

1 BY MR. ANNESSER:

2 Q. Have you retained Mr. Lomax individually?

3 A. No.

4 Q. Are you currently employed by any of the  
5 defendants in this case?

6 A. No.

7 Q. Okay. Can you please state your full name  
8 for the record?

9 A. **My name is Joseph Alan Murray.**

10 Q. And what is your home address?

11 A. **2646 Saint Marys Street, Raleigh, North**  
12 **Carolina 27609.**

13 Q. Your business address or addresses?

14 A. **I have a home office now at my home address.**  
15 **And I also have an office that's under construction at**  
16 **5107 Unicon Drive, Unit K in Wake Forest, North**  
17 **Carolina.**

18 Q. Are you currently employed?

19 A. **I started a new business after Industrial**  
20 **Heat shut down.**

21 Q. Industrial Heat is shut down?

22 A. **They ceased to have an engineering operation,**  
23 **so they let all of the engineers go.**

24 Q. What do you mean they ceased to have an  
25 engineering operation?

1           A.       So we had a group of, I don't know, five or  
2       six engineers that were working at the company. And as  
3       effective the end of October, they gave all of the  
4       engineers a severance package and released us, paying us  
5       through the end of the year. And then subsequently we  
6       had to agree to support their ongoing activities,  
7       as-needed basis for pay if needed.

8           Q.       Have you provided any services to Industrial  
9       Heat after October 2016?

10          A.       Yeah. Obligated to from October through  
11       December, and I did I would say very little. And then  
12       in January there were a few questions, and then this  
13       month in preparation for the deposition there were a lot  
14       more questions.

15          Q.       Okay. What was the amount of your severance  
16       package?

17          A.       It was pay and benefits through the end of  
18       the year, so for November and December. It did not  
19       include any leave on the books. That was just  
20       terminated.

21          Q.       The question was how much.

22          A.       How much money?

23          Q.       Yes.

24          A.       I, I don't know, two months worth of salary.

25          Q.       What were you being paid at Industrial Heat?

1           A.       \$200,000 a year.

2           Q.       What benefits did you receive?

3           A.       Medical, 401(k), short-term, long-term  
4 disability, leave. Probably a few other things. Oh,  
5 there was a life insurance policy, kind of a standard  
6 life insurance policy.

7           Q.       Now, you said that you've started your own  
8 new business?

9           A.       Yes.

10          Q.       What's the name of that business?

11          A.       0 Base Design.

12          Q.       What does it do?

13          A.       Engineering services. I'm writing SBIR  
14 proposals, working with some other primarily  
15 defense-related companies.

16          Q.       I'm sorry. SBI proposals?

17          A.       SBIR. Small business innovation research  
18 contracts.

19          Q.       What is that?

20          A.       It's a, it's a small business contract that  
21 the federal government offers to anybody. It's an open  
22 solicitation. They occur anywhere from one to three  
23 times a year by all of the various groups within the  
24 department -- within the federal government.

25          Q.       Okay. Now, you said you did engineering

1 services. What engineering does this new company  
2 provide?

3 **A. Mechanical engineering, systems engineering,**  
4 **system architecture, design type work.**

5 Q. Okay. What is, can you define those for me?  
6 What is mechanical engineering as opposed to systems  
7 engineering?

8 **A. So mechanical engineering is normally the,**  
9 **the study of mechanical designs and elements, the**  
10 **creation of designs, fluid mechanics, thermodynamics,**  
11 **heat transfer, various other elements. System design is**  
12 **normally a broader multidisciplinary function that**  
13 **includes mechanical engineering, electrical engineering,**  
14 **computer engineering, overlooking large systems that may**  
15 **encompass functionality from all those areas.**

16 Q. What engineering projects have you worked on  
17 since starting this business, 0 --

18 **A. Base Design.**

19 Q. -- Base Design?

20 **A. I have been working on nanocomposite thin**  
21 **film coatings with another company for automotive and**  
22 **reverse osmosis desalinization proposals. I have been**  
23 **working on a proposal for an unmanned aircraft. I have**  
24 **worked on proposals for coatings associated with**  
25 **unmanned autonomous vehicle engines. I have worked on**

1 some simulation work related to helicopter applications;  
2 specifically, rotor blade interaction with, with  
3 particulates in unimproved landing and takeoff sites.

4 Q. Okay. Now, you said you've worked on  
5 proposals for these things?

6 A. Yes.

7 Q. What do you mean by a proposal for these  
8 things?

9 A. So in most of these areas you have to propose  
10 the work, get -- gain funding, and then have the work  
11 put on contract before you can actually get the work.

12 Q. Have you gained funding for any of those  
13 projects?

14 A. We have, I have one that has been awarded.  
15 The contract not has actually -- that's not true. Yes,  
16 I have one that has been awarded. The contract actually  
17 just came in this week. And another one that the  
18 contract is due in the next few weeks, the contract has  
19 been awarded. They're just putting it through, the  
20 money through on the vehicles.

21 Q. So as of this date, you have worked on the  
22 proposals, but you have not done the actual engineering  
23 or mechanical engineering or systems engineering side of  
24 the project, correct?

25 A. No. The proposal process involves an

1     **extensive amount of engineering to submit with the**  
2     **proposal to be selected and made eligible to be awarded.**

3           Q.     What is your job title at 0 Base Design?

4           A.     **Principal.**

5           Q.     How many employees does it have?

6           A.     **Two.**

7           Q.     Who is other than yourself? I assume you're  
8     one of the two?

9           A.     **Yes.**

10          Q.     Okay. Who is the other employee?

11          A.     **My wife.**

12          Q.     Okay. Is she an engineer?

13          A.     **No, she's not.**

14          Q.     What does she do?

15          A.     **She's doing administrative.**

16          Q.     So you're the only engineer with the company?

17          A.     **At this point, yes.**

18          Q.     Have you ever provided expert testimony  
19     before?

20          A.     **No.**

21          Q.     Have you ever been determined to be an expert  
22     by any court?

23          A.     **No, not that I'm aware of.**

24          Q.     What do you bill for your services?

25          A.     **What do I bill?**

1 Q. Yeah. How much?

2 A. An hourly rate? 150 or \$175 an hour.

3 Q. What are you being paid, sir, for your  
4 services that you're providing to Industrial Heat now?

5 A. \$175 an hour.

6 Q. Is your company, O Base Design, part of any  
7 professional organizations?

8 A. No.

9 Q. Are you part of any professional  
10 organizations?

11 A. Not presently.

12 Q. Have you been within the last three years?

13 A. Yes.

14 Q. Which organization?

15 A. I have been a member of ASME, a member of  
16 SPIE, the Society of Photographic and, and Imaging  
17 Engineering, and the American Physical Society.

18 Q. What is ASME?

19 A. American Society For Mechanical Engineers.

20 Q. Why are you no longer a member of that?

21 A. Just because I, I changed addresses and never  
22 renewed at my new address.

23 Q. Okay. What about the society for -- I'm  
24 sorry, SPIE?

25 A. Yeah. The, I, I am no longer doing imaging

1 systems. And so I used to go to conferences and  
2 participate in a lot of those, but I'm not doing that  
3 anymore.

4 Q. Okay.

5 A. So I no longer am a member.

6 Q. I'm sorry. The last one was?

7 A. The American Physical Society.

8 Q. Why are you no longer a member of that?

9 A. Just no longer participating in the  
10 conferences and proceedings.

11 Q. Now, you said that you have testified before.  
12 What type of case was that back in '98, '99?

13 A. There was a dispute between a, a company that  
14 manufactured, that built a software compiler technology  
15 and a company who licensed their technology. And I had  
16 written a proposal for the U.S. Army to actually use the  
17 same technology, and we licensed that technology from  
18 the supplier. And they were suing each other, the other  
19 two companies, and I was asked my opinion about the  
20 maturity of the technology and the usefulness of the  
21 technology.

22 Q. So you gave opinion testimony in that case?

23 A. Yes.

24 Q. Were you offered as an expert witness in that  
25 case?



1           **A.       I don't know. It's been so long ago.**

2           Q.       Do you recall the name of the case?

3           **A.       No. But I, I could probably find it.**

4           Q.       Okay. Do you know where the case was  
5 pending, what court?

6           **A.       Probably in Cleveland I would guess. I lived**  
7 **in Washington, D.C., at that time, but I'm not sure.**

8           Q.       Do you know if it was a federal or a state  
9 case?

10          **A.       I do not.**

11          Q.       Do you know who the attorneys were in that  
12 case?

13          **A.       I do not.**

14          Q.       What was the name of the company that you had  
15 provided testimony for?

16          **A.       I don't even recall. They were a small**  
17 **company. I, I know the engineer's name that ran the**  
18 **company, but I would have to look at, back at my notes.**

19          Q.       Other than that, have you ever provided  
20 deposition or trial testimony?

21          **A.       No.**

22          Q.       Sir, can you tell me starting with high  
23 school, well, let me just start there. Where did you go  
24 to high school?

25          **A.       I went to high school at Swartz Creek High**

1     **School in Swartz Creek, Michigan.**

2           Q.     Did you have any area of study there, or was  
3     it just general academia?

4           A.     **It was college prep and technical studies, so**  
5     **I studied drafting and design.**

6           Q.     Did you pursue a degree after high school?

7           A.     **Yes, I did.**

8           Q.     And what degree did you pursue?

9           A.     **I went to Michigan State University and**  
10    **received a degree in mass -- in mechanical engineering,**  
11    **a bachelors of science in mechanical engineering.**

12          Q.     Any specialty area or just generally  
13    mechanical engineering?

14          A.     **I spent most of my specialization in heat**  
15    **transfer, fluid mechanics, turbulence, and**  
16    **thermodynamics.**

17          Q.     Did you get a, does your degree reflect your  
18    studies in heat transfer and fluid mechanics?

19          A.     **No.**

20          Q.     Those were just courses that you took?

21          A.     **Actually did, I was, I took courses in that**  
22    **area, and then I worked in a research laboratory at the**  
23    **university.**

24          Q.     Okay. How long did you attend Michigan  
25    State?

1           **A.       I was at Michigan State University from**  
2           **August of 1986 until May or June of 1991.**

3           Q.       So almost five years?

4           **A.       Yes.**

5           Q.       You graduated with a degree, sir?

6           **A.       Yes.**

7           Q.       And you said you were, you worked in research  
8           at Michigan State?

9           **A.       Yes.   So throughout my undergraduate**  
10          **education, I came from a very large family. We didn't**  
11          **have the resources to go to college, so I worked as a**  
12          **co-op engineer throughout. So I would go to school one**  
13          **quarter, and I would go to university another quarter.**  
14          **So in general I worked the winter and summer quarters,**  
15          **and I went to school the fall and spring. So I worked**  
16          **at General Motors Truck and Bus throughout my**  
17          **undergraduate, and then during the semester I worked in**  
18          **the fluid mechanics and turbulence research laboratory.**

19          Q.       Fluid mechanics and turbulence?

20          **A.       Research, yes.**

21          Q.       And what did you do there?

22          **A.       Conducted experiments and measurements in**  
23          **turbulent flow systems, supported the graduate students**  
24          **to a large degree doing experiments.**

25          Q.       Okay. Now, after Michigan State did you

1 pursue any additional degrees?

2 A. Yes. I, also I, I studied as an  
3 undergraduate, when I was at Michigan State I studied  
4 abroad at the Rheinisch-Westfälische Technische  
5 Hochschule in Aachen, Germany. So in 1989 I spent about  
6 five or six months at RWTH studying abroad. And then  
7 subsequent to that I went to the University of Utah and  
8 received a masters degree, a masters of science in  
9 mechanical engineering where I specialized in fluid  
10 mechanics and heat transfer research.

11 Q. Does your degree reflect heat transfer and  
12 fluid mechanics?

13 A. No. It's a masters of science, my degree.  
14 All of my publications reflect the research area.

15 Q. Okay. I'll ask about your publications in a  
16 couple.

17 A. Okay.

18 Q. Did you receive a degree from the University  
19 of Utah?

20 A. Yes, I did.

21 Q. What year was that?

22 A. 1993.

23 Q. And for that degree did you have to write a  
24 thesis or a dissertation?

25 A. No. I did the publication option, so I wrote

1 papers and presented at ASME conference. There were two  
2 options.

3 Q. How many papers did you publish for that  
4 degree?

5 A. I believe I had two publications.

6 Q. What were they called?

7 A. Oh, I can't recall.

8 Q. What were they on?

9 A. They were on, the research I was doing at  
10 that time was in conjunction with the Army Dugway  
11 Proving Grounds. We were doing near-wall turbulence  
12 measurements. And the Army had a desire to use a  
13 technology called sonic anemometry to make --

14 (Phone ringing.)

15 A. Excuse me. I apologize. Forgot to turn that  
16 off. Let me just disable this. I'm sorry. There we  
17 go.

18 So my research was, the Army had a desire to  
19 do, to make turbulent measurements using a technology  
20 called sonic anemometry in the atmosphere; in  
21 particular, on the, the salt flats in the Utah desert.  
22 And one of the challenges was that the actual physical  
23 structure of the sonic anemometer interfered with the  
24 flow and, thereby, interfered with the, the fluid  
25 structure inside the measurement domain. So we did a

1 very extensive study of the, the turbulent structure and  
2 turbulent flow inside the sonic anemometers.

3 Q. Okay. You say an extensive study. How long  
4 did that take?

5 A. Probably worked on that for about a year.

6 Q. Full time?

7 A. Yeah. It was my research program.

8 Q. Okay. That was one of your publications?

9 A. Yes.

10 Q. What was the other?

11 A. The other one, my advisor and I worked on  
12 analysis of some of his thesis data. He was, he  
13 received his PhD and did his post doc at Michigan State.  
14 And I, he and I did measurements and a lot of analysis  
15 of his data, and that was published in the Journal of  
16 Fluid Mechanics.

17 Q. What was his thesis on?

18 A. Sub-grid scale turbulent measurements.

19 Q. Did you take any courses either in your  
20 masters program or bachelors program in nuclear  
21 engineering?

22 A. No.

23 Q. Did you take any power plant designs or power  
24 plants?

25 A. Yes.

1 Q. Okay. What courses?

2 A. As an undergraduate I was required to take  
3 two thermodynamic courses, which were fundamentally  
4 focussed on power plant design and steam systems. I  
5 also took two heat transfer courses that were  
6 requirements, and a lot of that was on heat, heat  
7 exchange for steam and other types of systems. And I  
8 took two fluid mechanics courses as an undergraduate.

9 In my masters program I took a conductive  
10 heat transfer graduate study class, which included a lot  
11 of study of conductive heat transfer in both steam and  
12 gas systems. I took a gas dynamics course in graduate  
13 school. The gas dynamics were focussed on turbine and  
14 gas dynamics. I also as an undergraduate took a class  
15 on gas and steam turbine design.

16 And then subsequent to my masters, in my PhD  
17 program I took classes on viscous flow, which also  
18 incorporated aspects of turbulent flow in these types of  
19 systems. And I took a viscous flow class in, in my --  
20 all of my graduate work was effectively focussed on  
21 fluid mechanics, heat transfer, and turbulent flows.

22 Q. Now, the three courses that you took,  
23 thermodynamics, heat transfer, and fluid measurements in  
24 undergrad, those were required courses?

25 A. It was heat transfer, two classes in heat

1     **transfer; two classes in thermodynamics; and two classes**  
2     **in, in fluid mechanics.**

3           Q.     Yes, sir.

4           A.     **Thermodynamics.**

5           Q.     I believe you said that those were required  
6     courses?

7           A.     **Yes, yeah. Required.**

8           Q.     And so everyone who got a mechanical  
9     engineering degree took those courses?

10          A.     **Absolutely.**

11          Q.     Okay. What about your masters? I believe  
12     you said conductive heat transfer and gas dynamics.  
13     Were those required courses?

14          A.     **No. I also took a viscous flow course in my**  
15     **masters program as well.**

16          Q.     And in a hundred words or less, what is  
17     viscous flow?

18          A.     **Viscous flow is the flow of liquids in either**  
19     **internal flow or external flow systems in looking at the**  
20     **actual structure of the flow and the losses in the**  
21     **flows, in 100 words or less.**

22          Q.     In your undergrad or masters program, did you  
23     receive any honors, prizes, fellowships, or otherwise?

24          A.     **Yes.**

25          Q.     And what were those?



1           A.       I graduated with honors as an undergraduate.  
2       In my graduate program I had an NSF fellow for one of my  
3       research years through my advisor, and then in my --

4           Q.       What is an NSF? I'm sorry.

5           A.       National Science Foundation fellow. So my  
6       advisor received a Young Investigator grant. I think  
7       now it's called a Young Investigator. Back then I don't  
8       know what it was called, but. And with that, he was  
9       given funding, research funding to have an NSF fellow  
10      work for him, and I received that for one year in my  
11      masters. And then my first year in my PhD program I  
12      received funding under a NASA fellowship, the same type  
13      of thing through my advisor.

14          Q.       Okay. So the advisor was awarded the grant  
15      money, and you were selected as the fellow to, to --

16          A.       To do the research.

17          Q.       Okay. Post masters degree did you pursue any  
18      additional degrees?

19          A.       Yes.

20          Q.       What degrees?

21          A.       PhD in mechanical engineering.

22          Q.       Were you awarded that degree?

23          A.       No, I was not.

24          Q.       Why not?

25          A.       We were living in Washington, D.C., and my

1 son was born, and I had to get a job that paid enough  
2 money to pay for my family. So I left my PhD program  
3 after I was advanced to candidacy and was completing my  
4 thesis. The company I went to work with agreed to give  
5 me half time to complete my thesis work and defend my  
6 thesis, but it just never happened. They became too  
7 emersed in the work and never was able to complete my  
8 dissertation.

9 Q. Okay. What was your thesis on?

10 A. My thesis was on sub-grid scale physics for  
11 large eddy simulations, the relationship to energy  
12 cascades, and dynamic modeling of the sub-grid scales.

13 Q. And in laymen's terms that means what?

14 A. So there are, in general there are three  
15 general forms of large scale simulations for turbulent  
16 flows and for heat transfer. One is a Reynolds-averaged  
17 technique, which is what's commonly used for things that  
18 you might see on the news or the weather. The second  
19 technique is called a direct numerical simulation.  
20 Since then I should note there's another whole emergent  
21 technology, but I won't get into that.

22 Direct numerical simulation, the problems are  
23 that, the problem with the direct numerical simulation  
24 is that you can only do very, very trivial, small  
25 problems because of the computational resources it

1 takes. It's a Fourier transform of the Navier-Stokes  
2 equation. The solvers are extraordinary. So in the  
3 1960s it was proposed that if you took a step kind of  
4 halfway between the two extremes and you solved the  
5 Navier --

6 Q. Too much.

7 A. Too much information?

8 Q. You're, you're actually confusing me more  
9 than when I began that question.

10 A. Yeah.

11 Q. So let me retract that for a moment.

12 A. Okay.

13 Q. During your time, whether in your undergrad,  
14 your masters, or your PhD program, did you ever teach  
15 courses?

16 A. Yes.

17 Q. What courses did you teach as an instructor?

18 A. I was, I taught a laboratory on fluid  
19 mechanics measurement in my masters program as a  
20 teaching assistant. And I taught a laboratory on, it  
21 was compressible flow. So it was a supersonic flow,  
22 basically running the supersonic wind tunnel.

23 Q. Wind tunnel you said?

24 A. Yeah, wind tunnel.

25 Q. Have you prepared or presented any