

COMPOSITE EXHIBIT 11

02/17/2017 Joseph Alan Murray

Page 1

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF FLORIDA

ANDREA ROSSI and LEONARDO
CORPORATION,

Plaintiffs,

VS.

No. 1:16-cv-2119-CMA

THOMAS DARDEN; JOHN T. VAUGHN;
INDUSTRIAL HEAT, LLC; IPH
INTERNATIONAL B.V.; and
CHEROKEE INVESTMENT PARTNERS,
LLC,

Defendants.

INDUSTRIAL HEAT, LLC and IPH
INTERNATIONAL B.V.,

Counter-Plaintiffs,

vs.

ANDREA ROSSI and LEONARDO
CORPORATION,

Counter-Defendants,

and

J.M. PRODUCTS, INC.; HENRY
JOHNSON; FABIO PENON; UNITED
STATES QUANTUM LEAP, LLC;
FULVIO FABIANI; and JAMES
BASS,

Third-Party Defendants.

HIGHLY CONFIDENTIAL

Videotaped Deposition of JOSEPH ALAN MURRAY
(Taken by Plaintiff)
Raleigh, North Carolina
Friday, February 17, 2017

Reported in Stenotype by
Lauren M. McIntee, RPR
Transcript produced by computer-aided transcription

02/17/2017 Joseph Alan Murray

Pages 6..9

Page 6 1 start just a couple minutes early. Just put us on 2 mute if you would. 3 MR. NUÑEZ: Okay. No problem. 4 JOSEPH ALAN MURRAY, 5 having first been duly sworn, was examined 6 and did testify as follows: 7 EXAMINATION 8 BY MR. ANNESSER: 9 Q. Mr. Murray, my name is John Annesser. I 10 represent the Plaintiffs in this matter as you know. 11 Have you had your deposition taken before, sir? 12 A. I have had a deposition taken before, yes. 13 Q. Okay. When was that? 14 A. Between 1998 and 1999. 15 Q. Okay. I'm going to give you a quick 16 refresher for depositions. Our court reporter here is 17 going to take down everything we say. With that being 18 the case, I'm going to do my absolute best not to 19 interrupt you or talk over you in any manner. I would 20 ask you to do the same for me as it makes her job nearly 21 impossible. During the course of the deposition I'm 22 going to be asking you a series of questions, none of 23 which are intended to embarrass or harass you in any 24 manner. They are simply to get to the facts in the 25 matter of this case.	Page 7 1 If I ask you a question and you do not 2 understand it, please let me know that and I will try to 3 either restate it or rephrase it. If you do not ask me 4 or do not tell me that you don't understand, I'm going 5 to assume that you do understand. Is that fair? 6 A. Yes. 7 Q. Okay. At any time if you need a break, just 8 let me know and we'll try to get to, to a break at the 9 next available opportunity. Are you represented by 10 counsel today? 11 A. Yes. 12 Q. And who is your counsel? 13 A. Chris Lomax of Jones Day. 14 Q. Does he represent you individually, or does 15 he just represent the Defendants in this matter and you 16 believe yourself to be part of that group? 17 A. He represents the Defendants and, therefore, 18 me in some capacity as a witness. 19 Q. Okay. Are you current -- are you currently 20 employed -- 21 MR. LEÓN: Francisco Leon here. 22 MR. ANNESSER: Okay. Francisco, we've begun 23 already. 24 MR. LEÓN: Okay. 25 MR. ANNESSER: Thank you.
Page 8 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?	Page 9 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?

02/17/2017 Joseph Alan Murray

Pages 14..17

Page 14 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	Page 15 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?
Page 16 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	Page 17 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?

02/17/2017 Joseph Alan Murray

Pages 22..25

Page 22 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	Page 23 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?
Page 24 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	Page 25 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

02/17/2017 Joseph Alan Murray

Pages 26..29

Page 26 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	Page 27 1 professional seminars? 2 A. Excuse me. Meaning presentations? 3 Q. Presentations to other people in your field. 4 A. Yes. Yes. 5 Q. And how many of those have you prepared and 6 presented? 7 A. I have presented at ASME conferences in the 8 '80s. I presented at the Division of Fluid Mechanics 9 annual meetings at the American Physical Society in the 10 '80s. I don't remember the exact year. I remember one 11 was in Atlanta and one was in San Diego, and one of them 12 I remember distinctly because it was disproving the 13 fundamental tenants of my thesis, so. 14 Q. I'm confused, sir. You, you said that -- 15 A. '90s, I'm sorry. '90s, early '90s. It was 16 in my masters program when I did ASME presentations 17 related to the sonic anemometers. And, and then 18 Division of Fluid Mechanics meetings were in, let me 19 think, '94 and '95, about those, that time frame. Could 20 have been '96. 21 Q. Were there any publications affiliated with 22 those presentations? 23 A. Yeah. Actually, I think the, the actual 24 presentations are published through American Physical 25 Society for the Division of Fluid Mechanics, and the
Page 28 1 ASME I believe are also published. You can find them 2 online. 3 Q. Have you, do you -- I'm sorry. Do you have 4 any continuing education requirements? 5 A. No. 6 Q. Have you taken any continuing education 7 courses or otherwise -- 8 A. Yes. 9 Q. -- in your field? 10 When is the last time you took one? 11 A. November. 12 Q. And what was that course in? 13 A. I was, it, within the last year I took two 14 courses on a simulation technology called OpenFOAM. 15 It's a new emergent 3D-simulation technology used for 16 fluid mechanics and heat transfer, and I've been 17 actually attempting to use it for about six or seven 18 years. I tried to get my engineering team to use it 19 some years ago, but I never had the time or the 20 resources, so in the last year I've had training twice 21 on that. 22 Q. Okay. So they were both on that? 23 A. Yes. 24 Q. How, okay. You said that was training. Was 25 it a continuing education course or just training on	Page 29 1 that software? 2 A. I don't know if I could differentiate between 3 the two. What, what do you mean? 4 Q. Were you, was it presented by the software 5 company? 6 A. Well, it was, there was -- yeah. Actually, 7 it was one of the developing companies that does it. 8 They offer training for these courses. 9 Q. How long were the courses? 10 A. The first one was three days. I'm sorry. 11 No. The, the first one was two days. The second one 12 was three days, and it also included one day for a, a 13 forum where people came from around the world and 14 presented their research on this tool. 15 Q. I'm sorry. What was the tool called again? 16 Open phone? 17 A. OpenFOAM. 18 Q. O-P-E-N? 19 A. FOAM, F-O-A-M. 20 Q. F-O-A-M? 21 A. Uh-huh. 22 Q. Is that a software that you can purchase? 23 A. It's actually freeware. You can download it. 24 Q. Sir, do you hold any licenses or 25 certifications?

02/17/2017 Joseph Alan Murray

Pages 30..33

Page 30 1 A. No. 2 Q. Do you have an engineering license? 3 A. No. 4 Q. Are you a professional engineer? 5 A. No. 6 Q. Have you ever applied to become a 7 professional engineer? 8 A. No. 9 Q. Have you ever applied for any other license 10 or certification? 11 A. No. 12 Q. Now, I'd like to walk through your employment 13 history prior to 0 Base Design. 14 A. Okay. 15 Q. I'm sorry. When did you begin working with 0 16 Base Design? 17 A. I formed the company I think the first week 18 of November 2016. 19 Q. Prior to that where were you employed? 20 A. Immediately prior to that I was employed by 21 Industrial Heat. 22 Q. What was your title there? 23 A. Vice President of Engineering. 24 Q. And when did you begin working as Vice 25 President of Engineering for Industrial Heat?	Page 31 1 A. About May of 2015. 2 Q. As an employee? 3 A. I began in May of 2015 as a, being paid as a 4 consultant because of my medical insurance, to carry my 5 medical insurance over to the end of the year from my 6 previous company. 7 Q. And I'm going to come back obviously to -- 8 A. Yeah. 9 Q. -- your time at Industrial Heat, but prior to 10 working for Industrial Heat, beginning in May 2015 where 11 were you employed? 12 A. I was employed by a company that I had 13 started in 2003. The name of the company was 3 Phoenix, 14 and we sold that company to a British publicly traded 15 company called Ultra Electronics in February of 2014, 16 and I was one of the co-founders and principal in that 17 company. 18 Q. How many co-founders were there? 19 A. There were five co-founders. 20 Q. What did that company do? 21 A. We built systems for the Department of 22 Defense. We built radar systems. We built A -- 23 engine -- let me see. We built radar systems. We built 24 sonar systems. We built imaging systems, a number of 25 different imaging systems. We built test systems for
Page 32 1 torpedos, heavyweight torpedo, it was the Mark 710 2 system to test the torpedos. We did a lot of innovative 3 research contracts as well, SBIRs. 4 Q. Okay. What do you mean by you built systems 5 such as radar systems? Were you building radar towers? 6 Were you designing -- 7 A. No. 8 Q. -- the system? 9 A. So our role at 3 Phoenix was primarily, when 10 the Department of Defense had a challenging problem and 11 a, and a very limited amount of time to get it done, 12 they would often hire us to build the system. So they 13 would have a set of requirements; for example, we need a 14 certain range resolution or other technical 15 requirements. We would document those requirements. We 16 would design both a physical hardware and software 17 system to address those requirements. 18 We would build EDM, engineering development 19 model, prototypes of that system. We would test those 20 systems with our Department of Defense customers, and 21 then we would do low-rate initial production typically. 22 And that's typically when we would end. Some systems 23 have gone on since then to a full-rate production, but 24 we would typically end at low-rate initial production. 25 Q. Okay. Now, when you say you built these	Page 33 1 systems, is that for, are we talking about designing 2 them on paper and saying, hey, guys, this is how you 3 build your system, or is this actual physically 4 constructing -- 5 A. We did everything. 6 Q. -- the system? 7 A. Yeah. We, we, we developed the requirements. 8 We went through requirements reviews with our customers. 9 We turned those requirements into designs, and normally 10 we would go through what's called a preliminary design 11 review and then a, a final design review or critical 12 design review. It depends on the customer. After, 13 between the preliminary and the critical we begin to 14 develop prototype elements; in particular, risk 15 reduction areas where they might be high risk. We 16 develop either software to hardware or address that. 17 And then after critical design review is finished, we 18 would actually build the system, physical hardware and 19 software. 20 Q. What were your job duties at 3 Phoenix? 21 A. I was, as I said, I was a principal and 22 co-founder. And I wrote a lot of proposals. I designed 23 a lot of systems. I was a chief system architect. I 24 oversaw the analysis and validation of the system 25 against the requirements.

02/17/2017 Joseph Alan Murray

Pages 54..57

Page 54 1 THE VIDEOGRAPHER: We are off the record at 2 9:52 a.m. 3 (Recess taken 9:52 a.m. to 9:58 a.m.) 4 THE VIDEOGRAPHER: We are back on the record 5 at 9:58 a.m. 6 BY MR. ANNESSER: 7 Q. Sir, to continue our discussion on that 8 1-megawatt plant for the DOD that you had been 9 previously discussing. So if I understand it correctly, 10 as you said before, you were transferring heat from 11 these solid-state conductors and whatnot equipment to 12 liquid -- 13 A. Yes. 14 Q. -- correct? So you were going from a solid 15 state to a liquid state? 16 A. Uh-huh. 17 Q. What is the mathematical computation for 18 that? How do you determine how much heat is being 19 transferred? 20 A. I don't recall off the top of my head. 21 That's a complicated analysis. 22 Q. Okay. Do you happen to know what the 23 computation is to go from a gaseous state to a solid? 24 A. The heat transfer? 25 Q. Yes. From gas to a solid.	Page 55 1 A. Again, it depends upon the, the details of 2 the system, how you transfer the heat. So there are 3 three primary modes of heat transfer. There's radiative 4 heat transfer. There's conductive heat transfer, which 5 typically is solid to solid, and then there's convective 6 heat transfer. So if you were going from a, a solid to 7 a gas, the primary mode in lower temperature Delta Ts 8 would be convection heat transfer. And then depending 9 upon the temperature differential, you could get into 10 radiative, but it's, those are detailed analyses that 11 you have to look at on a, kind of a design-by-design 12 basis. 13 Q. Okay. And you don't know sitting here today 14 what, how you would go about doing that? 15 A. It depends on the system and the details of 16 that system. 17 Q. It's been a while since you've done that I 18 take it? 19 A. Well -- 20 Q. That was back in -- 21 A. Yeah. It depends on the system. I mean you 22 just have to look at each one of the systems and look at 23 the details specifically. 24 Q. When was the last time you did that type of 25 calculation?
Page 56 1 A. The heat transfer calculation? 2 Q. Yes. 3 A. I did some for Industrial Heat in the fall 4 for various types of systems. Actually, that, what year 5 is this? This is 2000 -- primarily we were looking at 6 different types of heat transfer for the various 7 investments between let's say the Fall of 2015 to the 8 Summer of 2016. 9 Q. And what were those heat transfers? Were 10 they from -- was that conductive heat transfer? 11 A. It depends. There were three primary areas 12 of investment that Industrial Heat had made. And my 13 job, being in charge of engineering, was to, was really 14 twofold. We were to validate and verify each one of the 15 investments and then, any of the investments that 16 merited reproduction, then we would do an independent 17 reproduction of that. 18 And so each one of the systems was very 19 different because there were electrolytic systems, there 20 were plasma-based systems, and then there were 21 solid-based systems. So every one of the systems had 22 nuanced differences, and each one of the inventors and 23 technologists, they all came up with all their own 24 schemes for calorimetry and measurement of that heat 25 transfer.	Page 57 1 Q. Of all the systems you tested in Industrial 2 Heat, were there any that you were able to validate and 3 verify? 4 A. No. 5 Q. Why not? 6 A. We went through, the process was we worked 7 with the inventors. So there were, as I said, I don't 8 remember if there were five or six different groups, 9 probably name them. What we did was we went to work 10 with each one of the investments, and we looked at all 11 of the data that they were willing to share with us. 12 Almost all of them were completely transparent and open. 13 We went to their labs. We worked with them. We 14 collected their data, and we looked at it. We analyzed 15 it. And in many cases the heat that they were 16 producing, the excess heat, the anomalous heat was very 17 small. They, they had amounts that were very small. 18 And so any small errors in their sensor systems or small 19 errors in their assumptions would mask that level. 20 So we went through and carefully analyzed 21 their data, and in a few cases we actually reproduced 22 their experiments. We had two groups that in the 23 validation verification phase we came up with what I 24 would describe as nebulous results. They weren't 25 positive, but we certainly just couldn't say here is a

02/17/2017 Joseph Alan Murray

Pages 58..61

Page 58 1 major problem that has to be overcome before we could 2 legitimately verify and validate it. And so in those 3 cases we worked very closely with the inventors and 4 organizations to help them do independent reproduction 5 in our lab. 6 Q. Okay. And those were successful 7 reproductions? 8 A. No. Ultimately, the reproductions, yeah, we 9 didn't find anything that had excess or anomalous heat. 10 Q. Okay. And what were those two? 11 A. What were those two? 12 Q. Yeah. 13 A. If -- 14 Q. You know, who were the inventors? 15 A. The first one was Dr. Mizuno in Japan. That 16 was a plasma-based system. And the second one, which 17 was very much at arms length, I did not have privy or 18 access to this one, was HMRI. It was a, it was only a 19 partial investment into it. And so I was kind of, me 20 and the rest of the engineering team were kept at arms 21 length. We weren't allowed to have access to all of 22 their data, so I just got summary reports and briefings 23 on some of the things they had done. 24 Q. I thought you were able to reproduce their 25 experiments in your lab.	Page 59 1 A. So, yeah. No, we, what we did was, based on 2 the limited knowledge we had of their system, we 3 reproduced an electrolytic cell that to the best of our 4 ability looked like what we had understood they were 5 doing. And we could not achieve the same results that 6 they were giving us at this kind of arms length. 7 Q. Okay. What about Dr. Mizuno? Were you able 8 to identically reproduce what he was doing? 9 A. No, we were not. So Dr. Mizuno had conducted 10 a, a series of these plasma-based technique tests in his 11 lab in, in Sapporo, Japan. And so myself and some of 12 the other engineers went to Sapporo and looked at his 13 test apparatus and, and looked at his data. He was very 14 forthright, shared all of his data, everything he had 15 with us. There were some challenges just because of his 16 physical environment. He had a very small lab. He 17 didn't have good control over the environmental 18 conditions in the lab. 19 And so we had some reservations, but he had 20 some results that were just anomalous. We couldn't 21 quite understand them. So what we did was we didn't 22 notice that during his testing he -- and I should note, 23 you know, he's a, he's a wonderful person, but I should 24 note that he was one person and an assistant. He didn't 25 have a lot of people to help him. So what we found was
Page 60 1 that in the middle of his experimentation or kind of 2 towards the tail end he had changed a piece of 3 equipment. And so that was a concern, because you never 4 want to see in the middle of a test somebody changing a 5 piece of equipment. You could introduce all kinds of 6 problems. 7 So what we did was we worked with him to go 8 back to his experiments, instrument them with a much 9 more robust instrumentation set, and then re, have him 10 reproduce the experiments exactly as he had before. And 11 once we re-instrumented the, the equipment and put a 12 little better controls in his lab on the environmental 13 conditions, we couldn't get the same result again. And 14 that was in his lab. 15 Still, the, the senior management at 16 Industrial Heat, they, their view was if any of these 17 technologies have even one percent probability of 18 success, they want us to go all the way to the end to 19 find if anything works, because they were very eager to, 20 to find something that was successful. And so, so at 21 that time we didn't see results. So what we did was we 22 set up an independent test of Dr. Mizuno's in our lab, 23 and we completely replicated his system and we followed 24 his recipe. We couldn't get it to work. 25 And so then Dr. Mizuno sent over a system	Page 61 1 that he had prepared for us and brought it to our 2 facility, and then he came over and he spent, I don't 3 know if it was a week or ten days, he spent some time in 4 our lab setting that up and going through his process 5 that he had defined to validate it. And we, and there 6 were some nuances. I mean between the translation 7 between Japanese and English, and there were some 8 nuances that he highlighted while he was there that were 9 subtle differences, but we did his exact procedure and 10 process on his reactor in our facility, and we still 11 were not able to do it. 12 So, so our concern, you know, our conclusion 13 was that the one set of data where he had changed some 14 instrumentation was indeterminate. We couldn't make 15 head or tails of it, but we were not able, in any of the 16 series of experiments, able to produce that result, so. 17 Q. Why was it necessary for him to come over and 18 do the experiment in North Carolina as opposed to just 19 relying on the one that you had built? 20 A. How do you mean? 21 Q. Well, you said you, you constructed it based 22 on his formula, his, his design and tested, and it did 23 not produce results. 24 A. Right. 25 Q. So why then did you have to have him come

02/17/2017 Joseph Alan Murray

Pages 62..65

Page 62 1 over and test it again? 2 A. Well, because Mr. Darden was, wanted us to 3 drive to the end, that if there was even one percent 4 chance that that one measurement he did was correct, 5 then let's get to the bottom of it. And there was a big 6 language barrier. So what we did was we had him, after 7 we were able using all of his information, able to 8 reproduce it or not able to reproduce it, what we had 9 him do was we had him to come over and use one of his 10 reactors in our facility to see if there was something, 11 some nuance difference that we just weren't getting, and 12 then try to reproduce it. But we were not able to get 13 it to work even with him there. 14 Q. Would you say that it is essential to work 15 with the inventor in order to make sure that you're 16 getting absolutely everything to attempt to replicate 17 these tests? 18 A. In my opinion, yes. I mean if, these are 19 very nuanced and subtle areas. And so if you don't have 20 access to, to these people, it's very difficult to 21 really understand all of the, the small nuance 22 differences. 23 Q. Did you ever try to reproduce or test an 24 E-Cat device designed by Dr. Rossi? 25 A. I did not.	Page 63 1 Q. So you've never tested an E-Cat device? 2 A. We created a device that was as close as 3 possible to the best of our ability without, without the 4 ability to communicate with Mr. Rossi. We, we did the 5 best we could. So we created some reactors that were 6 similar to some of the reactors that he had tested at 7 the Triangle Drive facility before I was part of 8 Industrial Heat, and we tested those systems. 9 Q. Okay. Now, you said a couple things there I 10 want to ask you about. You said with no communication 11 with Dr. Rossi? 12 A. Uh-huh. 13 Q. Why didn't you have communication with 14 Dr. Rossi? 15 A. Well, so when I came on board, so in June of 16 2000 -- let me get the year right -- 15, Industrial Heat 17 was, had just received their funding. I don't know if 18 it was in April or May. They had received funding, and 19 they were in negotiations for several other investments. 20 And so those were ongoing, and the lawyers, you know, 21 not to say anything bad about lawyers, but the lawyers 22 were doing their thing. And so they were taking a long 23 time to kind of get to the point where we could really 24 engage and work with the various groups. 25 So in June of 2015 Tom Darden and John
Page 64 1 Mazzarino asked me to look at in detail what Mr. Rossi 2 was doing. So I took all the information that, that 3 they could provide me, and it was insufficient 4 information incidentally. There were, there were no 5 red-line drawings of the plant. There were no details. 6 And on top of that, this is another kind of detail, Tom 7 Darden was the keeper of the trade secrets. Nobody else 8 knew anything about the details of the fuel technology. 9 So what we did was we focussed on the heat 10 transfer and the coefficient of performance as they had 11 been defined so that we could figure out if we could 12 replicate it. Because Tom and John insisted that if 13 there's even one percent chance he's right, they want to 14 move ahead and figure out how to do this. 15 So in 2000 -- June of 2015 I went through 16 everything I could find. And, and there were some 17 commissioning reports I think they were from Mr. Penon. 18 And I was going through those, and there were a lot of 19 typos and errors, and so that was concerning. And so I 20 developed a whole bunch of questions. Like, for 21 example, in the commission report they had the flow rate 22 in the system was 36,000 -- let me think of the unit -- 23 kilograms per day, day after day after day, which I 24 thought was suspicious, but in the body of the text he 25 had written 3,600.	Page 65 1 So I thought, oh, 3,600 would be a lot more 2 logical. It was kind of consistent with what everybody 3 was describing as the coefficient of performance, those 4 types of things. So I thought, okay, well, maybe 5 there's an error there. Maybe it's just a simple typo. 6 I mean somebody could have transposed a number. That's 7 not a big deal. Things happen. 8 So we went through all of that. And I was 9 looking at it. I just couldn't figure it out because I 10 couldn't figure out where, in a thermodynamic sense 11 where the various sensors were. Because you have to 12 have the pressure and the temperature and the volume or 13 mass flow rate of the condensate return, and you need 14 the pressure and the temperature and the volume or mass 15 flow rate of the steam to, to measure the system. 16 Q. I'm going to stop you for just a minute. 17 A. Okay. 18 Q. We will get into that. I'm going to give you 19 plenty of -- 20 A. Okay. 21 Q. -- opportunity to tell me about it. 22 A. Okay. 23 Q. But I want to go back to the testing that you 24 did. 25 A. Okay.

02/17/2017 Joseph Alan Murray

Pages 82..85

Page 82 1 medical benefits renew -- I use a HSA medical plan, and 2 they renew at the beginning of the year. And so when I 3 left Ultra I was in the middle of a, kind of a plan 4 year. And my daughter was sick. She needed some 5 surgery, and I didn't want to mess with the insurance. 6 So I just said, look, let me just consult until the end 7 of the year, and then we'll convert to an employee at 8 the end of the year when the medical plans turn over. 9 Q. Now, as a consultant were you given a title 10 within the company? 11 A. Because the intention was for me to 12 transition to a full-time employee, yeah. My title was 13 Vice President of Engineering. 14 Q. So you were Vice President of Engineering 15 from day one? 16 A. Kind of from the beginning, yeah. 17 Q. I'm going to show you a document, sir, that 18 we'll mark as Exhibit 2. 19 (Whereupon, Exhibit 2 was marked for 20 identification.) 21 Q. Have you seen this document before, sir? 22 A. One second. Let me see. Yes, I actually 23 think I prepared this document. 24 Q. Okay. Now looking, sir, the, the date on the 25 front of this document appears to be January 2016?	Page 83 1 A. Uh-huh. 2 Q. Okay. What I'd like you to turn to -- and 3 I'm sorry. This document is a document with a bates 4 number IH00053931. I'll ask you to turn to the sixth 5 page of the document with the bates number IH00053936. 6 A. Uh-huh. 7 Q. There is an organizational structure there? 8 A. Uh-huh. 9 Q. And it lists engineering, J Murray. Is that 10 you? 11 A. Yes. 12 Q. Okay. And it has categories in which I 13 believe you're responsible: Development, integration 14 and tests, data management, project management, modeling 15 and simulation? 16 A. Yes. 17 Q. Okay. What development did you do for the 18 company? 19 A. We developed data acquisition systems and 20 replication reactor systems. We developed calorimetry 21 systems. We developed a wide range of test assets. We 22 developed databases to archive and store all of the 23 information from every test that we did. I don't know. 24 Just broad range of development activities. 25 Q. Didn't those exist before?
Page 84 1 A. No, not to, not to my knowledge. 2 Q. Did they have any systems in place when you 3 joined them in May or June of 2015? 4 A. This, this was for the new facility. So 5 we -- I don't recall when they got the lease on the new 6 facility. I think it was about August or maybe 7 September of 2015. So what we were doing is setting up 8 this entire new organization in the new facility. And 9 so these systems, I -- not that I'm aware of. I don't 10 know what they really had at Triangle Drive. I know 11 they did, they were doing some electrolytic system 12 testing at Triangle Drive at that time. I had gone over 13 there one or two times, but I wasn't really too versed 14 in what they were doing. 15 Q. Okay. Integration and tests, what was that? 16 A. So integration and tests is actually taking 17 the development assets, bringing them together and 18 executing test programs using those. So the integration 19 is kind of a validation procedure for the infrastructure 20 that lives over top of, for example, a reactor or we had 21 chambers and other equipment. So we were integrating 22 all that equipment together, and then we were testing it 23 and validating it to make sure that it was operating as 24 we had specified in the development phase. 25 Q. So that wouldn't be the testing and	Page 85 1 evaluation of the underlying LENR technology? And by 2 LENR do you understand what I mean? 3 A. Yes, I do. 4 Q. Low energy nuclear reaction? 5 A. Uh-huh. It would be, in fact, a combination 6 of testing of the equipment and infrastructure necessary 7 to test those reactors as well as the test of those 8 reactors -- 9 Q. Yeah. 10 A. -- when it was appropriate and when we got to 11 that point. 12 Q. Data management? 13 A. So in my experience, many companies fail to 14 adequately archive and manage data. So what we were 15 doing is we put a very robust plan in place to store and 16 archive the data and metadata associated with tests so 17 we could reproduce it. 18 Q. Okay. Project management? 19 A. Over -- 20 Q. Is that anything other than the common term, 21 project management, overseeing all these projects? 22 A. It's project management. 23 Q. Modeling and simulation? 24 A. Right. So we, we attempted to model and 25 simulate as many of the systems as we could so we could

02/17/2017 Joseph Alan Murray

Pages 202..205

Page 202 1 A. No. They're available in the public. You 2 can find them online. 3 Q. Sir, anything in any of your publications 4 that you now want to change or revise? 5 A. Not that I'm aware of. It's been many, many 6 years. 7 THE VIDEOGRAPHER: Seven minutes. 8 Q. Do you know if your publications have ever 9 been cited? 10 A. You know, I had to prepare a CV for an Army 11 program just a few weeks ago, and I was going back 12 cataloging some of that, and I was surprised. There 13 were a number of citations on some of the early work 14 that I had done. Yes. 15 Q. Who cited it? 16 A. Other engineers in this space of fluid 17 mechanics and turbulence research. 18 Q. Who? 19 A. Oh, I don't know by name. There were 20 numerous citations. If you go to the citation index, it 21 will point you to all of the citations. 22 Q. What citation index? 23 A. If you go online, you can go to Google and 24 you can search for specific scholar articles. And then 25 when you go to the links, they will show you what the	Page 203 1 cross-reference citations are, how many people cite the 2 documents, and then it links to those documents. 3 Q. Okay. I'm, I'm looking for documents that 4 cite to you. How am I going to find those? 5 A. You can go to, search for my publications, 6 and then in that you can, it will show you what the 7 citations are. 8 Q. Okay. But you don't maintain copies of 9 those? 10 A. No. 11 Q. All right. 12 A. No. 13 Q. Are you familiar with any publications 14 expressing contrary views to your publications? 15 A. Not that I'm aware of. 16 Q. Has anyone requested the right to reprint 17 your publication? 18 A. Not that I'm aware of. 19 Q. Did you ever receive any compensation for 20 your publications? 21 A. No. 22 Q. Except perhaps the work you did at GM? 23 A. Yeah -- no. I, I mean my, I was an engineer. 24 I was being paid for my work at General Motors. I was 25 being paid as a researcher at the universities. You
Page 204 1 know, the publications are just a criteria that you need 2 to publish to be able to continue on in these spaces. 3 Q. Okay. Have you ever appeared as an expert in 4 any cases where you did not wind up testifying? 5 A. No. 6 Q. Have you ever offered expert opinions to, in 7 respect to any litigation before? 8 A. No. I don't know if the deposition that I 9 did back in the late '90s, I don't know if that would be 10 considered expert or not. I just simply don't know. 11 They were asking me about my opinions on these various 12 products. 13 Q. Okay. 14 A. So I don't, I don't know if that's expert or 15 not. 16 Q. Have you been retained as an expert in this 17 case? 18 A. Well, that's hard to say. I am, I was asked 19 to, to do this deposition and to support, and in my 20 severance package it indicates that I have to support 21 them at, at their request. So I would guess that that's 22 probably yes, but I don't really understand the 23 technical delineation of that. I am doing it. I'm 24 billing them for my time. 25 Q. Okay. Who contacted you to do this work?	Page 205 1 A. You did. 2 Q. I asked you to do this work? 3 A. No, no, no. You sent me a subpoena. 4 Q. Yes. That's for your deposition. 5 A. Right. 6 Q. I'm talking about the work that you're doing 7 on the case. 8 A. Oh, the work that I'm doing on the case has 9 strictly been to review and kind of understand what's 10 happening and provide, I provided some simulation work 11 about nine months ago, and the file formats were 12 corrupt. They couldn't read the file formats, so I 13 reran those and recreated the files for them. So I 14 would say it's just that work, and I'm being paid by 15 Industrial Heat as a consultant on an hourly basis. 16 Q. When did you send them the non-corrupt files? 17 A. I sent them files, I don't know, a week ago, 18 but it turns out that those files were also corrupt. 19 And so yesterday I went through and tried to figure out 20 why the -- it was a video encoder problem. So yesterday 21 I went through and re-created the, the files and tested 22 them yet again and then made sure that they could test 23 them and they could see them, and in addition to that I 24 took screen captures of it. 25 Q. Is there any reason why we would not have

02/17/2017 Joseph Alan Murray

Pages 246..249

Page 246 1 opinion you state, "Mr. Murray will describe" -- I'm 2 sorry. Your disclosure states, "Mr. Murray will 3 describe how the data generated by Fabio Penon and 4 Fulvio Fabiani pertaining to the power absorbed during 5 the testing of the E-Cat plant at the address of Doral 6 location, JMP" -- is that address of Doral location, was 7 that, why is that in all caps? 8 A. I don't know. 9 Q. Was that supposed to actually be the address 10 of the Doral location? 11 A. Potentially. 12 Q. Okay. But you didn't draft this. Okay. 13 -- "Is at odds with the amount of power used 14 at the Doral location as demonstrated by Florida Power 15 and Light, FP&L records." 16 A. Uh-huh. 17 Q. What did you do to come to that conclusion? 18 A. We received the daily power or energy records 19 from Florida Power and Light via subpoena for periods of 20 time before the plant was installed, the period of time 21 when the plant was operating, and periods of time after 22 the plant was installed. And what we did was we, we 23 compared that daily energy level to the daily energy 24 levels that were provided by Fabio Penon and Fulvio 25 Fabiani.	Page 247 1 Q. How did you compare it? 2 A. We used a analytic tool to look at the data 3 and to plot it to make a comparison between them. 4 Q. What analytic tool did you use? 5 A. We used a series of tools called Python, 6 which is a programming language, with iPython -- it's 7 now called Jupiter Notebook, but it used to be called 8 iPython Notebook. We used NumPy, which is a numerical 9 tool kit; SciPy, which is a scientific library; and 10 something called Pandas, which is a data analytics tool 11 to be able to compare data. And we plotted that -- 12 Q. What -- 13 A. -- using Matplotlib to make comparisons 14 between the various data sets. 15 Q. So, so what exactly do these program do? 16 A. Well, you read the data in. You formulate it 17 so you can get an exact -- 18 Q. Hold on one second. How do you read the data 19 in? 20 A. So in that, there's a Pandas library that 21 allows you to read in a comma-separated file or an Excel 22 file, other types of files. We read that in and we then 23 com -- then we can directly compare date-matched times 24 and dates and plot the data. 25 Q. Okay. Let's talk about that for a moment.
Page 248 1 It reads Excel files. How did you get the data from the 2 Penon report into that system? 3 A. We typed it in by hand. 4 Q. Who did? 5 A. I typed in some of it. There was -- oh, did 6 you say Penon? 7 Q. Penon. 8 A. Penon. I typed it in. I had some, some of 9 the younger engineers type it in, and then we had a 10 separate person cross-check it to make sure it all 11 matched. 12 Q. Who was the younger engineer and who 13 cross-checked it? 14 A. So Jason Kemp was the person who 15 cross-checked it, and James Hartanto was the young 16 person who actually typed it in. 17 Q. Is Mr. Hartanto an engineer? 18 A. He is, he has a degree in I believe chemistry 19 and applied math. 20 Q. So the answer is no? 21 A. No. Yes. 22 Q. Okay. And James Kemp, is he an engineer? 23 A. Jason Kemp? 24 Q. I'm sorry, Jason. 25 A. No, he's not.	Page 249 1 Q. Okay. 2 A. They were doing just data transcription. 3 Q. Who do they work for? 4 A. At that time they worked for Industrial Heat. 5 Q. Who do they work for now? 6 A. I think Jason Kemp took a job with Pike 7 Electric, and I believe that James Hartanto is getting 8 ready to go to graduate school. 9 Q. Okay. Now, the FP&L data, how was that 10 in-put? 11 A. That data was received in a PDF file, and we 12 converted all of that data using an OCR reader to, to, 13 into a comma-separated file or Excel file. And then we 14 actually had Jason and James go back and cross-reference 15 and check it against the original documents. 16 Q. Do you know if there were any mistakes in 17 those? Typos? 18 A. I don't know. I mean they went through and 19 checked it and cross-checked it, and I went through and 20 sampled a check as well. 21 Q. How much sampling did you do? 22 A. I would say hundreds of points. I mean I 23 went through almost line by line to cross-check it, but 24 it becomes very bleary-eyed when you're doing that. So 25 then they did a every-single-line cross checking it to

02/17/2017 Joseph Alan Murray

Pages 250..253

Page 250 1 the data that was provided under subpoena. 2 Q. So all of the input was done by Industrial 3 Heat employees? 4 A. Yes. 5 Q. So you've got both of those in, and how did 6 you compare them using these programs? Was there a 7 complex analysis, or was it just plotting these out into 8 a graph? 9 A. So first, well, there was also a third piece 10 of data. That was the data provided by Fabio Penon. He 11 provided that, that data in, again in March/April time 12 frame he gave us files. I kind of described that 13 earlier. 14 Q. Mr. Penon did? 15 A. I'm sorry. Fulvio Fabiani provided us files. 16 And so we, we looked at that, that data. Fulvio 17 Fabiani's data actually had two measurements for each 18 day. He had a measurement at, I believe the numbers 19 were 10:30 a.m. and 10:30 p.m. Mr. Penon's data -- I 20 have to be careful, make sure these names are right -- 21 Mr. Penon's data was actually only once per day. It was 22 at I believe 10:30 p.m. each day. And the data from 23 Florida Power and Light was each day at midnight. 24 So what we did is we went back and we 25 cross-referenced it and made comparisons on a daily	Page 251 1 basis and made, to make sure that we were comparing 2 apples to apples. And then we plotted the data and took 3 the differences between the various data sets and 4 checked the integrity between Penon and Fabiani's data 5 and then checked the comparisons against Florida Power 6 and Light. 7 Q. Okay. So let's look at Exhibit A of 8 Exhibit 11, which you should have in front of you. 9 A. Okay. 10 Q. Is that, sir, the comparison that you did? 11 A. This is part of the comparison, yes. 12 Q. Okay. I only see two lines here, one green 13 and one red. 14 A. Underneath it you can see a few points where 15 Mr. Fabiani -- I'm sorry. We gotta look at the colors 16 here. It's hard to see at this scale. Mr. Fabiani's 17 data diverges from Mr. Penon's data. You can see right 18 about here, and you can see down here. So there were 19 very little divergence between Mr. Fabiani and 20 Mr. Penon's data. In fact, I would, I would argue they 21 were the same exact data. 22 Q. Okay. The same exact? 23 A. Except for these points where they diverge. 24 Because Mr. Fabiani's data, as I said, had two data 25 points per day where Mr. Penon's data only had one.
Page 252 1 Q. Okay. 2 A. And so they -- 3 Q. So that would be consistent with the data 4 points or the data being measured being accurate, 5 correct? 6 A. It would certainly be consistent with the 7 data being measured coming from the same device. 8 Q. Any reason to believe that either one of them 9 have manipulated the results? 10 A. No. 11 Q. Okay. So the green line is FP&L? 12 A. Yes. 13 Q. All right. 14 A. Florida Power and Light, yes. 15 Q. And for the vast majority of this, the green 16 line is higher than the red line? 17 A. That's correct. 18 Q. So the amount of power supplied by FP&L 19 substantially exceeds the amount of power that was 20 recorded going into this device? 21 A. Yes, yeah. 22 Q. Is that odd to you? 23 A. No. You would imagine that a facility like 24 this, the actual reactor system would absorb some power, 25 but you would imagine that there are also some, some	Page 253 1 lights and the fan in the bathroom. There were a few 2 air conditioners around there. There was an office in 3 the front that I imagine would have heat and air 4 conditioning. So you would expect that Florida Power 5 and Light numbers would be higher than the numbers that 6 Mr. Penon and Mr. Fabiani measured. That would be a 7 reasonable expectation. 8 Q. Florida Power and Light's measurements, how 9 were those taken? 10 A. They were taken with a smart meter located on 11 the, on the building. 12 Q. What type of smart meter? 13 A. The smart meter that's approved by the State 14 of Florida. 15 Q. You know it's approved by the State of 16 Florida? 17 A. Yes. 18 Q. How? 19 A. I looked at the Florida Public Works 20 Commission website to find out if these things were 21 approved and how they were approved. And they indicate 22 that for investor-owned utilities, that they have 23 approval and then they give you a link to Florida Power 24 and Light, and in Florida Power and Light's data they 25 give the full description of how they implemented these

02/17/2017 Joseph Alan Murray

Pages 254..257

Page 254 1 programs and what the options are for the programs. 2 Q. When was the FP&L device last calibrated? 3 A. I have no idea. 4 Q. Do you know if it's been three years? 5 A. No idea. 6 Q. Four years? 7 A. I have, still have no idea. 8 Q. Okay. So you, you have absolutely no 9 information with respect to whether their data is 10 accurate or not? 11 A. What I know is that they provided it under 12 subpoena. They may or may not be accurate. 13 Q. Okay. So you don't have any reason to 14 believe that we should rely on those results as opposed 15 to the results of Mr. Penon or Mr. Fabiani; is that 16 correct? 17 A. I disagree with that. I, I would say that we 18 have to at least look at this and understand why, why 19 would it be this way. And so my view is that if, if a 20 company like Florida Power and Light provides data under 21 subpoena, there would be an expectation that they would 22 provide, would provide proper and accurate data, and 23 it's a reasonable way to check the facility. We did 24 this, I did this kind of anticipating that Florida Power 25 and Light would always be higher than the measurements	Page 255 1 that were made here. 2 Q. Okay. And, and the vast majority of the time 3 here they are? 4 A. Yes. 5 Q. With very few exceptions, in fact. And one 6 exception is between November and December 2015? 7 A. Yes. 8 Q. And during that period it, it appears that 9 the power usage drops by the FP&L measurements, right? 10 A. The FP&L measurement drops, yes, below the 11 measurements provided by Mr. Penon and Mr. Fabiani. 12 Q. Do you know why that would be? 13 A. I have no idea. 14 Q. Do you know if it's accurate? Do you know 15 if, perhaps, there is a problem with the device, the 16 measuring device? 17 A. I have no information other than the data 18 that was provided in the subpoena by Florida Power and 19 Light. 20 Q. Okay. So you have no reason to believe that 21 that information is more accurate than the measurements 22 taken by Penon and/or Fabiani, correct? 23 A. No, other than the fact that it's a Florida 24 utility, and they are regulated. I would think that -- 25 Q. Do regulated Florida utilities ever have
Page 256 1 device malfunctions? 2 A. Oh, absolutely. Absolutely. In fact, I 3 believe in this facility they actually replaced a smart 4 meter at some point earlier in the year. 5 Q. Why do you believe that? 6 A. Because the registration number of the meter 7 in the subpoenaed data changed. 8 Q. When was that? 9 A. I don't recall. It was earlier in the year. 10 I would say sometime maybe in the May or June time 11 frame. 12 Q. Okay. Do you know if it was hooked up 13 correctly when it was replaced? 14 A. I do, I do not. 15 Q. Okay. So what you've got here is just a 16 comparison side by side of the two number sets. Is 17 there anything scientific about that other than looking 18 at it? 19 A. It's, it's very alarming to see a drop. I 20 mean in general when you see this, you see a very, very 21 consistent amount of power being absorbed by the reactor 22 system. And when the reactor system has a major drop 23 like here in the, let's say between July and August you 24 see a drop off, which I think corresponds to the data 25 that says, hey, we had some, some reactors go offline,	Page 257 1 you see that drop. That makes sense. And then sometime 2 in October they brought all of the units back online and 3 the power goes up. 4 So all of the trends seem to be consistent 5 except for this period of time when, in about from 6 middle of November to the beginning of December where 7 you have a power level absorbed into the building lower 8 than the measured. So that would give -- to me, there 9 are three potential explanations. Number one, Florida 10 Power and Light could be wrong. Number two, the 11 measurements made by Fabiani and Penon could be wrong. 12 And number four or -- I'm sorry, number three, the data 13 could have been manipulated. On either part, on either 14 party. 15 Q. Do you have any evidence that the data has 16 been manipulated -- 17 A. No, I don't. 18 Q. -- by either one? 19 A. Not by Florida Power and Light or by Fabiani 20 or Penon. 21 Q. Okay. So you have no evidence of 22 manipulation. So what are you opining to specifically 23 here? 24 A. Specifically, in this period it was, it was 25 determined by Mr. Penon that the measurements, the

02/17/2017 Joseph Alan Murray

Pages 258..261

Page 258

1 absorption of power was accurate and reflected what was
2 happening in the reactors. But if, in fact, Florida
3 Power and Light indicates that their data is valid in
4 the data provided under subpoena, then it would be
5 impossible for them to absorb more power than Florida
6 Power and Light provided.
7 Q. Now, you keep saying data provided under
8 subpoena, as if that makes it more accurate. It's the
9 measuring equipment that makes it more accurate or not,
10 correct?
11 A. Sure.
12 Q. Not whether it was voluntarily provided or
13 under subpoena?
14 A. Uh-huh.
15 Q. Correct?
16 A. Yeah. My view is that if, if a, if a person
17 is providing data under subpoena, they're going to
18 probably provide the best possible data they have. We
19 also know that Florida Power and Light has hourly
20 measurements for this facility, and we have not received
21 that data.
22 Q. Okay. But you don't know whether it was
23 measured correctly or not at that point in time. All
24 you can tell based on this is that there is a
25 difference?

Page 260

1 But this is a problem, and these areas down here are a
2 problem. What they're indicating is that nothing else
3 in the building is absorbing power, only the reactor,
4 and that's simply not realistic.
5 Q. And as you said, there's one of three
6 options. Either FP&L is wrong, Penon and Fabiani are
7 wrong, or there's manipulation on the data?
8 A. On, on the part of some party, yes.
9 Q. Okay. So basically one or the other is
10 incorrect, and then the third option is that it was
11 intentionally incorrect?
12 A. Right, by somebody.
13 Q. By somebody?
14 A. That's right.
15 Q. Okay. But you don't know which one is which?
16 A. No.
17 Q. Okay. So your opinion is simply that this is
18 an area of concern where it drops below and the other
19 areas where it drops below slightly are --
20 A. In the context of this one plot, yes.
21 Q. Okay. Now, the measurements taken by FP&L
22 were taken at what time?
23 A. Midnight.
24 Q. Midnight. The measurements taken by Engineer
25 Penon were what time?

Page 259

1 A. Yeah. I don't know whether or not any of
2 these lines were measuring correctly at that time.
3 Q. Okay. So what I'm, what I'm trying to
4 determine, because you're, you're giving an opinion as
5 to this, is I can see this as well as you can. I can
6 see this graph.
7 A. Right.
8 Q. I can see the, the lines where they drop
9 below the Penon number and, which would indicate that if
10 the FP&L measurements was right, it was supplying less
11 power than the power going into the unit. Okay. But
12 other than that, is there anything scientific that we
13 had to apply, any methodology to apply to, to create
14 this graph?
15 A. This is just a summary graph. And I think
16 there's, might be another plot in this --
17 Q. There is. And we'll --
18 A. -- Exhibit B.
19 Q. And we'll get to that one.
20 A. Yeah, so there were a series of analyses that
21 I completed. And we looked at the baseline power of the
22 building, and that gets to, more to the opinion. This
23 is just the raw data comparison. And if the raw data
24 showed that there was no period, then I think we could
25 have said it's potentially a reasonable expectation.

Page 261

1 A. Well, he was only in the facility I believe
2 four times. So I would imagine he only collected the
3 data. He didn't actually take the measurements. So
4 that's why I believe that Fabiani actually collected the
5 data in the logs and provided that to Mr. Penon.
6 Q. That's your belief?
7 A. It is my belief, yes.
8 Q. Okay. Do you know what data Mr. Penon
9 received directly?
10 A. How would Mr. Penon receive data directly?
11 Q. It's called the internet.
12 A. Really? No, I have no idea what data. I
13 would be interested to see. So he --
14 Q. Do you know if he did?
15 A. I do not.
16 Q. Do you know if he had a computer on site?
17 A. I believe that there were computers on site
18 that were collecting data from, from the instruments,
19 yes.
20 Q. Okay. Do you know if one of those was
21 Mr. Penon's, or Dr. Penon's I should say?
22 A. I do not.
23 Q. Okay. Now, now you said that FP&L's data was
24 recorded at midnight?
25 A. Yes.

02/17/2017 Joseph Alan Murray

Pages 266..269

Page 266

1 Q. Well, let's, let's look specifically at,
 2 let's see, May 20, 2015.
 3 A. Okay.
 4 Q. Okay. So between May 20, 2015, and June 20,
 5 2015.
 6 A. Uh-huh.
 7 Q. Okay. There are at least one, two, three,
 8 four, five, six, seven, eight days out of a 30-day
 9 month, 31-day month? What is it? 31-day month. So
 10 almost a third of the days there was no read during that
 11 month, yet I don't see a single gap on your --
 12 A. Yeah, this, this --
 13 Q. -- line graph.
 14 A. -- plot is actually connecting the points
 15 rather than showing the, the data points. So as I said,
 16 there were numerous different plots that I did to look
 17 at the data, both from a joint probability density
 18 function analysis techniques. I also looked at a wide
 19 range of other techniques, so --
 20 Q. I'm sorry.
 21 A. -- this one --
 22 Q. What was that technique?
 23 A. That's a joint probability density function
 24 analysis.
 25 Q. What is that?

Page 268

1 so you look at all of the days that you had a particular
 2 power level and you bend them and you contrast that
 3 jointly with the two series, the two time series, then
 4 you can create a, a distribution, a joint distribution
 5 between two independent data sources. And then you can
 6 create a probability density. So how probable is this?
 7 What is the relationship between this? And two highly
 8 correlated signals will have a very defined structure.
 9 And when you contrast that with signals that are
 10 unrelated, then they will have a completely different
 11 structure.
 12 So it's very difficult to see in a scale like
 13 this where there are probably, I don't know, 300 and, I
 14 don't know, however many days, 350 days or 360 days
 15 worth of data. It's very difficult to see when you just
 16 are connecting the points and you don't show the data
 17 line. So this plot is, is just one example of the
 18 analysis.
 19 Q. Okay. Now, the, the plot below that says
 20 cumulative energy absorption. What did that tell you?
 21 A. Nothing. I mean it just shows the flat
 22 points in the distribution. It was one of the things
 23 that we analyzed along the way to see if there were
 24 points where the cumulative energy were, were not
 25 related, but it was just not --

Page 267

1 A. So what you do is you create a distribution
 2 of the two data sources so you can look at how those
 3 measurements correlate, so you can look at the
 4 distribution shape to find out if there's anomalous
 5 structure in the distribution.
 6 Q. Anomalous structure in the distribution?
 7 A. Yes.
 8 Q. We're, we're comparing presumptively two data
 9 points on the same date to each other?
 10 A. No. In a joint probability density function
 11 what you're doing is you're actually creating a
 12 distribution of all the days at the various power levels
 13 and corresponding the power levels measured by, in this
 14 case, Penon to the power levels measured by Florida
 15 Power and Light. So we could look to see how these
 16 distributions vary over time to see if there's
 17 structural changes in it.
 18 Q. I guess I'm not understanding. Structural
 19 changes in the distributions of what?
 20 A. Of the, the behavior between the two power
 21 sources. So you do a, you're creating a, a distribution
 22 of these power measurements.
 23 Q. What, what do you mean by distribution of
 24 these power measurements?
 25 A. So a, if you take, if you create a histogram,

Page 269

1 Q. Do they seem related to you here?
 2 A. There are a couple of strange points where
 3 one signal is steadily going up and the other signal is
 4 flat, but it's very difficult to see in this. It would
 5 be far better suited if it was plotted on a log scale so
 6 you could exaggerate that and see that.
 7 Q. Did you plot it on a log scale?
 8 A. In other plots, yes.
 9 Q. Is there a reason that this graph was
 10 included in your expert disclosure then if it --
 11 A. It was just --
 12 Q. -- tells you nothing?
 13 A. -- an, it was an example. So actually this
 14 was plotted together in one function call, and so it was
 15 just together when we saved the file or saved the image
 16 out of the, the analysis.
 17 Q. So you would agree with me, sir, that if
 18 FP&L's data was incorrect and there had been an error in
 19 the reading, your report would not accurately reflect
 20 the relationship between the amount of energy supplied
 21 by FP&L and that recorded by Engineer Penon and
 22 Mr. Fabiani?
 23 A. Could you repeat that?
 24 Q. Sure. You would, you would agree with me
 25 that if the FP&L data was incorrect, that would render

02/17/2017 Joseph Alan Murray

Pages 286..289

Page 286 1 basis. 2 Q. Okay. So the energy out is the numerator, 3 correct? 4 A. Yes. 5 Q. The energy in is the denominator? 6 A. Yes. 7 Q. Okay. So logically speaking, COP would 8 increase one of two ways, by the energy out increasing 9 relative to the energy in, correct? 10 A. Uh-huh. 11 Q. Or by the energy in decreasing, correct? 12 A. Uh-huh. If the energy out stayed constant. 13 Q. What if the energy out increased? 14 A. Well, then it would even increase more. 15 Q. Okay. So let's look at your graph. Your 16 concern over this is that, and you say there is no 17 logical reason why COP would increase when energy in 18 decreases? 19 A. Uh-huh. 20 Q. How do you come to that conclusion? 21 A. So what I was referring to is throughout the 22 entire test period there were numerous points that were 23 documented in various reports and along the way of 24 reactors going offline. Mr. Fulvio Fabiani provided us 25 with a log, actually in Italian that had to be	Page 287 1 translated to English, that showed this reactor went 2 offline and that reactor went offline, this Big Frankie 3 went offline, it was brought back on. It gives us 4 intervals of time. 5 And the thing that we saw was that when a 6 reactor went offline, the COP went up and the output 7 energy stayed the same, but we know from the physical 8 configuration that the pump system on the front end that 9 provides water to these systems is feeding the 10 individual reactors. So if you turned off a reactor -- 11 and you would expect a COP to be constant, but let's say 12 he had a COP of 100. When you turned off a reactor, you 13 would expect the COP to be constant, but the power 14 output would go down. 15 And this, and instead, what we saw was that 16 when a reactor was taken offline, the COP went up and 17 the output power stayed exactly the same, which in my 18 opinion is consistent with measurement error and 19 particularly the measurement error associated with the 20 flow meter. Because if the flow meter was flowing water 21 through it and it was inaccurately measuring just 22 because it was incorrectly sized or wasn't properly 23 implemented in this system, it may read the same exact 24 invalid number below the minimum. 25 And so it was indicative of, hey, this is an
Page 288 1 obvious problem. I, it is my opinion that any competent 2 engineers would have seen this and said wait a minute, 3 we have to understand this. 4 Q. Okay. Let me ask you a question. If you 5 have two devices, let's say we have two reactors. 6 A. Sure. 7 Q. Each operating at 50 percent capacity. 8 A. Okay. 9 Q. Okay. And they're each capable of producing 10 50, what, kilowatts? Does that make sense? Kilowatts? 11 A. 250, but okay. 12 Q. Okay. Let's say it's 250. 13 A. Okay. 14 Q. Each, right? 15 A. Uh-huh. 16 Q. Okay. So that means when they're operating 17 together at 50 percent capacity each, they're putting 18 out a total of 250 kilowatts, correct? 19 A. Okay. I buy that. 20 Q. Now, and they're receiving energy in to 21 operate? 22 A. So input. 23 Q. Yeah. 24 A. Yeah, the heating energy, yes. 25 Q. Okay. The heating energy to those two units.	Page 289 1 A. Uh-huh. 2 Q. If one of those goes offline and you increase 3 the energy to the remaining unit, okay, that means not 4 necessarily an excess of what -- I mean you could double 5 the energy to that second unit and still at the same be 6 at the same energy input, correct? 7 A. Last week when I was sitting in on 8 Mr. Rossi's deposition, he specifically stated that they 9 did not have the means to control the energy input when 10 reactors went offline, which is consistent with what I 11 understood. So the scenario you're describing is 12 inconsistent with the testimony that I, I listened to 13 last week. 14 Q. I'm sorry. You believe he said that he could 15 not, he could not control the energy input to the units? 16 A. Yeah. He could not, he could not control the 17 COP by increasing the energy to a unit. That's what I, 18 that's what I believe I heard last week. And 19 furthermore, that when we looked at this, the question 20 was how would you control the heating elements in each 21 one of the individual units? Because as was evident and 22 when we visited the plant, numerous of the actual 23 elements were pulled out and taken offline. They were 24 covered up with hose, little hose covers like garden 25 hose covers.

02/17/2017 Joseph Alan Murray

Pages 290..293

Page 290 1 Q. Off the Big Frankies? 2 A. Yes, yes. Many of the actual reactors were 3 completely disabled when we were there on February 16th 4 and 17th. I, I took pictures of it. I was kind of 5 surprised to see that all of them were not functional. 6 And so what we saw was a lot of failures. And so what 7 would happen is if, if you were in a condition when at 8 several points during the test -- in fact, in the 9 October time frame I think Mr. Penon came back to the 10 site and he identified all of the reactors that were 11 turned off and disabled. He indicated that by a zero 12 amperage input to them when he was measuring the system. 13 And so when you look at that, what you would 14 be doing is you would be overdriving certain heater 15 elements, but you didn't have the ability to increase 16 the water flow because some of those pumps were routed 17 to Big Frankie 1, some were routed to Big Frankie 2, 18 some to 3 and some to 4. So it would have required a 19 complete reconfiguration of the water flow system. So 20 in my opinion -- 21 Q. How were the pumps controlled? 22 A. How were the pumps controlled? They looked, 23 looked to be manually controlled on the front panel. 24 Q. Okay. So, so if you have one system go down, 25 somebody could go and manually --	Page 291 1 A. So we looked at that -- 2 Q. -- turn off the pumps, right? 3 A. So we looked at that and we took pictures of 4 the pump configuration when the plant was still 5 operational on the 16th, and what we saw was that the 6 pumps were in a fixed, almost maximal rate. And, in 7 fact, we also saw that some of the pumps had sediment 8 and, and biofouling in some of the lines, indicating 9 that there's no flow in those. So those pumps were 10 disabled. 11 And so it's, it's very unusual. You would 12 expect a system like this to maintain a constant 13 coefficient of performance nominally, in particular 14 considering that the system was originally supposed to 15 operate I believe it was 64 reactors in the Big Frankie 16 coupled with 51 of the smaller reactors. And at the 17 onset of the test all 51 of the other reactors were 18 disabled, and by the time we got there many of the Big 19 Frankie reactors were disabled. And furthermore, we 20 know from the data that Mr. Penon provided, numerous of 21 the Big Frankie reactors were disabled in that October 22 time period when he was there. 23 Q. Okay. Now, taking this one at a time. If 24 all of the reactors within the E-Cat unit were 25 operational at their maximum capacity, how much energy
Page 292 1 would be put out by that machine? 2 A. I have no idea. 3 Q. Okay. So you really can't testify that any 4 particular reduction makes it impossible that the amount 5 of energy reported by Dr. Penon could not have been 6 achieved? 7 A. What I can say as, as an engineer is that 8 taken, taking all of these factors together, the flow 9 rate, the pressure measurements, the, the adding of 10 water, the inability to see what's on the other side of 11 the plant, the lack of defining the state for the output 12 steam as well as the input steam, taking them on the 13 whole, it seems highly unlikely. In fact, in my opinion 14 I would say it cannot happen. 15 Q. What cannot happen? The amount of power -- 16 A. Yeah. 17 Q. -- the input? 18 A. The amount of power going up proportionally 19 when they turn off more and more reactors cannot happen. 20 Q. The amount of power went up or the COP? 21 A. Well -- 22 Q. Please -- 23 A. Let's be careful. Let's be careful. So if 24 you look at the formula for the COP, and let's say in 25 terms of energy. We'll take it on a, energy on a daily	Page 293 1 average. What happened was the amount of output energy 2 was effectively not, I shouldn't say constant, it varied 3 some, but the input energy to the system actually went 4 down. So we actually see a reduction in the input 5 energy. So this disproportion means the output energy 6 was constant and the input went down and, therefore, the 7 COP went up. So if I put in less power, how could that 8 happen? It's just completely illogical. 9 Q. Okay. How long, this reaction that's used on 10 the device -- first of all, do you have any background, 11 education, or work experience with LENR technologies? 12 A. Not before I went to Industrial Heat. 13 Q. Okay. And any experience with nuclear 14 reactors prior to that? 15 A. No. 16 Q. Okay. So are you familiar with nuclear 17 reactors? 18 A. Yes, I am. 19 Q. Do you feel competent to testify as to them? 20 A. No, no. 21 Q. Okay. 22 A. I'm not into the full operation of a nuclear 23 reactor, no. 24 Q. Now, when the reaction is started in the 25 E-Cat and you remove the power source, the input power,

02/17/2017 Joseph Alan Murray

Pages 302..305

Page 302

1 provided, analyze it, and to look at the, the time
2 history of the energy absorption provided by Mr. Penon
3 and Mr. Fabiani.
4 Q. And if I take the time, could I, could I go
5 through and make those comparisons and come to the same
6 conclusion?
7 A. I don't know if you could. That's me
8 projecting onto you. I'm not sure. You told me before
9 you only, you slept through math -- all your science
10 classes, so I would have to say no.
11 Q. I said I slept through one of them.
12 A. Oh, all right. For the record, it was one.
13 MR. ANNESSER: Okay. We need to change the
14 tape.
15 THE WITNESS: Okay. I need to run to the
16 restroom.
17 THE VIDEOGRAPHER: We're off the record at
18 3:55 p.m.
19 (Recess taken 3:55 p.m. to 4:03 p.m.)
20 THE VIDEOGRAPHER: We are back on the record
21 at 4:03 p.m.
22 BY MR. ANNESSER:
23 Q. Sir, I think previously you had testified
24 with respect to Mr. Dewey Weaver that you had hundreds
25 of e-mails with him.

Page 304

1 back in the record of the final report, it looked like
2 the days leading up to the end when they turned off the
3 system, it was, it was operating at near full capacity.
4 And so from that standpoint I also observed
5 that there was a skylight and then there was a vent, but
6 when we were there that day or those days the vent was
7 never running. And so I was a little perplexed and
8 tried to figure out how hot should it be in that. So we
9 put together some buoyancy-driven flow simulations of
10 the building based on the estimates for where the wall
11 was and how big was the, the, the box on the other side.
12 And we made the assumption that some amount of heat,
13 various levels of heat had to be dissipated through that
14 box.
15 And so we did a 3D simulation using OpenFOAM,
16 a steady-state buoyancy-driven flow simulation so that
17 we could try to assess, you know, how hot should it have
18 been, just to kind of do a sanity check, make sure
19 things made sense.
20 Q. And your opinion was that the room would have
21 been heated to a temperature unsuited for a human
22 working environment?
23 A. Yes.
24 Q. What temperature?
25 A. We did it for 100-kilowatt dissipation. We

Page 303

1 A. From him.
2 Q. Or from him. Okay. Were they hundreds of
3 e-mails regarding the E-Cat for the most part?
4 A. No. No, he, as I described earlier, Dewey
5 was kind of like a business development outreach guy
6 looking for people that were doing research and
7 technology development in this area, trying to build
8 relationships for the, you know, what they described as
9 the portfolio. And so he was always sharing lots and
10 lots of information about different people that he had
11 met and what they were doing and what people were
12 interested in and things of that sort.
13 Q. Okay. Now, getting to the next opinion that
14 you have in your report regarding heat simulations. You
15 say, "Mr. Murray's simulation demonstrates how the heat
16 would typically build over time to achieve a steady
17 state temperature. See thermal simulations." What,
18 what is thermal simulations? Is that a publication?
19 A. No. It's the results of thermal simulations
20 that I have run. And so I, I did a series of OpenFOAM
21 3D simulations of buoyancy-driven flow inside of the
22 building. So when we were there, one of the, on, on
23 February 16th and 17th, 2016, one of the things I
24 noticed was it was not as hot in the facility as I was
25 kind of expecting. When we got there, and I checked

Page 305

1 did it for 500-kilowatt dissipation, 750, 250, and 800.
2 The 100-kilowatt dissipation reached a steady-state
3 temperature in the building -- I drew a --
4 Q. Okay.
5 A. I'm sorry.
6 Q. I'm going to stop you for a moment.
7 A. Okay.
8 Q. Let's just go to the 800.
9 A. Yeah. I don't have the data. I, I haven't
10 looked at the 800 data since last August, because it was
11 extraordinarily hot. I, the data I focussed on was the
12 100-kilowatt dissipation in the building.
13 Q. Is that the data that you had provided to
14 Industrial Heat back when you made it?
15 A. The 100? Yeah. I provided 100, 250, 500,
16 750, and 800, various different simulations.
17 Q. Do you know why that has never been provided
18 to us?
19 A. Well, those, those simulations, they, for
20 some reason, I don't know why, but when I converted the
21 video simulations, they were corrupted.
22 Q. But I think you testified that that was when
23 you sent it to counsel, but --
24 A. Yeah.
25 Q. -- that Industrial Heat had it previously?

02/17/2017 Joseph Alan Murray

Pages 326..329

Page 326 1 Q. Okay. But what are those equations 2 specifically? Do you know? 3 A. I can't recite them off the top of my head. 4 Q. Okay. Do you know what they are? 5 A. Yeah, they're the -- 6 Q. If -- 7 A. -- well, heat transfer, the -- 8 Q. Okay. 9 A. Yeah. 10 Q. This simulator, if I were to go to open, open 11 flow -- 12 A. OpenFOAM. 13 Q. -- OpenFOAM, sorry, and put in all of the 14 requested data for this, could I run a simulation? 15 A. I don't think you have the competency to do 16 that. 17 Q. I would not -- 18 A. And nothing personal. 19 Q. -- be insulted. 20 A. Right. So not, nothing personal. I don't 21 believe that -- I mean you have to have some 22 expertise -- 23 Q. Why? 24 A. -- and that's why -- 25 Q. What, what does it take that I don't have?	Page 327 1 A. A lot of understanding of the heat transfer 2 and the fluid mechanics and -- 3 Q. What about? What about? I mean give me 4 specifics, not just about the heat transfer. 5 A. You have to have an understanding of all the 6 boundary conditions that you would define, the materials 7 that you would define, how you would -- a major part of 8 this is how you decompose the system into a series of 9 grids so that you can solve it. And you would have to 10 have an understanding of how the tools work. You would 11 have to have a computing system that was adequately 12 large to run the simulations. 13 For example, the 100-kilowatt simulation that 14 I've been running, that actually has taken almost three 15 weeks on a pretty powerful computer. So there's, 16 there's a lot that goes into it, and that's why I 17 actually, I have been doing simulations of this sort for 18 many, many years. And, and actually we have outsourced 19 when, in my previous company we outsourced it to other 20 companies that did this. And when I left my company, I 21 was very interested in looking at OpenFOAM because of 22 the power of this tool. And it's open source. So I 23 actually went and had training on open -- on using this 24 tool in contrast to other tools that we have used in the 25 past.
Page 328 1 Q. And so it, it applies these equations that 2 you can't tell me today what they are? 3 A. Yeah. They're the, they're the diffusive 4 heat transfer equations. Do you, you want me to write 5 out the calculus? 6 Q. Do, do you know it? 7 A. No, not off the top of my head. 8 Q. Okay. 9 A. And so. 10 Q. Did you rely, in preparing the data to put 11 into this simulator, did you rely upon any written 12 literature, publications, or otherwise? 13 A. Yeah. I, I relied on all of my training 14 throughout my masters and PhD programs in convective 15 heat transfer, fluid mechanics, turbulence simulations. 16 Most of my graduate work was actually in those areas, 17 and then I used and then I employed this tool. As I 18 said before, my, my research in my PhD program was on 19 large eddy simulations, which is a family of simulations 20 that can be done in this tool. And so, and 21 that's actually how -- 22 Q. Large eddy deals with fluid, correct, not 23 air? 24 A. -- it's -- what's that? 25 Q. Large eddies refer to fluid?	Page 329 1 A. No. A large eddy simulation -- 2 Q. Sure. 3 A. -- is a, it's a course grid scale full 4 simulation of the Navier-Stokes equations, and it can 5 incorporate the heat transfer equations for, on a course 6 grid. And what you do in large eddy is you solve at a 7 large grid, and you model at a smaller grid. So that 8 was my research. You said we were going to get back to 9 it, but that was my research in my PhD program. 10 And so a large eddy simulation is not, it, it 11 can be used for lots of different things. You can use 12 it for fluids. You can use this for gas. You can use 13 it for plasmas. You can do lots of different things. 14 In this case, we were doing it for air, the most simple 15 case. 16 Q. With respect to the flow meters, sir -- 17 A. Yes. 18 Q. -- did you test what the reading on the flow 19 meter would be if the amount of water passed through it 20 and the amount being, the amount that Penon reported 21 went through? 22 A. Uh-huh. 23 Q. You did? 24 A. I'm sorry. Say that again. I'm sorry. 25 Q. Did at any time you test these flow meters

02/17/2017 Joseph Alan Murray

Pages 370..373

Page 370

1 MR. LOMAX: And Defendants are going to
2 designate Mr. Murray's testimony at this time as
3 highly confidential due to a lot of the information
4 that was provided here today.
5 (DEPOSITION CONCLUDED AT 5:20 P.M.)
6 (SIGNATURE RESERVED)
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

Page 372

1 WITNESS'S CERTIFICATE
2
3 I, JOSEPH ALAN MURRAY, do hereby certify
4 that I have read and understand the foregoing
5 transcript and believe it to be a true, accurate, and
6 complete transcript of my testimony, subject to
7 the attached list of changes, if any.
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

JOSEPH ALAN MURRAY

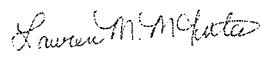
This deposition was signed in my presence by
_____, on the _____ day of _____,
_____, 2017.

_____
Notary Public

My commission expires: _____

Page 371

1 STATE OF NORTH CAROLINA
2 COUNTY OF WAKE:
3
4 REPORTER'S CERTIFICATE
5 I, LAUREN MCINTEE, RPR, a Notary Public in
6 and for the State of North Carolina, do hereby certify
7 that there came before me on Friday, the 17th day of
8 February, 2017, the person hereinbefore named, who was
9 by me duly sworn to testify to the truth and nothing but
10 the truth of his knowledge concerning the matters in
11 controversy in this cause; that the witness was
12 thereupon examined under oath, the examination reduced
13 to typewriting under my direction, and the deposition is
14 a true record of the testimony given by the witness.
15 I further certify that I am neither attorney
16 or counsel for, nor related to or employed by, any
17 attorney or counsel employed by the parties hereto or
18 financially interested in the action.
19 IN WITNESS WHEREOF, I have hereto set my
20 hand, this the 20th day of February, 2017.
21
22
23
24
25


LAUREN MCINTEE, RPR, Notary Public
Notary Number: 201616600044

Page 373

1 CaseWorks, Inc.
2 811 Ninth Street, Suite 260 (Page 1 of 2)
3 Durham, North Carolina 27705
4 E R R A T A S H E E T
5 Re: Andrea Rossi, et al. vs. Thomas Darden, et al.
6 Deposition of: JOSEPH ALAN MURRAY
7 Please read this transcript with care, and if
8 you find any corrections or changes you wish made, list
9 them by page and line number below. DO NOT WRITE IN
10 THE TRANSCRIPT ITSELF. Return the
11 Certificate and Errata Sheet to this office after
12 it is signed. We would appreciate your prompt
13 attention to this matter.
14 To assist you in making any such corrections,
15 please use the form below. If supplemental or
16 additional pages are necessary, please furnish same and
17 attach them to the errata sheet.
18 Page _____ Line _____ should
19 read: _____
20 Page _____ Line _____ should
21 read: _____
22 Page _____ Line _____ should
23 read: _____
24 Page _____ Line _____ should
25 read: _____

From: Tom Darden <tdarden@industrialheat.co>
Sent: Tuesday, December 01, 2015 1:15 PM
To: Joseph Murray
Subject: Re: Plant status

Thanks. See you in AM.

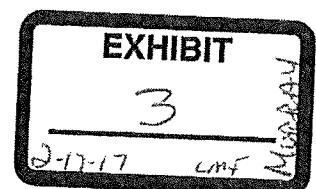
From: Joseph Murray
Sent: Tuesday, December 1, 2015 12:49 PM
To: Tom Darden
Subject: Re: Plant status

TBD is starting up now. He will have the system calibrating. Not sure where he landed on the dual laser system. We have the first reactor installed and are buzzing out the lines on the controller. We hope to have the controller set up and heating the reactor this afternoon. We should have at least TBD Legacy Rossi system in calibration and our system alive.

Joe.

On Tue, Dec 1, 2015 at 11:35 AM, Tom Darden <tdarden@industrialheat.co> wrote:
BTW, how are things looking for tomorrow's meeting? Will anything be running, eg TBD's project?

--
Joe Murray
Industrial Heat
p: 919.670.2771
c: jmurray@industrialheat.co



From: Fulvio Fabiani <fulviofabiani@mail.com>
Sent: Monday, April 25, 2016 1:01 PM
To: Joseph Murray
Subject: Re: Follow Up

sorry Joe,

but I am very upset about the behavior of both parties.

Rossi is very disappointed with me because he thinks that I'm an IH spy and IH did not pay the last invoice to me, taking me around saying (words of JT) that the check has been shipped (over 20 days ago).

These two behaviors are really bad and not reflecting the honesty with which I worked for Rossi and IH.

My data are frozen inside a certificated server,

and I will not make any use of such information except for defence myself from Rossi and IH accusations against me.

Anyway I'm ready for a beer with you, because you are the only one in my same situation (between the hammer & anvil), txt me.

Now back to my search for new customers.

Have a good day.

Fulvio

Sent: Wednesday, April 20, 2016 at 11:42 AM
From: "Joseph Murray" <jmurray@industrialheat.co>
To: "Fulvio Fabiani" <fulviofabiani@mail.com>, "JT Vaughn" <jvaughn@industrialheat.co>
Subject: Re: Follow Up

Fulvio,

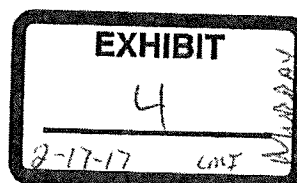
Any updates on the raw data and the final report. We are approaching a month past due. Should we talk today? Should we arrange a face to face meeting to sort this out?

Thanks,

Joe.

On Thursday, April 14, 2016, Joseph Murray <jmurray@industrialheat.co> wrote:
Fulvio,

I still have not received the final report and raw data - that you indicated would be sent at the end of March, and then again more that a week ago. I wanted to make sure you did not have any issues preparing the files for transmission.



Please advise.

B/R,

Joe.

On Thu, Apr 7, 2016 at 3:39 PM, Joseph Murray <jmurray@industrialheat.co> wrote:
Fulvio,

Any updates on the report and raw data?

Thanks,

Joe.

On Wed, Apr 6, 2016 at 2:10 PM, Joseph Murray <jmurray@industrialheat.co> wrote:
Fulvio,

Great I am looking forward to the raw data files. I could really use the unofficial flow meter records when you find them. Also, please send a copy of your full report.

Best regards,

Joe.

On Wed, Apr 6, 2016 at 1:43 PM, Fulvio Fabiani <fulviofabiani@mail.com> wrote:
Hello Joseph,

I received the written consent from JT to transmit to you the RAW DATA of entire year (thermal and electrical) of which you has already received from me the xls summary for the analyzes.

Just be ready to certified transmission, I will look to send it to you.

About the unofficial data of flowmeter, Im sorry to announce that, until now, I did not find my notes about that Instrument.

If I had to find this data, I will warn promptly.

Have nice day.

M.Eng. Fulvio Fabiani
C.E.O. if USQL LLC
+1(919)8127863

Sent: Tuesday, April 05, 2016 at 9:21 PM
From: "Fulvio Fabiani" <fulvio.fabiani@mail.com>
To: "Joseph Murray" <jmurray@industrialheat.co>
Subject: Re: Follow Up

Hello Joseph,

For continue some discussion about my work for IH i need writed autorization from Tom or JT.

Have nice day.

Fulvio

Sent using the [mail.com](mailto:fulvio.fabiani@mail.com) mail app

On 4/1/16 at 12:51, Joseph Murray wrote:

> Fulvio,
>
> I hope this message finds you well. A few weeks back I requested a copy of
> the original raw data as well as the unofficial data you recorded that
> included the flow meter logs. JT indicated that you were in Canada but
> would get back with me. Could you please pass along that information.
>
> In addition I think your final report was to be completed by 3/31/16. Can
> you send that along with all of the supporting data?
>
> Thanks and hope all is well.
>
> B/R,
>
> Joe.
>
>
> On Tue, Mar 22, 2016 at 5:52 PM, Joseph Murray <jmurray@industrialheat.co>
> wrote:
>
> > Fulvio,
> >
> > I hope this message finds you well. I have gone through the data that you
> > provided and it was very helpful. I think it clarifies many things that
> > were ambiguous with the other data sets that we were provided by Penon.
> >
> > Did you have any success in finding the other log data that you were going
> > to look for on the other computer? We were interested in your informal
> > measurements from the flow meter.
> >
> > Also, is it possible for you to send me a raw data files with the data
> > sampled at the raw rate? This would be most helpful.
> >
> > Best regards,
> >
> > Joe.
> >
> > --
> > Joe Murray
> > Industrial Heat
> > p: 919.670.2771
> > e: jmurray@industrialheat.co
> >
> >
> >
> > --
> > Joe Murray
> > Industrial Heat
> > p: 919.670.2771
> > e: jmurray@industrialheat.co

--
Joe Murray
Industrial Heat
p: 919.670.2771
e: jmurray@industrialheat.co

--
Joe Murray
Industrial Heat
p: 919.670.2771

e: jmurray@industrialheat.co

--

Joe Murray
Industrial Heat
p: 919.670.2771
e: jmunay@industrialheat.co

--

Joe Murray
Industrial Heat
p: 919.670.2771
e: jmurray@industrialheat.co

From: JT Vaughn <jvaughn@industrialheat.co>
Sent: Monday, July 13, 2015 9:12 AM
To: Joe Murray
Subject: Fwd: Andrea Rossi

Alright, he'll start getting worked up now...should be a fun trip.

----- Forwarded message -----

From: JT Vaughn <jvaughn@industrialheat.co>
Date: Mon, Jul 13, 2015 at 9:10 AM
Subject: Re: Andrea Rossi
To: "con333@libcro.it" <con333@libcro.it>
Cc: Trista Balmer <tbalmer@industrialheat.co>

Thanks, Andrea. We'll try to get this processed.

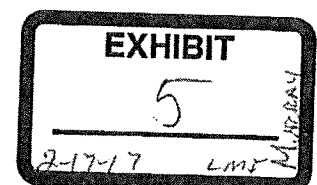
Also, I would like to introduce you to one of our new team members, Joe Murray. He and I have booked a flight down on Tuesday afternoon and will depart Wednesday afternoon. I hope we can come see you at the plant on Tuesday afternoon, then we'll go get cleaned up at the hotel and plan to do dinner with you on Tuesday evening, and then spend some time at the plant on Wednesday morning through lunch or so--does that work? I am looking forward to seeing you, Barry and Fulvio and also introduce you guys to Joe.

Separately, concerning the provisional applications--rather than mailing to the shop, could you please mail the receipts and a copy of the applications to me at 111 E. Hargett St., Suite 300, Raleigh, NC 27601? Alternatively, you can scan and email if you like--feel free to encrypt the email and/or attachments (we use Virtru for this purpose, but not sure if it works with your email).

Best,
JT

On Mon, Jul 13, 2015 at 8:48 AM, con333@libero.it <con333@libero.it> wrote:
Dear Tista, JT:
Please find attached the invoice # 29-2015.
Warmest Regards,
Andrea

--
JT Vaughn
Industrial Heat
jvaughn@industrialheat.co



THIS ELECTRONIC TRANSMISSION IS DIRECTED TO ITS INTENDED RECIPIENT ONLY AND MAY CONTAIN INFORMATION THAT IS PROPRIETARY AND CONFIDENTIAL. If you are not the intended recipient, you are hereby notified that any use, disclosure, distribution or copying of this communication or any attachment is strictly prohibited. If you have received this electronic transmission in error, please delete it from your system without copying it, and notify the sender immediately by reply e-mail or by calling 919.743.5724. Thank you.

--

JT Vaughn
Industrial Heat
jvaughn@industrialheat.co

THIS ELECTRONIC TRANSMISSION IS DIRECTED TO ITS INTENDED RECIPIENT ONLY AND MAY CONTAIN INFORMATION THAT IS PROPRIETARY AND CONFIDENTIAL. If you are not the intended recipient, you are hereby notified that any use, disclosure, distribution or copying of this communication or any attachment is strictly prohibited. If you have received this electronic transmission in error, please delete it from your system without copying it, and notify the sender immediately by reply e-mail or by calling 919.743.5724. Thank you.

INDUSTRIAL HEAT

DATE: 18-JUL-2015

SUBJECT: Summary of the Swansboro Meeting

ATTENDEES: Joseph Murray (JAM)
T Barker Dameron (TBD)
Barry West (BW)

This document is protected by Attorney Client Privilege

In an effort to better understand the configuration of the Leonardo Inc. (LI) trial that is presently being conducted in Doral, Florida a meeting was conducted between the attendees listed above. This meeting was initiated subsequent to LI indicating that JAM would not be permitted to enter the Doral Plant on a planned visit scheduled for 14 and 15 July 2015. Industrial Heat, LLC (IH) has a contractual interest in understanding the operations of the Doral Plant of LI. LI has represented that since February of 2015 the plant has been operational and consistently produces about 0.8 Megawatts (MW) of steam. This steam has been delivered to an independent organization that is co-located in this facility by way of an arrangement between LI and JM Products Inc. JM Products Inc. requests invoices from IH on a monthly basis for the purchase of the steam. These requests invoices indicate the amount of steam JM Products Inc. has received during the period but does not have any indication of how they are measuring the steam received. The invoices are requested by Mr. Henry W. Johnson with the subtitle "Advanced Derivatives Of Johnson Matthew Platinum Sponges". Note that JM Products Inc. has also been known to operate under the name JM Chemicals Inc. and JM Chemical Products Inc. all of which are suggested to be United Kingdom based companies. Note that Johnson Matthew Platinum Sponges should not be confused with Johnson Matthey Platinum Sponges. Johnson Matthey is a preeminent specialty chemical and renewable technology provider based in the United Kingdom.

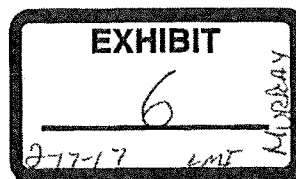
The data reviewed in support of the proposed July 14 introduction and plant tour included background contract documents, requests for invoice from Mr. Henry W. Johnson, President of JM Products Inc., and reports from LI's consultant and advisor Dr. Fabio Penon¹.

¹ The initial report from Dr. Penon with the title "E-CAT MW1 ENERGY PLANT IN MIAMI PLANT START UP" dated 4/30/2015 indicates in section 4 "Data Analysis" that the effective flowed water into the system is 3600 kg / day. However, all calculations presented in the "Daily valuation of the energy multiple - February 2015, March 2015, April 2015, and May 2015" use a value of 36,000 kg / day. A discrepancy of 10x between the the report value of 3600 kg / day and the value used in the calculations of 36,000 kg / day results in a COP increase of 10x. This is an extraordinarily large error that must be addressed.

CONFIDENTIAL

ih.memo.20150704

Page 1 of 4



CONFIDENTIAL

IH-00120182

INDUSTRIAL HEAT

In an attempt to understand the Doral Plant configuration and operation a meeting was arranged between the attendees on 18-July-2015. TBD, BW, and JAM discussed BW's ongoing role in support of IH at the Doral Plant. It was the intent that BW provide as much information regarding the As-Built configuration, operation of, and issues associated with the Doral Plant. The following items highlight topics that were discussed at the meeting:

1. **Plant Sensors:** The Plant does not have an operational steam flow meter. The only indication of the amount of water made available for generation of steam is an estimate of the amount of time water is pumped into the E-CAT heater tank from the feed water tank aperiodically. Per this discussion there is no mass or volume flow rate sensor on the condensate return line, nor on the piping between the feed water tank and E-CAT heater tank, nor is there a steam flow meter on the steam side of the device.
2. **Plant Sensors:** It was indicated that the pressure on the output steam line that is routed to the steam customer is continuously zero (0) pressure (gage). For steam to flow requires a pressure differential between the source and sink locations. Therefore, to overcome the pressure loss associated with the piping between the 2 locations and the need for steam to flow requires that the sink device (heat exchanger) must be operating in a vacuum state (in this context a vacuum state is a pressure below atmospheric pressure). Details on the design and configuration of the steam customer is required.
3. **Plant Sensors:** It was indicated that there was a steam flow sensor installed in the system by Dr. Penon. This sensor was located in the steam line between the source and sink but the device "burned out" at some point and therefore no data on mass or volume flow is readily available.
4. **Plant Sensors:** BW indicated that the power meter, model PCE830, used to monitor the 480 3 Phase input power reads 73 A on each of the 3-480 VAC phases.
5. **Operations:** The Plant does not include the ability to continuously monitor or automatically control the water level in the E-CAT heater tank. From time to time an operator must enable the level indicator on the E-CAT heater tank. When this task is executed the operator determines if additional water is needed in the tank. If the tank needs water the operator will turn on the pumps to move water from the feedwater tank to the E-CAT heater tank. The time that the the pumps are run is measured and an estimate of how much water was pushed into the E-CAT heater tank is estimated. The interval for checking the water in the E-CAT heater tank was not clearly known. Further, the need to fill the tank when there is no operator on site was not addressed.
6. **Operations:** BW indicated that the power configuration is unsafe. He indicated that he hoped "nobody every came to inspect the place". He stated that there is power floating all over in the system configuration and touching the wrong piece of equipment would

---

CONFIDENTIAL
ih.memo.20150704

Page 2 of 4

CONFIDENTIAL

IH-00120183

INDUSTRIAL HEAT

result in shocking an individual. This is a safety hazard and should be immediately investigated. Further, this may actually suggest why there have been extensive equipment failures. Floating a system like this can result in complicated and unanticipated current leaks at dangerous levels. The safety concerns centered on the failure of the heater units shorting to ground.

7. **Operations:** The physical configuration of the Plant was discussed. BW indicated that some or all of the non "Big Franky" units are disabled (by removing their wiring) from the control system; All of these units are not operational in the system. Within the four (4) operating "Big Franky" units each one contains 16 E-CAT heaters. The intention was that 1 MW of steam would be produced by operating 4 "Big Franky" and the other E-CAT devices. Within a "Big Franky" unit only 15 E-CAT heaters were to be operational and the other unit a spare (in the event of a failure).
8. **Operations:** The Plant is presently running exclusively with "Big Franky" units. All of the other E-CAT devices are disabled. Furthermore, BW indicated that on average only about 8 - 9 E-CAT heaters are operational in each of the "Big Franky" units due to continuing failures of units. BW was responsible for removing power inputs to the failed E-CAT heaters in the "Big Franky" units. In summary, only approximately 28 - 36 E-CAT heaters distributed across the 4 "Big Franky" units are operational.
9. **Operations:** BW indicated that the waveforms feeding power into the system are manipulated and adjusted often. In general the phase relationship are manipulated. In general the duty cycle is nominally 10 seconds of power applied followed by 30 seconds of power removed.
10. **Operations:** BW indicated that it is clear that when standing near the E-CAT heater tank that the water in the tank is boiling vigorously.
11. **Operations:** BW indicated that on a regular basis additional distilled water is brought to the Plant. This water is added to the system from time to time.
12. **Personnel:** BW indicated that there is a person, Renaldo, living in the space rented by JM Products, Inc. This person is often engaged to allow BW and Mr. Fulvio Fabiani gain access to their work area. In addition to Renaldo, the JM Products, Inc. personnel include "Jim". Jim is in the space from time to time. He generally drives an vehicle that appears as an unmarked government vehicle. BW has been told that the customer who is buying the steam via JM Products, Inc. is from the United States Department of Defense. The suggestion is that the secrecy associated with the purchaser of the steam is related to the nature of the customer.
13. **Personnel:** BW reports to the Plant and works regular hours on a 4 week on 1 week off schedule. BW generally reports to the Plant in the AM at approximately the same time as Mr. Fabiani. BW and Mr. Fabiani are colleagues and spend extensive time together in the office and have from time to time spent time outside of the office in recreational activities. At one point Mr. Fabiani indicated to BW that he would cause him physical

---

CONFIDENTIAL
lh.memo.20150704

Page 3 of 4

CONFIDENTIAL

IH-00120184

INDUSTRIAL HEAT

harm if BW interfered with the Plant. The nature and motivation for this threat should be better understood.

14. **Personnel:** BW noted that Dr. Rossi and Dr. Penon have heated arguments in Italian when he is present at the facility. The details and nature of the arguments is unknown.

CONFIDENTIAL
ih.memo.20150704

Page 4 of 4

CONFIDENTIAL

IH-00120185

From: fabiopenon@iol.it
Sent: Tuesday, February 23, 2016 9:58 AM
To: jmurray@industrialheat.co
Cc: tdarden@industrialheat.co; ar.123@mail.com
Subject: E-Cat reports
Attachments: attachment-1.pdf; attachment-2.pdf; attachment-3.pdf; attachment-4.pdf; attachment-5.pdf; attachment-6.pdf; attachment-7.pdf; attachment-8.pdf; attachment-9.pdf; attachment-10.pdf; attachment-11.pdf; attachment-12.pdf; attachment-13.pdf; attachment-14.pdf; attachment-15.pdf; attachment-16.pdf; attachment-17.pdf; attachment-18.pdf; attachment-19.pdf

Dear Mr. Murray,

following your request, please find attached all the reports on E-Cat MW1 Energy Plant Reports have already been sent to Mr. Darden and Mr Rossi:

E-Cat MW1 Energy Plant in Miami: test plan, by e-mail dated 02/10/2015

E-Cat MW1 Energy Plant in Miami: plant start up, by e-mail dated 05/28/2015

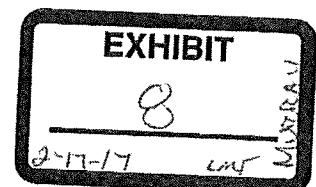
E-Cat MW1 Energy Plant in Miami: first step, by e-mail dated 05/28/2015

E-Cat MW1 Energy Plant in Miami: second step, by e-mail dated 10/22/2015

E-Cat MW1 Energy Plant in Miami: second step - from 05/01/2015 to 11/30/2015, by e-mail dated 01/12/2016

Sincerely

Dr. Eng. Fabio Penon



Ing. Fabio Penon

Plant start up

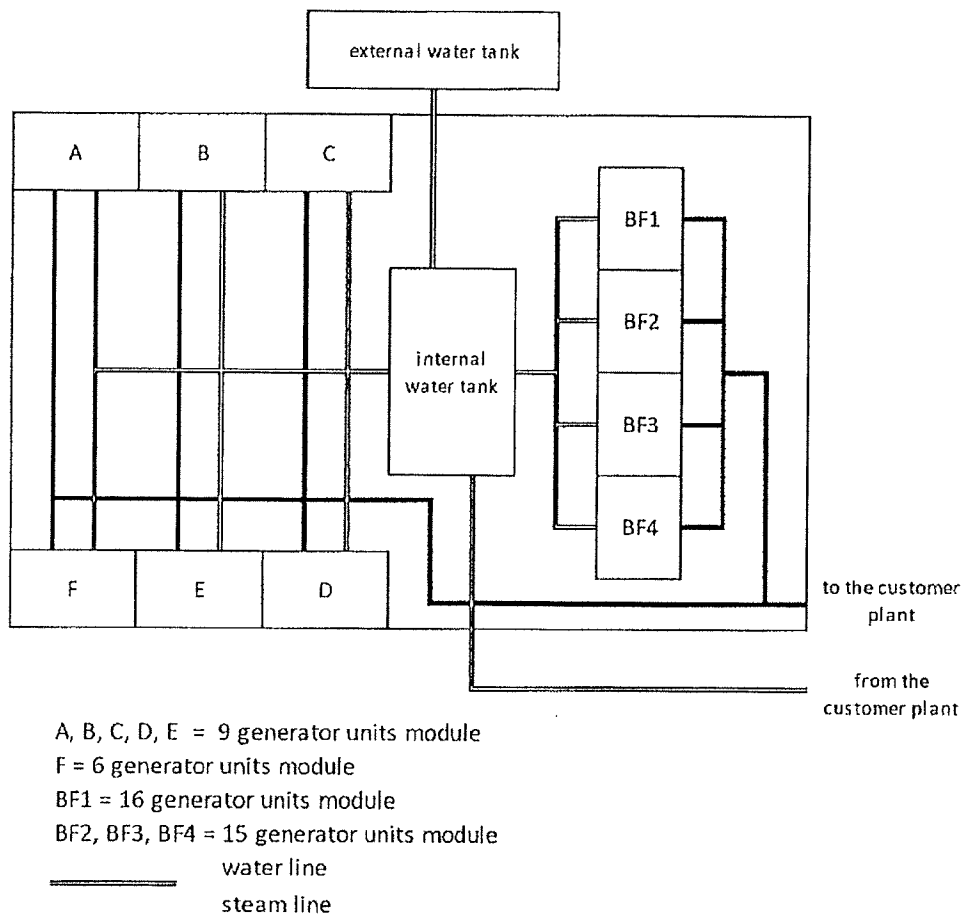
E-CAT MW1 ENERGY PLANT IN MIAMI PLANT START UP

The ERV visited the MW1 – USA plant at Doral on February 16 -18, 2015
He verified the compliance of the plant configuration and of the measuring chains with reference documentation.
During his visit, the ERV was assisted by ing. F. Fabiani and by doc. A. Rossi.

1. Plant configuration and measuring instruments positioning

The thermohydraulic diagram of the plant is represented in figure 1.
The plant is composed of 112 units of energy generation, grouped in modules: 111 units are operational during the tests, one unit is used as spare part.
In figure 1 the configuration of every module is reported

Figure 1: Thermohydraulic diagram of the plant



Ing. Fabio Penon

Plant start up

The cooling water is conveyed by pumps in the units E-Cat, where it is heated to vaporize. The steam is conveyed in a unique pipe of the steam line, which conveys it outside of the shelter.

The steam is then passed through the customer's installation, where it cools up to its condensation.

The water is so recycled to the internal tank in a closed loop. The water is distilled water.

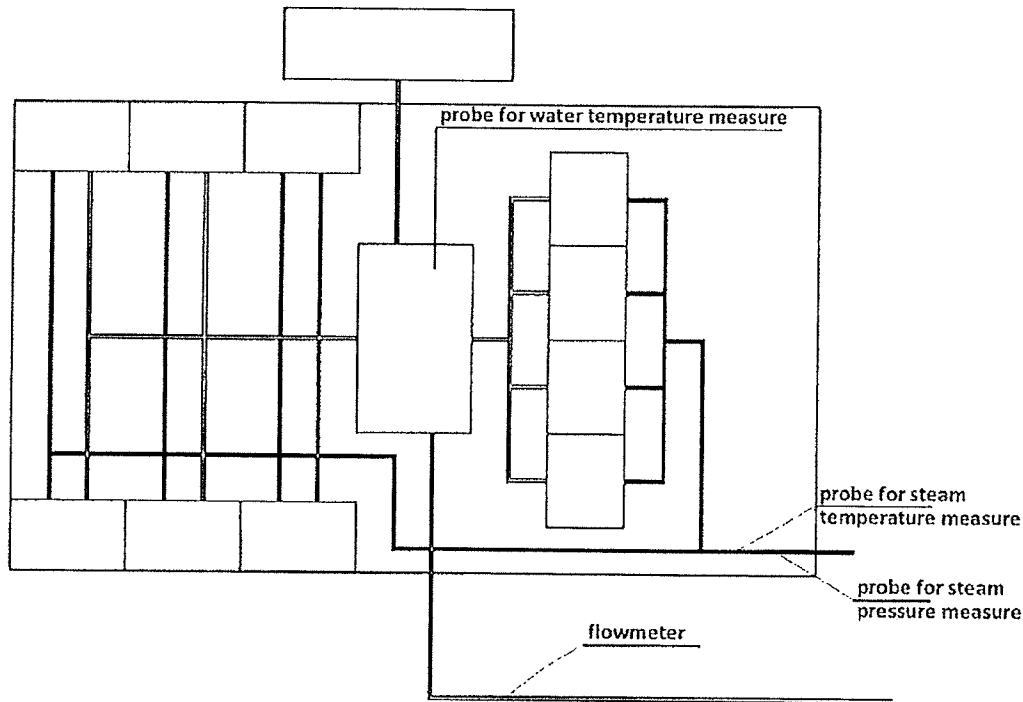
The internal tank is connected with the external one.

By this way it is possible to refill refrigerant leaks during operation.

The amount of water refilled is recorded

Figure 2 shows where the instrumentation to measure thermohydraulic characteristics is positioned in the thermohydraulic circuit

Figure 2: Position of the thermohydraulic measuring instrumentation



Identification of thermohydraulic measuring instrumentation

- Flowmeter, APATOR, type MWN 130-80 NC, type n. 15305714, test report n. 01/2015, issue date 01/15/2015
- Thermocouple for water temperature measure, OMEGA, type n HSTC-TT-TI-24S-1M, id. n. T4, certificate n. M16758, issue date 02713/2015

Ing. Fabio Penon

Plant start up

- Digital Thermometer and Probe for steam temperature measure, OMEGA, type n. HH806AU, HTSC-TT-TI-24S-1M-SMPW-M and TC-T-NPT-U-72-SMP, s.n. 140124 (HH806AU), certificate number M16760, issue date 02/13/2015
- Probe for steam temperature measure , OMEGA, T Probe, Type TC-T-NPT-U-72, type n. T3, certificate number M16759, issue date 02/13/2015
- Digital manometer, KELLER, type LEO1, type n. 43407, certificate n. RTV-MA-0141-15, issue date 03/16/2015

Annexe 1 shows wiring diagram and where the instrumentation to measure electrical characteristics is positioned in the electrical circuit

Identification electrical measuring instrumentation

- Power analyzer, PCE, type PCE-830, type n. 12080171, clamp model 6801, type n. 12020682, 12020677, 12020676, certificate n. 0518/15, issue date 01/28/2015.
- Power analyzer, PCE, type PCE-830-2, type n. 15040068, clamp model 6802, type n. 15060298, 15060299, 15060300, certificate n. 3934/15, issue date 04/20/2015.

2. Start up procedure

- Every power generation unit is filled with distilled water, coming from inner tank. until the water level is the desired.

The internal tank is filled with distilled water coming from external tank, until the water level in the inner tank is equal to the initial one.

- The hydraulic circuit is closed to see if there are leaks in the E-Cat plant or in the customer's one.

All the leaked water is refilled with water coming from external tank, until the water level in the inner tank is equal to the initial one.

- When the level of the water in the inner tank has stabilized, the hydraulic circuit is closed. The heating resistors are switched on.

Power supply is increased by 5% every 10 minutes till the desired power level

- The water in the circuit heats up to the temperature of vaporization.

When vaporization process is finished and all the water is transformed into superheated steam, after about 2 hours, the power is reduced up to that required for the stability of this situation (stability level)

- After 24 hours, a power supply cycle is started: ten minutes power supply at stability level, ten minutes no power supply

3. Data recording

The measuring systems collect the following data every ten seconds: power supply (Kw), water temperature in the inner tank (°C), steam temperature (°C) and steam pressure (bar) in the pipe going to customer plant.

All data are recorded in a data logger

Only the mass of water (m³), flowed through the plant, is recorded manually once in a day.

In the logbook the E-Cat each addition of distilled water from external tank to an internal tank is registered.

Ing. Fabio Penon

Plant start up

4. Data analysis

The analysis of the data on February 24th shows that steam pressure has been about 0,0 bar.

The minimum steam temperature has been 103,6 °C, i.e. the steam has been always superheated steam.

The maximum water temperature has been 69,1 °C

The effective flowed water has been 3600 kg/d, the reduced flowed water 3240 kg/d.

The supplied energy has been 247000 wh/d

The energy produced by E-Cat plant is given by the sum of the heat of heating of water, heat of vaporization of water and heat of superheating the steam.

$$E_p = E_R + E_v + E_s$$

In order to be conservative:

- it is not taken into account the heating energy of water and the heating energy of steam
- the temperature of the incoming water is always considered to be equal to the maximum value of the same, measured during the entire test day

It is possible small leaks of water to the inside of the shelter and are measurement uncertainties are present.

To take this into account the total mass of water transited during the test period is reduced by 10%.

Consequently

$$E_p = E_v = \lambda \times M_w$$

where

M_w = total mass of water, flowed through the system in one day, reduced by 10%.

λ = (latent energy of vaporization) = 627,5 Wh/kg at 0. bar

The absorbed energy (E_A) supplied from the public grid

In order to be conservative:

- all the supplied energy is supposed be absorbed by the 111 reactors

In reality a part of this energy feeds the pump, which conveys the water from the tank external to the reactors This energy doesn't feed the reactors

$$\text{Energy multiple (February 24, 2015)} = \frac{\text{energy produced (} E_p \text{)}}{\text{energy absorbed (} E_A \text{)}} = 82,3$$

5. Annexes

Annexe 1: Wiring diagram

Abano Terme, 2015/04/30

POIESIS srl
Dr Eng. Fabio Penon
(Nuclear Engineer)

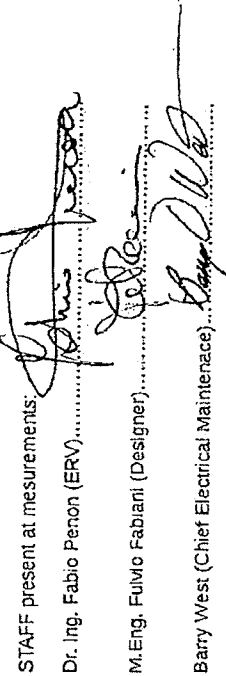
		average power supply (Kw)	supplied energy wh/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
02/23 22:30	02/24 22:30	10,29	247000	69,1	36000	32400	103,6	0.0	2,03E+07	82,3
02/24 22:30	02/25 22:30	10,29	247000	68.6	36000	32400	104,5	0.0	2,03E+07	82,3
02/25 22:30	02/26 22:30	10,42	255000	68,6	36000	32400	103,6	0.0	2,03E+07	79,7
02/26 22:30	02/27 22:30	10,5	252000	68.6	36000	32400	104,5	0.0	2,03E+07	80,7
02/27 22:30	02/28 22:30	10,59	259000	69.1	36000	32400	104,5	0.0	2,03E+07	78,5

Annex 7: DAILY VALUATION OF THE ENERGY MULTIPLE - NOVEMBER 2015										
		average power supply (w)	supplied energy wh/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
10/31 22:30	11/01 22:30	11125.0	267000	71.1	36000	32400	104,4	0.0	2,03E+07	76,1
11/01 22:30	11/02 22:30	11125.0	267000	71.1	36000	32400	104,4	0.0	2,03E+07	76,1
11/02 22:30	11/03 22:30	11041.7	265000	71.1	36000	32400	104,4	0.0	2,03E+07	76,7
11/03 22:30	11/04 22:30	11208.3	269000	71.1	36000	32400	104,4	0.0	2,03E+07	75,6
11/04 22:30	11/05 22:30	11208.3	269000	71.1	36000	32400	104,3	0.0	2,03E+07	75,6
11/05 22:30	11/06 22:30	11208.3	269000	71.1	36000	32400	104,1	0.0	2,03E+07	75,6
11/06 22:30	11/07 22:30	11125.0	267000	71.1	36000	32400	104,4	0.0	2,03E+07	76,1
11/07 22:30	11/08 22:30	10958.3	263000	71.1	36000	32400	104,4	0.0	2,03E+07	77,3
11/08 22:30	11/09 22:30	11000.0	264000	71.1	39000	35100	104,4	0.0	2,20E+07	83,4
11/09 22:30	11/10 22:30	10958.3	263000	71.1	36000	32400	104,4	0.0	2,03E+07	77,3
11/10 22:30	11/11 22:30	10958.3	263000	71.1	36000	32400	104,4	0.0	2,03E+07	77,3
11/11 22:30	11/12 22:30	10916.7	262000	71.1	36000	32400	104,4	0.0	2,03E+07	77,6
11/12 22:30	11/13 22:30	11156.7	268000	71.1	36000	32400	104,4	0.0	2,03E+07	75,9
11/13 22:30	11/14 22:30	11125.0	267000	71.1	36000	32400	103,7	0.0	2,03E+07	76,1
11/14 22:30	11/15 22:30	11333.3	272000	71.1	36000	32400	104,4	0.0	2,03E+07	74,7
11/15 22:30	11/16 22:30	11333.3	272000	71.1	36000	32400	104,1	0.0	2,03E+07	74,7
11/16 22:30	11/17 22:30	11375.0	273000	71.1	36000	32400	103,6	0.0	2,03E+07	74,5

Annex 7: DAILY VALUATION OF THE ENERGY MULTIPLE - NOVEMBER 2015										
		average power supply (w)	supplied energy wh/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
11/17 22:30	11/18 22:30	11083.3	266000	71,1	36000	32400	103,6	0.0	2,03E+07	76,4
11/18 22:30	11/19 22:30	11404.2	273700	71,1	36000	32400	103,6	0.0	2,03E+07	74,3
11/19 22:30	11/20 22:30	11358,3	272600	71,1	36000	32400	103,7	0.0	2,03E+07	74,6
11/20 22:30	11/21 22:30	11266,7	270400	71,1	36000	32400	103,9	0.0	2,03E+07	75,2
11/21 22:30	11/22 22:30	11262,5	270300	71,1	36000	32400	103,6	0.0	2,03E+07	75,2
11/22 22:30	11/23 22:30	11333,3	272000	71,1	36000	32400	103,6	0.0	2,03E+07	74,7
11/23 22:30	11/24 22:30	11291,7	271000	71,1	36000	32400	103,5	0.0	2,03E+07	75,0
11/24 22:30	11/25 22:30	11291,7	271000	71,1	36000	32400	103,5	0.0	2,03E+07	75,0
11/25 22:30	11/26 22:30	11168,7	268000	71,4	36000	32400	103,7	0.0	2,03E+07	75,9
11/26 22:30	11/27 22:30	11083,3	266000	71,4	36000	32400	103,9	0.0	2,03E+07	76,4
11/27 22:30	11/28 22:30	11125,0	267000	71,1	36000	32400	103,9	0.0	2,03E+07	76,1
11/28 22:30	11/29 22:30	11083,3	266000	71,1	36000	32400	103,9	0.0	2,03E+07	76,4
11/29 22:30	11/30 22:30	11083,3	266000	71,1	36000	32400	104,5	0.0	2,03E+07	76,4

IH-00011103

Date: 10/13/2015 time: 11:00AM



Ing. Fabio Penon

Plant start up

E-CAT MW1 ENERGY PLANT IN MIAMI ENERGY MULTIPLE VALUATION: FIRST STEP

The ERV visited the MW1 – USA plant at Doral on May 18 - 20, 2015

He verified that the plant configuration and the measuring chains were not modified in relation with the ones controlled in february.

He verified also the consistency of the experimental data and calculated the energy multiple for every day, in which the plant was operating

During his visit, the ERV was assisted by ing. F. Fabiani and by doc. A. Rossi.

1. Plant configuration and measuring instruments positioning

No significant modification on the plant configuration and on the measuring chains positioning was revealed.

2. Data recording

The measuring systems collect the following data every ten seconds: power supply (Kw), water temperature in the inner tank (°C), steam temperature (°C) and steam pressure (bar) in the pipe going to customer plant.

All data are recorded in a data logger

Only the mass of water (m³), flowed through the plant, is recorded manually once in a day at 10.30 p.m.

In the logbook the E-Cat each addition of distilled water from external tank to an internal tank is registered.

3. Data analysis

The data analysis shows that steam pressure has been about 0,0 bar throughout the period from 02/24 to 05/20.

The minimum steam temperature has been about 103 – 104 °C during the same period, i.e. the steam has been always superheated steam.

The energy produced by E-Cat plant is given by the sum of the heat of heating of water, heat of vaporization of water and heat of superheating the steam.

$$E_p = E_R + E_v + E_s$$

In order to be conservative:

- it has not been taken into account the heating energy of water and the heating energy of steam

- the temperature of the incoming water has been always considered to be equal to the maximum value of the same, measured during the entire test day

There has been small leaks of water to the inside of the shelter and are present measurement uncertainties

Ing. Fabio Penon

Plant start up

To take this into account the total mass of water transited during the test period has been reduced by 10%.

Consequently

$$E_p = E_v = \lambda \times M_w$$

where

M_w = total mass of water, flowed through the system in one day, reduced by 10%.

λ = (latent energy of vaporization) = 627,5 Wh/kg at 0. bar

The absorbed energy (E_A) supplied from the public grid

In order to be conservative:

- all the supplied energy is supposed be absorbed by the 111 reactors

In reality a part of this energy feeds the pump, which conveys the water from the tank external to the reactors This energy doesn't feed the reactors

$$\text{Energy multiple} = \frac{\text{energy produced (} E_p \text{)}}{\text{energy absorbed (} E_A \text{)}}$$

Throughout the period from 02/24 to 05/19 the energy multiple value has been always above 62.

During the month of February it has been fluctuating between 78 and 82, average value 80,7

During the month of March it has been fluctuating between 78 and 87, average value 80,6

During the month of April it has been fluctuating between 62 and 87, average value 80,7

In the period May 1 to 19 it has been fluctuating between 67 and 87, average value 79,9

4. Annexes

Annexe 1: Daily valuation of the energy multiple – February 2015

Annexe 2: Daily valuation of the energy multiple -- March 2015

Annexe 3: Daily valuation of the energy multiple – April 2015

Annexe 4: Daily valuation of the energy multiple – May 2015

Abano Terme, 2015/05/25

POIESIS srl
Dr Eng. Fabio Penon
(Nuclear Engineer)

DAILY VALUATION OF THE ENERGY MULTIPLE - MARCH 2015										
		average power supply (Kw)	supplied energy wh/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
02/28 22:30	03/01 22:30	10.59	254000	69,7	36000	32400	104,5	0.0	2,03E+07	80,0
04/01 22:30	04/02 22:30	10.46	251000	69,1	36000	32400	104,5	0.0	2,03E+07	81,0
03/02 22:30	03/03 22:30	9.92	238000	69,7	36000	32400	104,5	0.0	2,03E+07	85,4
03/03 22:30	03/04 22:30	10.56	253000	69,7	36000	32400	104,5	0.0	2,03E+07	80,4
03/04 22:30	03/05 22:30	10.83	255000	69,1	36000	32400	104,5	0.0	2,03E+07	79,7
03/05 22:30	03/06 22:30	10.63	255000	69,1	36000	32400	103,9	0.0	2,03E+07	79,7
03/06 22:30	03/07 22:30	10.5	252000	68,6	36000	32400	103,9	0.0	2,03E+07	80,7
03/07 22:30	03/08 22:30	10.59	259000	69,1	36000	32400	103,9	0.0	2,03E+07	78,5
03/08 22:30	03/09 22:30	10.21	245000	69,1	36000	32400	103,9	0.0	2,03E+07	83,0
03/09 22:30	03/10 22:30	10.67	256000	69,1	36000	32400	104,5	0.0	2,03E+07	79,4
03/10 22:30	03/11 22:30	10.63	255000	69,7	36000	32400	104,5	0.0	2,03E+07	79,7
03/11 22:30	03/12 22:30	10.54	253000	69,7	36000	32400	104,5	0.0	2,03E+07	80,4
03/12 22:30	03/13 22:30	10.63	255000	69,7	36000	32400	104,5	0.0	2,03E+07	79,7
03/13 22:30	03/14 22:30	10.63	255000	69,7	36000	32400	103,9	0.0	2,03E+07	79,7
03/14 22:30	03/15 22:30	10.5	252000	69,1	36000	32400	103,9	0.0	2,03E+07	80,7
03/15 22:30	03/16 22:30	10.79	259000	69,1	36000	32400	103,9	0.0	2,03E+07	78,5
03/16 22:30	03/17 22:30	10.25	246000	68,6	36000	32400	103,9	0.0	2,03E+07	82,6

DAILY VALUATION OF THE ENERGY MULTIPLE - MARCH 2015										
		average power supply (Kw)	supplied energy wh/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
03/17 22:30	03/18 22:30	10.46	251000	68,6	36000	32400	103,9	0.0	2,03E+07	81,0
03/18 22:30	03/19 22:30	10.29	247000	68,6	38000	34200	103,9	0.0	2,15E+07	86,9
03/19 22:30	03/20 22:30	10.63	255000	68,6	36000	32400	103,9	0.0	2,03E+07	79,7
03/20 22:30	03/21 22:30	10.54	253000	68,6	36000	32400	103,9	0.0	2,03E+07	80,4
03/21 22:30	03/22 22:30	10.58	255000	68,6	36000	32400	103,9	0.0	2,03E+07	79,7
03/22 22:30	03/23 22:30	10.63	255000	68,6	36000	32400	103,9	0.0	2,03E+07	79,7
03/23 22:30	03/24 22:30	10.5	252000	69,1	36000	32400	103,9	0.0	2,03E+07	80,7
03/24 22:30	03/25 22:30	10.79	259000	69,1	36000	32400	103,9	0.0	2,03E+07	78,5
03/25 22:30	03/26 22:30	10.59	254000	68,6	36000	32400	103,9	0.0	2,03E+07	80,0
03/26 22:30	03/27 22:30	10.46	251000	66,9	36000	32400	103,9	0.0	2,03E+07	81,0
03/27 22:30	03/28 22:30	10.5	252000	66,9	36000	32400	103,9	0.0	2,03E+07	80,7
03/28 22:30	03/29 22:30	10.54	253000	68,6	36000	32400	104,5	0.0	2,03E+07	80,4
03/29 22:30	03/30 22:30	10.55	258000	69,1	36000	32400	103,9	0.0	2,03E+07	78,8
03/30 22:30	03/31 22:30	10.34	248000	68,6	36000	32400	103,9	0.0	2,03E+07	82,0

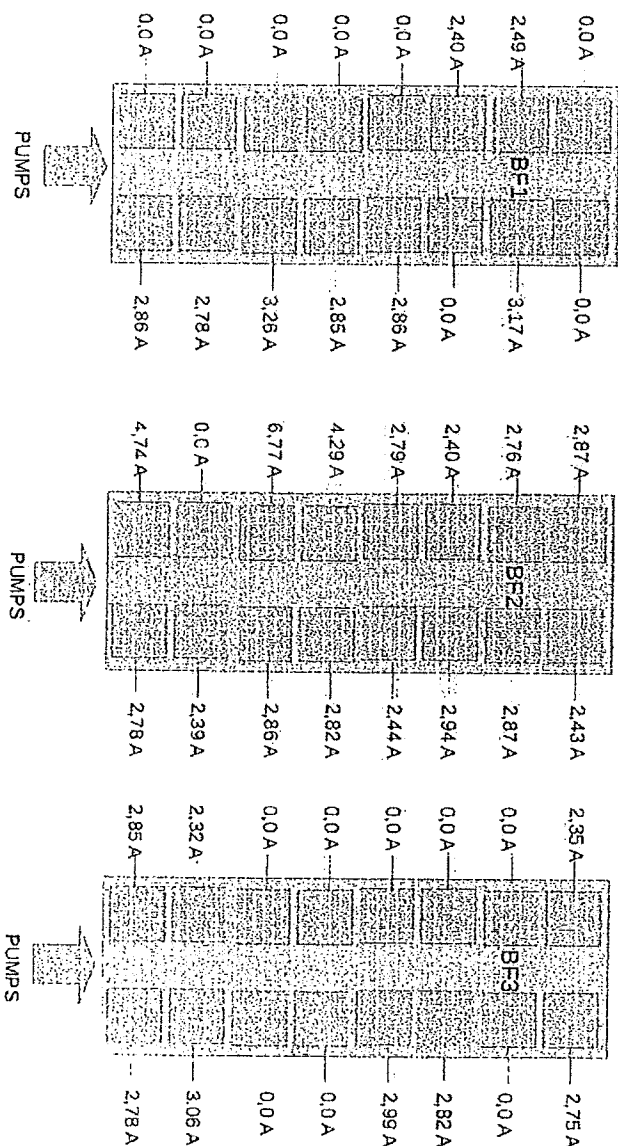
Annexe 6: DAILY VALUATION OF THE ENERGY MULTIPLE - OCTOBER 2015										
		average power supply (w)	supplied energy wh/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
09/30 22:30	10/01 22:30	7625,0	183000	70,7	27000	24300	103,5	0.0	1,52E+07	83,3
10/01 22:30	10/02 22:30	10333.3	248000	70,7	36000	32400	104,4	0.0	2,03E+07	82.0
10/02 22:30	10/03 22:30	11166.7	268000	71.1	36000	32400	104,4	0.0	2,03E+07	75,9
10/03 22:30	10/04 22:30	11000,0	264000	70,7	36000	32400	104,2	0.0	2,03E+07	77,0
10/04 22:30	10/05 22:30	11041,7	265000	71,1	36000	32400	104,4	0.0	2,03E+07	76,7
10/05 22:30	10/06 22:30	11250,0	270000	70,7	36000	32400	104,2	0.0	2,03E+07	75,3
10/06 22:30	10/07 22:30	11458.3	275000	70,3	36000	32400	104	0.0	2,03E+07	73,9
10/07 22:30	10/08 22:30	11458.3	275000	70	36000	32400	103,9	0.0	2,03E+07	73,9
10/08 22:30	10/09 22:30	11250,0	270000	70	36000	32400	103,9	0.0	2,03E+07	75,3
10/09 22:30	10/10 22:30	11250,0	270000	70	36000	32400	103,9	0.0	2,03E+07	75,3
10/10 22:30	10/11 22:30	11458.3	275000	70,3	36000	32400	103,9	0.0	2,03E+07	73,9
10/11 22:30	10/12 22:30	11500,0	276000	70	36000	32400	103,9	0.0	2,03E+07	73,7
10/12 22:30	10/13 22:30	11474.2	275380	70,3	36000	32400	104	0.0	2,03E+07	73,8
10/13 22:30	10/14 22:30	11470.8	275300	70	36000	32400	104,4	0.0	2,03E+07	73,9
10/14 22:30	10/15 22:30	11483.3	275600	70,3	36000	32400	104,4	0.0	2,03E+07	73,8
10/15 22:30	10/16 22:30	11493.8	275850	70,3	36000	32400	104,4	0.0	2,03E+07	73,7
10/16 22:30	10/17 22:30	11416.7	274000	70,3	36000	32400	104,3	0.0	2,03E+07	74.2

Annexe 6: DAILY VALUATION OF THE ENERGY MULTIPLE - OCTOBER 2015										
		average power supply (w)	supplied energy vat/d	tank water T max (°C)	effective flowed water(Kg/c)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (vat)	COP
10/17 22:30	10/18 22:30	11458,3	275000	70,3	36000	32400	104,4	0.0	2,03E+07	73,9
10/18 22:30	10/19 22:30	11208,3	269000	70,7	36000	32400	104,2	0.0	2,03E+07	75,6
10/19 22:30	10/20 22:30	11208,3	269000	70,3	36000	32400	104	0.0	2,03E+07	75,6
10/20 22:30	10/21 22:30	11333,3	272000	70,3	36000	32400	104	0.0	2,03E+07	74,7
10/21 22:30	10/22 22:30	11333,3	272000	70,3	36000	32400	104	0.0	2,03E+07	74,7
10/22 22:30	10/23 22:30	11375,0	273000	70,3	36000	32400	104,3	0.0	2,03E+07	74,5
10/23 22:30	10/24 22:30	11375,0	273000	70,3	36000	32400	104,3	0.0	2,03E+07	74,5
10/24 22:30	10/25 22:30	11375,0	273000	70,7	36000	32400	104,4	0.0	2,03E+07	74,5
10/25 22:30	10/26 22:30	11333,3	272000	70,7	36000	32400	103,9	0.0	2,03E+07	74,7
10/26 22:30	10/27 22:30	11250,0	270000	71,1	36000	32400	104	0.0	2,03E+07	75,3
10/27 22:30	10/28 22:30	11375,0	273000	71,1	36000	32400	104,3	0.0	2,03E+07	74,5
10/28 22:30	10/29 22:30	11291,7	271000	71,1	36000	32400	104,4	0.0	2,03E+07	75,0
10/29 22:30	10/30 22:30	11250,0	270000	71,1	36000	32400	104,2	0.0	2,03E+07	75,3
10/30 22:30	10/31 22:30	11375,0	273000	70,7	36000	32400	104,4	0.0	2,03E+07	74,5

MW1-USA ELECTRICAL MESUREMENT in reactors BF1,BF2,BF3

Clamp: MASTECH S.N.: MBEI 053309

Date: 10/14/2015 time: 10:20AM



STAFF present at measurements
 Dr. Ing. Fabio Penon (ERV).....
 M.Eng. Fulvio Fabiani (Designer).....
 Barry West (Chief Electrical Maintenance).....

DAILY VALUATION OF THE ENERGY MULTIPLE - APRIL 2015										
		average power supply (Kw)	supplied energy wh/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
03/31 22:30	04/01 22:30	10.25	246000	69,1	36000	32400	103,9	0.0	2,03E+07	82,6
04/01 22:30	04/02 22:30	10.29	247000	69,1	36000	32400	103,9	0.0	2,03E+07	82,3
04/02 22:30	04/03 22:30	10.67	256000	68,6	36000	32400	103,9	0.0	2,03E+07	79,4
04/03 22:30	04/04 22:30	10.21	247000	68	36000	32400	103,9	0.0	2,03E+07	82,3
04/04 22:30	04/05 22:30	10.29	247000	68,6	36000	32400	103,9	0.0	2,03E+07	82,3
04/05 22:30	04/06 22:30	9,96	239000	69,1	36000	32400	103,9	0.0	2,03E+07	85,1
04/06 22:30	04/07 22:30	not measured	not measured	not measured	not measured	not measured	not measured	not measured	not measured	not measured
04/07 22:30	04/08 22:30	9,92	238000	69,1	36000	32400	103,9	0.0	2,03E+07	85,4
04/08 22:30	04/09 22:30	10.54	253000	69,1	28000	25200	103,9	0.0	1,58E+07	62,5
04/09 22:30	04/10 22:30	10.55	253000	69,1	38000	34200	103,9	0.0	2,15E+07	84,8
04/10 22:30	04/11 22:30	10.75	258000	69,1	36000	32400	103,9	0.0	2,03E+07	78,8
04/11 22:30	04/12 22:30	10.64	253000	68,6	37000	33300	103,9	0.0	2,09E+07	82,6
04/12 22:30	04/13 22:30	10.67	256000	68,6	36000	32400	103,9	0.0	2,03E+07	79,4
04/13 22:30	04/14 22:30	10.64	255000	69,1	36000	32400	103,9	0.0	2,03E+07	79,7
04/14 22:30	04/15 22:30	10,5	252000	68,6	36000	32400	103,9	0.0	2,03E+07	80,7
04/15 22:30	04/16 22:30	10.67	256000	69,1	36000	32400	103,9	0.0	2,03E+07	79,4
04/16 22:30	04/17 22:30	10.59	254000	68,6	36000	32400	103,9	0.0	2,03E+07	80,0

DAILY VALUATION OF THE ENERGY MULTIPLE - APRIL 2015										
		average power supply (Kw)	supplied energy wh/d	lank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
04/17 22:30	04/18 22:30	10.46	251000	69,1	36000	32400	103,9	0.0	2,03E+07	81,0
04/18 22:30	04/19 22:30	10.54	253000	68,6	39000	35100	103,9	0.0	2,20E+07	87,1
04/19 22:30	04/20 22:30	10.67	256000	69,1	36000	32400	103,9	0.0	2,03E+07	79,4
04/20 22:30	04/21 22:30	10.46	251000	69,7	36000	32400	103,9	0.0	2,03E+07	81,0
04/21 22:30	04/22 22:30	10.67	256000	69,1	36000	32400	103,9	0.0	2,03E+07	79,4
04/22 22:30	04/23 22:30	10.67	256000	69,1	36000	32400	103,9	0.0	2,03E+07	79,4
04/23 22:30	04/24 22:30	10.59	254000	69,1	36000	32400	103,9	0.0	2,03E+07	80,0
04/24 22:30	04/25 22:30	10.75	258000	69,1	36000	32400	103,9	0.0	2,03E+07	78,8
04/25 22:30	04/26 22:30	10.54	253000	68,6	36000	32400	103,9	0.0	2,03E+07	80,4
04/26 22:30	04/27 22:30	10.55	253000	68,6	36000	32400	103,9	0.0	2,03E+07	80,4
04/27 22:30	04/28 22:30	10.34	248000	69,1	36000	32400	103,9	0.0	2,03E+07	82,0
04/28 22:30	04/29 22:30	10.25	246000	69,1	36000	32400	103,9	0.0	2,03E+07	82,6
04/29 22:30	04/30 22:30	10.29	247000	69,7	36000	32400	103,9	0.0	2,03E+07	82,3

Annexe 5: DAILY VALUATION OF THE ENERGY MULTIPLE - SEPTEMBER 2015										
		average power supply (w)	supplied energy wh/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
08/31 22:30	09/01 22:30	5583,3	134000	56,4	27000	24300	103,5	0.0	1,52E+07	113,8
09/01 22:30	09/02 22:30	5625,0	135000	58	27000	24300	103,5	0.0	1,52E+07	113,0
09/02 22:30	09/03 22:30	5583,3	134000	58	27000	24300	103,5	0.0	1,52E+07	113,8
09/03 22:30	09/04 22:30	5666,7	136000	58	27000	24300	103,8	0.0	1,52E+07	112,1
09/04 22:30	09/05 22:30	5625,0	135000	58	27000	24300	103,8	0.0	1,52E+07	113,0
09/05 22:30	09/06 22:30	5708,3	137000	58	27000	24300	103,8	0.0	1,52E+07	111,3
09/06 22:30	09/07 22:30	5708,3	137000	58	27000	24300	104,2	0.0	1,52E+07	111,3
09/07 22:30	09/08 22:30	5708,3	137000	58	27000	24300	104,2	0.0	1,52E+07	111,3
09/08 22:30	09/09 22:30	5666,7	136000	58	27000	24300	104,2	0.0	1,52E+07	112,1
09/09 22:30	09/10 22:30	5625,0	135000	58	27000	24300	104,2	0.0	1,52E+07	113,0
09/10 22:30	09/11 22:30	5666,7	136000	58	27000	24300	104,2	0.0	1,52E+07	112,1
09/11 22:30	09/12 22:30	5583,3	134000	58	27000	24300	104,2	0.0	1,52E+07	113,8
09/12 22:30	09/13 22:30	5625,0	135000	58	28000	25200	104,2	0.0	1,58E+07	117,1
09/13 22:30	09/14 22:30	5666,7	136000	58	27000	24300	104,2	0.0	1,52E+07	112,1
09/14 22:30	09/15 22:30	5583,3	134000	58	27000	24300	103,8	0.0	1,52E+07	113,8
09/15 22:30	09/16 22:30	5625,0	135000	58	27000	24300	104,2	0.0	1,52E+07	113,0
09/16 22:30	09/17 22:30	5625,0	135000	58	27000	24300	104,2	0.0	1,52E+07	113,0

Annexe 5: DAILY VALUATION OF THE ENERGY MULTIPLE - SEPTEMBER 2015										
		average power supply (w)	supplied energy wh/d	lank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
09/17 22:30	09/18 22:30	5625,0	135000	58	27000	24300	104,2	0.0	1,52E+07	113,0
09/18 22:30	09/19 22:30	5625,0	135000	58	27000	24300	104,2	0.0	1,52E+07	113,0
09/19 22:30	09/20 22:30	5666,7	136000	58	27000	24300	104,2	0.0	1,52E+07	112,1
09/20 22:30	09/21 22:30	5666,7	136000	58	27000	24300	104,2	0.0	1,52E+07	112,1
09/21 22:30	09/22 22:30	5625,0	135000	58	27000	24300	104,2	0.0	1,52E+07	113,0
09/22 22:30	09/23 22:30	5666,7	136000	58	27000	24300	104,2	0.0	1,52E+07	112,1
09/23 22:30	09/24 22:30	5583,3	134000	58	27000	24300	104,2	0.0	1,52E+07	113,8
09/24 22:30	09/25 22:30	5625,0	135000	58	27000	24300	104,2	0.0	1,52E+07	113,0
09/25 22:30	09/26 22:30	5666,7	136000	58	27000	24300	104,2	0.0	1,52E+07	112,1
09/26 22:30	09/27 22:30	5625,0	135000	58	27000	24300	104,2	0.0	1,52E+07	113,0
09/27 22:30	09/28 22:30	6166,7	148000	58	28000	25200	104,2	0.0	1,58E+07	106,8
09/28 22:30	09/29 22:30	6104,2	146500	58	27000	24300	104,2	0.0	1,52E+07	104,1
09/29 22:30	09/30 22:30	5687,5	136500	58	27000	24300	104,2	0.0	1,52E+07	111,7

Annexe 4: DAILY VALUATION OF THE ENERGY MULTIPLE - AUGUST 2015

		average power supply (w)	supplied energy wh/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
07/31 22:30	08/01 22:30	6291,7	151000	76,8	36000	32400	103	0.0	2,03E+07	134,6
08/01 22:30	08/02 22:30	6208,3	149000	68,6	36000	32400	103,9	0.0	2,03E+07	136,4
08/02 22:30	08/03 22:30	6125,0	147000	68,6	27000	24300	103,5	0.0	1,52E+07	103,7
08/03 22:30	08/04 22:30	5750,0	138000	68,6	27000	24300	103,5	0.0	1,52E+07	110,5
08/04 22:30	08/05 22:30	6458,3	155000	69,1	27000	24300	103,9	0.0	1,52E+07	98,4
08/05 22:30	08/06 22:30	6291,7	151000	70,3	36000	32400	103,9	0.0	2,03E+07	134,6
08/06 22:30	08/07 22:30	6291,7	151000	70,3	36000	32400	103,9	0.0	2,03E+07	134,6
08/07 22:30	08/08 22:30	5958,3	143000	70,8	36000	32400	103,5	0.0	2,03E+07	142,2
08/08 22:30	08/09 22:30	5708,3	137000	70,3	27000	24300	103,5	0.0	1,52E+07	111,3
08/09 22:30	08/10 22:30	5875,0	141000	69,7	27000	24300	103,5	0.0	1,52E+07	108,1
08/10 22:30	08/11 22:30	6125,0	147000	70,3	27000	24300	103,5	0.0	1,52E+07	103,7
08/11 22:30	08/12 22:30	6166,7	148000	69,7	29000	26100	103,5	0.0	1,64E+07	110,7
08/12 22:30	08/13 22:30	6125,0	147000	69,1	29000	26100	103,9	0.0	1,64E+07	111,4
08/13 22:30	08/14 22:30	6125,0	147000	69,7	29000	26100	103,9	0.0	1,64E+07	111,4
08/14 22:30	08/15 22:30	6125,0	147000	69,7	29000	26100	103,9	0.0	1,64E+07	111,4
08/15 22:30	08/16 22:30	6083,3	146000	69,7	29000	26100	103,5	0.0	1,64E+07	112,2
08/16 22:30	08/17 22:30	6125,0	147000	69,7	29000	26100	103,5	0.0	1,64E+07	111,4

CONFIDENTIAL

IH-00011115

Annexe 4: DAILY VALUATION OF THE ENERGY MULTIPLE - AUGUST 2015

		average power supply (w)	supplied energy wh/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
08/17 22:30	08/18 22:30	5958,3	143000	69,7	29000	26100	103,5	0.0	1,64E+07	114,5
08/18 22:30	08/19 22:30	5666,7	136000	66,7	29000	26100	103,5	0.0	1,64E+07	120,4
08/19 22:30	08/20 22:30	5625,0	135000	65,9	29000	26100	103	0.0	1,64E+07	121,3
08/20 22:30	08/21 22:30	5625,0	135000	62	29000	26100	103,9	0.0	1,64E+07	121,3
08/21 22:30	08/22 22:30	5666,7	135000	60,9	27000	24300	103,9	0.0	1,52E+07	112,1
08/22 22:30	08/23 22:30	5708,3	137000	65,9	27000	24300	103,9	0.0	1,52E+07	111,3
08/23 22:30	08/24 22:30	5666,7	136000	65,9	27000	24300	103,9	0.0	1,52E+07	112,1
08/24 22:30	08/25 22:30	5666,7	136000	60,9	27000	24300	103,5	0.0	1,52E+07	112,1
08/25 22:30	08/26 22:30	5625,0	135000	60,2	27000	24300	103,5	0.0	1,52E+07	113,0
08/26 22:30	08/27 22:30	5625,0	135000	59,8	27000	24300	103,9	0.0	1,52E+07	113,0
08/27 22:30	08/28 22:30	5583,3	134000	59,0	27000	24300	103,9	0.0	1,52E+07	113,8
08/28 22:30	08/29 22:30	5583,3	134000	56,8	27000	24300	103,5	0.0	1,52E+07	113,8
08/29 22:30	08/30 22:30	5625,0	135000	62,8	27000	24300	103,5	0.0	1,52E+07	113,0
08/30 22:30	08/31 22:30	5625,0	135000	58,5	27000	24300	103,9	0.0	1,52E+07	113,0

CONFIDENTIAL

IH-00011116

Ing. Fabio Penon

Second step

E-CAT MW1 ENERGY PLANT IN MIAMI ENERGY MULTIPLE VALUATION: SECOND STEP

The ERV visited the MW1 – USA plant at Doral on October 12 - 14, 2015.
The visit was without notice, in accordance with the e-mail dated 02/20/2015
He verified that the plant configuration and the measuring chains were not modified in relation with the ones controlled in february and in may
He verified also the consistency of the experimental data and made a first approximation calculation of the energy multiple during his visit.
He checked the current absorption in the reactors BF1, BF2 and BF3.
During his visit, the ERV was assisted by M. Eng. F. Fabiani (IH), Eng. B. West (IH) and by doc. A. Rossi (LC).

1. Plant configuration and measuring instruments positioning

No significant modification on the plant configuration and on the measuring chains positioning was revealed.

2. Data recording

The measuring systems collect the following data every ten seconds: power supply (Kw), water temperature in the inner tank (°C), steam temperature (°C) and steam pressure (bar) in the pipe going to customer plant.

All data are recorded in a data logger

Only the mass of water (m³), flowed through the plant, is recorded manually once in a day at 10.30 p.m.

In the logbook the E-Cat each addition of distilled water from external tank to an internal tank is registered.

On 10/13/2015 and 10/14/2015 a control of absorption of instantaneous current in the reactors BF1, BF1 and BF3 has been performed manually

3. Data analysis

The data analysis shows that steam pressure has been about 0,0 bar throughout the period 10/12 – 10/14.

The steam temperature, manually checked, has been about 103 – 104 °C during the same period, i.e. the steam has been always superheated steam.

The water temperature, manually checked, has been between 60 – 80 °C during the same period.

The energy produced by E-Cat plant is given by the sum of the heat of heating of water, heat of vaporization of water and heat of superheating the steam.

$$E_p = E_R + E_v + E_s$$

Ing. Fabio Penon

Second step

Assuming the same conservative criteria for the calculations made in the past, i.e.

- it has not been taken into account the heating energy of water and the heating energy of steam
- the temperature of the incoming water has been always considered to be equal to the maximum value of the same, measured during the entire test day
- the total mass of water transited during the test period has been reduced by 10%, to take into account the small leaks of water to the inside of the shelter and the measurement uncertainties

the energy produced by the E-Cat plant is:

$$E_p = E_v = \lambda \times M_w$$

where

M_w = total mass of water, flowed through the system in one day, reduced by 10%.

λ = (latent energy of vaporization) = 627,5 Wh/kg at 0. bar

In order to be conservative all the absorbed energy (E_A) has supposed be absorbed by the 111 reactors

In reality a part of this energy feeds the pump, which conveys the water from the tank external to the reactors This energy doesn't feed the reactors

$$\text{Energy multiple} = \frac{\text{energy produced (} E_p \text{)}}{\text{energy absorbed (} E_A \text{)}}$$

The energy multiple value has been always about 74.

4. Annexes

Annexe 1: MW1-USA Electrical measurement in reactors BF1, BF2, BF3. 10/13/2015

Annexe 2: MW1-USA Electrical measurement in reactors BF1, BF2, BF3. 10/14/2015

Abano Terme, 10/19/2015

POIESIS srl
M. Eng. Fabio Penon
(Nuclear Engineer)

Annexe 3: DAILY VALUATION OF THE ENERGY MULTIPLE - JULY 2015										
		average power supply (w)	supplied energy kWh/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
06/30 22:30	07/01 22:30	8500,0	204000	75,3	36000	32400	103,9	0.0	2,03E+07	99,7
07/01 22:30	07/02 22:30	8541,7	205000	69,1	36000	32400	103,9	0.0	2,03E+07	99,2
07/02 22:30	07/03 22:30	8583,3	206000	71,4	36000	32400	103,9	0.0	2,03E+07	98,7
07/03 22:30	07/04 22:30	8458,3	203000	73,7	36000	32400	103,9	0.0	2,03E+07	100,2
07/04 22:30	07/05 22:30	8333,3	200000	75,3	36000	32400	104,4	0.0	2,03E+07	101,7
07/05 22:30	07/06 22:30	8500,0	204000	70,3	36000	32400	103,3	0.0	2,03E+07	99,7
07/06 22:30	07/07 22:30	8416,7	202000	70,3	36000	32400	103,3	0.0	2,03E+07	100,6
07/07 22:30	07/08 22:30	8416,7	202000	70,3	36000	32400	102,8	0.0	2,03E+07	100,6
07/08 22:30	07/09 22:30	8500,0	204000	70,3	36000	32400	103,9	0.0	2,03E+07	99,7
07/09 22:30	07/10 22:30	8500,0	204000	73,1	36000	32400	103,9	0.0	2,03E+07	99,7
07/10 22:30	07/11 22:30	8333,3	200000	75,3	36000	32400	103,9	0.0	2,03E+07	101,7
07/11 22:30	07/12 22:30	8458,3	203000	71,4	36000	32400	104,4	0.0	2,03E+07	100,2
07/12 22:30	07/13 22:30	8458,3	203000	70,8	32000	28800	104,3	0.0	1,81E+07	89,0
07/13 22:30	07/14 22:30	8500,0	204000	75,3	36000	32400	103,9	0.0	2,03E+07	99,7
07/14 22:30	07/15 22:30	8708,3	209000	75,3	36000	32400	103,9	0.0	2,03E+07	97,3
07/15 22:30	07/16 22:30	8666,7	208000	70,3	36000	32400	103,5	0.0	2,03E+07	97,7
07/16 22:30	07/17 22:30	8708,3	209000	67,43	36000	32400	103,5	0.0	2,03E+07	97,3

Annexe 3: DAILY VALUATION OF THE ENERGY MULTIPLE - JULY 2015										
		average power supply (w)	supplied energy w/h/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam I min (°C)	steam pressure	produced energy (wh)	COP
07/17 22:30	07/18 22:30	8708,3	209000	69,7	36000	32400	103,9	0.0	2,03E+07	97,3
07/18 22:30	07/19 22:30	8708,3	209000	75,3	36000	32400	103,5	0.0	2,03E+07	97,3
07/19 22:30	07/20 22:30	8666,7	208000	73,7	36000	32400	103,9	0.0	2,03E+07	97,7
07/20 22:30	07/21 22:30	8625,0	207000	69,7	36000	32400	103,9	0.0	2,03E+07	98,2
07/21 22:30	07/22 22:30	8625,0	207000	81,5	36000	32400	103,9	0.0	2,03E+07	98,2
07/22 22:30	07/23 22:30	8541,7	205000	78,4	36000	32400	103,5	0.0	2,03E+07	99,2
07/23 22:30	07/24 22:30	8583,3	206000	78,4	36000	32400	103,9	0.0	2,03E+07	98,7
07/24 22:30	07/25 22:30	8500,0	204000	76,8	36000	32400	103,9	0.0	2,03E+07	99,7
07/25 22:30	07/26 22:30	8500,0	204000	78,4	36000	32400	103,5	0.0	2,03E+07	99,7
07/26 22:30	07/27 22:30	9125,0	219000	78,4	36000	32400	103,5	0.0	2,03E+07	92,8
07/27 22:30	07/28 22:30	6083,3	146000	81,5	36000	32400	103,9	0.0	2,03E+07	139,3
07/28 22:30	07/29 22:30	6458,3	155000	75,3	31000	27900	103,5	0.0	1,75E+07	113,0
07/29 22:30	07/30 22:30	5950,3	143000	83,1	27000	24300	103,5	0.0	1,52E+07	106,6
07/30 22:30	07/31 22:30	6375,0	163000	80	36000	32400	103,9	0.0	2,03E+07	132,9

Ing. Fabio Penon

**E-CAT MW1 ENERGY PLANT IN MIAMI
ENERGY MULTIPLE VALUATION
FROM 05/01/2015 TO 11/30/2015**

The ERV visited the MW1 – USA plant at Doral on October 12 - 14, 2015.

The results have been already presented in the document 'E-Cat MW1 Energy Plant in Miami. Energy multiple valuation, second step', dated 10/19/2015

This report presents the 'energy multiple' value, calculated during the period 05/01/2015 – 11/30/2015

The Energy Multiple values have been calculated, assuming the same conservative criteria for the calculations made in the past, i.e.

- it has not been taken into account the heating energy of water and the heating energy of steam
- the temperature of the incoming water has been always considered to be equal to the maximum value of the same, measured during the entire test day
- the temperature of the outgoing steam has been always considered to be equal to the minimum value of the same, measured during the entire test day
- the total mass of water transited during the test period has been reduced by 10%, to take into account the small leaks of water to the inside of the shelter and the measurement uncertainties

The energy produced by the E-Cat plant is:

$$E_p = E_v = \lambda \times M_w$$

where

M_w = total mass of water, flowed through the system in one day, reduced by 10%.

λ = (latent energy of vaporization) = 627,5 Wh/kg at 0. bar

In order to be conservative all the absorbed energy (E_A) has supposed be absorbed by the 111 reactors

In reality a part of this energy feeds the pump, which conveys the water from the tank external to the reactors This energy doesn't feed the reactors

$$\text{Energy multiple} = \frac{\text{energy produced (} E_p \text{)}}{\text{energy absorbed (} E_A \text{)}}$$

Annexes

- Annexe 1: Daily valuation of the energy multiple – May 2015
- Annexe 2: Daily valuation of the energy multiple – June 2015
- Annexe 3: Daily valuation of the energy multiple – July 2015
- Annexe 4: Daily valuation of the energy multiple – August 2015
- Annexe 5: Daily valuation of the energy multiple – September 2015
- Annexe 6: Daily valuation of the energy multiple – October 2015
- Annexe 7: Daily valuation of the energy multiple – November 2015

Abano Terme, 07/01/2016

POIESIS srl
M. Eng. Fabio Penon
(Nuclear Engineer)

Annexe 2: DAILY VALUATION OF THE ENERGY MULTIPLE - JUNE 2015										
		average power supply (Kw)	supplied energy wh/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
05/31 22:30	06/01 22:30	7791,7	187000	69,1	22000	19800	104,5	0.0	1,24E+07	66,4
06/01 22:30	06/02 22:30	9208,3	221000	71,4	27000	24300	104,5	0.0	1,52E+07	69,0
06/02 22:30	06/03 22:30	8458,3	203000	69,7	26000	23400	104,5	0.0	1,47E+07	72,3
06/03 22:30	06/04 22:30	6750,0	162000	71,4	27000	24300	104,5	0.0	1,52E+07	94,1
06/04 22:30	06/05 22:30	7750,0	186000	70,3	27000	24300	103,9	0.0	1,52E+07	82,0
06/05 22:30	06/06 22:30	9750,0	234000	70,3	36000	32400	104,5	0.0	2,03E+07	86,9
06/06 22:30	06/07 22:30	8916,7	214000	70,3	36000	32400	104,5	0.0	2,03E+07	95,0
06/07 22:30	06/08 22:30	8125,0	195000	70,8	36000	32400	103,4	0.0	2,03E+07	104,3
06/08 22:30	06/09 22:30	8000,0	192000	70,3	27000	24300	103,4	0.0	1,52E+07	79,4
06/09 22:30	06/10 22:30	7958,3	191000	70,3	18000	16200	103,9	0.0	1,02E+07	53,2
06/10 22:30	06/11 22:30	8083,3	194000	69,1	36000	32400	103,4	0.0	2,03E+07	104,8
06/11 22:30	06/12 22:30	8375,0	201000	70,3	27000	24300	103,9	0.0	1,52E+07	75,9
06/12 22:30	06/13 22:30	8875,0	213000	69,7	27000	24300	104,5	0.0	1,52E+07	71,6
06/13 22:30	06/14 22:30	8208,3	197000	71,4	27000	24300	103,9	0.0	1,52E+07	77,4
06/14 22:30	06/15 22:30	8541,7	205000	69,7	33000	29700	103,9	0.0	1,86E+07	90,9
06/15 22:30	06/16 22:30	8458,3	203000	70,3	36000	32400	103,9	0.0	2,03E+07	100,2
06/16 22:30	06/17 22:30	8416,7	202000	70,3	36000	32400	103,9	0.0	2,03E+07	100,6

Annexe 2: DAILY VALUATION OF THE ENERGY MULTIPLE - JUNE 2015										
		average power supply (Kw)	supplied energy wh/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
06/17 22:30	06/18 22:30	8416,7	202000	69,1	36000	32400	103,9	0.0	2,03E+07	100,6
06/18 22:30	06/19 22:30	8416,7	202000	69,1	36000	32400	103,9	0.0	2,03E+07	100,6
06/19 22:30	06/20 22:30	8416,7	202000	68,6	36000	32400	103,9	0.0	2,03E+07	100,6
06/20 22:30	06/21 22:30	8416,7	202000	69,1	36000	32400	103,9	0.0	2,03E+07	100,6
06/21 22:30	06/22 22:30	8375,0	201000	68,5	34000	30600	103,9	0.0	1,92E+07	95,5
06/22 22:30	06/23 22:30	8416,7	202000	69,1	36000	32400	103,9	0.0	2,03E+07	100,6
06/23 22:30	06/24 22:30	8500,0	204000	69,1	36000	32400	103,9	0.0	2,03E+07	99,7
06/24 22:30	06/25 22:30	8450,3	203000	69,2	36000	32400	104,5	0.0	2,03E+07	100,2
06/25 22:30	06/26 22:30	8500,0	204000	69,7	36000	32400	104,5	0.0	2,03E+07	99,7
06/26 22:30	06/27 22:30	8583,3	206000	70,2	26000	23400	104,5	0.0	1,47E+07	71,3
06/27 22:30	06/28 22:30	8750,0	210000	70,8	36000	32400	104,5	0.0	2,03E+07	96,8
06/28 22:30	06/29 22:30	8750,0	210000	68,5	36000	32400	104,5	0.0	2,03E+07	96,8
06/29 22:30	06/30 22:30	8541,7	205000	69,1	36000	32400	103,9	0.0	2,03E+07	99,2

DAILY VALUATION OF THE ENERGY MULTIPLE - MAY 2015										
		average power supply (Kw)	supplied energy wh/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
04/30 22:30	05/01 22:30	10,25	246000	70,8	36000	32400	103,4	0,0	2,03E+07	82,6
05/01 22:30	05/02 22:30	10,29	247000	69,1	36000	32400	103,9	0,0	2,03E+07	82,3
05/02 22:30	05/03 22:30	10,29	247000	71,4	36000	32400	103,9	0,0	2,03E+07	82,3
05/03 22:30	05/04 22:30	9,96	239000	69,7	35000	31500	103,9	0,0	1,98E+07	82,7
05/04 22:30	05/05 22:30	10,67	256000	71,4	36000	32400	103,4	0,0	2,03E+07	79,4
05/05 22:30	05/06 22:30	10,29	247000	70,3	36000	32400	103,4	0,0	2,03E+07	82,3
05/06 22:30	05/07 22:30	10,21	245000	70,3	35000	31500	103,9	0,0	1,98E+07	80,7
05/07 22:30	05/08 22:30	10,12	243000	70,3	36000	32400	103,9	0,0	2,03E+07	83,7
05/08 22:30	05/09 22:30	10,25	246000	70,8	36000	32400	104,5	0,0	2,03E+07	82,6
05/09 22:30	05/10 22:30	9,96	239000	73,1	36000	32400	104,5	0,0	2,03E+07	85,1
05/10 22:30	05/11 22:30	10,33	248000	70,3	32000	28800	104,5	0,0	1,81E+07	72,9
05/11 22:30	05/12 22:30	10,33	244000	71,4	34000	30600	104,5	0,0	1,92E+07	78,7
05/12 22:30	05/13 22:30	10,29	245000	70,8	35000	31500	104,5	0,0	1,98E+07	80,7
05/13 22:30	05/14 22:30	10,25	246000	70,3	36000	32400	104,5	0,0	2,03E+07	82,6
05/14 22:30	05/15 22:30	10,21	245000	70,8	34000	30600	104,5	0,0	1,92E+07	78,4
05/15 22:30	05/16 22:30	8,67	208000	70,3	29000	26100	104,5	0,0	1,64E+07	78,7
05/16 22:30	05/17 22:30	10,28	247000	69,1	38000	34200	104,5	0,0	2,15E+07	86,9

DAILY VALUATION OF THE ENERGY MULTIPLE - MAY 2015										
		average power supply (Kw)	supplied energy wh/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	prduced energy (wh)	COP
05/17 22:30	05/18 22:30	10	240000	70,3	29000	26100	104,5	0.0	1,64E+07	68,2
05/18 22:30	05/19 22:30	10,39	249600	70,8	30000	27000	104,5	0.0	1,69E+07	67,9

Annexe 1: DAILY VALUATION OF THE ENERGY MULTIPLE - MAY 2015

		average power supply (Kw)	supplied energy wh/d	tank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
04/30 22:30	05/01 22:30	10.25	246000	70,8	36000	32400	103,4	0.0	2,03E+07	82,6
05/01 22:30	05/02 22:30	10.29	247000	69,1	36000	32400	103,9	0.0	2,03E+07	82,3
05/02 22:30	05/03 22:30	10.29	247000	71,4	36000	32400	103,9	0.0	2,03E+07	82,3
05/03 22:30	05/04 22:30	9.96	239000	69,7	35000	31500	103,9	0.0	1,98E+07	82,7
05/04 22:30	05/05 22:30	10.67	256000	71,4	36000	32400	103,4	0.0	2,03E+07	79,4
05/05 22:30	05/06 22:30	10.29	247000	70,3	36000	32400	103,4	0.0	2,03E+07	82,3
05/06 22:30	05/07 22:30	10.21	245000	70,3	35000	31500	103,9	0.0	1,98E+07	80,7
05/07 22:30	05/08 22:30	10.12	243000	70,3	36000	32400	103,9	0.0	2,03E+07	83,7
05/08 22:30	05/09 22:30	10.25	246000	70,8	36000	32400	104,5	0.0	2,03E+07	82,6
05/09 22:30	05/10 22:30	9.96	239000	73,1	36000	32400	104,5	0.0	2,03E+07	85,1
05/10 22:30	05/11 22:30	10.33	248000	70,3	32000	28800	104,5	0.0	1,81E+07	72,9
05/11 22:30	05/12 22:30	10.33	244000	71,4	34000	30600	104,5	0.0	1,92E+07	78,7
05/12 22:30	05/13 22:30	10.29	245000	70,8	35000	31500	104,5	0.0	1,98E+07	80,7
05/13 22:30	05/14 22:30	10.25	246000	70,3	36000	32400	104,5	0.0	2,03E+07	82,6
05/14 22:30	05/15 22:30	10.21	245000	70,8	34000	30600	104,5	0.0	1,92E+07	78,4
05/15 22:30	05/16 22:30	8.67	208000	70,3	29000	26100	104,5	0.0	1,64E+07	78,7
05/16 22:30	05/17 22:30	10.28	247000	69,1	38000	34200	104,5	0.0	2,15E+07	86,9

Annexe 1: DAILY VALUATION OF THE ENERGY MULTIPLE - MAY 2015										
		average power supply (Kw)	supplied energy wh/d	lank water T max (°C)	effective flowed water(Kg/d)	reduced flowed water (kg/d)	steam T min (°C)	steam pressure	produced energy (wh)	COP
05/17 22:30	05/18 22:30	10	240000	70,3	29000	26100	104,5	0.0	1,64E+07	68,2
05/18 22:30	05/19 22:30	10,39	249600	70,8	30000	27000	104,5	0.0	1,69E+07	67,9
05/19 22:30	05/20 22:30	10,22	245100	70,3	36000	32400	104,5	0.0	2,03E+07	82,9
05/20 22:30	05/21 22:30	10,09	242100	69,7	36000	32400	105,1	0.0	2,03E+07	84,0
05/21 22:30	05/22 22:30	10,17	244000	81,5	38000	34200	105,1	0.0	2,15E+07	88,0
05/22 22:30	05/23 22:30	10,22	245200	78,4	34000	30600	104,5	0.0	1,92E+07	78,3
05/23 22:30	05/24 22:30	10,46	251000	78,4	36000	32400	104,5	0.0	2,03E+07	81,0
05/24 22:30	05/25 22:30	10,29	247000	76,8	36000	32400	104,5	0.0	2,03E+07	82,3
05/25 22:30	05/26 22:30	10,38	249000	78,4	36000	32400	104,5	0.0	2,03E+07	81,7
05/26 22:30	05/27 22:30	10,59	254000	80	36000	32400	104,5	0.0	2,03E+07	80,0
05/27 22:30	05/28 22:30	9,75	234000	81,5	36000	32400	104,5	0.0	2,03E+07	86,9
05/28 22:30	05/29 22:30	10,38	249000	80	36000	32400	104,5	0.0	2,03E+07	81,7
05/29 22:30	05/30 22:30	9,17	220000	83	36000	32400	104,5	0.0	2,03E+07	92,4
05/30 22:30	05/31 22:30	9,67	232000	80	36000	32400	104,5	0.0	2,03E+07	87,6

Ing. Fabio Penon

Tests plan

E-CAT MW1 ENERGY PLANT IN MIAMI TESTS PLAN

1. Plant description

The MW1-USA plant under test consists of 115 power generation units, grouped in modules. Only 111 units will be operational during the tests: Four units will be used as spare parts.

Every unit absorbs a power of about 1.1 kW – 2.5 kW

Each unit consists of a reaction chamber, where the nickel powder reacts with the hydrogen in the presence of a catalyst.

Electric heaters heat the reaction chamber and by this way trigger the reaction between nickel and hydrogen.

The power panel regulates the power supply of the electric heaters

The cooling water is contained in a tank, placed inside the plant, that receives the water from an external plant.

It is conveyed by pumps in the units E-Cat, where it is heated to vaporize. The steam is collected in one tube of the steam line, which conveys it to the outside of the shelter.

The steam is then passed through the customer's facility, where it cools up to its condensation.

The water is so recycled to the internal tank in a closed loop. The water is distilled water. The external tank is connected with the internal tank, by a water line and a floating valve, so that the level of water inside the internal tank is maintained constant. The water flows from the external tank into the internal tank by gravity.

The heating elements of the E-Cat units, the pumps for the water, the internal services to the shelter and the control panel are powered by the public grid

In the plant some measuring instruments are installed:

- flowmeter for measuring the flow rate of cooling water inlet into the shelter.

It is located along the line of return of the water, between the plant of the Customer and the 1 MW E-Cat

- temperature probe for measuring the cooling water temperature at the inlet of the shelter.

It is located in the internal water tank, containing cooling distilled water

- temperature probe for measuring steam temperature at the outlet of the shelter.

It is located along the steam pipe at the outside of the shelter

- pressure probe for measuring steam pressure at the outlet of the shelter.

It is located along the steam pipe at the outside of the shelter

- power analyzer for measuring the power supply.

It is located along the electric power line before the E-Cat

Ing. Fabio Penon

Tests plan

2. Test set up

2.1 List of components

- n. 60 Water pump (Prominent)
- n. 115 E-Cat units
- n. 1 Water pump
- n. 1 Internal Water tank (0.2 C.M.)
- n. 1 Auxiliary external water tank

2.2 Measurement instrumentation

- Flowmeter Test report n. 01/2015, dated 2015/01/15
- Power analyzer PCE 830 Calibration certificate n. 0518/15, dated 2015/01/28
- Probe for water temperature measurement HSTC - TT - TI - 24S.
- Probe for steam temperature measurement TU - T - NPT - U 72
- Probe for steam pressure measurement PX 309-100A5V
- Multifunction calibrator

The measurement chain of temperature a will be calibrated by the thermometer HSTC-TT-TI-24S-1M-SMPW-M

3. Calculation of the energy mutiple

6.1 Calculation of the energy produced (E_p)

The energy produced by 111 power generator units is given by the sum of the heat of heating of water, heat of vaporization of water and heat of superheating the steam.

$$E_p = E_R + E_v + E_s$$

$$E_R \text{ (energy of heating of water up to } 100^\circ\text{C)} = M_w \times C_{sw} \times (T_{vw} - T_{iw})$$

where

M_w = mass of water vaporized during the whole test, coming from tank

T_{iw} = inlet temperature of the water, coming from tank

C_{sw} = specific heat of water = 1,14 Wh/(kg°K)

T_{vw} = vaporization temperature of the water = 100 °C

$$E_v = \text{(energy of vaporization of water)} = \lambda \times M_w$$

$$\lambda = \text{(latent energy of vaporization)} = 627,5 \text{ Wh/kg}$$

Ing. Fabio Penon

Tests plan

$$E_s (\text{heating energy of steam}) = M_s \times C_{ps} \times (T_{os} - T_{vw})$$

M_s = mass of steam produced during the whole test
 C_{ps} = specific heat of steam at constant pressure = 0,542 Wh/kg

T_{os} = outlet temperature of the steam
 T_{vw} = vaporization temperature of the water

The values refer to the atmospheric pressure

In order to be conservative:

- it will be not taken into account the heating energy of steam
  - the temperature of the incoming water will be always considered to be equal to the maximum value of the same measured during the entire test day
- It will be possible small leaks of water to the inside of the shelter and are present measurement uncertainties

To take this into account the total mass of water transited during the test period will be reduced by 10%..

3.2 Calculation of the energy absorbed (E_a)

The energy is supplied from the public grid

In order to be conservative:

- all the supplied energy is supposed be absorbed by the 111 reactors

In reality a part of this energy feeds the pump, which conveys the water from the tank external to the reactors This energy doesn't feed the reactors

3.3 Calculation of the 'energy multiple'

$$\text{Energy multiple} = \frac{\text{energy produced (} E_p \text{)}}{\text{energy absorbed (} E_a \text{)}}$$

4. Test protocol

Before testing Leonardo Corporation will implement the system in accordance with reference documentation

The ERV will provide the measuring devices: probe for measuring water inlet temperature, probe to measure outlet steam temperature, probe to measure the outlet steam pressure, inlet water flowmeter, electrical power analyser

Leonardo Corporation will install measuring devices with reference documentation

Ing. Fabio Penon

Tests plan

Before the plant start up the ERV will verify the compliance of the plant configuration and of the measuring chains with reference documentation.

He will carry out a trial run

Leonardo Corporation will start the system

The ERV will then follow the system start-up to reach the operating conditions and at least the next 24 hours of operation

According to data collected after the first 24 hours of operation, he will make an initial assessment of the 'Energy Multiple' and he will prepare the report

During the test will be detected the electrical power supplied, the temperature of the inlet water, the temperature and the pressure of the outlet steam, the flow rate of inlet water.

At 00.00 of every day of the test, the measurement system will calculate the mass of water that has passed through the E-Cat and the total energy supplied to the E-Cat.

Every event that occurs from the start until the close of the tests, after 350 days of operation, will be recorded in the logbook by Leonardo Corporation.

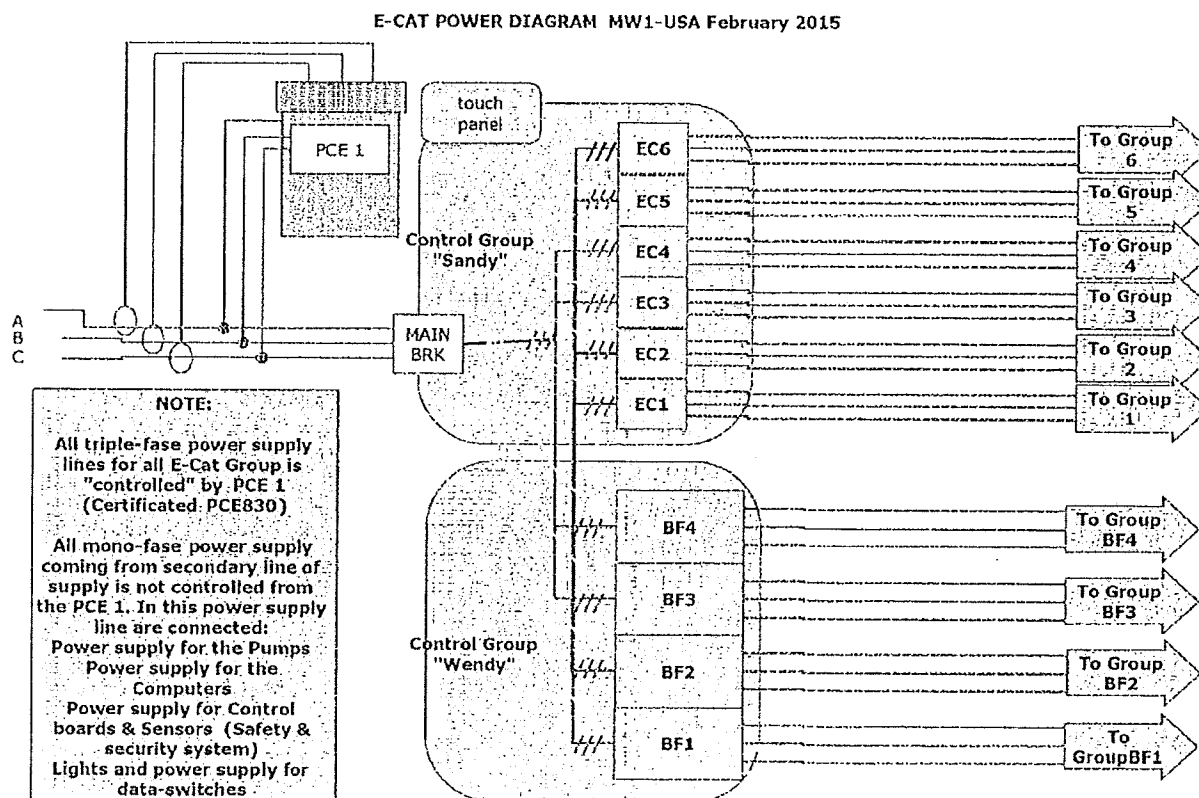
During the 350 days of operation, the ERV will visits to the plant with a frequency approximately four months in order to verify the configuration of the system and the measuring chains and make evaluations of Multiple Energy

At the end of the 350 days of operation the ERV will follow the shutdown of the plant

At the conclusion of the test the ERV will produce a final report, showing the results

Abano Terme, 2015/02/09

POIESIS srl
Fabio Penon M.E.



From: McLaughlin, Brian <BMcLaughlin@apcoworldwide.com>
Sent: Tuesday, March 29, 2016 7:34 PM
To: Joseph Murray
Cc: Tom Darden; JT Vaughn
Subject: Re: From Rossi's email list...Fwd: Fw: report fyi

5 lpm + 60

Thanks Joe. Tom mentioned you wrote an analysis. Could you share that?

Sent from my iPhone

On Mar 29, 2016, at 6:46 PM, Joseph Murray <jmurray@industrialheat.co> wrote:

Yes, and it is completely bogus.

Joe.

On Tuesday, March 29, 2016, McLaughlin, Brian <BMcLaughlin@apcoworldwide.com> wrote:
Thanks Dewey.

Do we actually have the report?

Sent from my iPhone

On Mar 29, 2016, at 6:23 PM, dewey.weaver <dewey.weaver@deepiv.com> wrote:

This just forwarded from Dennis Cravens who is on R's mailing list.

We're going to need a counter-punch soon.
- Dewey

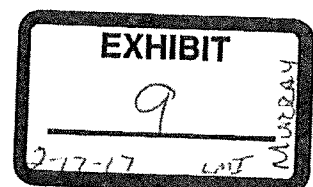
On Tuesday, March 29, 2016 6:21 PM, Dennis <dennis@tularosa.net> wrote:

Andrea Rossi
March 29, 2016 at 1:44 PM

DEAR READERS:

**WE HAVE RECEIVED RIGHT NOW THE ERV'S REPORT WHICH
HAS BEEN DELIVERED TO INDUSTRIAL HEAT AND TO MYSELF.**

While I cannot release the report publicly at this time, I can state that I am *very pleased with the results*. I hope that Industrial Heat and I will be able to release the report publicly in the near future.
May God help us for the hard work waiting for us all.



Warm Regards,
Dr Andrea Rossi,
CEO of Leonardo Corporation

CONFIDENTIALITY

This email may contain material that is confidential, privileged or/ or work product for the sole use of the intended recipient. Any review, reliance or distribution by others or forwarding without express permission is strictly prohibited. If you are not the intended recipient, please contact the sender and delete all copies.

--

Joe Murray
Industrial Heat
p: 919.670.2771
e: jmurray@industrialheat.co

From: dewey.weaver <dewey.weaver@deeprv.com>
Sent: Wednesday, July 22, 2015 9:13 AM
To: Joe Murray
Cc: Paul Morris
Subject: Re: Re: Re: Fwd: ECAT Heat Energy - News from Andrea Rossi / Ecat.com

Agreed - There is a high probability that R is going to screw up his deal. TD is the right guy for that job and that gives R his best chance. TD may try and change the status quo and lower the pressure on R with a more simplified / lower profile plan b. (single reactor 100W challenge or something like that).

- Dewey

----- On Wed, 22 Jul 2015 09:10:13 -0400 **Joe Murray** <jmurray@industrialheat.co> wrote -----
Dewey,

This is a very encouraging note. Leo Corp does muddy the waters. I hope that can be brought into a viable path soon.

B/R,

Joe.

On Wed, Jul 22, 2015 at 9:03 AM, dewey.weaver <dewey.weaver@deeprv.com> wrote:
FYI on important news from Srini / India.

- Dewey

===== Forwarded message =====

From : Srini Srinivasan <chino37@gmail.com>

To : "dewey.weaver" <dewey.weaver@deeprv.com>, Tom Darden <tdarden@industrialheat.co>, JT Vaughn <jvaughn@industrialheat.co>

Date : Wed, 22 Jul 2015 08:55:27 -0400

Subject : Re: Re: Fwd: ECAT Heat Energy - News from Andrea Rossi / Ecat.com

===== Forwarded message =====

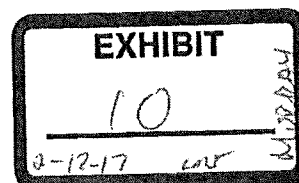
22nd July 2015

Dear Dewey,

The meeting with the Sr. VP in charge of Advanced Research along with two of his junior VPs in charge of different departments at the Mahindra Research Valley campus went off very well this morning. I am happy to report that Mahindras have decided to get involved in LENR. This is the culmination of two years of correspondence and discussions with them by me!

To begin with they will collaborate and fund the recently started research program at IIT Madras. One of their younger employees (a Mechanical Engineer) will register for a Ph.D under Prof. Ramaprabhu and start some experimental studies. Already a young lady research scholar has started a Thesis problem study at IIT M.

It is a fortuitous coincidence that Dr.Pawan Goenka, the President of the Automotive and farm Sector Division of the Mahindras is presently the Chairman of the Board of Governors of IIT Madras. So it makes it very easy for him to convince the Director of IITM to encourage this effort. In any case he is going to fund this research program!



I have told the Mahindras about Tom, IH and your interest in the Mahindras. I propose to send them more links to stuff available in the open domain.

I am happy to note that testing work at your new facilities has commenced. But for rapid progress you perhaps need more such parallel groups to carry out rigorous tests. I have a feeling that involving the Mahindas even in the testing phase may be mutually beneficial. They have about 1500 to 2000 people at the MRV facilities. Very modern equipment; world class as it became operational only in the last couple years.

I do realize that for this to happen delicate negotiations and signing of agreements etc need to take place prior to that. Ofcourse you are the judge to decide at what stage you would like to talk to them and get them involved.

Meanwhile I shall keep them updated on the progress of the field.

Best regards to all.

Srini

Dr.M.Srinivasan
(Formerly Associate Director,
Physics Group, BARC, Mumbai)
chino37@gmail.com

On Wed, Jul 22, 2015 at 7:48 AM, dewey.weaver <dewey.weaver@deepw.com> wrote:
Srini - I hope that you are doing well and as always, thank you for all that you continue to do to educate the world regarding the benefits of sustained LENR research. Confidentially we are continuing in our efforts to develop several reactors within our existing R&D network. I can report slow but steady progress.

As we explained during your visit to Raleigh, we are moving into a verification and engineering phase that we believe will be fruitful. We are very interested in working with Mahindra Research once we are internally satisfied that we have something useful to share.

In addition, we are aware of Rossi's test progress and his heat offer. We believe that a considerable amount of testing and research is needed before an onsite system will be ready for even prototyping with an outside customer.

We hope that your meeting goes well tomorrow. Please let us know if there is anything that we can do to assist you moving forward.

Thank you and let us know if there is anything that we can do to assist you in the interim. We trust that the Mahindra meeting will go well.

All the best,
Dewey
919-812-3441

----- On Sat, 18 Jul 2015 07:29:12 -0400 Srini Srinivasan <chino37@gmail.com> wrote -----
18th July 2015

Dear Dewey,

Thank you so much for your response.

We are confused about the role of Learnado Corporation. Would they be manufacturing and marketing independent of and in addition to IH?

We keep hearing from Rossi's blogs as reported in e-catworld about his outsourcing plans, namely that Learnado Corporation has identified various parties to manufacture components.

I am going to be meeting the VP in charge of Research at Mahindra Research Valley on Wed 22nd July. I have been repeatedly trying to get them involved in LENR Research; atleast they start funding research in Academic Institutions like the IITs.

I am trying to form a clearer picture of the time line of LENR technology in India.

Meanwhile we shall await your feedback.

Thanks once again.

Srini

Dr.M.Srinivasan
(Formerly Associate Director,
Physics Group, BARC, Mumbai)
chino37@gmail.com

On Sat, Jul 18, 2015 at 4:44 PM, dewey.weaver <dewey.weaver@deepiv.com> wrote:
Srini - thank you for the note. As previously stated, Rossi operates his own planet. Unofficially and confidentially, we are not confident that he is ready to be making such offers. I'm going to discuss with IH next week and will follow-up with a more informative response.

Mahindra discussion is also next week - everyone has been traveling.

Hope that everything is well with you.

Best,
Dewey
919-812-3441

----- On Fri, 17 Jul 2015 18:11:44 -0400 Srini Srinivasan <chino37@gmail.com> wrote -----

18th July 2015

Dr.M.Srinivasan
chino37@gmail.com

Dear Dewey,

If an Indian company is interested in a heat source is it worth encouraging them to pursue this? Do you have any info on how serious is this offer!

Where does IH come into this business?

Srini

----- Forwarded message -----

From: <noreply@lenr-forum.com>

Date: Fri, Jul 17, 2015 at 7:57 PM

Subject: ECAT Heat Energy - News from Andrea Rossi / Ecat.com

To: chino37@gmail.com

Leonardo Corporation now offers ECAT Heat Energy as a separate product solution. The ECAT plants are owned and operated by Leonardo Corporation while installed in the customers facilities or at a location in the vicinity of the customers facilities depending on local needs and infrastructure.

The ECAT Heat Energy is delivered by steam at 100-120 Celsius and extracted through the customers local heat exchangers. Return temperatures can be in any range between 5-95 Celsius.

Leonardo Corporation initially look for customers with 24/7 facility operation due to ECAT plants preferred continuous operation.

Please contact for quotes

<http://www.lenr-forum.com/forum/index.php/Thread/1847-ECAT-Heat-Energy-News-from-Andrea-Rossi-Ecat-com/>

--
LENR Forum

<https://www.lenr-forum.com/forum>

--

Joseph A. Murray

Industrial Heat, LLC

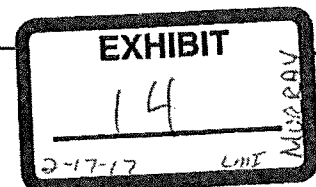
(C) 919-606-5330

(E) jmurray@industrialheat.co

From: Joseph Murray <jmurray@industrialheat.co>
Sent: Saturday, May 07, 2016 5:35 PM
To: Tom Darden
Cc: dewey.weaver; Christopher R Pace; JT Vaughn; Kight, April; McLaughlin; Watkins; Christopher M Lomax
Subject: Re: Flow meter testing

Redacted - Privilege

1



CONFIDENTIAL

IH-00120283

and we are lucky he did not burn down the whole building. In my opinion there is no possible way, even in theory, that the BF systems as they were built could support a large amount of heat.

Redacted - Privilege

On Sat, May 7, 2016 at 1:58 PM, Tom Darden <tdarden@industrialheat.co> wrote:

Redacted - Privilege

From: dewey.weaver

Sent: Saturday, May 7, 2016 9:27 AM

To: Joseph Murray

Cc: Christopher R Pace; JT Vaughn; Kight, April; McLaughlin; Watkins; Tom Darden; Christopher M Lomax

Subject: Re: Flow meter testing

Redacted - Privilege

----- On Thu, 05 May 2016 18:13:03 -0400 **Joseph Murray** <jmurray@industrialheat.co> wrote -----

All:

Attached are 3 500kW simulation video's. I have others simulations complete that I need to make video's out of. It should have been very hot in the building. At 500kW in that building you would have buoyancy driven tornadoes in the building.

B/R,

Joe.

On Wed, May 4, 2016 at 6:25 PM, Joseph Murray <jmurray@industrialheat.co> wrote:
All:

The flow meter testing is ongoing. It is very obvious that the meter will report the numbers that Rossi has validated as correct with Penon with only a trickle of water running through it. However, I really need to know what the run length of the pipe is and the drop to be able to make a valid comparison. When can we get into the facility?

Thanks,

Joe.

--

Joe Murray
Industrial Heat
p: 919.670.2771
e: jmurray@industrialheat.co

This communication and any attachments may contain confidential information. All unauthorized use, disclosure or distribution is prohibited. If you are not the intended recipient, please notify infosecurity@industrialheat.co immediately and destroy all copies of this communication. Thank you.

--

Joe Murray
Industrial Heat
p: 919.670.2771
e: jmurray@industrialheat.co