

OFFSHORE HELICOPTER SAFETY INQUIRY

June 30, 2010

Tara Place, Suite 213, 31 Peet Street

St. John's, NL

June 30, 2010

PRESENT:

John F. Roil, Q.C./

Anne Fagan.....Inquiry Counsel

Amy Crosbie/ Canada-Newfoundland and Labrador Offshore

John Andrews Petroleum Board (C-NLOPB)

Ian Wallace/ Hibernia Management and

Cecily Strickland..... Development Company (HMDC)

D. Blair Pritchett Suncor (Petro-Canada)

Stephanie Hickman.. Husky Oil Operations Ltd.

Nick Schultz Canadian Association of Petroleum Producers (CAPP)

Geoffrey Spencer..... Helly Hansen Canada Ltd.

Rolf Pritchard/..... Government of Newfoundland and Labrador

Laura Brown Laengle

Jack Harris, Q.C., Member of Parliament (Self-Represented)

Kevin Stamp, Q.C. Cougar Helicopters Inc.

Jamie Martin..... Families of Deceased Passengers

Kate O'Brien.....Davis Estate (Pilot) and

.....Agent on behalf of Douglas A. Latto for Lanouette Estate (Co-pilot)

V. Randell J. Earle, Q.C. Communications, Energy and Paperworkers Union

..... Local 2121

David F. Hurley, Q.C. Offshore Safety and Survival Centre, Marine Institute

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1 June 30, 2010
 2 COMMISSIONER:
 3 Q. Good morning, ladies and gentlemen. Good
 4 morning, Mr. Power. So are we ready, Ms.
 5 Fagan?
 6 MS. FAGAN:
 7 Q. Yes, Commissioner.
 8 COMMISSIONER:
 9 Q. Thank you.
 10 MS. FAGAN:
 11 Q. Today's witness is Jonathan Power and he is a
 12 Research Council officer with the National
 13 Research Council Institute for Ocean
 14 Technology. This is a Federal Crown
 15 Corporation that supports science and
 16 technology for Canada and Canadian businesses.
 17 The NRC, which is how I will refer to the
 18 National Research Council, is divided into 20
 19 institutions, with over 4,000 professionals.
 20 They cover a wide variety of topics.
 21 In St. John's, since 1985, we have had
 22 the Ocean -- it's the Institute for Ocean
 23 Technology, the IOT. I'm starting to feel
 24 like I'm getting into the Transport Canada
 25 stuff with all those acronyms again, but

Page 2

1 anyway, the IOT is the nation's centre for
 2 ocean technology and research and we have that
 3 right here in St. John's, just down on the
 4 Parkway. So it's nice and close if those want
 5 to go and see what they're doing, and the
 6 Institute is capable of a number of things
 7 that you can't get anywhere else and that is
 8 because they have a 200-metre towing tank, a
 9 75-metre by 32-metre engineering basin and
 10 they have the largest ice tank in the world,
 11 being 90 metres.
 12 What may not be known, and I will have
 13 Mr. Power discuss this in more detail, is that
 14 they do tests on human subjects as to how they
 15 perform in these tanks, the same as they do
 16 tests on the hulls of vessels. So quite
 17 often, especially for the local Newfoundland
 18 audience and those in Labrador, we've seen
 19 various programs and various shows on TV that
 20 show, whether it's students from Memorial
 21 University or engineering students or, you
 22 know, hulls of sailing ships being tested at
 23 the Institute. What doesn't seem to have the
 24 same prominence is the human subjects that are
 25 being tested in these wave tanks, and that's

Page 3

1 what Mr. Power is here to talk about.
 2 So I would ask to have Mr. Power
 3 affirmed, and then we will have his exhibits
 4 entered.
 5 COMMISSIONER:
 6 Q. Okay then.
 7 MR. JONATHAN POWER (AFFIRMED) EXAMINATION BY MS. ANNE
 8 FAGAN
 9 REGISTRAR:
 10 Q. State your name, please.
 11 MR. POWER:
 12 A. Jonathan Thomas Power.
 13 REGISTRAR:
 14 Q. Thank you.
 15 MS. FAGAN:
 16 Q. Mr. Power, you were the author of a paper,
 17 research paper that was prepared for
 18 Commissioner Wells and I believe that was co-
 19 authored by one of the other researchers with
 20 you at the Institute, and that's Antonio
 21 Simoes Re, and can you please provide: your
 22 CV, which we're going to have entered as
 23 Exhibit 218; Antonio Simoes Re's CV, which is
 24 going to go in as 219. We have the report
 25 which is 220, and a PowerPoint presentation,

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1 which is 221, and we'd have those marked as
 2 exhibits. They're public exhibits and they're
 3 all 00220, 00221.
 4 COMMISSIONER:
 5 Q. All right then.
 6 MS. FAGAN:
 7 Q. Mr. Power, can you turn to your CV, which is
 8 Exhibit 218, and provide a brief summary of
 9 your background, and in particular, your
 10 current research, which I understand is part
 11 of your Ph.D. study, and which is what is why
 12 we have you here today is your study. It's
 13 very interesting with respect to the
 14 performance of humans in cold water. So can
 15 you go through your CV for the group?
 16 MR. POWER:
 17 A. Yes. I graduated from Memorial in 2002 with
 18 my Bachelor of Science in Biology and I then
 19 completed my Masters of Science in Kinesiology
 20 in 2005 and I'm now pursuing my doctorate with
 21 Professor Michael Tipton in the University of
 22 Portsmouth in England. The work composing my
 23 doctorate is also the work that I'm currently
 24 managing at NRC and that's examining human
 25 performance in varying weather conditions in

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1 the tank facilities that you mentioned
 2 earlier.
 3 MS. FAGAN:
 4 Q. Okay. Now we have heard from Dr. Susan
 5 Coleshaw and from Mr. Michael Taber. They
 6 both, in their reports, refer to a Michael
 7 Tipton, Professor Tipton, and we've also heard
 8 it's a pretty small group. So is the
 9 Professor Tipton that's overseeing your
 10 doctorate the same Professor Tipton that's in
 11 -- referred to by many of these other experts?
 12 MR. POWER:
 13 A. Yes, he is.
 14 MS. FAGAN:
 15 Q. Okay. So he is your supervisor on this
 16 project?
 17 MR. POWER:
 18 A. Yes.
 19 MS. FAGAN:
 20 Q. Okay. I briefly just described the three
 21 facilities. Could you give just a little more
 22 detail on the facilities at the Institute?
 23 Because that will be relevant when we then
 24 start speaking about the study that's
 25 currently underway.

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1 MR. POWER:
 2 A. Well, we have three main facilities at IOT.
 3 We have our ice tank, which is the world's
 4 longest tank. We can grow ice sheets of
 5 varying sizes and thickness and we can drop
 6 the temperature down to as low as minus 20
 7 degrees Celsius and maintain it. We also have
 8 our clear water towing tank, which is a 200-
 9 metre long tank that has a dual flap wave
 10 maker located at one end and this tank is used
 11 for assessing the performance of model hulls
 12 under tow in both calm conditions and in wave
 13 conditions. We also have the offshore
 14 engineering basin, which is where the majority
 15 of the tests that I've conducted took place.
 16 This facility has dual -- has wave makers on
 17 two sides of the tank allowing for waves
 18 coming in a variety of directions.
 19 MS. FAGAN:
 20 Q. We have heard about pools where there's wave
 21 or turbulence created. Is there a difference
 22 between the basin, which I hear is referred to
 23 as the wave maker -- is there a difference
 24 between the wave maker and a pool or turbulent
 25 water?

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1 MR. POWER:
 2 A. Yes. Our wave makers, we're capable of
 3 generating a wide spectrum of waves and we can
 4 program our wave makers to produce these waves
 5 to a high degree of accuracy and make sure
 6 they're repeatable as well.
 7 MS. FAGAN:
 8 Q. What's the difference between a wave and
 9 turbulent water?
 10 MR. POWER:
 11 A. With a wave, when we dial in a wave into the
 12 wave maker and we send it down the tank, we
 13 program in a set wave and we know the kind of
 14 wave we're going to get. We can measure it to
 15 a high degree of accuracy and it's repeatable.
 16 With other tanks, it's more turbulent, it's
 17 chaos. You may not know exactly what you're
 18 getting at certain points in that tank.
 19 MS. FAGAN:
 20 Q. Okay. Are you a member of any boards?
 21 MR. POWER:
 22 A. Yes. I currently sit on two boards.
 23 MS. FAGAN:
 24 Q. And what are the two boards?
 25 MR. POWER:

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1 A. The boards I sit on are the National Research
 2 Council's Research Ethics Board and the
 3 Canadian General Standards Board for Immersion
 4 Suit Systems.
 5 MS. FAGAN:
 6 Q. On the Ethics Board, what would you -- what's
 7 that Board responsible for?
 8 MR. POWER:
 9 A. That Board is responsible for granting ethics
 10 approval for all applications across NRC,
 11 which is across Canada, for all studies
 12 involving human participants. It's our job
 13 every month to review the applicants that come
 14 in and to determine do they meet ethical
 15 approval or not.
 16 MS. FAGAN:
 17 Q. So what would be -- for example, in your study
 18 and others, these are studies where you're
 19 going to use human subjects or participants.
 20 What would be some of the considerations of
 21 the Board and how would your background,
 22 especially your kinesiology, help in making
 23 those decisions or, I guess, guidelines for
 24 tests?
 25 MR. POWER:

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1 A. One of the primary purposes of an ethics board
 2 is to weigh the risk versus reward for any
 3 kind of research project. So what is the risk
 4 to the participant versus the reward that can
 5 come out of the research? We examine the
 6 applications, determine the risk versus reward
 7 balance. We also make sure that in the
 8 consent forms supplied to the participants
 9 that they're giving full informed consent, so
 10 they get the complete details of the project,
 11 they know exactly what's going to be
 12 happening, and as well, we also take a look at
 13 the methodology. Are they approaching it the
 14 correct way? Are they doing anything that
 15 could be potentially harmful to the
 16 participants, to their privacy, to their
 17 anonymity.
 18 MS. FAGAN:
 19 Q. Okay. Ethically, would you make any sort of
 20 determinations or decisions as to the sex, say
 21 male or female or whether or not you're going
 22 to put certain age restrictions or health
 23 restrictions on tests?
 24 MR. POWER:
 25 A. We wouldn't normally do that. If we see an

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1 age range or limit to a gender in a specific
 2 application, we may ask the researcher why
 3 they've included this age range and we would
 4 like to see a justification for limiting or
 5 narrowing the scope of the participants they
 6 could recruit.
 7 MS. FAGAN:
 8 Q. Okay. On the Canadian General Standards
 9 Board, what is your role on that Board? And
 10 I'm going to -- you're going to have to
 11 explain a little bit about the Board, but
 12 first, what's your role?
 13 MR. POWER:
 14 A. Well, I represent NRC-IOT on the Board and I'm
 15 a general interest member, but also a voting
 16 member as well.
 17 MS. FAGAN:
 18 Q. Okay. We understand that that Board is
 19 currently studying or examining the standard
 20 that is now in place for the helicopter
 21 transportation suit. Is that correct?
 22 MR. POWER:
 23 A. That is correct. The standard is now open.
 24 MS. FAGAN:
 25 Q. Okay. You're on the Board. How many people

Page 11

1 are on the board?
 2 MR. POWER:
 3 A. A large number of individuals representing a
 4 wide range of groups.
 5 MS. FAGAN:
 6 Q. Okay. Can you tell us who's on the Board,
 7 like -
 8 MR. POWER:
 9 A. There's -
 10 MS. FAGAN:
 11 Q. - not people really, who they represent.
 12 MR. POWER:
 13 A. Well, they represent general interest members,
 14 such as ourselves. We also have manufacturers
 15 and regulators on the Board, as well as end
 16 users.
 17 MS. FAGAN:
 18 Q. Okay. Do you have a list -- because I'm
 19 interested in knowing who is now going to be
 20 making the decision with respect to the
 21 standard for the suit that the workers are
 22 currently wearing, because it's -- the suit
 23 right now has been built to a standard that
 24 was set by the Board. Is that correct?
 25 MR. POWER:

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1 A. Yes.
 2 MS. FAGAN:
 3 Q. And that same Board, that group, is now
 4 deciding whether the standard should change?
 5 MR. POWER:
 6 A. Yes.
 7 MS. FAGAN:
 8 Q. Or what the standard should be. So do you
 9 have a list of who's on the Standards Board?
 10 MR. POWER:
 11 A. Yes, I do.
 12 MS. FAGAN:
 13 Q. Okay. Can you tell us who's on it? Do you
 14 have that list there?
 15 MR. POWER:
 16 A. Yes, I do.
 17 COMMISSIONER:
 18 Q. Are you asking for the names or the
 19 institutions?
 20 MS. FAGAN:
 21 Q. No, I'd like the organization of who's on the
 22 Board.
 23 COMMISSIONER:
 24 Q. The organizations, yes.
 25 MS. FAGAN:

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1 Q. Because the names can switch. They're there
 2 not in a personal capacity. They're there
 3 representing an organization. So you say
 4 there's voting members and various
 5 institutions are represented. So who is
 6 represented on the Board?
 7 MR. POWER:
 8 A. The Government of Newfoundland and Labrador,
 9 the National Research Council, the Marine
 10 Institute, Survival Systems Training Limited,
 11 National Resources Canada, a wide variety of
 12 suit manufacturers, the National Energy Board,
 13 Transport Canada, the United Food and
 14 Commercial Workers Union, Exxon Mobil,
 15 Communication Energy and Paperworkers Union.
 16 MS. FAGAN:
 17 Q. Are the petroleum regulator -
 18 MR. POWER:
 19 A. Yes.
 20 MS. FAGAN:
 21 Q. - the C-NLOPB, are they on the Board?
 22 MR. POWER:
 23 A. Yes, they are.
 24 MS. FAGAN:
 25 Q. And the Nova Scotia Petroleum is on the Board

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1 as well?
 2 MR. POWER:
 3 A. Yes.
 4 MS. FAGAN:
 5 Q. What about CAPP?
 6 MR. POWER:
 7 A. CAPP is represented on the Board as well.
 8 MS. FAGAN:
 9 Q. Department of National Defence?
 10 MR. POWER:
 11 A. Yes, they are.
 12 MS. FAGAN:
 13 Q. Okay. Manufacturers, I understand a number of
 14 manufacturers, would the manufacturers include
 15 Helly Hansen?
 16 MR. POWER:
 17 A. Yes.
 18 MS. FAGAN:
 19 Q. Okay. We heard that there's a CORD group. A
 20 number of times we'd heard a reference to CORD
 21 group. Are they also on that Standards Board?
 22 MR. POWER:
 23 A. Yes, they are.
 24 MS. FAGAN:
 25 Q. Okay. I believe some oil producers are also

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1 either on the Board or receive information
 2 from the Board, and we're going to ask
 3 questions about the standard later on.
 4 Commissioner, perhaps it would be worthwhile,
 5 because the composite of the Board changes and
 6 it may be worthwhile to have the list of who's
 7 on the Standards Board, because I don't know -
 8 - we've had this information before when Helly
 9 Hansen gave it, but I don't know if we have
 10 the current list.
 11 COMMISSIONER:
 12 Q. I don't think we have a full list. I would
 13 like to see it go in evidence.
 14 MS. FAGAN:
 15 Q. Okay. I know we're still in the process of
 16 discussing Mr. Power's credentials. However,
 17 I don't think there's anything to stop us from
 18 having this marked as an exhibit.
 19 COMMISSIONER:
 20 Q. Well, the important thing -
 21 MS. FAGAN:
 22 Q. And perhaps the other, you know, parties would
 23 like to know who is on the Board and who will
 24 be setting the standard for the suits.
 25 COMMISSIONER:

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1 Q. Yes. The names of the people aren't
 2 important, but the institutions and entities,
 3 they're important.
 4 MS. FAGAN:
 5 Q. I believe this is available -- is this
 6 publicly available? Like can you just Google
 7 this information and -
 8 MR. POWER:
 9 A. Via the Canadian General Standards Board
 10 website.
 11 MS. FAGAN:
 12 Q. Okay. So you can just go into the Standards
 13 Board and pull this out. So is there any
 14 issue with having the names?
 15 MR. POWER:
 16 A. I don't think so.
 17 MS. FAGAN:
 18 Q. If it's available on the -
 19 COMMISSIONER:
 20 Q. If it's available on a website, then it's -
 21 REGISTRAR:
 22 Q. A public exhibit?
 23 MS. FAGAN:
 24 Q. It would be a public exhibit.
 25 COMMISSIONER:

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1 Q. Yes.

2 REGISTRAR:

3 Q. 00226.

4 MS. FAGAN:

5 Q. Okay. I'll continue on with Mr. Power.

6 REGISTRAR:

7 Q. Can we make copies now?

8 MS. FAGAN:

9 Q. And perhaps the Registrar could organize

10 getting some copies made for the -- so we're

11 just going to mark it 00226 and then later on,

12 if there's any other questions come up, we can

13 -- we'll have that. And I'll ask you more

14 questions about the Board when we get further

15 into your presentation.

16 Now on the topic of your Masters, what

17 was the subject matter that you studied?

18 MR. POWER:

19 A. We examined whether or not colder water

20 temperatures would influence breath hold time

21 with the idea being is if people were trapped

22 in an inverted helicopter and had to make an

23 escape underwater, would they be able to hold

24 their breath long enough to reach the surface.

25 MS. FAGAN:

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1 Q. And we've heard evidence from Dr. Susan

2 Coleshaw on breath hold times, because she

3 indicated she did have some experience with

4 that. What was the results, just generally?

5 We don't need to go into it in detail, but

6 just to give the group an indication that you

7 do have experience in this area.

8 MR. POWER:

9 A. What we found is when people immerse their

10 faces in zero degrees Celsius water, it

11 significantly decreased their breath hold

12 time, compared to warmer water temperatures.

13 We saw a range of breath hold temperatures at

14 zero degrees Celsius, but the average value

15 was approximately 30 seconds.

16 MS. FAGAN:

17 Q. I believe Dr. Coleshaw had said it could be as

18 low as 10 to 20 seconds. Would that be

19 inconsistent with what you found?

20 MR. POWER:

21 A. Yes. Again, we saw a range of breath hold

22 values at that temperature and 30 seconds was

23 the average.

24 MS. FAGAN:

25 Q. Okay. So her statement would be consistent

Page 19

1 with your research?

2 MR. POWER:

3 A. Yes, it would be.

4 MS. FAGAN:

5 Q. Thank you. Mr. Power is here to speak to his

6 report, which is based upon his study. The

7 other thing that Mr. Power will speak to is a

8 literature review of what information is out

9 there so far on how humans react, and the

10 other topic will be on the Canadian General

11 Standards Boards. So they are the areas on

12 which I would like to have Mr. Power speak,

13 and I don't know if any of the group, any

14 other of the lawyers here wish to question Mr.

15 Power. The area is a fairly narrow, I would -

16 - the topics. We're not going to speak

17 generally on the other -- many of the other

18 issues that were discussed today, we're not --

19 and that would be all the evidence, I would

20 have on his credentials.

21 COMMISSIONER:

22 Q. Okay. Would anyone like to ask a question

23 about Mr. Power's credentials? Yes, Mr.

24 Earle?

25 EARLE, Q.C.:

Page 20

1 Q. Mr. Commissioner, perhaps counsel could

2 clarify because Mr. Power does discuss in his

3 paper, or Mr. Power and Dr. Simoes Re, do

4 discuss in their paper extensively the merits,

5 demerits of a prescriptive regulatory system

6 versus a old test or aspirational regulatory

7 system. We would have a problem if someone is

8 suggesting he is an expert in that area, and

9 I'd like it clarified whether it is intended

10 to qualify him as an expert in that area?

11 MS. FAGAN:

12 Q. Mr. Power is going to speak to that topic.

13 His background and basis for speaking to that

14 topic is based upon his research. His

15 research deals with the human reaction in cold

16 water and realistic -- you know, how a human

17 will react in a more realistic environment

18 than a pool environment and that ties into how

19 the standard has now been set and therefore

20 his prescriptive versus performance based is

21 tied to his position which is that a more

22 realistic goal based approach would offer

23 better protection. So I'm not putting him

24 forward as an expert on that topic. However,

25 he does have a view as to why that approach

Page 21

1 would be different. As well, Mr. Power is
 2 presenting his report based on the -- it's an
 3 NRC report. So I can have Mr. Power go
 4 through the process to have the report issued
 5 by NRC and Antonio Simoes Re's CV, as well as
 6 the review process at NRC, because he is here
 7 to explain the report, which is the NRC
 8 report.
 9 COMMISSIONER:
 10 Q. I think, Mr. Earle, if it's any help, my
 11 understanding -- now, of course, I've been to
 12 the National Research Council. I've talked at
 13 length with all the people involved. When we
 14 normally have heard about prescriptive as
 15 against goal setting, we're talking about the
 16 regulator and the oil operators and that sort
 17 of thing. Mr. Power has nothing to do with
 18 that aspect of prescriptive versus goal-
 19 related. His is actual hands-on research. Am
 20 I correct?
 21 MR. POWER:
 22 A. Yes.
 23 COMMISSIONER:
 24 Q. And he will describe his research, and I
 25 should say also that this is the work of the

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1 National Research Council. Everything he has
 2 prepared has been vetted from top to bottom by
 3 his colleagues and supervisors, if you like,
 4 and this is the work of the National Research
 5 Council.
 6 EARLE, Q.C.:
 7 Q. It may well be, Mr. Commissioner, but we would
 8 probably equally challenge the role of this
 9 particular division of the National Research
 10 Council to give expert evidence in what we
 11 would submit, and quite frankly, we're a bit
 12 disappointed that actually the Inquiry has not
 13 been able to get an expert opinion in this
 14 area. It really is an area of organizational
 15 dynamics and social psychology and we want it
 16 to be clear, because this appears to be,
 17 outside of the comments of Ms. Turner, the
 18 most significant amount of comment we've had
 19 on the merits or demerits of a prescriptive
 20 versus goal-oriented -
 21 REGISTRAR:
 22 Q. Excuse me, would the solicitor please come to
 23 a mic? Thank you.
 24 EARLE, Q.C.:
 25 Q. This appears to be the most extensive

Page 23

1 commentary we've had, other than some comments
 2 by Ms. Turner, on the merits or demerits of a
 3 prescriptive versus goal-based system of
 4 regulation and you will know, of course, that
 5 this was a matter raised as a concern by the
 6 Federation of Labour, in terms of the report
 7 they submitted to you earlier, and it is, in
 8 our view, not a matter of the type of research
 9 that is done at the Centre here. I'm quite
 10 sure that there are probably other parts of
 11 the National Research Council that do
 12 extensive research in the area of
 13 organizational behaviour and social
 14 psychology. It is, in our view, an important
 15 matter for this Inquiry and with the greatest
 16 respect to the authors, we're very interested
 17 in their work on human performance in cold
 18 water conditions, but that is a different
 19 matter than advising or offering expert
 20 opinion to the Inquiry on the manner in which
 21 we should proceed in the governance really of
 22 the industry, and as the paper touches on that
 23 extensively, there's about -
 24 COMMISSIONER:
 25 Q. I hear what you're saying.

Page 24

1 EARLE, Q.C.:
 2 Q. - 20 percent of the paper is in that area, we
 3 want to be very clear as to the field of
 4 expertise that it is sought to qualify this
 5 witness for.
 6 COMMISSIONER:
 7 Q. As I understand, and we've talked about
 8 prescriptive and goal setting, Ms. Turner has
 9 talked about it, that's in the governance of
 10 the industry, the oil producing offshore
 11 industry. Mr. Power, you're not involved in
 12 that in any way, are you?
 13 MR. POWER:
 14 A. In the what?
 15 COMMISSIONER:
 16 Q. The governance of the offshore industry.
 17 MR. POWER:
 18 A. No.
 19 COMMISSIONER:
 20 Q. When you talk about prescriptive and goals, I
 21 think you're talking about scientific
 22 research.
 23 MR. POWER:
 24 A. Yes.
 25 COMMISSIONER:

Page 25

1 Q. Which is a different thing altogether.
 2 MR. POWER:
 3 A. Well -
 4 COMMISSIONER:
 5 Q. But you can make, you know -
 6 EARLE, Q.C.:
 7 Q. As long as nobody is -
 8 COMMISSIONER:
 9 Q. I'm very clear.
 10 EARLE, Q.C.:
 11 Q. - seeing this as a situation where we're
 12 hearing from somebody on the methodology of
 13 governance of the industry, we're quite
 14 comfortable with it.
 15 COMMISSIONER:
 16 Q. Yes. It's scientific research and the
 17 approach to that. That's what we're talking
 18 about. Okay then.
 19 MS. FAGAN:
 20 Q. Anybody else?
 21 COMMISSIONER:
 22 Q. Anybody else any questions or like to ask any
 23 questions? All right then, I am admitting Mr.
 24 Power as an expert in the fields in which he
 25 is working that involve scientific research as

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1 he has described. Okay then.
 2 MS. FAGAN:
 3 Q. Thank you, Commissioner. Now before we
 4 actually begin your PowerPoint presentation,
 5 which is an outline of the report, I would ask
 6 you to describe how the NRC became involved
 7 with the Offshore Helicopter Safety Inquiry.
 8 MR. POWER:
 9 A. The Offshore Helicopter Safety Inquiry
 10 approached IOT, as an institute, with a list
 11 of items for us to consider. We took this
 12 list of items. We met internally and we went
 13 through the list and determined where our
 14 expertise could best fit with those items. We
 15 replied to the Inquiry outlining the items
 16 that we felt we could contribute to and the
 17 Inquiry drafted a terms of reference for us
 18 and outlined five areas for us to provide
 19 comments on.
 20 MS. FAGAN:
 21 Q. Okay. The list that you're referring to,
 22 would that be the issues list that has been
 23 referred to by many of the other witnesses so
 24 far?
 25 MR. POWER:

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1 A. Yes.
 2 MS. FAGAN:
 3 Q. Okay, and the terms of reference, they were
 4 signed on May 4th, 2010?
 5 MR. POWER:
 6 A. Yes.
 7 MS. FAGAN:
 8 Q. Prior to all of this being finalized, the
 9 Commissioner had mentioned that he had been to
 10 the Institute. Can you -- I was there as
 11 well, and Mr. Roil, my colleague. Can you
 12 describe what was going on? Because I can't
 13 give evidence, so can you describe what was
 14 going on at the time we toured the Institute,
 15 what was the purpose of us being there?
 16 MR. POWER:
 17 A. The day the Inquiry came to the Institute, we
 18 were in the middle of a test program that was
 19 examining human performance in varying weather
 20 conditions. When the Inquiry came, they were
 21 able to see some of the testing where we had
 22 somebody in our wave tanks performing a three-
 23 hour immersion. I'll touch on this later on
 24 to the presentation, but you guys did come to
 25 see some of our tests.

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1 MS. FAGAN:
 2 Q. Okay, thank you. Can you please, for the
 3 record, read the terms of reference, not the
 4 entire thing, just the topics that you were
 5 asked to cover in your report?
 6 MR. POWER:
 7 A. Yes. Item one was summarize existing
 8 knowledge of human thermal responses in
 9 varying environmental conditions. Item two
 10 was to summarize current IOT-led research that
 11 has examined human performance in laboratory
 12 controlled environments with immersion suits
 13 in varying conditions. Item three was
 14 identify knowledge gaps in immersion suit
 15 standard and expected performance, compare a
 16 prescriptive versus performance-based
 17 methodology for standards setting for
 18 immersion suits. Four, provide comments on
 19 suggested safety approaches and best practices
 20 specific to immersion suits, as well as part
 21 of a holistic safety approach. And the last
 22 item was to provide insight into emerging
 23 technology areas for further research to
 24 support an enhanced Newfoundland and Labrador
 25 offshore safety system.

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1 MS. FAGAN:
 2 Q. Okay, thank you. The report was co-authored
 3 with you and Antonio Simoes Re. Can you tell
 4 us something about your co-author?
 5 MR. POWER:
 6 A. Antonio is a senior research officer with the
 7 Institute for Ocean Technology and has been
 8 there for over 20 years. He has been very
 9 active in leading the marine safety group area
 10 of research at IOT.
 11 MS. FAGAN:
 12 Q. And I believe Mr. Simoes Re's CV is at 219, in
 13 the event anyone wishes to review it, but it's
 14 on the record. He was the co-author. I'd
 15 just have you highlight a couple of other
 16 points beyond his work at the Institute. I
 17 understand he's a member of the Society of
 18 Naval Architects and Marine Engineers and he's
 19 also a member of the Association of
 20 Professional Engineers in Nova Scotia. Is
 21 that correct?
 22 MR. POWER:
 23 A. Yes, he is.
 24 MS. FAGAN:
 25 Q. And he's been with the Institute since 1986?

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1 MR. POWER:
 2 A. Yes.
 3 MS. FAGAN:
 4 Q. And his two degrees are Masters of Science and
 5 Naval Architect and a Bachelor of Engineering
 6 in Shipbuilding?
 7 MR. POWER:
 8 A. Yes.
 9 MS. FAGAN:
 10 Q. Now this was a study on human immersion, so
 11 what was Mr. Simoes Re's sort of relationship
 12 in the report writing?
 13 MR. POWER:
 14 A. Mr. Simoes Re's relationship was that he was
 15 able to go and provide a great degree of
 16 depth, insight and experience on a
 17 prescriptive versus performance-based
 18 approach.
 19 MS. FAGAN:
 20 Q. Okay.
 21 COMMISSIONER:
 22 Q. Approach to what?
 23 MR. POWER:
 24 A. Pardon?
 25 COMMISSIONER:

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1 Q. Approach to what?
 2 MR. POWER:
 3 A. Approach to the terms of reference outlined
 4 here.
 5 COMMISSIONER:
 6 Q. Okay, not governance?
 7 MR. POWER:
 8 A. No.
 9 COMMISSIONER:
 10 Q. Scientific approach?
 11 MR. POWER:
 12 A. Yes.
 13 COMMISSIONER:
 14 Q. Okay.
 15 MS. FAGAN:
 16 Q. I believe what your -- you have two slides on
 17 this and it's standard setting. Is that what
 18 you're going to -- it's the performance based
 19 and setting a standard?
 20 MR. POWER:
 21 A. Yes.
 22 MS. FAGAN:
 23 Q. A scientific standard, a scientific basis?
 24 MR. POWER:
 25 A. Yes.

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1 MS. FAGAN:
 2 Q. That's where you're going with this
 3 prescriptive versus performance, isn't that
 4 right?
 5 MR. POWER:
 6 A. Yes.
 7 MS. FAGAN:
 8 Q. Okay. As well, we had a list of Mr. Simoes
 9 Re's publications. I believe it's a ten-page
 10 list attached to his CV. Is that correct?
 11 MR. POWER:
 12 A. Yes, it's an extensive list.
 13 MS. FAGAN:
 14 Q. Now the report itself is a report that was
 15 issued by NRC. So you may have been one of
 16 the authors, but were you the only person
 17 behind the report? Can you please describe
 18 the process for the issuance of this report?
 19 MR. POWER:
 20 A. Once the terms of reference were identified by
 21 the Inquiry to us, myself and Mr. Simoes Re
 22 began working on a draft version of the
 23 manuscript. Once we were satisfied with our
 24 version of the manuscript, we then submitted
 25 it internally to multiple internal reviews at

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1 IOT. So it went off to our director of
 2 research, Dr. Bruce Parsons. It went off to
 3 our director general, Dr. Mary Williams, our
 4 communications coordinator, Derek Yetman, and
 5 our business development officer, Frank
 6 Dormady. All these people then provided
 7 comments on the manuscript. Myself and Mr.
 8 Simoes Re then incorporated the comments into
 9 the manuscript. We sent the manuscript out
 10 for another round of internal review. More
 11 comments were provided. We incorporated the
 12 comments and so on and so on until we were all
 13 satisfied with the content of the report.
 14 Then it was issued to the Inquiry.
 15 MS. FAGAN:
 16 Q. Why is the director of research involved?
 17 MR. POWER:
 18 A. Just to make sure -
 19 MS. FAGAN:
 20 Q. What's each person's role?
 21 MR. POWER:
 22 A. The role of each person is to ensure that the
 23 content of the manuscript reflects what NRC-
 24 IOT says as a whole. It wasn't just myself
 25 and Antonio's views. It was the views of the

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1 Institute as a whole.
 2 MS. FAGAN:
 3 Q. Okay. Why -- I thought your comment on why
 4 you involve your communications officer was
 5 interesting. I mean, is it to spin the
 6 report? I mean, why do you get a
 7 communications officer involved?
 8 MR. POWER:
 9 A. No, oftentimes when we're in this area of
 10 research, we keep the terminology at somewhat
 11 of a high level. We're used to dealing with
 12 acronyms and shorthand notations. So the idea
 13 behind the communications coordinator
 14 reviewing it is to be able to go and make the
 15 language a bit more palatable.
 16 MS. FAGAN:
 17 Q. Okay. I believe your term to me is, while
 18 fascinating, it may be very difficult to read.
 19 MR. POWER:
 20 A. Exactly.
 21 MS. FAGAN:
 22 Q. Okay, and this is a fairly technical piece,
 23 because what you're going to describe is your
 24 research and I'm going to ask you to get into
 25 your PowerPoint and I would just like to put

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1 the statement forward that I asked that it be
 2 put in layman's terms and to try and bring it
 3 to a place where those who don't have the
 4 technical expertise can understand it and I'll
 5 tell the group, there was one spot where they
 6 said deep body temperature and I thought that
 7 was great, and then a revision came back and
 8 there was a DT with a little number next to it
 9 and I said, you've gone back to those symbols
 10 and numbers again. I thought we were going to
 11 go with deep body temperature. So these are
 12 highly skilled, highly technical people and
 13 I've asked them to work hard on bringing it to
 14 a level where those without the technical
 15 expertise can understand, because it is
 16 important to know how the body reacts.
 17 So let's go to your overview, slide two
 18 of your PowerPoint presentation which is
 19 Exhibit 221. Can you just give a brief
 20 overview of the outline? And I believe Mr.
 21 Power is going to control the -
 22 MR. POWER:
 23 A. A brief outline would be the first - first
 24 we'll talk about the NRC-IOT's Marine Safety
 25 Research Program, and what are some of the

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1 driving goals behind this research program.
 2 We'll then have a brief overview of human
 3 responses to cold water immersion, a review of
 4 literature that's examined human performance
 5 in immersion suits. We'll then get into the
 6 NRC-IOT research. We'll look at some examples
 7 of prescriptive versus performance-based
 8 approach to standards. We'll then look at
 9 existing knowledge gaps in standards, and then
 10 we'll also have observations for ways forward.
 11 MS. FAGAN:
 12 Q. So your first topic, I believe you have one
 13 slide on that. Can you just give us the marine
 14 safety, because I know IOT has a lot of topics
 15 and we've asked you to describe the very
 16 narrow aspect?
 17 MR. POWER:
 18 A. IOT has four separate areas of research and
 19 marine safety being one of them. It looks at
 20 the characterization safety equipment
 21 performance in extreme conditions. So how do
 22 lifesaving appliances, and this can be
 23 immersion suits, lifeboats, life rafts, how do
 24 they operate in more realistic conditions. We
 25 also look at the assessment of new

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1 technologies for survival in harsh
 2 environments, with the ultimate goal being we
 3 want to address the knowledge gap between the
 4 performance in calm water testing conditions
 5 were lifesaving appliances are often
 6 certified, and their performance in real world
 7 conditions where they're often used.

8 MS. FAGAN:
 9 Q. So what you're saying is right now we're
 10 moving, or work is being done to do this
 11 testing in a more realistic environment
 12 because now we have facilities that more
 13 closely resemble a more realistic environment?
 14 Years ago we just didn't have wave makers and
 15 some of the equipment that's now available,
 16 would that be fair?

17 MR. POWER:
 18 A. That's right.

19 MS. FAGAN:
 20 Q. So let's move right into the human responses
 21 to cold water immersion.

22 MR. POWER:
 23 A. So one of the areas we're looking at now in
 24 marine safety is human responses in a variety
 25 of extreme conditions. So if a human was to

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1 become suddenly immersed in cold water, this
 2 presents a significant risk to their safety.
 3 The most common assumption that when somebody
 4 perishes in cold water is that they die due to
 5 hypothermia, but oftentimes this isn't the
 6 case if they've perished quickly in cold
 7 water. There's another phenomenon called the
 8 cold shock response that happens upon sudden
 9 immersion in cold water, and it's important to
 10 understand the physiology between these two in
 11 emergency situations for an increased chance
 12 of survival.

13 MS. FAGAN:
 14 Q. Okay, so, you know, we here have a lot of cold
 15 water and a lot of water and you hear of, you
 16 know, ski-dooers, who go down through the ice
 17 and they'll - you know, you'll hear that they
 18 died within fifteen or twenty minutes or five
 19 minutes, and then people will say, oh, they
 20 died of hypothermia. Is that the case? I
 21 mean, what's the difference, and I know we've
 22 covered cold shock, but we need to understand
 23 this because we're going to get into
 24 hypothermia because hypothermia is more of an
 25 issue once you get out of your helicopter and

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1 you're on the surface of the water. We've
 2 heard experts on those issues, and this issue
 3 and what you're going to drill down and deal
 4 with is really once you're out there in your
 5 survival suit, how is the body going to react?
 6 So can you go through cold shock and
 7 hypothermia?

8 MR. POWER:
 9 A. Yes. Hypothermia is defined as a two degree
 10 celsius drop in deep body temperature. So for
 11 most people deep body - the resting deep body
 12 temperature is approximately 37 degrees
 13 celsius, and as the body begins to cool over
 14 time, you'll start seeing a variety of
 15 physiological responses. Within the first two
 16 degrees celsius drop, you may have some
 17 shivering and impairment of manual dexterity,
 18 but as your deep body temperature continues to
 19 drop, you'll have increased shivering, you'll
 20 find that muscle functions are significantly
 21 impaired, you may start to become apathetic
 22 and withdrawn. As you start to decrease even
 23 further, you'll get a slowing of mental and
 24 physical activity, you won't be able to
 25 process things as quickly, you'll have

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1 amnesia. Keep going down even further, it can
 2 result in unconsciousness and then erratic
 3 beatings of the heart, and finally a slowing
 4 of breathing and heart rate and ultimately it
 5 can lead to death.

6 MS. FAGAN:
 7 Q. So you start at 37, and hypothermia, it would
 8 be at 35?

9 MR. POWER:
 10 A. Yes.

11 MS. FAGAN:
 12 Q. So when the - and this is the core body
 13 temperature?

14 MR. POWER:
 15 A. Yes.

16 MS. FAGAN:
 17 Q. So when the core body temperature drops to 35,
 18 that's hypothermia?

19 MR. POWER:
 20 A. Exactly, two degree celsius drop.

21 MS. FAGAN:
 22 Q. How long - cold water, okay, give me an
 23 example of our water offshore, let's say, you
 24 know, out where these helicopters are flying?
 25 MR. POWER:

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1 A. Well, since it's salt water the temperature
 2 can drop to as low as -1.8 degrees celsius.
 3 MS. FAGAN:
 4 Q. So let's just be optimistic. It's 2 degrees
 5 or somewhere in around there, at least be in
 6 the positive. From your experience, how long
 7 would an unclothed - not unclothed, but -
 8 MR. POWER:
 9 A. A lightly clothed person.
 10 MS. FAGAN:
 11 Q. A lightly clothed person, how long would it
 12 take to drop the two degrees, on average?
 13 MR. POWER:
 14 A. Previous research has shown that people in ice
 15 water, so around 0 degrees celsius, wearing
 16 light clothing can take as long as 30 minutes
 17 to develop hypothermia.
 18 MS. FAGAN:
 19 Q. Okay, and that is 35, which is the shivering,
 20 that's not the death area which is down around
 21 the 28 or the 24. I mean, death you say is
 22 between 26 and 24?
 23 MR. POWER:
 24 A. Yes.
 25 MS. FAGAN:

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1 Q. And you could have some heart problems when
 2 you get down around the 28 degrees, is that
 3 fair?
 4 MR. POWER:
 5 A. Yes.
 6 MS. FAGAN:
 7 Q. So if it's a half hour to get to 35, how long
 8 would it take - maybe you don't do tests that
 9 would bring people down to the point of death,
 10 that mightn't get past your ethics committee.
 11 MR. POWER:
 12 A. No.
 13 MS. FAGAN:
 14 Q. So -
 15 MR. POWER:
 16 A. They may raise an eyebrow at that one.
 17 MS. FAGAN:
 18 Q. So based on your research to date, and we'll
 19 get into that in a little more detail, but
 20 this will help explain why this is important,
 21 how long would it take for a lightly clothed
 22 person to move down this scale?
 23 MR. POWER:
 24 A. That can vary from person to person. There
 25 are many factors that can influence that.

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1 MS. FAGAN:
 2 Q. Well, a range?
 3 MR. POWER:
 4 A. Could be a few hours, could be two hours, I
 5 can't say.
 6 MS. FAGAN:
 7 Q. All right, but it's more than 30 - on average,
 8 it's more than 30 minutes?
 9 MR. POWER:
 10 A. Yes, the important take home message from this
 11 is that hypothermia does take some time to
 12 occur even if you're wearing light clothing.
 13 MS. FAGAN:
 14 Q. Okay. So we're back to the cold shock
 15 response?
 16 MR. POWER:
 17 A. Yes.
 18 MS. FAGAN:
 19 Q. So somebody who ends up in icy cold water is
 20 not likely going to die of hypothermia in that
 21 half hour to one hour time span?
 22 MR. POWER:
 23 A. You hear of people becoming suddenly immersed
 24 in cold water within three meters of shore or
 25 safety and for some reason, they can't make

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1 it, and this is one of the reasons why, it's
 2 the cold shock response. This is what is
 3 responsible for the fatalities in a short
 4 amount of time after people become suddenly
 5 immersed in cold water.
 6 MS. FAGAN:
 7 Q. Okay, and we've heard from the other witnesses
 8 on this, so perhaps you can just go through
 9 this area, what is the reaction and how does
 10 cold shock response work?
 11 MR. POWER:
 12 A. So the cold shock response is four separate
 13 responses. First there's a large involuntary
 14 gasp that Dr. Coleshaw talked about. Then you
 15 have hyperventilation, a massive increase in
 16 your breathing rate. You'll also have an
 17 increased heart rate, and then you'll have
 18 what's called vaso-constriction which is your
 19 blood vessels going to your extremities start
 20 to close down to make sure that warm blood
 21 doesn't get lost - the heat in your blood
 22 doesn't get lost to be outside, instead that
 23 warm blood is redirected back towards your
 24 core. So the large involuntary gasp and the
 25 hyperventilation, this can increase your

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1 chance of inhaling water when you suddenly
 2 become immersed. You're not able to hold your
 3 breath, you're not able to regulate your
 4 breathing upon sudden immersion in cold water,
 5 you aspirate water and then you drown.
 6 Part 3 and 4, the increased heart rate
 7 and the vaso-constriction, this can actually
 8 pose a threat to people who have pre-existing
 9 heart conditions because now your heart is
 10 beating faster. With vaso-constriction, your
 11 blood vessel is closing down, your heart is
 12 now trying to push fluid through a smaller
 13 opening. This increased cardiac workload may
 14 be too much for some people who have pre-
 15 existing heart conditions.
 16 MS. FAGAN:
 17 Q. When some of the testing is done, are people
 18 screened for heart conditions?
 19 MR. POWER:
 20 A. Yes, we have all our participants, when they
 21 perform tests, we have them screened by a
 22 medical doctor to make sure they're physically
 23 fit and able to perform our tests.
 24 MS. FAGAN:
 25 Q. So if one of the subjects stepped forward and

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1 they had a pre-existing heart condition, they
 2 would be eliminated as a participant, would
 3 that be fair?
 4 MR. POWER:
 5 A. Yes. In fact, we did have one participant
 6 from a previous study, he was screened out by
 7 our medical doctor because he had a pre-
 8 existing hypertensive condition.
 9 MS. FAGAN:
 10 Q. So it's the blood in the arms moving to the
 11 core. So it's the extra blood that's sort of
 12 all moving towards the heart, placing more
 13 pressure on the heart that contributes to the
 14 potential heart problems from immersion in
 15 cold water?
 16 MR. POWER:
 17 A. Well, it's the heart now trying to push fluid
 18 through a smaller opening. So your blood
 19 vessels are closing down to your extremities
 20 and your heart is still trying to push -
 21 MS. FAGAN:
 22 Q. Still trying to get the blood out?
 23 MR. POWER:
 24 A. It's still trying to push the blood out, but
 25 your body doesn't want it to go out there

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1 because it wants to keep it inside, keep it at
 2 your core and keep you warm.
 3 MS. FAGAN:
 4 Q. Okay, so it's the opposite of what I just
 5 described, but at least I now understand it.
 6 Now immersion suits, what are they designed to
 7 do?
 8 MR. POWER:
 9 A. Well, immersion suits are designed to help
 10 reduce thermal shock, so the cold shock
 11 response, delay the onset of hypothermia,
 12 provide floatation and minimize the risk of
 13 drowning.
 14 MS. FAGAN:
 15 Q. And where does this come from, this statement?
 16 MR. POWER:
 17 A. This comes directly from the Canadian General
 18 Standards Board, 65.16-2005 for immersion suit
 19 systems.
 20 MS. FAGAN:
 21 Q. Now the two different suit systems that are
 22 worn offshore, can you describe those systems?
 23 MR. POWER:
 24 A. There are two different suit systems.
 25 Immersion suit systems, which are more

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1 commonly found on fishing vessels, for
 2 example, and helicopter transportation suit
 3 systems which is represented by this suit up
 4 here.
 5 MS. FAGAN:
 6 Q. Okay, and they are required by regulators, is
 7 that correct?
 8 MR. POWER:
 9 A. Yes.
 10 MS. FAGAN:
 11 Q. Now the third section of your report was a
 12 review of the literature. Why is it
 13 important?
 14 MR. POWER:
 15 A. It's important because we know that the
 16 performance of immersion suits can help delay
 17 the onset of hypothermia, but the question
 18 becomes is the environment going to impact the
 19 performance of people in immersion suits. So
 20 before we began your project at NRC, we needed
 21 to see what was done before us to know that we
 22 can conduct work that can help address those
 23 knowledge gaps.
 24 There has been previous work that looked
 25 at the environment impacts on human

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1 performance. We found - some earlier studies
 2 had found that waves can increase cooling.
 3 There's also later experiments that used
 4 lifeboats and rigid hull inflatable boats to
 5 simulate rough sea conditions. So they
 6 conducted a study where they looked at the
 7 performance of people in calm water, and then
 8 they created waves using the wake of boats,
 9 and they found that there was some change in
 10 the rate of core temperature drop in weather
 11 conditions compared to calm, and they
 12 concluded that rough seas may result in
 13 significantly lower survival times than those
 14 estimated in calm water.
 15 MS. FAGAN:
 16 Q. What was - was there any issue with these
 17 studies? I mean, you've taken further
 18 studies. So why was more study needed?
 19 MR. POWER:
 20 A. Well, some of the earlier studies, and the one
 21 I just referred to about testing in calm water
 22 and then using the boats to create waves, it
 23 lacked a degree of repeatability. When you
 24 test outside, you're at the mercy of the
 25 weather. So what they tested in the calm

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1 conditions, whatever the water temperature was
 2 that day and whatever the air temperature was,
 3 the wind speed, that's what it was. So there
 4 may have been a problem with every participant
 5 experiencing the same condition as all the
 6 others.
 7 MS. FAGAN:
 8 Q. Okay. You the mention Professor Tipton. What
 9 was his study?
 10 MR. POWER:
 11 A. Well, Professor Tipton then went and conducted
 12 a study in laboratory conditions where he was
 13 able to make sure that every participant saw
 14 the same conditions as all the rest of them
 15 did.
 16 MS. FAGAN:
 17 Q. So he did it in a laboratory?
 18 MR. POWER:
 19 A. In a laboratory setting, yes.
 20 MS. FAGAN:
 21 Q. And what results or what was the takeaway from
 22 his study?
 23 MR. POWER:
 24 A. Well, what Tipton concluded from his study was
 25 the possibility exists that to overestimate

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1 survival times based on lab conditions that do
 2 not recreate the stresses in a real emergency,
 3 and he also suggested that this limitation
 4 could be reduced if lab testing could be made
 5 more realistic.
 6 MS. FAGAN:
 7 Q. What was Professor Tipton's study, can you
 8 describe what this study was, what were the
 9 conditions?
 10 MR. POWER:
 11 A. Professor Tipton looked at the performance of
 12 suits in both calm water and with 15
 13 centimetre waves, approximately 12 kilometres
 14 per hour wind and spray, and 4 degrees celsius
 15 water. He found that there was a significant
 16 difference compared to the calm conditions and
 17 the rough weather conditions that he tested
 18 in.
 19 MS. FAGAN:
 20 Q. Your next slide refers to a - I guess we're
 21 now down to water leakage. So we've - there's
 22 a little bit done on calm versus rough. What
 23 is the situation when you have some water
 24 leakage?
 25 MR. POWER:

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1 A. Well, in Tipton's study that I was just
 2 referring to, he found that the suits - that
 3 one style suit allowed 1.32 litres of water to
 4 ingress, and another 2.2 litres of water to
 5 leak into the other style of suit. So later
 6 work conducted by Tipton and Balmi
 7 investigated the effects of water leakage, and
 8 he found that as little as two cups of water
 9 applied over the torso can result in a 30
 10 percent reduction in clothing insulation.
 11 MS. FAGAN:
 12 Q. So now what do you mean by that?
 13 MR. POWER:
 14 A. Pardon?
 15 MS. FAGAN:
 16 Q. What do you mean by that?
 17 MR. POWER:
 18 A. Well, the level of clothing insulation, how
 19 much insulative value, Clo value, I think as
 20 we've heard earlier from other witnesses, that
 21 was reduced by 30 percent by adding water over
 22 the torso.
 23 MS. FAGAN:
 24 Q. So if you're wet, you'll get colder?
 25 MR. POWER:

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1 A. Yes, but what was interesting as well to come
 2 from that study was that the same amount of
 3 water applied over the limbs resulted in the
 4 same change in deep body temperature as with
 5 no water leakage added to the suit. So it's
 6 the location of the water leakage that's just
 7 as important as how much that comes in.
 8 MS. FAGAN:
 9 Q. So water on the limbs didn't affect the
 10 temperature. The takeaway there would be
 11 either stay bone dry, but if you have to have
 12 some water, have the water on your arms or
 13 your limbs?
 14 MR. POWER:
 15 A. Yes.
 16 MS. FAGAN:
 17 Q. The worse place to have water is your torso.
 18 If you have water on your torso, that will
 19 affect the cooling or the insulation value?
 20 MR. POWER:
 21 A. That would significantly increases your
 22 cooling rate compared to water along your
 23 extremities.
 24 MS. FAGAN:
 25 Q. Okay. What was the next research?

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1 MR. POWER:
 2 A. Some later work conducted by Dr. Michel
 3 Ducharme and Dr. Chris Brooks investigate the
 4 effects of varying wave heights on heat flow.
 5 So they had six volunteers perform immersions
 6 in waves ranging from 0 to 70 centimetres, and
 7 even though they found that there was no
 8 change in deep body temperature over these
 9 range of waves, they did find that heat flow
 10 was affected by wave height. So waves 30
 11 centimetres and higher produced a
 12 significantly great amount of heat flow, so
 13 heat flowing from the humans to the external
 14 environment. They found that waves 30
 15 centimetres and higher produced a
 16 significantly greater increase in heat flow
 17 compared to calm conditions.
 18 MS. FAGAN:
 19 Q. So what is the difference between - now we've
 20 heard core temperature and deep body
 21 temperature.
 22 MR. POWER:
 23 A. Sorry, it's -
 24 MS. FAGAN:
 25 Q. Are they different?

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1 MR. POWER:
 2 A. No, it's the same term.
 3 MS. FAGAN:
 4 Q. So there was no change in the core
 5 temperature, which is what you'd be looking at
 6 from a hypothermic type scenario.
 7 MR. POWER:
 8 A. Right.
 9 MS. FAGAN:
 10 Q. So what's heat flow?
 11 MR. POWER:
 12 A. Heat flow is measuring how much heat is
 13 flowing from the surface of your skin to the
 14 external environment.
 15 MS. FAGAN:
 16 Q. And how does that affect a person from, you
 17 know, their physical condition? I mean,
 18 what's the - I mean, heat flow, how does that
 19 change your situation?
 20 MR. POWER:
 21 A. Well, heat flow, obviously with a higher level
 22 of heat flow, you're losing more heat to the
 23 external environment, and if you're losing
 24 more heat, then you're able to compensate for,
 25 so referring back to the hypothermia graph and

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1 we saw some of those physical reactions to
 2 cooling. If you're not able to overcome the
 3 amount of heat flow that you're losing to the
 4 environment, say, by shivering to generate
 5 more heat, or vaso-constriction to reduce the
 6 amount of heat you're losing to the
 7 environment, if you're going to what's
 8 referred negative thermal balance, then you're
 9 losing more heat than you can produce and you
 10 will eventually reach hypothermia.
 11 MS. FAGAN:
 12 Q. So heat flow is what you would expect, it's a
 13 precursor -
 14 MR. POWER:
 15 A. Yes.
 16 MS. FAGAN:
 17 Q. To hypothermia?
 18 MR. POWER:
 19 A. Yeah.
 20 MS. FAGAN:
 21 Q. The review of the literature, what would be a
 22 summary of all of this information because
 23 this is what led you to then start your study?
 24 MR. POWER:
 25 A. What we saw in the summary of literature is

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1 that varying environments can possibly reduce
 2 the performance of humans in immersion suits
 3 compared to calm water conditions. The studies
 4 that were conducted in lab conditions showed
 5 that wind and waves could result in a
 6 degradation in this performance, and Tipton
 7 recommended that test standards must recreate
 8 the tasks which have to be undertaken in the
 9 environmental conditions they're to be
 10 undertaken in.

11 MS. FAGAN:
 12 Q. Okay, so this is Tipton's recommendation, you
 13 look at the environment when you're setting a
 14 standard? Would that be -

15 MR. POWER:
 16 A. No, take a look at the environment in order to
 17 get an accurate assessment of the performance.

18 MS. FAGAN:
 19 Q. Okay. So you then have a chart, and I think
 20 that may explain that idea a little better,
 21 and can you go through the chart and who is
 22 the author of this chart?

23 MR. POWER:
 24 A. This is by Professor Michael Tipton. The
 25 reference for the chart is at the bottom

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1 there, and what this chart conveys is that
 2 it's important to consider both the human
 3 responses and the environmental conditions
 4 when we're looking at setting suit standards
 5 and designing and getting an accurate idea of
 6 suit performance, or people in suit
 7 performance, excuse me. As Professor Tipton
 8 has outlined here in the diagram, if we ignore
 9 either the human responses or the
 10 environmental conditions, ultimately we're
 11 going to lead to surprisingly poor performance
 12 in a real accident. However, if we consider
 13 both the human responses and the environmental
 14 conditions, it isn't the opposite of
 15 surprisingly poor performance and surprisingly
 16 good performance. Instead, when we consider
 17 both the humans and the environment, we get
 18 expected performance in a real accident.

19 MS. FAGAN:
 20 Q. So you then knowing and having this
 21 information, undertook a project with the
 22 Institute, and can you please describe the
 23 project because this didn't start last week?

24 MR. POWER:
 25 A. No, this project was originally started in

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1 2007, and we set out to investigate the
 2 effects of weather conditions on human
 3 performance, with our objective being measure
 4 human thermal responses in wind and wave
 5 conditions while in immersion suits. We used
 6 our facilities at IOT to create realistic
 7 repeatable conditions to address that
 8 knowledge gap that exists between calm water
 9 testing standards and the real world
 10 conditions.

11 MS. FAGAN:
 12 Q. So as I understand it right now, the standard
 13 requires the suits to be tested in a pool or
 14 calm water and there is some wave, is that
 15 right?

16 MR. POWER:
 17 A. Depending if you're using suits or manikins,
 18 but we'll touch on that a bit later in the
 19 presentation.

20 MS. FAGAN:
 21 Q. And your testing was to have the - see the
 22 performance in a more realistic, more
 23 realistic than the current means by which
 24 they're tested, the suits are tested?

25 MR. POWER:

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1 A. For humans, yes.

2 MS. FAGAN:
 3 Q. And we'll have to deal with the whole
 4 manikin/human thing in a minute. So can you
 5 describe your tests? The first phase was
 6 March of 2008?

7 MR. POWER:
 8 A. Yes.

9 MS. FAGAN:
 10 Q. Can you just describe the conditions for the
 11 test, the first phase of the test?

12 MR. POWER:
 13 A. For the first phase of the test, we set out to
 14 quantify the effects that wind and waves had
 15 on human thermal responses. We had 12 people
 16 perform one hour immersions in calm water,
 17 immersion with only wind, and immersion with
 18 only waves, and then immersion in both wind
 19 and waves. The waves that we used in this test
 20 were actually generated from data collected
 21 from a wave buoy deployed on the southwest
 22 coast of the Grand Banks. So we logged into
 23 the wave buoy, took the wave data that it
 24 collected for February of 2008, brought it
 25 down to our facility and recreated a wave

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1 spectrum that was similar to what was out on
 2 the Grand Banks in February of 2008.
 3 MS. FAGAN:
 4 Q. Okay, so a spectrum is a pattern?
 5 MR. POWER:
 6 A. A pattern of waves, yes.
 7 MS. FAGAN:
 8 Q. So if in February of 2008 the waves were
 9 short, short, long, long, long, short,
 10 whatever it happened to be, that is what was
 11 recreated in the wave tank?
 12 MR. POWER:
 13 A. Yes.
 14 MS. FAGAN:
 15 Q. Now what was in the wave tank?
 16 MR. POWER:
 17 A. Well, we had twelve human participants, as
 18 well as we had the CORD Group Limited's
 19 thermal manikin tested alongside the humans.
 20 MS. FAGAN:
 21 Q. Okay. Why did you have a manikin in the wave
 22 tank when you had the twelve humans in the
 23 tank?
 24 MR. POWER:
 25 A. We were looking at adding to the growing

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1 knowledge base of correlating thermal manikin
 2 responses to human responses under a variety
 3 of weather conditions.
 4 MS. FAGAN:
 5 Q. Can you describe this manikin?
 6 MR. POWER:
 7 A. The CORD Group thermal manikin is owned by the
 8 CORD Group Limited, and it's often used to
 9 test immersion suits.
 10 MS. FAGAN:
 11 Q. Is it used to certify suits?
 12 MR. POWER:
 13 A. Yes.
 14 MS. FAGAN:
 15 Q. I know you haven't built the manikin, but
 16 could you just give us a little bit more of a
 17 - I mean, a manikin that I know is a manikin
 18 that's in a window shop. So what's different
 19 about a thermal manikin? I assume it has
 20 something to do with heat.
 21 MR. POWER:
 22 A. Yes, I'm sorry, I'm no expert on a thermal
 23 manikin, the CORD Group's thermal manikin, but
 24 the idea behind a thermal manikin is it has
 25 several heaters in it, and you set the manikin

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1 at a set temperature, put it in a suit, and
 2 then you put it in an immersion condition, and
 3 when it reaches a stable threshold, the amount
 4 of power required to maintain that manikin's
 5 temperature is equivalent to the power or heat
 6 lost to the external environment. So through
 7 this balance of how much power does it take to
 8 maintain this set temperature at a given water
 9 temperature, you're able to determine the
 10 clothing insulation value on a suit.
 11 MS. FAGAN:
 12 Q. Okay. Does the vascular restriction in the
 13 arms, is that - how does that contribute to a
 14 human thermal regulating or a human
 15 maintaining their core temperature, how does
 16 that work?
 17 MR. POWER:
 18 A. Well, by having vaso-constriction redirecting
 19 that warm blood to the core and preventing
 20 warm blood going out to the extremities and
 21 losing heat to the environment, a human is
 22 able to successfully thermal regulate, keep
 23 the warm blood into the core, shiver, increase
 24 your core body temperature.
 25 MS. FAGAN:

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1 Q. So does the manikin have a shivering mechanism
 2 and does it have an ability to redirect sort
 3 of a temperature from the limbs to the core of
 4 the manikin?
 5 MR. POWER:
 6 A. No, hence the importance of correlating human
 7 responses - correlating the manikin responses
 8 to the human responses.
 9 MS. FAGAN:
 10 Q. So is there a knowledge gap as to sort of the
 11 manikin - how the manikin is in relationship
 12 to a human? You're saying the core
 13 relationship - is the knowledge there now, do
 14 you know what the correlation is between the
 15 limb of the manikin and the limb of a human
 16 being?
 17 MR. POWER:
 18 A. That's growing.
 19 MS. FAGAN:
 20 Q. That's growing?
 21 MR. POWER:
 22 A. It's growing, yes.
 23 MS. FAGAN:
 24 Q. But it's not known yet?
 25 MR. POWER:

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1 A. No.
 2 MS. FAGAN:
 3 Q. Okay. What did you measure?
 4 MR. POWER:
 5 A. Well, on the humans we measured skin
 6 temperature, heat flow, and deep body
 7 temperature.
 8 MS. FAGAN:
 9 Q. And can you give us the conditions?
 10 MR. POWER:
 11 A. We had four separate conditions; calm, wind
 12 only, waves, and then wind and waves, and the
 13 chart that's up on the screen here shows the
 14 given environmental conditions for each one.
 15 We had wind speed of approximately 16
 16 kilometres per hour and the wave spectrum had
 17 a maximum wave height of 0.67 metres and the
 18 water temperature we tested in ranged from
 19 10.8 to 11.1 degrees, and air temperature was
 20 approximately 17.6 to 18.1 degrees.
 21 MS. FAGAN:
 22 Q. So would it be fair to say that is warmer than
 23 the Grand Banks?
 24 MR. POWER:
 25 A. Yes.

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1 MS. FAGAN:
 2 Q. The Grand Banks would be closer to 0, 3,4
 3 degrees, and the air can be cooler than 17
 4 degrees celsius?
 5 MR. POWER:
 6 A. Yes.
 7 MS. FAGAN:
 8 Q. I don't even know if we're going to reach that
 9 today and it's June 30th. Let's have a look
 10 at the setup, which I believe you have a
 11 photograph for that. Can you describe what's
 12 in the photograph for us?
 13 MR. POWER:
 14 A. Yes. The person in the red suit you see over
 15 on the right is one of our participants
 16 performing the immersion. This bank of
 17 machinery right here is our wind fan, so
 18 generating the wind that's blowing over the
 19 participants, and this over here, the object
 20 situated between the two yellow rectangles is
 21 the thermal manikin tested right alongside the
 22 humans.
 23 MS. FAGAN:
 24 Q. Okay, so what are the yellow - what are the
 25 yellow objects?

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1 MR. POWER:
 2 A. They're floatation bags. They're designed -
 3 they're filled with air and they allow the
 4 manikin to float in a similar position to the
 5 human.
 6 MS. FAGAN:
 7 Q. Okay. So why wouldn't the manikin just use the
 8 life jacket, the preserver that's around the
 9 human?
 10 MR. POWER:
 11 A. The thermal manikin is much heavier than the
 12 human and needs these floatation bags in order
 13 to stay in a floating position similar to the
 14 human.
 15 MS. FAGAN:
 16 Q. Okay. We can see, but many of those who can't
 17 see the photograph, the suit in the photograph
 18 is red. What type of suit were you using for
 19 the test?
 20 MR. POWER:
 21 A. This is a marine abandonment suit that we're
 22 using.
 23 MS. FAGAN:
 24 Q. How does the marine abandonment suit relate
 25 to, or are there any similarities between the

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1 marine abandonment suit and the helicopter
 2 passenger transportation suit, because you
 3 weren't using the helicopter suit in the test?
 4 MR. POWER:
 5 A. No.
 6 MS. FAGAN:
 7 Q. So is there any relationship between them?
 8 MR. POWER:
 9 A. The standards between both suits, the
 10 immersion suit or marine abandonment suit and
 11 the helicopter transportation suit are very
 12 similar.
 13 MS. FAGAN:
 14 Q. What about the insulation value?
 15 MR. POWER:
 16 A. The insulation - well, they both have the same
 17 thermal protective test required for both.
 18 MS. FAGAN:
 19 Q. Okay. So the Clo?
 20 MR. POWER:
 21 A. Yes.
 22 MS. FAGAN:
 23 Q. We've heard a lot about Clo, so they're
 24 required to have the same Clo?
 25 MR. POWER:

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1 A. Same Clo, yes.
 2 MS. FAGAN:
 3 Q. Buoyancy - we understand that the helicopter
 4 transportation suit can only reach a certain
 5 maximum buoyancy. That wouldn't apply to the
 6 marine abandonment suit?
 7 MR. POWER:
 8 A. No.
 9 MS. FAGAN:
 10 Q. So where they're similar is the insulation
 11 value? The two suits are similar from a
 12 thermal insulation standard?
 13 MR. POWER:
 14 A. Well, they have to meet the same standard.
 15 MS. FAGAN:
 16 Q. Okay. Just because you have to meet the same
 17 standard, can you exceed the standard?
 18 MR. POWER:
 19 A. Yes.
 20 MS. FAGAN:
 21 Q. Now that might affect buoyancy when it comes
 22 to the passengers?
 23 MR. POWER:
 24 A. Yes.
 25 MS. FAGAN:

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1 Q. Can you go through the next couple of slides?
 2 What are in this - this is the human that
 3 we're seeing here, is that right?
 4 MR. POWER:
 5 A. Yes, these are our willing human participants
 6 that we had. The photo on the left shows a
 7 participant performing an immersion in wind
 8 and waves, so you can see the effect of the
 9 wind on the water, the blurring of the water,
 10 and then it's hard to tell, but there are
 11 waves coming down towards the participants
 12 feet in the picture on the left. The picture
 13 on the right is our calm water testing
 14 condition. So if we were to be testing humans
 15 in suits, we would be testing them in set
 16 conditions similar to what you see in the
 17 photo on the right.
 18 MS. FAGAN:
 19 Q. So the current standard, if you want to test a
 20 human under the current standard, that's -
 21 MR. POWER:
 22 A. It's a calm circulating water that has a
 23 temperature of 2 degrees celsius.
 24 MS. FAGAN:
 25 Q. Now these participants were in 11 degrees

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1 celsius?
 2 MR. POWER:
 3 A. Yes.
 4 MS. FAGAN:
 5 Q. Okay. The next section is a very, very short
 6 video. I don't know if we'll have any sound,
 7 so can you describe - there is no sound on the
 8 video?
 9 MR. POWER:
 10 A. No.
 11 MS. FAGAN:
 12 Q. So could you just describe before the video
 13 plays what is demonstrated by this video?
 14 MR. POWER:
 15 A. This video is a short clip of a participant
 16 performing immersion in our wave conditions.
 17 So this clip will give you an idea of the
 18 kinds of waves that people were experiencing
 19 while they were doing this test.
 20 MS. FAGAN:
 21 Q. Okay, and there's no sound, so you can go
 22 ahead and play. I can see the waves are a
 23 little irregular, there's some big ones and
 24 then bigger ones. So how long did this last?
 25 An hour?

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1 MR. POWER:
 2 A. These tests were for one hour in duration.
 3 MS. FAGAN:
 4 Q. Okay, all right, what were the results?
 5 MR. POWER:
 6 A. Some of the results we found was that there
 7 was no significant change in deep body or core
 8 temperature across all the immersion
 9 conditions, but this was not surprising given
 10 the fact that the water was only approximately
 11 11 degrees celsius and the immersions were
 12 only for one hour.
 13 MS. FAGAN:
 14 Q. Okay. Did you find anything that was
 15 surprising? I mean, this wasn't a surprise.
 16 MR. POWER:
 17 A. No.
 18 MS. FAGAN:
 19 Q. I mean, it's 11 degrees and you're in an
 20 immersion suit. These suits are supposed to
 21 keep your core temperature from dropping for
 22 how long?
 23 MR. POWER:
 24 A. For six hours.
 25 MS. FAGAN:

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1 Q. So they should have been good for at least six
 2 hours in these suits, especially at 11
 3 degrees, would it be fair?
 4 MR. POWER:
 5 A. Yes.
 6 MS. FAGAN:
 7 Q. Okay.
 8 MR. POWER:
 9 A. But what we did find was--a surprising
 10 finding--was the fact that just be adding wind
 11 and waves, we increased the heat flow from the
 12 humans to the external environment by 37
 13 percent. There was no significant change in
 14 water temperature or air temperature just be
 15 adding wind and waves, we brought the heat
 16 flow up 37 percent.
 17 MS. FAGAN:
 18 Q. Okay, and heat flow is the precursor to
 19 hypothermia?
 20 MR. POWER:
 21 A. How much head you are losing to the
 22 environment.
 23 MS. FAGAN:
 24 Q. Okay. What else can you tell us from your
 25 results? I believe slide 23.

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1 MR. POWER:
 2 A. Okay, so this slide 23 shows the clothing
 3 insulation value or Clo value of the suit that
 4 we tested as measured by the CORD Group
 5 Limited's thermal manikin. The dashed black
 6 line you see going across the slide is the
 7 0.75 Clo value that suits have to meet. So
 8 what is surprising here is that we can see the
 9 Clo value of the suit start dropping as we
 10 move from calm to wind and then waves and then
 11 over to wind and waves, with wind and waves
 12 producing the greatest drop in Clo value.
 13 MS. FAGAN:
 14 Q. Okay. The human subjects, were they dry or
 15 wet?
 16 MR. POWER:
 17 A. Both the manikin and the participants were dry
 18 in this test.
 19 MS. FAGAN:
 20 Q. Okay, can the manikin be wet?
 21 MR. POWER:
 22 A. Yes.
 23 MS. FAGAN:
 24 Q. Okay, so -
 25 MR. POWER:

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1 A. But it wasn't wet for these tests.
 2 MS. FAGAN:
 3 Q. Okay, so everything was dry?
 4 MR. POWER:
 5 A. Everything was dry.
 6 MS. FAGAN:
 7 Q. Okay. But I believe later on people are wet?
 8 MR. POWER:
 9 A. Yes.
 10 MS. FAGAN:
 11 Q. So we'll move to the conclusions from Phasd
 12 and then into Phase 2.
 13 MR. POWER:
 14 A. Briefly the conclusions, we didn't see any
 15 significant differences in water or air
 16 temperature and this is important because when
 17 we go to wind and waves, there's this 37
 18 percent increase in heat flow. So it wasn't a
 19 significant change in temperature, it was just
 20 by adding these environmental conditions we
 21 saw the increase in heat flow.
 22 MS. FAGAN:
 23 Q. Okay, so it's wind, wind and wave is what made
 24 the difference?
 25 MR. POWER:

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1 A. Yes.
 2 MS. FAGAN:
 3 Q. Okay. Phase 2, so the next year, March of
 4 2009, you do another test.
 5 MR. POWER:
 6 A. Yes.
 7 MS. FAGAN:
 8 Q. And you change things up a little bit.
 9 MR. POWER:
 10 A. Now that we've established that wind and waves
 11 will cause the greatest amount of heat flow
 12 from the humans to the environment, we
 13 investigated if varying weather conditions or
 14 varying wind and waves will cause a
 15 significantly greater increase in heat flow in
 16 a linear fashion, so as we increase the
 17 weather conditions, will heat flow increase in
 18 a similar fashion.
 19 MS. FAGAN:
 20 Q. Okay. So what were the conditions, you can go
 21 through--describe this test for us.
 22 MR. POWER:
 23 A. Okay, we did three-hour immersions this time
 24 in three separate conditions: a calm water
 25 immersion; an immersion condition termed

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1 weather 1; and an immersion condition termed
 2 weather 2. Weather 2 had the same
 3 environmental conditions, so same wind speed,
 4 same wave pattern as we did in the wind and
 5 waves condition from the previous test.
 6 MS. FAGAN:
 7 Q. Okay.
 8 MR. POWER:
 9 A. Weather 1 was half of the wave height of
 10 weather 2 with wind speeds matched
 11 accordingly.
 12 MS. FAGAN:
 13 Q. What do you mean by "wind speeds matched
 14 according"?
 15 MR. POWER:
 16 A. Well, for every sea state, so seas with a
 17 certain wave height, that there's an
 18 associated wind speed, so we didn't half the
 19 wind speed when we halved the wave height
 20 because it would not be a wind speed
 21 representative of those wave conditions that
 22 we had in the tank.
 23 MS. FAGAN:
 24 Q. Okay. So if you have a certain wave, you can
 25 expect a certain wind?

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1 MR. POWER:
 2 A. Yes.
 3 MS. FAGAN:
 4 Q. And in the real world, a certain wave will
 5 likely have a certain wind associated with it.
 6 MR. POWER:
 7 A. Yes.
 8 MS. FAGAN:
 9 Q. So once you had your wave, you put in the
 10 corresponding real wind, not just some
 11 arbitrary, let's just pull the fan back to
 12 half.
 13 MR. POWER:
 14 A. Exactly.
 15 MS. FAGAN:
 16 Q. Okay. Now there was a--besides 3 hours,
 17 there's another bullet down here. What does
 18 this last bullet -
 19 MR. POWER:
 20 A. So we also measured the participant's
 21 metabolic rate during this experiment, so as I
 22 referred to earlier with hypothermia, one of
 23 the body's natural responses is to shiver,
 24 increase heat production and shivering you use
 25 energy, so by measuring their metabolic rate,

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1 we can determine how hard they are working to
 2 try to maintain this deep body temperature.
 3 MS. FAGAN:
 4 Q. Why is that relevant?
 5 MR. POWER:
 6 A. Well, you could say for example if we had two
 7 participants in two separate styles of suits
 8 and in both suits the participants performed
 9 an immersion and neither participant
 10 experienced a significant drop in deep water
 11 temperature, neither one of them became
 12 hypothermic, but one participant has to shiver
 13 like a paint shaker to maintain his deep body
 14 temperature, while the other participant is
 15 perfectly fine. We get both participants out
 16 of the water, the question is who had to work
 17 harder to maintain their deep body
 18 temperature, who had to work harder to try
 19 and, you know, shiver, bring up that deep body
 20 temperature.
 21 MS. FAGAN:
 22 Q. And if you're in the water for a long time
 23 trying to survive, how does working harder
 24 affect your ability to survive?
 25 MR. POWER:

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1 A. It can lead to fatigue.
 2 MS. FAGAN:
 3 Q. Okay. What were the Phase 2 conditions? I
 4 believe the temperature of the water is about
 5 the same, 11 degrees?
 6 MR. POWER:
 7 A. So the temperature of the water was the same
 8 and air temperature was slightly warmer than
 9 what it was the previous year, so again we can
 10 see that the maximum wave height is
 11 approximately half in weather 1, compared to
 12 weather 2, but the wind speed isn't half
 13 because as I mentioned earlier, we matched
 14 wind speed according to the wave height.
 15 MS. FAGAN:
 16 Q. Okay. Now, your next slide has photographs
 17 and what are the white tubes because they're
 18 different from the last -
 19 MR. POWER:
 20 A. The white tube is--we have the participants
 21 wearing a mask that allows us to capture and
 22 measure the amount of oxygen and carbon
 23 dioxide in their exhaled breath. So by
 24 measuring the amount of oxygen they consume,
 25 we have an idea of their metabolic rate, so

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1 that white tube is leading from the
 2 participant to our metabolic measuring unit
 3 located on the shore.
 4 MS. FAGAN:
 5 Q. And the one on the left is with the fans, I
 6 guess, and the one on the right is the calm,
 7 is that correct?
 8 MR. POWER:
 9 A. Yes.
 10 MS. FAGAN:
 11 Q. Those photographs.
 12 MR. POWER:
 13 A. Yes, yes.
 14 MS. FAGAN:
 15 Q. And I believe you have another video, a very
 16 short clip to show what this experiment looked
 17 like.
 18 MR. POWER:
 19 A. So this video shows a participant performing a
 20 three hour immersion in the weather 2
 21 conditions, so the highest wind and the
 22 highest waves.
 23 MS. FAGAN:
 24 Q. And this time it's three hours.
 25 MR. POWER:

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1 A. And this time it's three hours.
 2 MS. FAGAN:
 3 Q. Okay, so perhaps we can play the clip so
 4 everybody can have an idea what it was like
 5 for three hours. Now there's something
 6 interesting in the background and perhaps you
 7 could explain--I don't know if they'll see it
 8 here, but the screen that's now coming up with
 9 Lord of the Rings.
 10 MR. POWER:
 11 A. Yes, in order to help prevent boredom and keep
 12 our participants entertained in the water for
 13 three hours, we constructed a movie screen, so
 14 the participants were able to watch movies on
 15 the screen and they had a portable FM Walkman
 16 with earphones in and we had the audio for the
 17 movie playing over a FM frequency.
 18 MS. FAGAN:
 19 Q. Were the participants paid?
 20 MR. POWER:
 21 A. Yes, they were
 22 MS. FAGAN:
 23 Q. Okay, is it a big money maker?
 24 MR. POWER:
 25 A. Fifty dollars per immersion is what we paid

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1 the participants.
 2 MS. FAGAN:
 3 Q. So if things are slow when the Inquiry is over
 4 -
 5 MR. POWER:
 6 A. Yes, please see me.
 7 MS. FAGAN:
 8 Q. If you meet the age requirements. So, now the
 9 Phase 2 results.
 10 MR. POWER:
 11 A. Similar to Phase 1, we didn't see significant
 12 change in deep body temperature across all the
 13 immersion conditions, so weather 2, the
 14 highest wind and wave conditions, did not
 15 produce a significantly greater decrease in
 16 deep body temperature compared to the calm
 17 conditions.
 18 MS. FAGAN:
 19 Q. And this graph is a point of a degree, is that
 20 correct? So -
 21 MR. POWER:
 22 A. Point one, yes.
 23 MS. FAGAN:
 24 Q. Point one or point two, which isn't a full
 25 degree, it's one-tenth of a degree.

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1 MR. POWER:
 2 A. I think so, yes,
 3 MS. FAGAN:
 4 Q. So there wasn't an appreciable shift.
 5 MR. POWER:
 6 A. No.
 7 MS. FAGAN:
 8 Q. What about the next slide which is the heat
 9 flow?
 10 MR. POWER:
 11 A. So the next graph here shows the amount of
 12 heat loss from the humans to the external
 13 environment and similar to our previous study,
 14 we saw that the weather 2 conditions, so the
 15 highest wind and wave speed produced a
 16 significantly greater increase in heat flow
 17 compared to the calm conditions. But what was
 18 also surprising was that the weather 1
 19 conditions, so half of the wave height and
 20 appropriately matched wind speed, also
 21 produced significantly greater increase in
 22 heat flow compared to the calm conditions.
 23 MS. FAGAN:
 24 Q. Okay, so the wave was reduced and the wind was
 25 reduced not in half, but it was reduced and

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1 you still had this heat flow loss?
 2 MR. POWER:
 3 A. A significant increase in heat flow, yes.
 4 MS. FAGAN:
 5 Q. And so what were the conclusions?
 6 MR. POWER:
 7 A. What we concluded was that while weather 1 and
 8 weather 2 produced significantly greater
 9 increases in heat flow compared to the calm
 10 conditions, the participants' deep body
 11 temperature did not change significantly.
 12 MS. FAGAN:
 13 Q. So three hours, still no change.
 14 MR. POWER:
 15 A. Still no change.
 16 MS. FAGAN:
 17 Q. These are six hour suits.
 18 MR. POWER:
 19 A. Yes. So what we're able to conclude is that
 20 the participants were able to successfully
 21 thermoregulate in these conditions, so even
 22 though there's an increase in heat flow, so
 23 even though they were losing more heat to the
 24 environment through shivering, through vaso-
 25 constriction, they were able to successfully

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1 overcome this and maintain a stable deep body
 2 temperature.
 3 MS. FAGAN:
 4 Q. Okay, so they may have had to work, they may
 5 have had to work, but their core temperature
 6 remained -
 7 MR. POWER:
 8 A. Yes, they responded to the increased heat loss
 9 through their own natural thermoregulatory
 10 responses and were able to maintain a stable
 11 deep body temperature.
 12 MS. FAGAN:
 13 Q. How were the human participants--can you
 14 describe how they were when they got out of
 15 the water after their three hours?
 16 MR. POWER:
 17 A. All participants were able to perform three
 18 hour immersions and they came out of the water
 19 and they reported feeling cold, but overall
 20 they were no worse for wear. After a quick 20
 21 minute dip in the hot tub and some warm drinks
 22 and snacks they were feeling fine.
 23 MS. FAGAN:
 24 Q. Okay, Phase 3 which was March of 2010, how did
 25 you change things for Phase 2, what's

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1 different from the other two?
 2 MR. POWER:
 3 A. What we looked at with Phase 3 was going back
 4 to Tipton and Balmi's earlier work where they
 5 saw that 500 millimeters of water can cause a
 6 significant change during the immersion. We
 7 investigated if the effects of weather
 8 conditions are now amplified by adding 500
 9 mils of water to the suit, so that's a cup of
 10 water to the front and cup of water to the
 11 back.
 12 MS. FAGAN:
 13 Q. All right, so this is on the torso?
 14 MR. POWER:
 15 A. On the torso.
 16 MS. FAGAN:
 17 Q. Not on the limbs.
 18 MR. POWER:
 19 A. No.
 20 MS. FAGAN:
 21 Q. Tipton's earlier work had showed that the
 22 limbs, having the limbs wet didn't seem to
 23 affect core temperature.
 24 MR. POWER:
 25 A. Correct.

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1 MS. FAGAN:
 2 Q. But the torso seemed to have more of an impact
 3 -
 4 MR. POWER:
 5 A. Yes.
 6 MS. FAGAN:
 7 Q. - on the body. So you aimed for the torso.
 8 MR. POWER:
 9 A. Yes.
 10 MS. FAGAN:
 11 Q. How did you make them wet?
 12 MR. POWER:
 13 A. What we did was we took two separate spray
 14 bottles and we measured out 250 millilitres of
 15 water in each bottle, so then we had one
 16 bottle was sprayed all over the front of the
 17 participant, this is before they got into
 18 their immersion suit, so they were in their
 19 test clothing, and then the second bottle was
 20 sprayed on the back of the participant.
 21 MS. FAGAN:
 22 Q. What were they wearing?
 23 MR. POWER:
 24 A. They were wearing the standard CGSB test
 25 clothing which includes a long sleeve cotton

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1 shirt, cotton pants, wool socks, underwear and
 2 an undershirt.
 3 MS. FAGAN:
 4 Q. So it wasn't that kind of wick away fabric
 5 that we've heard discussed earlier.
 6 MR. POWER:
 7 A. No.
 8 MS. FAGAN:
 9 Q. It's cotton.
 10 MR. POWER:
 11 A. No, and the suit or excuse me, the shirt was
 12 completely saturated with just two cups of
 13 water.
 14 MS. FAGAN:
 15 Q. What was the temperature of the water that you
 16 sprayed?
 17 MR. POWER:
 18 A. Oh, it was room temperature water.
 19 MS. FAGAN:
 20 Q. So it wasn't cold water.
 21 MR. POWER:
 22 A. No.
 23 MS. FAGAN:
 24 Q. Probably felt cold -
 25 MR. POWER:

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1 A. Yes, it did.
 2 MS. FAGAN:
 3 Q. Can you move on and describe the rest of the
 4 test please?
 5 MR. POWER:
 6 A. Yes, so the idea behind this, as I mentioned
 7 from the Phase 2 work, the participants were
 8 able to successfully thermoregulate in the
 9 given conditions we had them in in Phase 2.
 10 The purpose of adding the water is will the
 11 affects of weather be amplified and now will
 12 we push participants past that
 13 thermoregulatory boundary? Will they be
 14 pushed past their capability of maintaining a
 15 stable deep body temperature. So some
 16 preliminary results from Phase 3, because the
 17 data is still under analysis right now, with
 18 the water temperature at 8 degrees celsius and
 19 the air temperature approximately 16 degrees
 20 celsius, so it's similar to the conditions
 21 we've tested in previously. What we saw this
 22 time, though, was very different responses
 23 from the participants when they were coming
 24 out of the water. We saw that some of them
 25 had intense shaking and shivering, a lot of

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1 them had a blue tinge to their lips when they
 2 came out. We saw a near hypothermic level
 3 drops in deep body temperature and we also saw
 4 several participants zoning out or losing
 5 cognitive processing. An example of this is
 6 when the participants are in the water, we
 7 periodically check on them, so we walk over to
 8 the side of the beach and we'll wave at them
 9 while they're in the water and if they're
 10 fine, they'll wave back, they'll give us a
 11 "thumbs up". So this one time a participant
 12 was performing immersion in weather 2 and I
 13 walked over to the side of the rail, I waved
 14 at him, he turned his head and he looked at me
 15 and for a full five seconds, he did nothing.
 16 Then he slowly raised his hand and we waved at
 17 me. So when he got out, I asked him why was
 18 he so slow to respond and he said, "I remember
 19 seeing you come over, I remember seeing you
 20 wave at me and I remember thinking there was
 21 something I was supposed to do, but I couldn't
 22 remember what it was I was supposed to do when
 23 you waved at me." We also had some
 24 participants report that during the last 30
 25 minutes of the immersion they couldn't even

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1 watch their movie, they were just zoned out
 2 and they had no concept of the passage of
 3 time.
 4 MS. FAGAN:
 5 Q. Did you have 12?
 6 MR. POWER:
 7 A. We had 12 participants and some of them had
 8 trouble finishing the three hour immersions.
 9 MS. FAGAN:
 10 Q. So some got out early?
 11 MR. POWER:
 12 A. Yes.
 13 MS. FAGAN:
 14 Q. Is that what you mean?
 15 MR. POWER:
 16 A. Yes.
 17 MS. FAGAN:
 18 Q. Okay. And when you say "weather 2", so you
 19 mean the windiest, the same weather 2, the
 20 windier condition, the waves, and so the
 21 difference here is that the torso was wet.
 22 MR. POWER:
 23 A. Yes.
 24 MS. FAGAN:
 25 Q. And what is the sort of take away or summary

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1 because you don't have the charts for this
 2 particular phase because this particular phase
 3 is being--is still being analyzed, is that
 4 correct?
 5 MR. POWER:
 6 A. Uh-hm.
 7 MS. FAGAN:
 8 Q. So from your preliminary results, what can you
 9 tell us?
 10 MR. POWER:
 11 A. What we can see so far is that adding--
 12 initially from these initial observations that
 13 adding 500 mls of water will produce a
 14 significant affect, compared to being dry.
 15 MS. FAGAN:
 16 Q. Okay. So they didn't drop the full two
 17 degrees, but what you could tell was they were
 18 starting to get close?
 19 MR. POWER:
 20 A. They were getting close, yes.
 21 MS. FAGAN:
 22 Q. This is three hours in 8 degrees, in the suit
 23 that should last six. Now they didn't go
 24 below the two but there was a significant
 25 change once you put in the water and added the

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1 wind and waves?
 2 MR. POWER:
 3 A. Yes.
 4 MS. FAGAN:
 5 Q. I am going to end there because it's almost
 6 11. There's a couple of questions on the
 7 upcoming tests and what's going on, but I
 8 think we'll stop at this stage.
 9 COMMISSIONER:
 10 Q. All right, we'll take the break now then.
 11 MS. FAGAN:
 12 Q. Okay, thank you.
 13 (RECESS)
 14 MS. FAGAN:
 15 Q. Thank you, Mr. Power. Now before we move to
 16 Section 5 of your presentation, just a couple
 17 of things on the study. The age of the group,
 18 you mentioned the subject who had a difficulty
 19 waving or responding to the wave. Can you tell
 20 us how old - the demographics of the 12?
 21 MR. POWER:
 22 A. For the past two studies, the demographics
 23 were 19 to 34 year old healthy males.
 24 MS. FAGAN:
 25 Q. And we've had a survey conducted and the

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1 workforce, although predominantly male, there
 2 are some females and they don't fall in the
 3 category of 19 to 35. Our workforce is
 4 getting older and older and they may not
 5 necessarily be the same shape or age as your
 6 participants. Can you have participants that
 7 are older? I mean, why did you select this
 8 group?
 9 MR. POWER:
 10 A. The age range was recommended by the medical
 11 doctor who conducts the assessments of the
 12 participants for this experiment. Upon
 13 consultation with Atlantic Offshore Medical
 14 Services, they recommended to me that the age
 15 range between 19 to 34 years of age, because
 16 35 years and older increases your chances of a
 17 cardiovascular incident. So in the interest of
 18 safety of the participants during our test, we
 19 capped the age range at 34.
 20 MS. FAGAN:
 21 Q. Okay, so many of us in the room may have to
 22 think about something else versus the -
 23 COMMISSIONER:
 24 Q. The Inquiry is safe.
 25 MS. FAGAN:

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1 Q. That \$50.00 fee for the immersion. Now I
 2 understand there's another phase. You're
 3 going to do an analysis of the information you
 4 have where the real difference was making the
 5 torso wet, however, that was in 8 degrees and
 6 it was three hours. Do we have another phase
 7 that we can all keep our eyes on?
 8 MR. POWER:
 9 A. The previous phases of research have looked at
 10 wind and waves, and as everybody has seen
 11 here, we've been testing in pretty much warm
 12 water and warm air. The next phase of this
 13 study is going to investigate the thermal
 14 aspect of it. So we will be testing people in
 15 2 degree celsius water and 2 degrees celsius
 16 air in our ice tank. We're also looking at -
 17 we're investigating if the heat lost in waves
 18 can be replicated by increasing water velocity
 19 past the participants, with the idea being
 20 will the heat loss in waves equal the heat los
 21 in increased water flowing past the people.
 22 MS. FAGAN:
 23 Q. So the wave is not just water moving up and
 24 down. A wave action has a flow.
 25 MR. POWER:

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1 A. Yes.
 2 MS. FAGAN:
 3 Q. So do you know if it's the flow of the water
 4 or if it's the wind or the combination, right
 5 now, what's causing this loss in heat flow?
 6 MR. POWER:
 7 A. Well, there's two ideas that I've discussed
 8 with my supervisor about why there's an
 9 increase in heat loss compared to water
 10 velocity past the object, the person, manikin,
 11 and it's either there's what's called a
 12 boundary layer. So if I was to be immersed in
 13 calm still water, I would be immersed, and
 14 then I would start heating up the water
 15 directly next to me. So then that water would
 16 increase in temperature, the water next to
 17 that would start increasing in temperature. So
 18 what you would have, in effect, is you would
 19 have the warm body with water that's warmer,
 20 going to cooler, until you finally get to the
 21 temperature of the water over here. The idea
 22 is this is a boundary layer. So I'm not going
 23 to lose heat in, say, 10 degrees celsius water
 24 as fast as I would lose heat in 0 degree
 25 celsius water, which could be out here. The

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1 idea with wave action is if we're pushing
 2 water past the participants, we are stripping
 3 away that boundary layer. So instead of having
 4 water 10 degrees celsius that I've heated up
 5 with my own body heat, instead I'll have
 6 continuous flushing of 0 degrees celsius water
 7 next to me, so it will always be 0 degrees
 8 celsius water right alongside of me.
 9 MS. FAGAN:
 10 Q. How does that, or does that replicate the
 11 conditions on the Grand Banks?
 12 MR. POWER:
 13 A. Well, this is what we're investigating. We're
 14 going to be investigating if a given wave
 15 spectrum, if we can reproduce the heat loss in
 16 a given wave spectrum with water velocity
 17 moving past the participants at the same rate
 18 as the wave moves past them.
 19 MS. FAGAN:
 20 Q. So this is a - you're going to try to
 21 replicate the flow of water?
 22 MR. POWER:
 23 A. Yes.
 24 MS. FAGAN:
 25 Q. Because as I understand it, in the ocean,

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1 water and the waves - what waves are is not up
 2 and down water, waves really represent the
 3 flow of water as it moves down a current, is
 4 that correct?
 5 MR. POWER:
 6 A. In effect.
 7 MS. FAGAN:
 8 Q. So you're going to try and replicate the flow
 9 and you're going to have 2 degrees?
 10 MR. POWER:
 11 A. Yes.
 12 MS. FAGAN:
 13 Q. Wind, 2 degrees, wave, and when is this going
 14 to happen?
 15 MR. POWER:
 16 A. This is scheduled to take place in the fall of
 17 this year.
 18 MS. FAGAN:
 19 Q. Same subjects, human participants?
 20 MR. POWER:
 21 A. Well, same age range. I'll try and get back
 22 as many participants as I can from previous
 23 studies. If they're still going to talk to me
 24 at this point, who knows, but let's hope so.
 25 MS. FAGAN:

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1 Q. Is the plan for an hour or three hours?
 2 MR. POWER:
 3 A. Three hour immersions.
 4 MS. FAGAN:
 5 Q. And this will be in the ice tank?
 6 MR. POWER:
 7 A. Yes.
 8 MS. FAGAN:
 9 Q. The suit that will be worn, what do you plan
 10 on for a suit?
 11 MR. POWER:
 12 A. We plan on keeping as many variables the same
 13 as we have in previous tests. So we will use
 14 the same suit systems that we've been using in
 15 the previous year's tests.
 16 MS. FAGAN:
 17 Q. Now this information that you've gained so
 18 far, you have two tests completed. Your third
 19 test, the analysis is being done. Is this
 20 information being passed on to the Canadian
 21 General Standards Board?
 22 MR. POWER:
 23 A. Yes, it has been.
 24 MS. FAGAN:
 25 Q. So all of what you have discussed and told us

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1 here today has been passed on to the board
 2 that's trying to make a decision as to what to
 3 do with the standards for this suit, the
 4 helicopter suit?
 5 MR. POWER:
 6 A. The reports for the first two phases have been
 7 passed on to the board. The third report,
 8 which hasn't been completed yet, will be
 9 passed on to the board when it is written.
 10 MS. FAGAN:
 11 Q. When do you expect that to happen?
 12 MR. POWER:
 13 A. Probably in the fall of this year.
 14 MS. FAGAN:
 15 Q. And when will be have the results - if your
 16 tests go off in the fall of this year for a
 17 fourth phase, which really in my mind, and I
 18 am, you know, not an expert, I'm a layperson
 19 here, but I'm hearing it's 2 degrees out there
 20 and I'm hearing the air is much colder, so I'd
 21 be very interested in seeing what the results
 22 are from a - when we get into a really cold
 23 water environment. So when are those - when
 24 would you expect those results to be passed on
 25 to the board?

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1 MR. POWER:
 2 A. Probably spring, late spring, 2011.
 3 MS. FAGAN:
 4 Q. Okay, and the standard that's now being
 5 considered by the board, how long is that
 6 process? I mean, what I'd like to think is
 7 that information will be available to the
 8 board before the board made a decision on the
 9 standard for the helicopter passenger suit?
 10 MR. POWER:
 11 A. So how long has the standard been open for
 12 review?
 13 MS. FAGAN:
 14 Q. How long does that review process take?
 15 MR. POWER:
 16 A. It approximately would take about 18 months.
 17 I'm not completely sure, though, how long it
 18 will take.
 19 MS. FAGAN:
 20 Q. Would it be fair to say that most likely this
 21 information would be to the board during its
 22 deliberations? What I'm getting at is I
 23 wouldn't want the information to end up in the
 24 board's hands after the board has -
 25 MR. POWER:

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1 A. I'm not sure.
 2 MS. FAGAN:
 3 Q. You can't say.
 4 MR. POWER:
 5 A. No.
 6 MS. FAGAN:
 7 Q. You're on the board, though?
 8 MR. POWER:
 9 A. Yes.
 10 MS. FAGAN:
 11 Q. So you can keep them abreast of developments
 12 as they happen?
 13 MR. POWER:
 14 A. Yes.
 15 MS. FAGAN:
 16 Q. Okay. Now the next section is prescriptive
 17 versus performance based standards. Exactly
 18 what is your position or what are you getting
 19 at - Mr. Earle, the counsel for the union for
 20 the workers that work offshore, is concerned
 21 that you're dealing with the oil regulation
 22 itself. When you talk about prescriptive
 23 versus performance, exactly what area are you
 24 speaking to?
 25 MR. POWER:

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1 A. What we're looking at is, in the previous
 2 research we've done and the research that
 3 we've spent the morning discussing, the calm
 4 conditions, with the exception of the water
 5 temperature, is the conditions that we
 6 currently would test humans in. So they are
 7 the prescribed standards. So when we're
 8 approaching prescriptive versus performance,
 9 one of the main goals of the IOT Marine Safety
 10 Research Program is to address that knowledge
 11 gap between the prescriptive testing standards
 12 and the performance of people, suits,
 13 whatever, in real world conditions. So we are
 14 looking at the data to show that there is this
 15 knowledge gap, there is this decrease in
 16 performance when we move away from conditions
 17 that are not representative or that are
 18 prescribed by current prescriptive standards.
 19 MS. FAGAN:
 20 Q. Can you give us an example right now how do
 21 the standards read?
 22 MR. POWER:
 23 A. This slide shows two standards for the thermal
 24 protection tests for people and manikins in
 25 immersion suits. So for the current standard

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1 for helicopter transportation suits, it says
 2 that with humans the suit system shall provide
 3 thermal protection such that the average body
 4 core as measured via temperature of persons
 5 wearing suit system for six hours in calm
 6 circulating water that is between 0 to 2
 7 degrees celsius shall not drop more than 2
 8 degrees celsius.
 9 MS. FAGAN:
 10 Q. Okay.
 11 MR. POWER:
 12 A. So what that means is a person should not
 13 develop hypothermia in six hours in calm
 14 circulating water with a temperature of 2
 15 degrees celsius.
 16 MS. FAGAN:
 17 Q. So right now the standard is calm circulating
 18 water?
 19 MR. POWER:
 20 A. For humans.
 21 MS. FAGAN:
 22 Q. For a human. If a suit meets that standard,
 23 then the regulation would allow a suit that is
 24 good in six hours of calm circulating water to
 25 be used in a number of areas?

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1 MR. POWER:
 2 A. Yes.
 3 MS. FAGAN:
 4 Q. Of the world is what I'm getting at.
 5 MR. POWER:
 6 A. Well, in Canada.
 7 MS. FAGAN:
 8 Q. In Canada, right, sorry, because it's the
 9 Canadian Standards Board. Now what about the
 10 other standard that you've mentioned here?
 11 MR. POWER:
 12 A. So the other standard is when suits are tested
 13 with a thermal manikin, and when tested in
 14 accordance with Section 8.1.6.2, the mean
 15 level of thermal insulation over the body as
 16 provided by the suit system, which includes
 17 test clothing, must not be less than 0.75
 18 immersed Clo.
 19 MS. FAGAN:
 20 Q. Okay, so what's the difference between - does
 21 this say you can use a human or a manikin to
 22 test the suit?
 23 MR. POWER:
 24 A. Yes.
 25 MS. FAGAN:

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1 Q. Okay, and this would be the standard for
 2 testing the helicopter passenger suit?
 3 MR. POWER:
 4 A. Yes.
 5 MS. FAGAN:
 6 Q. What's the difference in the test when you use
 7 a human - so you can put a human in that suit
 8 and test, or you can put a manikin in the suit
 9 and test. What's the difference in the two
 10 tests if you're in a manikin or you have a
 11 human?
 12 MR. POWER:
 13 A. What is the two differences -
 14 MS. FAGAN:
 15 Q. What's the difference between the manikin test
 16 and the human test? I mean, they're both in
 17 the suit.
 18 MR. POWER:
 19 A. Well, the humans are tested in calm
 20 circulating water at 2 degrees celsius and the
 21 manikin is tested in 40 centimetre waves, and
 22 if you refer back to what I said earlier about
 23 the set point of the manikin - so when we put
 24 the manikin in and we tell it to maintain a
 25 certain temperature, that temperature has to

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1 be 3 degrees celsius higher than the water
 2 it's being tested in, 3 degrees celsius or
 3 more than the water it's being tested in.
 4 MS. FAGAN:
 5 Q. Okay. So if you use a human, which is what's
 6 really using the suits, it's this first one of
 7 calm water?
 8 MR. POWER:
 9 A. Yes.
 10 MS. FAGAN:
 11 Q. If you use a manikin, you can have a wave type
 12 action in the pool?
 13 MR. POWER:
 14 A. Yes.
 15 MS. FAGAN:
 16 Q. Okay, but you said earlier it's not known how
 17 the manikin correlates to the human?
 18 MR. POWER:
 19 A. That work is still ongoing.
 20 MS. FAGAN:
 21 Q. That work is still ongoing. Now assuming that
 22 the suit has passed the test, and the evidence
 23 is that the suit has met the standard, where
 24 can it be used?
 25 MR. POWER:

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1 A. Assuming the suit passes all its tests,
 2 including the thermal protective test, be it
 3 manikin or human, it's now - the suit can be
 4 used off the west coast of BC, a sheltered
 5 harbour in PEI, the Arctic Circle, the east
 6 coast of Newfoundland, or anywhere in Canada
 7 for that matter.
 8 MS. FAGAN:
 9 Q. So if a human will not lose its core
 10 temperature by any more than 2 degrees in a
 11 pool for six hours, then the standard would
 12 allow that human to use that suit in the
 13 Arctic Circle?
 14 MR. POWER:
 15 A. Yes.
 16 MS. FAGAN:
 17 Q. And is the assumption the suit is going to
 18 last for six hours in the Arctic Circle?
 19 MR. POWER:
 20 A. Yes.
 21 MS. FAGAN:
 22 Q. But there's been nothing - there's been no
 23 tests to replicate a human in Arctic Circle
 24 real conditions?
 25 MR. POWER:

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1 A. No.
 2 MS. FAGAN:
 3 Q. Based on what you've studied, and looking at
 4 the standard, can you say whether this suit
 5 will prevent a 2 degrees drop in core
 6 temperature in six hours in the real world
 7 conditions?
 8 MR. POWER:
 9 A. I can't say with certainty, but the data that
 10 we've collected so far suggests that there
 11 would be a change in performance from the
 12 conditions it was tested in and the conditions
 13 it would be ultimately used in.
 14 MS. FAGAN:
 15 Q. Okay. If you're advocating, you know, I
 16 believe, the suit should perform in the areas
 17 in which they are used, the standard should
 18 require that the suit be shown to perform in
 19 conditions that are similar to where they're
 20 actually going to be used. So how would you
 21 like to see a standard?
 22 MR. POWER:
 23 A. Well, an example, if we switched from a
 24 prescriptive based standard to a performance
 25 based standard, this would read if there was a

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1 performance based standard, is that the suit
 2 must prevent a 2 degree celsius drop in core
 3 body temperature in conditions representative
 4 of the area of operation for the amount of
 5 time it would take Search and Rescue to
 6 respond. As an additional note of guidance
 7 for this, the size and distribution of the
 8 test subjects should have physical
 9 characteristics equal to that of the workforce
 10 using the suit. So if we switch - if we move
 11 towards performance based standard, we would
 12 allow the area of operation, the SAR response
 13 assets, and the size of the people to set the
 14 testing standards, and this would help reduce
 15 the uncertainty and help close that knowledge
 16 gap between testing conditions and real world
 17 conditions.
 18 MS. FAGAN:
 19 Q. So if you want to use it where it's 2 degrees,
 20 and the other sort of conditions, and you know
 21 it's - you know, I don't know, however long
 22 it's going to take to a rescue, you must prove
 23 or establish that the suit will prevent the 2
 24 degree drop in those same conditions?
 25 MR. POWER:

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1 A. Exactly.
 2 MS. FAGAN:
 3 Q. You have - there are advantages and
 4 disadvantages, is that correct?
 5 MR. POWER:
 6 A. Yes. So some advantages of a prescriptive
 7 based standard, they're easy to create and
 8 implement and they provide certainty for
 9 operators and regulators as to compliance.
 10 Some of the disadvantages is that compliance
 11 may not always provide the best solution; it
 12 can reduce the flexibility to the operator to
 13 provide the best solution, it does not account
 14 for improvements in technology, it can reduce
 15 innovative solutions, and there is a possible
 16 tendency to become passive in approaches to
 17 safety.
 18 MS. FAGAN:
 19 Q. What do you mean by that?
 20 MR. POWER:
 21 A. The check box.
 22 MS. FAGAN:
 23 Q. All right. What do you mean by the check box,
 24 meet the minimum or -
 25 MR. POWER:

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1 A. Yeah, so just tick off the list, meets this,
 2 meets this, meets this.
 3 MS. FAGAN:
 4 Q. And not worry about what could be done to
 5 improve the situation. You have a second
 6 slide.
 7 MR. POWER:
 8 A. Right. So performance based standards, like
 9 perspective based standards, there are
 10 advantages and disadvantages as well. Some of
 11 the advantages of a performance based standard
 12 is that it puts responsibilities for solutions
 13 on the operators, it provides flexibility in
 14 developing solutions, it can foster innovative
 15 solutions, it allows for continuous upgrading
 16 of the system, and allows for adaptation of
 17 new technologies. Some of the disadvantages is
 18 that it requires that the regulators,
 19 inspectors, and operators be highly qualified,
 20 management system must be adaptive and closely
 21 monitored in order to change the system if
 22 required, and as well the regulators and
 23 operators must work together harmoniously to
 24 provide the best solutions available.
 25 MS. FAGAN:

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1 Q. When you have your performance based approach,
 2 what's your view on guidance of guidelines?
 3 Can guidelines or guidance also be provided?
 4 MR. POWER:
 5 A. Yes.
 6 MS. FAGAN:
 7 Q. So you could - or what about minimums, can
 8 there be - just because you have a performance
 9 based approach, can you still have minimum
 10 requirements that must be met?
 11 MR. POWER:
 12 A. Yes.
 13 MS. FAGAN:
 14 Q. You have some examples here of standards and
 15 the knowledge gap that exists between the
 16 standards that are now set, and I'll just ask
 17 you to move to slide 41. The donning time is
 18 not really that appropriate here because the
 19 passengers are already in their suits. What
 20 about mobility and hand dexterity? We've
 21 heard that cold water can affect the hands,
 22 and if you're in your passenger suit, you have
 23 to get the gloves on after you have escaped
 24 from the helicopter. So what does the standard
 25 require somebody to prove?

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1 MR. POWER:
 2 A. Well, the standard requires that mobility and
 3 hand dexterity tests to be conducted in water
 4 not less than 18 degrees celsius, but earlier
 5 work by Vincent and Tipton reported that with
 6 only two minutes with your hand in 5 degrees
 7 celsius water, you could have a significant
 8 reduction in maximum grip strength.
 9 MS. FAGAN:
 10 Q. So the test is 18 degrees. So as long as you
 11 can get your hand in the glove in 18 degree
 12 water, then according to the standard that
 13 will be sufficient. However, the suit is being
 14 used in an area where we know the water
 15 temperature is far less than 18 degrees?
 16 MR. POWER:
 17 A. Yes.
 18 MS. FAGAN:
 19 Q. What about the stability and floating
 20 standard?
 21 MR. POWER:
 22 A. Well, stability, floating, and vertical
 23 positioning are all conducted in calm water
 24 pools and it's unknown at this time how wave
 25 motion can influence the performance during

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1 these tests.
 2 MS. FAGAN:
 3 Q. So what do you mean by that?
 4 MR. POWER:
 5 A. Well, the stability and floatation
 6 characteristics are conducted in calm water
 7 pools. Will we still see 120 millimetres of
 8 freeboard when we move to wave environment?
 9 MS. FAGAN:
 10 Q. What do you mean by 120 millimetres of
 11 freeboard?
 12 MR. POWER:
 13 A. Sorry, 120 millimetres of freeboard is the
 14 distance - the minimum distance between your
 15 nose and mouth and the surface of the water.
 16 MS. FAGAN:
 17 Q. So you have to be out of the water by that
 18 amount of space?
 19 MR. POWER:
 20 A. Yes, from your nose and mouth to the surface
 21 of the water.
 22 MS. FAGAN:
 23 Q. To the surface of the water, but the standard
 24 right now does not require testing to be done
 25 in a wavy condition?

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1 MR. POWER:
 2 A. No, but work is ongoing that's going to
 3 investigate the effects of waves on floatation
 4 and stability.
 5 MS. FAGAN:
 6 Q. Where is that work ongoing?
 7 MR. POWER:
 8 A. Right now we're looking like it might be
 9 conducted at IOT.
 10 MS. FAGAN:
 11 Q. What about vertical positioning, what do you
 12 mean by vertical positioning?
 13 MR. POWER:
 14 A. Vertical positioning is your ability to stand
 15 upright in the water.
 16 MS. FAGAN:
 17 Q. And the test right now, I take it from what
 18 you're saying is calm pools?
 19 MR. POWER:
 20 A. Yes.
 21 MS. FAGAN:
 22 Q. So we don't know if a suit that works in a
 23 calm pool will work in a wavy turbulent
 24 environment?
 25 MR. POWER:

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1 A. We don't know how the performance will change
 2 moving from calm to waves.
 3 MS. FAGAN:
 4 Q. What about the ingress?
 5 MR. POWER:
 6 A. The current standards for water ingress or
 7 water leakage tests requires that you start
 8 the test with a three metre or greater jump
 9 and a 60 metre swim in calm water, and then
 10 you start adding in - you multiply the water
 11 obtained during the 60 metre swim, plus an
 12 extra standard deviation, I won't get into the
 13 math, to calculate the amount of water that's
 14 to be added to the suit before you conduct the
 15 thermal protective tests. However, there's
 16 been some work conducted by the CORD Group
 17 Limited that shows that rougher conditions
 18 could result in more water leakage entering
 19 the suit than conditions that are prescribed
 20 in the current standard.
 21 MS. FAGAN:
 22 Q. So the current standard is conducted or allow
 23 the test to be conducted in calm water?
 24 MR. POWER:
 25 A. Yes.

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1 MS. FAGAN:
 2 Q. And some of the work, and I believe this work
 3 may have been referred - is this the same work
 4 that was referred to earlier evidence that
 5 there was some testing done in Halifax by the
 6 CORD Group when the changes were made to the
 7 suit. Do you know if that was the same
 8 testing?
 9 MR. POWER:
 10 A. I'm not sure for certain.
 11 MS. FAGAN:
 12 Q. Okay. The next slide has been covered, I
 13 believe.
 14 MR. POWER:
 15 A. Yes.
 16 MS. FAGAN:
 17 Q. Is that correct?
 18 MR. POWER:
 19 A. Yeah.
 20 MS. FAGAN:
 21 Q. And slide 44, what would you like us to
 22 takeaway from this slide?
 23 MR. POWER:
 24 A. The idea is, and this is what has led to or
 25 started our research at IOT, is that there's a

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1 knowledge gap between the calm testing
 2 conditions that we often certify lifesaving
 3 appliances in and their performance in real
 4 world conditions. So when we prescribe
 5 testing standards, when we say it has to be
 6 calm circulating water at 2 degrees celsius,
 7 we create a narrow avenue of criteria that we
 8 establish the performance of the lifesaving
 9 appliance in, and then we take this - we
 10 measure its performance in this narrow avenue
 11 and then we assume that this is going to be
 12 the same performance at any level.
 13 MS. FAGAN:
 14 Q. Okay. I think you have a diagram that would
 15 help demonstrate this idea?
 16 MR. POWER:
 17 A. Yes. So the graph you see before you has two
 18 axis. The bottom axis or bottom line is a sea
 19 state. So starting at the very left, it's calm
 20 water, flat, still, calm water, and moving
 21 along to the right we see an increase in sea
 22 state until we get something equivalent to a
 23 hurricane, and then we see performance along
 24 the left hand line. So at the bottom near the
 25 calm water, we can assume no performance, and

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1 the higher up we go in performance, we assume
 2 a better level of performance, a higher value.
 3 So we can say this red line represents the
 4 minimum requirement to preserve life and at
 5 this point it's just an abstract idea. This
 6 could be an immersion suit, a life raft, a
 7 life boat, but the red line represents the
 8 minimum requirement or how good the suit has
 9 to perform just to preserve life. So when we
 10 use a prescriptive standard, we prescribe a
 11 very narrow avenue of testing conditions. As
 12 you can see here, we oftentimes only test in
 13 pools, sheltered harbours, things of that, and
 14 it creates a very narrow window at which we
 15 can measure the performance of a lifesaving
 16 appliance, but as we know, lifesaving
 17 appliances are oftentimes used in sea states
 18 or weather conditions that are much worse than
 19 calm circulating water.
 20 The black dash line represents our
 21 assumption. We assume that because this
 22 lifesaving appliance reached this level of
 23 performance in prescribed testing conditions
 24 that it'll have the same level of performance
 25 all the way across through higher increasing

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1 sea states, but we know from past work and the
 2 work that IOT is currently conducting that the
 3 green line, which represents the performance
 4 of lifesaving appliances, can start to
 5 decrease as you start increasing your sea
 6 state. We know that performance will
 7 decrease, but the question remains will you
 8 each a certain sea state where the performance
 9 of a lifesaving appliance will drop below the
 10 minimum requirement to preserve life.
 11 MS. FAGAN:
 12 Q. And this would be - this last section is the
 13 knowledge gap, you don't know exactly how far
 14 you can push the appliance?
 15 MR. POWER:
 16 A. Exactly. So the difference between the assumed
 17 level and the unknown level of performance is
 18 this uncertainty, is this knowledge gap in
 19 real world conditions, and it's this
 20 uncertainty that leads to the surprisingly
 21 poor performance in real accidents as
 22 mentioned by Tipton in his chart that we had
 23 up earlier.
 24 MS. FAGAN:
 25 Q. And what's a way to eliminate or reduce some

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1 of this uncertainty?
 2 MR. POWER:
 3 A. The best way to reduce this uncertainty is to
 4 test people and the equipment in the most
 5 realistic conditions, representative
 6 conditions possible, with the people who will
 7 be using them. So should we be testing with
 8 19 to 34 year old young health fit males.
 9 MS. FAGAN:
 10 Q. Well, you at some point will have to balance
 11 that with safety.
 12 MR. POWER:
 13 A. Yes.
 14 MS. FAGAN:
 15 Q. And that's an issue for the Training Institute
 16 and many others as to exactly how far you can
 17 push the boundary when it comes to realism
 18 versus safety, and I guess that'll just have
 19 to be up to your medical advisors as to how
 20 far you can go. Do you have any suggestions
 21 as to how this situation, the uncertainty, can
 22 be reduced and the situation improved?
 23 MR. POWER:
 24 A. We do. We do have some observations for the
 25 way forward. So one of the first things is to

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1 examine the cost and feasibility to shift from
 2 a prescriptive to performance based
 3 regulations. We can also look at a holistic
 4 design of the transportation environment and
 5 its components, new fabrics and materials for
 6 immersion suits that allow for increased
 7 performance in realistic conditions. We could
 8 also possibly look at redesign of immersion
 9 suits for thermal balance. That's been
 10 discussed earlier. We could also look at
 11 develop of training simulators for helicopter
 12 emergency operations, escape, evacuation, and
 13 rescue. We can also look at the continuous
 14 monitoring and assessment of the offshore
 15 workforce's physical characteristics and their
 16 physical capabilities. We could also use this
 17 ongoing database of these parameters that can
 18 be transferred back to suit standards - the
 19 standards boards and manufacturers to allow
 20 for further refinements of their products.
 21 MS. FAGAN:
 22 Q. Do you know right now if data is being
 23 collected on the physical characteristics of
 24 the workforce that's using the suits?
 25 MR. POWER:

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1 A. I'm not sure.
 2 MS. FAGAN:
 3 Q. What's the advantage of having this data? I
 4 mean, why is it important that that data go
 5 back to the standards boards and the
 6 manufacturers?
 7 MR. POWER:
 8 A. Well, just to give an example, for the longest
 9 time IMO, the International Maritime
 10 Organization, stated whenever you designed a
 11 16 person life raft or a 150 person life raft,
 12 they said the average weight of the person
 13 using the life raft was 75 kilograms, and 75
 14 kilograms is a very low weight for many of us
 15 here in North America, but when you saw a 150
 16 person life raft and a 16 person life raft, it
 17 was always under the assumption that they were
 18 75 kilograms. We know for a fact that this is
 19 not often the case. So then you could have
 20 sixteen 100 kilogram people trying to use this
 21 life raft, and all of a sudden it can't fit
 22 sixteen 100 kilogram people any more. So it's
 23 important to feed this information back to
 24 standards boards, to manufacturers, so they
 25 know who the people are that will be using

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1 their products.
 2 MS. FAGAN:
 3 Q. That's all the questions that I have for you,
 4 and I don't know if there's anything you want
 5 to add before it's turned over to the group
 6 for questioning.
 7 MR. POWER:
 8 A. No, nothing further to add.
 9 MS. FAGAN:
 10 Q. Okay, thank you very much.
 11 COMMISSIONER:
 12 Q. Thank you, Ms. Fagan. You know, one thing I
 13 want to mention to you, since I've been
 14 involved in this work and become aware of the
 15 suit issues, I've thought a hundred times or
 16 more how come in this part of Canada where
 17 conditions are, everybody agrees, quite severe
 18 in terms of cold, wind, waves, and all that,
 19 how come a suit wasn't purposely designed and
 20 built for these conditions? I wondered it a
 21 hundred times or more. Any comment on that?
 22 MR. POWER:
 23 A. No, I'm not sure.
 24 COMMISSIONER:
 25 Q. In your view, does a national standard in a

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1 huge country like Canada meet the requirement
 2 of more of the more difficult environments to
 3 be immersed in the offshore?
 4 MR. POWER:
 5 A. I think we have to further examine the
 6 performance in these kinds of conditions,
 7 which is the work that's ongoing.
 8 COMMISSIONER:
 9 Q. So you - yeah, I see what you mean. So that
 10 may come out of - the answer to that question
 11 may come out of the work that's -
 12 MR. POWER:
 13 A. Ongoing.
 14 COMMISSIONER:
 15 Q. Still ongoing?
 16 MR. POWER:
 17 A. Yes.
 18 COMMISSIONER:
 19 Q. Okay, thank you. Now I will go back to the
 20 list of parties. Transport Canada is not
 21 present. Counsel for CAPP.
 22 MR. SCHULTZ:
 23 Q. No questions, thank you, sir.
 24 COMMISSIONER:
 25 Q. Thank you. The oil operators.

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1 MS. STRICKLAND:
 2 Q. No questions from HMDC at this time.
 3 MS. HICKMAN:
 4 Q. No questions for Husky Oil, Commissioner.
 5 MR. PRITCHETT:
 6 Q. No questions for Suncor.
 7 COMMISSIONER:
 8 Q. Okay. Counsel for Cougar.
 9 STAMP, Q.C.:
 10 Q. No questions, Mr. Commissioner.
 11 COMMISSIONER:
 12 Q. Helly Hansen?
 13 MR. SPENCER:
 14 Q. Not at this time, Mr. Commissioner, although
 15 we do reserve the right to ask (inaudible).
 16 COMMISSIONER:
 17 Q. Thank you. Counsel for MUN, Mr. Hurley.
 18 HURLEY, Q.C.:
 19 Q. No questions.
 20 COMMISSIONER:
 21 Q. Mr. Pritchard.
 22 MR. PRITCHARD:
 23 Q. No questions, thank you.
 24 COMMISSIONER:
 25 Q. Mr. Harris.

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1 HARRIS, Q.C.:

2 Q. Yes, I have a few questions, Commissioner.

3 MR. JONATHAN POWER - EXAMINATION BY JACK HARRIS, Q.C.:

4 HARRIS, Q.C.:

5 Q. Thank you, Mr. Commissioner. Mr. Power, my

6 name is Jack Harris. I'm a Member of

7 Parliament and have standing at this hearing.

8 I was very interested in your research, in

9 particular, your findings that when you

10 started variations from the test standards

11 that are being used by adding increased wind

12 and wave conditions, that you - resulted in

13 different conditions, in fact, more - you

14 found, I guess, that the standard changed as a

15 result of that. Now this is something that

16 most of us would assume just by logic alone.

17 Can you tell us why is it that you had to

18 undertake what appears to be three years of

19 research to come to that conclusion? I know

20 you're quantifying it and that's important,

21 but wouldn't it be accepted that the calm

22 water test conditions would be not as rigorous

23 as the actual conditions in the ocean?

24 MR. POWER:

25 A. You are correct, but we sought out to actually

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1 quantify that. So we - everybody kind of had

2 the idea that wind and waves can increase heat

3 flow, can it be worse than calm water

4 conditions, and we set out to put a hard

5 number to those values.

6 HARRIS, Q.C.:

7 Q. And of course, if you started decreasing the

8 temperature, you know, you did your tests in

9 16/17 degrees of air and 11 degrees of water

10 temperature, started decreasing those, of

11 course, you'd have even more significant, at

12 least in theory, more significant changes?

13 MR. POWER:

14 A. In theory, but until we actually do the work,

15 we can't say with certainty.

16 HARRIS, Q.C.:

17 Q. Uh-hm. I guess, you know, I'm listening to

18 your argument that there needs to be - you're

19 suggesting, for example, the solution here is

20 a performance based approach, and what I get

21 from your evidence, though, is that the

22 standard that's being used is inadequate

23 because it doesn't test for the right weather

24 conditions, and I'm guessing you're

25 criticizing the fact that the same standard

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1 applies to calm water in the harbour in PEI to

2 the Arctic, that that is inadequate for the

3 conditions that we're operating in here of

4 Newfoundland, or it may be operating in the

5 Arctic. Doesn't it just argue that the

6 standard is inadequate?

7 MR. POWER:

8 A. I would say it's inadequate, but we don't know

9 the level of performance; will performance

10 change, and if so, by how much. Until we

11 actually establish that, it may be a bit

12 premature to call a standard inadequate.

13 HARRIS, Q.C.:

14 Q. So you're not saying the performance is

15 inadequate. What you're saying, though, is

16 that the standard doesn't necessarily -

17 obviously doesn't have universal application?

18 MR. POWER:

19 A. No, again prescriptive creates a very narrow

20 avenue.

21 HARRIS, Q.C.:

22 Q. Well, my problem, though, with a - if you had

23 one standard which - and I don't have a

24 disagreement with the guideline that you would

25 use. For example, your suggestion that the

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1 suit must prevent a 2 percent drop in deep

2 body temperature in conditions representative

3 of the area of operation for the amount of

4 time it would take Search and Rescue to

5 respond as a general guideline for developing

6 a standard. That seems to me to be a good

7 rationale, but my question, based on the fact

8 that it's taken, and I'm not criticizing this,

9 but it's taken three years to come up with the

10 information that you've given us here today,

11 and even the work that was done in 2009 has

12 not yet been collated to the point that you're

13 able to give us anything definitive, how many

14 years do you think it might take for the

15 industry or for some group to come up with a

16 standard that was adequate for the offshore in

17 Newfoundland, how many years will be have to

18 wait for this research to be done?

19 MR. POWER:

20 A. I'm not sure.

21 HARRIS, Q.C.:

22 Q. Okay. What you've told us so far, though, and

23 the research based on the 2009 work, you had 8

24 degrees of temperature and similar wind

25 conditions, that in under three hours a number

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1 at least of the subjects that you were testing
 2 showed a reaction, which I guess you - a
 3 reaction, a change in cognitive ability, I
 4 think, zoning out, or the - you only talked
 5 about one subject here in your evidence, but
 6 I'm looking at page five of your presentation,
 7 your hypothermia chart, I wonder if you could
 8 just turn that up. What I see in the chart
 9 here is different categories based on changes,
 10 I think, in body temperature. The first
 11 category is shivering, impairment of manual
 12 dexterity, errors of omission. The second one
 13 down includes shivering, plus, plus, and I
 14 guess that means more - a high degree of
 15 shivering. Muscle function significantly
 16 impaired. The next category shows slowing
 17 mental and physical activity, amnesia, and
 18 muscle spasticity. Would the kind of activity
 19 that you described, the zoning out, would that
 20 fall into that third category or would it be
 21 somewhere else?
 22 MR. POWER:
 23 A. Probably be higher up. I would be more
 24 inclined to think it would be under errors of
 25 omission and the introversion/apathy. Like,

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1 the participant was still able to successfully
 2 get out of the tank, sit down and talk with me
 3 afterwards. So he still had his cognitive
 4 faculties in that regard.
 5 HARRIS, Q.C.:
 6 Q. But he wasn't able to respond -
 7 MR. POWER:
 8 A. Not quickly, no.
 9 HARRIS, Q.C.:
 10 Q. Not quickly. So he would be in the second
 11 category?
 12 MR. POWER:
 13 A. I would put him near errors of omission.
 14 HARRIS, Q.C.:
 15 Q. So in your view, he would still be within the
 16 2 degree range?
 17 MR. POWER:
 18 A. Yes, he was, because if they actually did
 19 experience hypothermia during the test, we had
 20 to stop the test and pull them out for safety
 21 reasons.
 22 HARRIS, Q.C.:
 23 Q. So nobody did that during your -
 24 MR. POWER:
 25 A. No, that was a safety limit that we have

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1 during these tests.
 2 HARRIS, Q.C.:
 3 Q. You said that some people couldn't finish the
 4 three hours. Was that just an individual
 5 choice or was there any objective measurement
 6 that you had?
 7 MR. POWER:
 8 A. No, it was individual choice. As always in any
 9 of our experiments all participants have the
 10 right to voluntarily withdraw at any time with
 11 no penalty. So again this periodic waving that
 12 we would do, that was to make sure they are
 13 all right, and there were a lot of times when
 14 we came over and we waved and the participant
 15 would shake their head and point saying that
 16 they wanted to get out.
 17 HARRIS, Q.C.:
 18 Q. They wanted to get out. So that was - that's
 19 basically a self indication that their comfort
 20 level was beyond that and they wanted to
 21 finish, but there was no indication that their
 22 core body temperature was below 35 at this
 23 point?
 24 MR. POWER:
 25 A. No, because we would have stopped the tests,

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1 anyways.
 2 HARRIS, Q.C.:
 3 Q. So you - I take it, you know, if we're talking
 4 about conditions, and I would call the
 5 conditions that you were testing fairly
 6 moderate for Newfoundland offshore, 16 degrees
 7 of - 16 kilometres of wind and 8 degrees of
 8 temperature was the lowest that you went. They
 9 would be fairly moderate for the offshore
 10 Newfoundland, and I'm just saying that as a
 11 general observer, I haven't done any studies
 12 on it, but would you agree with that?
 13 MR. POWER:
 14 A. No, I do agree, and the objective of the first
 15 three phases of the project was to examine the
 16 effect of wind and waves, and with the water
 17 temperature, we did recognize that as a
 18 limitation in the study, which is why phase
 19 four, which is coming up in this fall, we will
 20 be testing in two degrees Celsius water and
 21 two degrees Celsius air.
 22 HARRIS, Q.C.:
 23 Q. So the six-hour standard, which I guess is
 24 what we're talking about here, two degrees
 25 body temperature loss within six hours using

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1 an immersion suit, that standard is based on
 2 temperature of two degrees?
 3 MR. POWER:
 4 A. The water temperature?
 5 HARRIS, Q.C.:
 6 Q. Water temperature of two degrees?
 7 MR. POWER:
 8 A. Yes.
 9 HARRIS, Q.C.:
 10 Q. And calm water?
 11 MR. POWER:
 12 A. Calm, circulating water, yes.
 13 HARRIS, Q.C.:
 14 Q. So calm, circulating water, no wind, no waves.
 15 And have you any idea what the -- or you know,
 16 as part of your scoping of your study, I
 17 guess, did you do any comparison with the
 18 average temperatures on a month-by-month basis
 19 in the Newfoundland offshore or in any
 20 particular conditions?
 21 MR. POWER:
 22 A. You mean for the work we've already conducted?
 23 HARRIS, Q.C.:
 24 Q. Yes.
 25 MR. POWER:

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1 A. Well, as I mentioned earlier, the objective of
 2 the first three phases was to examine the
 3 effect of wind and waves and we weren't active
 4 -- we weren't able to actively control the
 5 temperature of the facility we were testing
 6 in. We were able to maintain a constant
 7 temperature for throughout the test, but we
 8 weren't able to say we want two degrees
 9 Celsius water, we want two degrees Celsius
 10 air.
 11 HARRIS, Q.C.:
 12 Q. Are you able to do that? Is your facility
 13 capable of doing that?
 14 MR. POWER:
 15 A. For phase four, we're going into our ice tank
 16 and we can control the temperature, so we will
 17 say two degrees Celsius water and two degrees
 18 Celsius air.
 19 HARRIS, Q.C.:
 20 Q. As I said, the standard or, I guess, the
 21 standard is based on whatever the prescriptive
 22 standard, we're calling that, was established,
 23 I guess, just as other standards are
 24 established, and you mentioned the standard
 25 that an individual 75 kilograms, for example,

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1 applied in liferafts. Clearly that standard
 2 is inadequate, and you're suggesting that by
 3 having a performance-based standard that
 4 somehow that would change. You know, somebody
 5 somewhere along the line decided that this
 6 standard of 75 kilograms was inadequate and
 7 either they're no longer using it or they're
 8 ignoring it when they're designing adequate
 9 safety measures. Isn't that the case now? I
 10 mean, I've heard recently, for example, that
 11 has been recognized. What you said here today
 12 -
 13 MR. POWER:
 14 A. Yes.
 15 HARRIS, Q.C.:
 16 Q. - has been stated publicly, and people are
 17 adjusting their activities accordingly, are
 18 they not?
 19 MR. POWER:
 20 A. Yes. The IMO standard I was referring to, 75
 21 kilograms, is no longer the average weight.
 22 HARRIS, Q.C.:
 23 Q. But wouldn't -- when you're suggesting that --
 24 what I'm trying to get at here is how is it
 25 that a performance-based approach to having a

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1 standard would make a difference if what
 2 you're saying here -- and let's say we'll
 3 adopt your standard based -- performance-based
 4 standard which is found on page 38, the suit
 5 must prevent a two percent drop in deep body
 6 temperature in conditions representative of
 7 the area of operation for the amount of time
 8 it would take search and rescue to respond.
 9 That seems to me to be a good starting point
 10 for developing a standard, but if you said
 11 that this is the standard, then it leaves it
 12 basically open to an operator or "the
 13 industry" or parties who are participating to
 14 interpret that based on whatever, you know,
 15 data they have available, whatever research is
 16 available, who does the research, how long it
 17 takes and all of that. Wouldn't it make more
 18 sense for government, say, or using the
 19 facilities such as yours, as National Research
 20 Council, to undertake or commission the
 21 research or get industry to do that, establish
 22 a standard for the Newfoundland offshore or a
 23 standard for the Arctic or a standard for the
 24 wind and weather conditions that you're going
 25 to expect, wouldn't that make just as much

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1 sense as saying, well, we have a standard now,
 2 but the standard doesn't tell you anything
 3 other than set guidelines?
 4 MR. POWER:
 5 A. No, I agree. I agree with what you're
 6 suggesting, that we have to actually perform
 7 those tests in areas like you just mentioned.
 8 Conditions representative of the east coast of
 9 Newfoundland, conditions representative of the
 10 Arctic. We have to establish how those
 11 conditions affect the performance.
 12 HARRIS, Q.C.:
 13 Q. Um-hm. So there seems to be a bit more work
 14 to be done?
 15 MR. POWER:
 16 A. Yes.
 17 HARRIS, Q.C.:
 18 Q. And obviously your work so far has proven
 19 certain points, that wind and wave does have a
 20 quantifiable change in the performance of
 21 these immersion suits. So I guess the obvious
 22 -- from my perspective, the obvious is okay,
 23 let's define what are the wind and wave
 24 conditions that you're going to anticipate and
 25 water temperature conditions that you're going

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1 to anticipate in the Newfoundland offshore,
 2 figure out if you can test for them, and just
 3 go do it and set the standard based on that.
 4 Why would that not be a reasonable way of
 5 approaching this, other than changing the
 6 system entirely?
 7 MR. POWER:
 8 A. No, I agree.
 9 HARRIS, Q.C.:
 10 Q. Because that's just as reasonable as changing
 11 the approach, okay. So you're not able to
 12 say, based on your research, that you don't
 13 have enough information to show -- and I used
 14 that chart recently, the last chart that you
 15 show where the -- on page 45, I notice that
 16 these lines don't have any numbers associated
 17 with them, but they just show degrees of
 18 change and it's not showing up there on the
 19 screen here, but there's a -- my slide has a
 20 line that goes this way and then -
 21 COMMISSIONER:
 22 Q. That's the last one, I think.
 23 HARRIS, Q.C.:
 24 Q. There we go.
 25 COMMISSIONER:

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1 Q. There it is.
 2 HARRIS, Q.C.:
 3 Q. We're getting lines coming up now. Okay, so
 4 that last line there decides that there's a
 5 sharp drop at a certain sea state, but we
 6 don't know where that is?
 7 MR. POWER:
 8 A. No, and this graph is just to represent the
 9 concept.
 10 HARRIS, Q.C.:
 11 Q. Sure.
 12 MR. POWER:
 13 A. It's not supposed to have any numerical value
 14 assigned to it.
 15 HARRIS, Q.C.:
 16 Q. So your concept is that as the sea state
 17 increases, you know, the higher the waves and
 18 as the wind increases, the performance of
 19 these suits deteriorates, but we don't know
 20 how much?
 21 MR. POWER:
 22 A. Exactly, and we're also suggesting that there
 23 may come a sea state where we may start seeing
 24 a linear drop in performance, but then there
 25 could reach a certain level, who knows what

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1 level that is, where performance could sharply
 2 drop.
 3 HARRIS, Q.C.:
 4 Q. So this is important information that we don't
 5 have?
 6 MR. POWER:
 7 A. Yes, we don't know. Maybe just like we assume
 8 the performance stays linear and maybe it does
 9 stay linear, but maybe the performance drops
 10 and if it drops, how much does it drop? And
 11 will you reach a certain condition where you
 12 could see a sharp drop in performance?
 13 HARRIS, Q.C.:
 14 Q. So there's no -- I mean, based on -- and
 15 obviously this is speculation, but the six-
 16 hour standard, based on this suit here,
 17 supposing it complies, and I understand it
 18 does, complies with this six-hour standard,
 19 it's not clear. In fact, it seems to be clear
 20 that it wouldn't give a six-hour performance
 21 in the wind and wave conditions that we find
 22 in offshore Newfoundland. Are you able to say
 23 that?
 24 MR. POWER:
 25 A. I'm not able to say that.

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1 HARRIS, Q.C.:

2 Q. But you are able to say that within three

3 hours, it deteriorates because the loss of

4 heat is greater and the ability of the body to

5 maintain the heat is starting to be affected?

6 MR. POWER:

7 A. Right. In the conditions we tested in in our

8 facility, so that includes the warm water

9 temperatures and the suit we tested in, the

10 participants were able to successfully thermal

11 regulate. With regards to this suit, I'm not

12 sure.

13 HARRIS, Q.C.:

14 Q. The difficulty that I have though, when you're

15 testing -- well, you won't find out until you

16 do the ice water test, right, because the ice

17 water test will be the same temperature as the

18 standard is.

19 MR. POWER:

20 A. Yes.

21 HARRIS, Q.C.:

22 Q. And that's -- so far you've only tested eight

23 degrees. You'd have to go down considerably

24 to two degrees before you start your testing,

25 and then the idea would be to see how fast the

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1 temperature of the body decreases and whether

2 it meets that six-hour standard?

3 MR. POWER:

4 A. We'll also be examining the effect of -- if

5 you remember what I was referring to earlier

6 with Anne with regards to the heat flow

7 equivalent in waves and increased water

8 velocity. So when we actually do the test in

9 the ice tank, we're going to be testing in

10 calm, circulating water, but also with wind

11 and the increased water velocity past the

12 participants to replicate the heat loss due to

13 waves.

14 HARRIS, Q.C.:

15 Q. So the wave and water, you're going to -- are

16 you going to try to replicate the conditions

17 in the Newfoundland offshore? Are you again

18 doing this staged experiment to see what --

19 whether it's linear or not?

20 MR. POWER:

21 A. Staged experience, one step at a time.

22 HARRIS, Q.C.:

23 Q. So this could take another two or three years?

24 MR. POWER:

25 A. I'm not sure.

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1 HARRIS, Q.C.:

2 Q. Not sure, but the pace that you've been going

3 so far, it seems to be at that stage. Okay,

4 so it seems pretty clear, however, from your

5 adoption of a performance-based standard that

6 the time that it takes for search and rescue

7 to respond is a clear outside parameter for

8 the performance of these suits. That's fair

9 to say, is it?

10 MR. POWER:

11 A. Yes.

12 HARRIS, Q.C.:

13 Q. So clearly that has to be taken into account,

14 especially when we don't know what the

15 performance of these suits is in the wind and

16 wave conditions that's available.

17 MR. POWER:

18 A. Correct.

19 HARRIS, Q.C.:

20 Q. So that would, I guess, echo what the

21 Commissioner has said in the past, that time

22 is still of the essence when it comes to

23 search and rescue, regardless of whether you

24 have a perfectly performing suit meeting the

25 standard or not?

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1 MR. POWER:

2 A. Yes.

3 HARRIS, Q.C.:

4 Q. And the standard, you talked about the water

5 ingress into suits and I think there's some

6 indication that the heavier the seas, the more

7 likely that there would be a water ingress as

8 well.

9 MR. POWER:

10 A. I'm not sure of that relationship, if stormier

11 sea states create more water ingress.

12 HARRIS, Q.C.:

13 Q. I think one of the studies in your paper

14 refers to that. I don't know which one now.

15 MR. POWER:

16 A. They test it in rough weather conditions. So

17 this included waves and wind and they found

18 that this resulted in more water leakage into

19 the suit compared to the 60-minute swim in

20 calm water.

21 HARRIS, Q.C.:

22 Q. So that may have an effect on water ingress as

23 well and the standard that applies to the suit

24 or the suits that are being used or the

25 standard that we're talking about, the two

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1 degree temperature drop in calm water, is
 2 based on dry conditions?
 3 MR. POWER:
 4 A. No, actually that's a good point. The thermal
 5 tests, before the thermal tests are conducted,
 6 you'd conduct the water leakage tests. So you
 7 record the amount of water leakage that goes
 8 into a suit. Then you add it to the suit
 9 before the thermal protective tests start.
 10 HARRIS, Q.C.:
 11 Q. What's the effect of that?
 12 MR. POWER:
 13 A. So as we saw earlier, water ingress can
 14 decrease the suit's insulation. That's the
 15 Tipton and Balmi study I referenced earlier.
 16 So the idea is that you conduct the water
 17 leakage test first, record how much water,
 18 pour it into the suit before you start the
 19 thermal protective test. If the suit still
 20 passes the thermal protective test with that
 21 water in it, then it's approved.
 22 HARRIS, Q.C.:
 23 Q. So in other words, that's adjusted for -- so
 24 if a suit passed the test, the water is taken
 25 into account?

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1 MR. POWER:
 2 A. Yes.
 3 HARRIS, Q.C.:
 4 Q. Okay. Well, those are all my questions, Mr.
 5 Power. Thank you very much.
 6 MR. POWER:
 7 A. Thank you.
 8 COMMISSIONER:
 9 Q. Thank you, Mr. Harris. CEP, Mr. Earle?
 10 MR. JONATHAN POWER, EXAMINATION BY V. RANDELL J. EARLE,
 11 Q.C.
 12 EARLE, Q.C.:
 13 Q. Mr. Power, the area of moisture inside the
 14 suit, and we've had some suggestions from some
 15 people that there's a great deal of value in
 16 wearing this high-tech underwear that purports
 17 at least to wick away the moisture from your
 18 body, but I take it in a sealed suit like
 19 that, it would still be within the suit, and
 20 you've demonstrated that if the subject has
 21 500 millilitres of water applied to them
 22 before they get in the suit, that there's a
 23 dramatic decrease in deep body temperature.
 24 MR. POWER:
 25 A. Well, no, we haven't demonstrated that. This

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1 was just the initial observations I reported
 2 today. The analysis is still ongoing before
 3 we can say with certainty that 500 mls of
 4 water did create a significant drop in deep
 5 body temperature.
 6 EARLE, Q.C.:
 7 Q. So it's possible that something else could
 8 have created the drop?
 9 MR. POWER:
 10 A. We're not sure until we take a look at the
 11 data fully.
 12 EARLE, Q.C.:
 13 Q. Well, let me ask you this. Are you aware of
 14 any studies on the effect of sweat within a
 15 suit, in terms of the effect on the subject?
 16 MR. POWER:
 17 A. So when you say the effect on the subject, do
 18 you mean sweating and then going into cold
 19 testing conditions?
 20 EARLE, Q.C.:
 21 Q. Yeah.
 22 MR. POWER:
 23 A. No, I'm not.
 24 EARLE, Q.C.:
 25 Q. Based on your observations, would you -- do

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1 you have any reason to believe that the idea
 2 that having a suit which moves the moisture
 3 away from the body would have a benefit?
 4 MR. POWER:
 5 A. Yes, I would believe that.
 6 EARLE, Q.C.:
 7 Q. You would believe that?
 8 MR. POWER:
 9 A. Yeah. As Mike Taber referred to yesterday in
 10 his presentation, the ability to wick sweat
 11 away, so sweat is water, water has 23 times
 12 the thermal conductivity than air. So that
 13 means water is able to transfer heat 23 times
 14 faster. So to be able to get that water away
 15 from your skin, you would then be able to
 16 prevent that 23 times faster rate of heat
 17 loss.
 18 EARLE, Q.C.:
 19 Q. But the question that comes to my mind is
 20 that's all very well if you're out cross
 21 country skiing and you've got an atmosphere
 22 that the moisture can be carried away into.
 23 But if you're in one of these sealed suits,
 24 it's like the garden in a bell jar. You still
 25 got the moisture in the atmosphere. And I

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1 think we do know that heat conducts
 2 differently in a moist atmosphere than in a
 3 dry atmosphere, don't we?
 4 MR. POWER:
 5 A. Yes.
 6 EARLE, Q.C.:
 7 Q. So would we not have to consider the fact that
 8 sweating creates a moist atmosphere inside the
 9 suit?
 10 MR. POWER:
 11 A. Yes.
 12 EARLE, Q.C.:
 13 Q. Now, on page 16 of your paper, and I'm not
 14 sure how that translates in terms of the
 15 actual exhibit, but you've listed advantages
 16 and disadvantages of prescriptive-based
 17 standards and performance-based standards, and
 18 the thing that immediately comes to mind to
 19 me, with a prescriptive-based standard,
 20 there's nothing out there that says you can't
 21 exceed the standard, is there?
 22 MR. POWER:
 23 A. No.
 24 EARLE, Q.C.:
 25 Q. But your proposition, as you would describe

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1 it, the checklist approach, is that human
 2 nature is such that if there's a prescriptive
 3 standard, good enough will do, so to speak.
 4 Is that your proposition?
 5 MR. POWER:
 6 A. Yes.
 7 EARLE, Q.C.:
 8 Q. Well, looking at your list of disadvantages
 9 for performance-based standards, the three of
 10 them there seem to be carrying the common
 11 factor of human behaviour that, you know,
 12 requires regulators, inspectors and operators
 13 be highly qualified. That requires somebody
 14 to say we've got to have the best people to do
 15 this job. Your management systems must be
 16 adaptive and closely monitored in order to
 17 change to the system if required. That's
 18 really a function of the quality of the people
 19 who are running that management system, is it
 20 not?
 21 MR. POWER:
 22 A. Yes.
 23 EARLE, Q.C.:
 24 Q. And regulators and operators must work
 25 together harmoniously to provide the best

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1 solutions available. That's a motivation
 2 thing. It's about, okay, we've got to get the
 3 best solution, not we've got to save the most
 4 dollars. Agree?
 5 MR. POWER:
 6 A. Yes.
 7 EARLE, Q.C.:
 8 Q. And even your last two ones where you show no
 9 disadvantage allows for continuous upgrading
 10 of system, allows for adaptation of new
 11 technologies. Again, these depend upon
 12 motivated participants. I mean, you can allow
 13 for continuous upgrading of the system, but if
 14 the participants are not motivated, if they're
 15 not driven to upgrade, what met the standard
 16 last year or five years ago will continue to
 17 do, won't it?
 18 MR. POWER:
 19 A. Yes.
 20 EARLE, Q.C.:
 21 Q. Now you're a member of the CGSB group for
 22 these suits?
 23 MR. POWER:
 24 A. Yes.
 25 EARLE, Q.C.:

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1 Q. Representing your employer. It seems to me
 2 that your group is fairly heavily weighted in
 3 terms of people who will ultimately hope to
 4 sell the product and ultimately have to buy
 5 the product. You've got a lot of producers
 6 and you got a lot of people who are described
 7 as users, although I would suggest to you that
 8 consumers might be a better description
 9 because oftentimes the person who has to buy
 10 and the person who ultimately uses are not the
 11 same person. The question I have for you is
 12 has there been any thought given to whether
 13 this kind of structure of standard setting
 14 body is well adapted to a goal-based standard?
 15 MR. POWER:
 16 A. I don't -- I'm not sure.
 17 EARLE, Q.C.:
 18 Q. So you're not aware of any?
 19 MR. POWER:
 20 A. No.
 21 EARLE, Q.C.:
 22 Q. Are you aware of any literature which examines
 23 -- and this is a point that you have made in
 24 your paper, you know, you really require a
 25 robust audit system and a robust challenge

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1 almost to the setting of the goals. It's got
 2 to be a challenging and dynamic situation and
 3 in particular, those people who will assess
 4 whether the standard has been met will be
 5 required to be very competent and skilled, and
 6 I was just wondering have there been any
 7 studies of how the audit function has worked
 8 in these kinds of performance based standards?
 9 MR. POWER:
 10 A. I'm not aware of any myself, no.
 11 EARLE, Q.C.:
 12 Q. Okay. One of the realities of what we're
 13 dealing with here, and the description may not
 14 please everybody, but in some ways we're
 15 dealing with a mouse regulating an elephant in
 16 that the reality is we have a regional board
 17 regulating companies that are global in scope
 18 and their wealth and access to resources is
 19 almost beyond comprehension. And I'm
 20 wondering, again in the context of the
 21 performance based standards, are you aware of
 22 any studies that have looked at, you know,
 23 issues like imbalance between the resources of
 24 the regulated and the regulator and this sort
 25 of thing?

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1 MR. POWER:
 2 A. No, I'm not aware of any.
 3 EARLE, Q.C.:
 4 Q. Okay. Thank you very much, Mr. Power.
 5 COMMISSIONER:
 6 Q. Okay, thank you, Mr. Earle. Mr. Martin,
 7 counsel for the families?
 8 MR. MARTIN:
 9 Q. No questions.
 10 COMMISSIONER:
 11 Q. No questions, okay. Ms. O'Brien for the
 12 families of the pilots?
 13 MR. JONATHAN POWER, EXAMINATION BY MS. KATE O'BRIEN
 14 MS. O'BRIEN:
 15 Q. Yes. Good afternoon, Mr. Power. My name is
 16 Kate O'Brien. Listening to you here today,
 17 it's really clear that you have put a lot of
 18 certainly your professional life into work
 19 that really to me seems designed at creating a
 20 better standard. Is that fair to say?
 21 MR. POWER:
 22 A. Yes.
 23 MS. O'BRIEN:
 24 Q. Okay, and you've put a lot of work into
 25 thinking about, you know, whether the standard

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1 should be prescriptive or whether they should
 2 be performance-based, also fair to say?
 3 MR. POWER:
 4 A. Yes.
 5 MS. O'BRIEN:
 6 Q. Okay. So why is it that you feel that a
 7 standard is even needed?
 8 MR. POWER:
 9 A. Why is a standard needed?
 10 MS. O'BRIEN:
 11 Q. Yeah.
 12 MR. POWER:
 13 A. Well, we have to be able to provide -- if
 14 we're shifting towards a performance-based
 15 standard, performance has to be demonstrated.
 16 So we have to provide some guidelines or
 17 standards for the ability to actually
 18 demonstrate that level of performance.
 19 MS. O'BRIEN:
 20 Q. Okay. So without a standard is the risk that
 21 people might be out there in, you know,
 22 clothing that won't protect them?
 23 MR. POWER:
 24 A. Exactly.
 25 MS. O'BRIEN:

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1 Q. Okay. So as I'm sure you're aware, because
 2 you're a member -- you're sitting on the CGSB,
 3 that we don't have a standard in Canada right
 4 now for the suits that pilots who are
 5 operating offshore wear. Are you aware of
 6 that?
 7 MR. POWER:
 8 A. Yes, that was discussed yesterday.
 9 MS. O'BRIEN:
 10 Q. Yeah. Were you aware of it before yesterday?
 11 MR. POWER:
 12 A. No, I was not.
 13 MS. O'BRIEN:
 14 Q. Oh, okay. So I take it this has not been --
 15 you know, you're sitting now on the CGSB
 16 looking specifically at helicopter
 17 transportation suits and so are you saying
 18 that it's never been a topic of discussion at
 19 that board that there is no equivalent
 20 standard for flight crew?
 21 MR. POWER:
 22 A. I've only been a member of the board since the
 23 summer of last year, and during my time on the
 24 board, it hasn't been discussed.
 25 MS. O'BRIEN:

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1 Q. Okay. I notice in your report, you referenced
 2 -- page 18-19 of your report, you reference
 3 some of the other standards that are in
 4 existence globally and are you aware that the
 5 European standards, they do have a standard
 6 that covers flight crew? Are you aware of
 7 that?
 8 MR. POWER:
 9 A. No.
 10 MS. O'BRIEN:
 11 Q. Okay. It's there on page 18 of your report
 12 anyway. You've listed the standard there and
 13 you'll note when you look at the title of the
 14 standard, it covers both passengers and flight
 15 crew. So you know, given that you're working
 16 in standards, the standards are obviously near
 17 and dear to your heart. Does it surprise you
 18 that we do not have, in this country, a
 19 standard to cover what flight crew are wearing
 20 when they're operating offshore?
 21 MR. POWER:
 22 A. Again, I've only been a member of the Board
 23 for about a year right now and during my time,
 24 there hasn't been any discussion about it.
 25 During my time, we've been looking at and

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1 opening the current suit standard. So with
 2 regards to one for aircraft crew, there may
 3 have been discussions had in the past before
 4 my time, before I joined the board.
 5 MS. O'BRIEN:
 6 Q. Okay. Do you personally think that -- you
 7 said that you feel that standards are
 8 important. You said that you feel that
 9 standards are important because if you don't
 10 have a standard, you have people out there and
 11 you don't know how they're going to be
 12 protected at all, right? Do you feel it's
 13 important that we have some sort of standard
 14 that will cover flight crew?
 15 MR. POWER:
 16 A. Yes, in my personal opinion.
 17 MS. O'BRIEN:
 18 Q. Okay. It seems to me -- you know, Mr.
 19 Commissioner said today that he's thought a
 20 number of times, wondered why it is we don't
 21 have a particular standard that covers
 22 offshore workers in this jurisdiction, you
 23 know, when we're dealing -- you know, one
 24 national standard would really cover people
 25 working in this really harsh environment, and

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1 I have to say it occurs to me that, you know,
 2 although the flight crew may be only a small
 3 percentage of the 1800 workers or so that we
 4 have operating offshore, in terms of every
 5 flight that goes out there, over ten percent
 6 of that flight is flight crew and in some
 7 cases, it's more than that and it keeps
 8 striking me as strange that we just don't have
 9 anything to cover those flight crew. I
 10 realize that's more of a statement on my part.
 11 Anyway, those are all my questions for you,
 12 Mr. Power. Thank you.
 13 COMMISSIONER:
 14 Q. Okay, thank you, Ms. O'Brien. C-NLOPB, Ms.
 15 Crosbie?
 16 MR. JONATHAN POWER, EXAMINATION BY MS. AMY CROSBIE
 17 MS. CROSBIE:
 18 Q. Good afternoon, Mr. Power. My name is Amy
 19 Crosbie and I represent the Canada
 20 Newfoundland and Labrador Offshore Petroleum
 21 Board and I just have a couple of questions
 22 for you. When you -- your paper deals with
 23 prescriptive and performance based standards
 24 and I just want to get you to clarify. When
 25 you talk about it in your paper, you're

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1 talking with respect to standards, not with
 2 respect to regulations? Is that correct?
 3 MR. POWER:
 4 A. Correct.
 5 MS. CROSBIE:
 6 Q. And you haven't come here today to put
 7 yourself forward as an expert with respect to
 8 prescriptive or performance based regulations?
 9 MR. POWER:
 10 A. No.
 11 MS. CROSBIE:
 12 Q. Okay. So when Mr. Earle asked you whether you
 13 were aware of any research or studies with
 14 respect to, I think as he put it, the mouse
 15 and the elephant, which he was discussing the
 16 regulatory regime in Newfoundland, that's not
 17 an area that you intended to comment on in
 18 your paper?
 19 MR. POWER:
 20 A. No, not at all.
 21 MS. CROSBIE:
 22 Q. That's all I have, thank you.
 23 COMMISSIONER:
 24 Q. Thank you, Ms. Crosbie. Well, I have no
 25 further questions. I understand precisely

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1 your position and what your report says and I
2 want to thank you for coming here at our
3 request. I also want to thank those who asked
4 questions, because all this helps to expand
5 our knowledge of the whole of the subject
6 matter of the reports. So this concludes this
7 particular public session or series of
8 sessions on the experts' reports. Thank you
9 very much for your participation.

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1 CERTIFICATE

2 We, the undersigned, do hereby certify that
3 the foregoing is a true and correct transcript of a
4 hearing heard on the 30th day of June, 2010 at Tara
5 Place, 31 Peet Street, Suite 213, St. John's
6 Newfoundland and Labrador and was transcribed by us
7 to the best of our ability by means of a sound
8 apparatus.
9 Dated at St. John's, NL this
10 30th day of June, 2010
11 Cindy Sooley
12 Discoveries Unlimited Inc.
13 Judy Moss
14 Discoveries Unlimited Inc.

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