker's piles to 2 messenger wire. They provided the messenger 3 wire itself, the dead ends for the messenger 4 wire as well as their cable hangers. 5 Q Did CAB provide an equipment grounding 6 conductor for that prototype? 7 MR. SHEA: Objection. Form. 8 A No. 9 Q Was it your view that the CAB system 10 would require an equipment grounding 11 conductor? 12 MR. SHEA: Objection. Form. Beyond 13 the scope. Calls for technical 14 analysis and conclusions. 15 A The solar power plant would require an 16 equipment grounding conductor. That would be 17 defined as the part of an EOR's, engineer of 18 record's, design of that power plant. So 19 it's not that a CAB system necessitates an 20 equipment grounding conductor. The power 21 plant necessitates an equipment grounding 22 conductor, which needs to be engineered.</p>	<p>72</p> <p>1 analysis or opinion. 2 A Can you ask that question again. 3 Q Sure. 4 MR. SWEENEY: Can the court reporter 5 read that question back. 6 (Whereupon, the requested 7 testimony was read by the court 8 reporter.) 9 MR. SHEA: Same objections. 10 A No. I don't believe it would have 11 increased the cost of the CAB system. It 12 would have... 13 Q Would it have increased the cost of 14 installing the prototype? 15 MR. SHEA: Objection. Form. Calls 16 for technical analysis or opinion. 17 Calls for speculation. 18 A If one of the exhibits that was 19 submitted lists the materials and the cables 20 used for that prototype, that's the reference 21 I would point you to. I don't believe an 22 equipment grounding conductor was provided as</p>

<p>73</p> <p>1 part of the prototype testing. So assuming 2 that we included that, it would have 3 increased the cost of the prototype testing 4 because we would have had to procure that 5 cable. 6 Q And would you have had to pay for 7 additional labor to install that cable? 8 A Yes. There'd be a labor component. 9 Q In Paragraph 36 of your declaration, you 10 state that CAB's aboveground cable management 11 system was not only a practical application. 12 What do you mean by "practical 13 application"? 14 A Just that it was a viable alternative to 15 underground utilities. It appeared to be a 16 good solution as an alternative to 17 underground utilities. 18 Q Why is that? 19 A It was -- so when going between rows -- 20 you know, I had previously mentioned 21 there's -- you need to be under the array, 22 under the level of the solar modules so as</p>	<p>75</p> <p>1 utility-scale power plant. And there were a 2 wide variety of complexities that needed to 3 be considered in adopting a CAB -- the CAB 4 system to the utility-scale power plant with 5 the tracker. 6 I'm not an electrical engineer, a 7 licensed electrical engineering, but a wide 8 variety of NEC code assessments needed to be 9 done to assess the approval of use of the CAB 10 system on a utility-scale power plant. I'm 11 also not a licensed structural engineer, but 12 there were Uniform Building Code applications 13 that needed to be assessed with the use of a 14 CAB system on a solar power plant. 15 In terms of how is the environment going 16 to effect the CAB system and the associated 17 tracker that it's attached to. So, you know, 18 how does wind, snow, seismic impact the 19 system? What are the associated loads? 20 What's the sag going to be between spans and 21 associated tension needed on the cables? How 22 do we use the, you know, the structural</p>
<p>74</p> <p>1 not to shade the solar modules. The solar 2 modules' job is to collect as much sun as 3 possible. Shading them is kind of a big 4 no-no in the industry. 5 The messenger wire provided a structural 6 support between the rows. So, you know, it 7 was not reliant on any alternative support 8 needs in that we could use the same piles 9 that were supporting the structure to be the 10 support for that messenger cable. And it -- 11 and the hangers themselves were designed in a 12 way to allow us to meet all our cabling needs 13 between rows. 14 Q In Paragraph 42 of your declaration, you 15 mention that SunEdison performed an 16 additional six months of work to vet all the 17 code issues, reliability concerns and 18 contingencies plans if the reliability 19 concerns manifested in field applications. 20 What do you mean by "vet"? 21 A So the CAB system was a new technology 22 to SunEdison and a very new application to a</p>	<p>76</p> <p>1 engineering code to assess the system? That 2 all needed to be defined. 3 So basically the term "vet" is flesh out 4 all those questions, you know, provide 5 answers in a new rule book for how to design 6 a power plant utilizing CAB. 7 Q Was it common for SunEdison to test 8 environmental impacts on products prior to 9 commercializing them? 10 MR. SHEA: Objection. Form. Beyond 11 the scope. Relevance. 12 A Could you repeat that question. 13 Q Was it common for SunEdison to test 14 environmental impacts on products prior to 15 commercializing them? 16 MR. SHEA: Objection. Form. Beyond 17 the scope. Relevance. 18 A It depended on the product. But, you 19 know, the intended design life of these power 20 plants is 25, 30 years. So depending on the 21 products and its use in that power plant, it 22 needs to survive whatever environment it's in</p>

<p>77</p> <p>1 on that power plant for the duration of that 2 time. 3 Q What did SunEdison's testing of cable 4 jackets in plastics include? 5 A Are you referring to the cable jackets 6 themselves or a cable jacket in plastic? I'm 7 not really sure what you're asking. 8 Q Sure. I'm referring to whatever it is 9 you're referring to in your declaration at 10 Paragraph 42, second to last sentence. 11 A Yeah, so there's a constant concern 12 about how UV is going to, over time, degrade 13 either exposed cables or any exposed plastic, 14 you know, or polymer. Polymers don't like 15 UV. 16 And so, you know, making sure that 17 performing an assessment of sunlight-exposed 18 polymers is an important aspect of making 19 sure you have a reliable power plant, whether 20 that's a cable and its installation, whether 21 that's, you know, a CAB hanger and its 22 dielectric material or other polymer exposed</p>	<p>79</p> <p>1 Q Did SunEdison explore the use of any 2 hangers from third parties besides CAB? 3 A No. 4 Q Did SunEdison test different plastic 5 chemical compositions for the cable jackets? 6 MR. SHEA: Objection. Beyond the 7 scope. 8 A No. But we would rely on those similar 9 types of test reports from the cable 10 manufacturers. 11 Q In Paragraph 43 you mention that 12 SunEdison relied on a white paper prepared by 13 Bill Brooks where he concluded the CAB system 14 was NEC compliant, correct? 15 A Yeah, as I stated in that paragraph, the 16 white paper provided by Bill Brooks was a 17 comfort to SunEdison that use of the CAB 18 system was going to be feasible within the 19 rules of the NEC. That being said, you know, 20 the SunEdison engineering team and licensed 21 engineers performed their own assessment on 22 how to apply the NEC code book to a CAB</p>
<p>78</p> <p>1 to the sun. 2 Q So the coating on CAB hangers was an 3 important aspect of using those hangers in 4 the field? 5 MR. SHEA: Objection. Form. 6 A The reliability of that coating was a 7 due diligence item that we wanted to assess 8 to make sure that, you know, these CAB 9 hangers were going to be a valid, reliable 10 solution over a long period of time. 11 Q And what did that due diligence on the 12 coating of the CAB hangers reveal? 13 A This was ten years ago, so I don't 14 remember the specifics, but studies were 15 performed by CAB in accordance with 16 Underwriter Laboratories standards for UV 17 tolerance. And you would have to look at 18 those reports to see what they revealed. But 19 I do know that it was a green enough light 20 for us to, you know, feel comfortable using 21 those hangers with their dielectric material 22 exposed.</p>	<p>80</p> <p>1 system. 2 Q So SunEdison didn't need the Brooks 3 white paper to make that determination, did 4 it? 5 MR. SHEA: Objection. Form. 6 Mischaracterizes the testimony. 7 A That's correct. You know, and SunEdison 8 had its own engineering team with licensed 9 engineers who would stamp and seal project 10 designs for a given project. It's on the 11 responsibility of that individual engineer to 12 perform all the codal checks associated with 13 different components and aspects of the solar 14 power plant. 15 Just because there's a white paper out 16 there doesn't mean that it's a green light on 17 every project. That being said, the white 18 paper was an important element early on in 19 the vetting of the CAB system to, you know, 20 show that, yes, you know, we -- this system 21 can be -- you know, can potentially be 22 code-compliant.</p>

<p>81</p> <p>1 Q On Page 20 of your declaration, you 2 state that FTC Solar deferred to the owner of 3 the solar power plant to select which 4 grounding method and cable management method 5 it employed, correct? 6 A Paragraph 20? 7 Q No, Page 20, so footnote -- 8 A Okay. Yeah, so, again, it -- FTC Solar, 9 our scope to the customer was to provide a 10 tracker. However, it was the customer's 11 scope to engineer the power plant and to lead 12 the electrical aspects of that power plant. 13 Q What other grounding systems did FTC 14 Solar recommend besides CAB's? 15 MR. SHEA: Objection. Foundation. 16 Beyond the scope. 17 A There's a wide variety of grounding 18 systems needed on a power plant. FTC 19 provided a mechanical clip that I previously 20 mentioned that affixed the module to our 21 tracker. That clip also was a UL-certified 22 device for grounding. That wasn't an option,</p>	<p>83</p> <p>1 module to our tracker, and that method also 2 happened to be the grounding device. So 3 there is no alternative. If you wanted to 4 attach a module to a tracker, you needed that 5 clip to mechanically attach it. That clip 6 also was the grounding path from the module 7 frame to the rail. 8 Q Can you describe the grounding clip for 9 me? 10 A It basically was a spring-loaded box. 11 The spring was a little bent piece of metal 12 that would have to be physically pressed into 13 two pieces of metal. One piece of metal 14 being the module frame, the other piece of 15 metal being our module rail. As you pressed 16 it in, that little thin piece of metal had 17 teeth on it. It would bite into the anodized 18 aluminum module frame to provide the 19 grounding path and that continuity. 20 Q Earlier just now you testified about a 21 grounded grid, what is that? 22 A So grounding is a very important aspect</p>
<p>82</p> <p>1 but that is a grounding system that FTC 2 provided its customers as part of our tracker 3 scope. 4 We also -- beyond that, there were no 5 other recommendations for -- beyond that, 6 there were three approved -- UL-approved 7 grounding -- ways to ground FTC tracker to a 8 customer's grounding system on the power 9 plant. You could use a UL-approved lug on 10 the dry pile. You could use a UL-approved 11 grounding screw and lug on a typical pile to 12 bond the torque tube to a typical pile and 13 then that typical pile to the ground grid. 14 Or you could use a UL-approved grounding 15 screw direct from the torque tube to the 16 customer's grounding system. 17 Q Why was the UL-certified clip not an 18 option for grounding? 19 MR. SHEA: Objection. Form. Beyond 20 the scope. Calls for technical 21 opinion. 22 A There was only one method to attach the</p>	<p>84</p> <p>1 of the solar power plant design for namely 2 safety reasons, so that if there is a fault, 3 an electrical fault, you know, anywhere on 4 the site it doesn't become a life safety risk 5 in addressing that fault. And basically the 6 ground grid is a series of conductors that 7 are engineered to take in fault current away 8 from that potential fault and bring it to 9 zero volts, which is the ground. So there's 10 not going to be any high voltage or faults 11 that somebody can accidentally touch and, you 12 know, shock themselves. 13 And the ground grid I reference is 14 referencing that grounding systems, which 15 sole function is to reduce any fault voltage 16 to zero, which is the ground. 17 Q So is ground grid the same as grounding 18 system? 19 A Yeah. I would say they're referring to 20 the same thing. 21 Q You mentioned using an approved lug, how 22 does the approved lug work?</p>

<p>85</p> <p>1 MR. SHEA: Objection. Beyond the 2 scope. 3 A So it would attach to the pile, the 4 foundation of the tracker on one side and 5 then on the other side that would attach to 6 the grounding cable. 7 Q And where would that grounding cable go? 8 MR. SHEA: Objection. Beyond the 9 scope. 10 A Depends on how that project was 11 designed. But the end place it would go 12 typically, again, it depends on how -- 13 aspects of the project, typically it would go 14 to the central inverter that the tracker was 15 feeding DC electrical power to. And at that 16 central inverter there would be a main ground 17 point that all the grounding system is wired 18 to. 19 MR. SHEA: Bobby, we've been going a 20 little over an hour. 21 MR. SWEENEY: Yeah, I'm just about the 22 wrap up this line of questioning.</p>	<p>87</p> <p>1 us which of those three options were being 2 used. Nor did we have insight into the final 3 grounding grid or grounding system employed 4 by the customer to tie all the different 5 aspects of this solar power plant back to a 6 central point for grounding purposes. 7 Q I see. So you don't know if customers 8 of FTC actually used CABs integrated 9 grounding systems; is that right? 10 MR. SHEA: Objection. Form. 11 Foundation. 12 A That's correct. 13 MR. SWEENEY: With that we pass the 14 witness? 15 MR. SHEA: Okay. We'll take a quick 16 break say 10 minutes, say back at 17 12:15. 18 MR. SWEENEY: Sure. 19 MR. SHEA: All right. 20 (Whereupon, a recess was taken 21 from 12:03 p.m. until 12:18 22 p.m.)</p>
<p>86</p> <p>1 MR. SHEA: All right. 2 MR. SWEENEY: Won't be much longer. 3 Q What was the most popular grounding 4 method employed by Voyager customers? 5 MR. SHEA: Objection. Form. Beyond 6 the scope. Foundation. 7 A As it was not part of FTC's 8 responsibility to perform that aspect of the 9 design, I really can't comment. 10 Q FTC didn't have any insight into which 11 grounding method its customer used with the 12 tracker? 13 MR. SHEA: Objection. Form. 14 Foundation. 15 A We provided, as I mentioned, three 16 options for grounding an FTC tracker to a 17 customer's ground grid. They were dictated 18 in our install manual, and all three options 19 were UL underwriter, laboratory -- 20 laboratories approved for use of grounding 21 the system. 22 We didn't require our customers to tell</p>	<p>88</p> <p>1 MR. SHEA: On the record. We don't 2 have any questions. 3 COURT REPORTER: Same orders as 4 before? 5 MR. SHEA: Yes. 6 MR. SWEENEY: Yes. 7 (Whereupon, this examination was 8 concluded at 12:19 p.m.) 9 10 11 _____ 12 MITCHEL BOWMAN 13 14 15 Subscribed and sworn to 16 before me on this ____ day 17 of _____, _____. 18 _____ 19 Notary Public 20 21 22</p>

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Transcript of Mitchel Bowman
Conducted on October 11, 2024

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<div>90</div> <div>1 CERTIFICATE OF SHORTHAND REPORTER - NOTARY PUBLIC</div> <div>2</div> <div>3 I, KIARA MILLER, Certified Reporter</div> <div>4 and Notary Public within and for the State of</div> <div>5 New York do hereby certify:</div> <div>6 That MITCHEL BOWMAN, the</div> <div>7 witness whose deposition is hereinbefore set</div> <div>8 forth, was duly sworn by me before the</div> <div>9 commencement of such deposition and that such</div> <div>10 deposition was taken before me and is a true</div> <div>11 record of the testimony given by such</div> <div>12 witness.</div> <div>13 I further certify that the adverse party,</div> <div>14 CAMBRIA COUNTY ASSOCIATION FOR THE BLIND AND</div> <div>15 HANDICAPPED, INC., was represented by counsel at</div> <div>16 the deposition.</div> <div>17 I further certify that the deposition of</div> <div>18 MITCHEL BOWMAN occurred remotely via</div> <div>19 mobile videoconference on Friday, October 11,</div> <div>20 2024, commencing at 9:31 a.m. to 12:19 p.m.</div> <div>21</div> <div>22</div>	

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