

TRANSCRIPT OF PROCEEDINGS

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VICTORIAN CIVIL AND ADMINISTRATIVE TRIBUNAL

PLANNING LIST

EXTRACT

No P2910/2012

MELBOURNE

TUESDAY, 26TH FEBRUARY 2013

BEFORE MEMBERS M WRIGHT AND A LISTON

IN THE MATTER OF

CHERRY TREE WIND FARM PTY LTD

Applicant

- and -

MITCHELL SHIRE COUNCIL

Respondent

APPEARANCES:

MR T POWER appeared on behalf of the Applicant

MR P QUINN appeared on behalf of the Respondent

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1 **DAVID RUSSELL BLACK, called:**

2

3 **MR POWER:** Dr Black, can I ask you to state to the Tribunal your
4 full name, your work address, and your occupation,
5 please.

6 **DR BLACK:** My full name is David Russell Black. My work address
7 is my practice of Enviromedix Ltd in Waiuku, in the
8 south of Auckland, New Zealand.

9 **MR POWER:** And, can I ask you to describe to the Tribunal your
10 academic qualifications, but also your professional
11 experience.

12 **DR BLACK:** All right. My academic qualifications are the New
13 Zealand Auckland degree in medicine, MBCHB, which
14 qualifies me as a medical practitioner in New Zealand
15 and Australia, and other countries if I was registered,
16 but I'm only registered in New Zealand. I also hold the
17 Fellowship of the Faculty of Occupational and
18 Environmental Medicine of the Royal Australasian College
19 of Physicians, which is the same qualification that a
20 colleague practising in the same area would hold in
21 Australia.

22

23 I also hold a postgraduate degree of Doctor of Medicine,
24 MD, from the University of Auckland, which is in the
25 area of biophysics, specifically radiofrequency safety.

26 **MR POWER:** Can I ask you to describe to the Tribunal also what's
27 the nature of the work that you do in Enviromedix?

28 **DR BLACK:** We have for many years worked in the area of public
29 health impacts of development proposals, particularly
30 relating to potential for physical waste hazards. So,
31 I've done a lot of work in electromagnetic safety. I've

1 done a lot of work in wind farms in New Zealand and a
2 lot of work in power transmission projects. I also have
3 had other various which are quite different such as rail
4 and road developments, and also some work in land
5 disposal and sewer, which is very different but it's all
6 in the broad area. But, my work really is in the - -
7 because I had a background prior to medicine in
8 electronics and engineering, my interest in medicine had
9 always been the interface between engineering, physics
10 and medicine which is generically biophysics.

11 **MR POWER:** And she mentioned wind farms. What has been the nature
12 of the work in general terms that you've done on wind
13 farms?

14 **DR BLACK:** Most of them have been to be involved at the beginning
15 of a project, and to look at the implications for public
16 health of a wind farm development, and usually the way
17 in which I have managed this in the New Zealand cases
18 where I've had years of lead time is essentially stand
19 in the shoes of the Medical Officer of Health as if I
20 were the Ministry of Health.

21 **MR POWER:** Yes.

22 **DR BLACK:** And to look at the proposal in those terms. Also to
23 then enter into a dialogue with the actual Ministry of
24 Health and ensure that the work that I've done, the work
25 proposal is aligned with the approach which the relevant
26 authorities would wish to be taken.

27 **MR POWER:** Yes, I see. And, have you given expert evidence on
28 medical and biomedical issues before courts in New
29 Zealand?

30 **DR BLACK:** Many times. Going back to the 1990s, on
31 electromagnetic safety in particular, on some recent

1 quite significant developments, motor ways around
2 Auckland and Wellington.

3 **MR POWER:** Yes - -

4 **DR BLACK:** And many times on wind farms before both Planning
5 Application Tribunals held at a Local Government level,
6 and also resource management work in New Zealand and the
7 New Zealand Environment Court.

8 **MR POWER:** And do you have any experience giving expert evidence
9 in Australia?

10 **DR BLACK:** Yes, I have. I've given expert evidence in the
11 environment courts of Queensland, New South Wales, and
12 Victoria, once.

13 **MR POWER:** Yes.

14 **DR BLACK:** Many years ago actually in Victoria, and that's been in
15 the areas of electromagnetic safety, relating to
16 powerlines and mobile phone networks.

17 **MR POWER:** In addition to your business, the Tribunal is right to
18 understand that you are an academic?

19 **DR BLACK:** Yes. I've been - - when I - - soon after I qualified I
20 joined the University of Otago as a lecturer as really
21 an apprentice to the professor. I then moved back to
22 Auckland and became involved as senior lecturer with the
23 University of Auckland. I developed and ran the
24 university's postgraduate courses on occupational
25 medicine until 2007, and I continue to be an honorary
26 senior lecturer in the School of Population and Health,
27 as senior lecturer in environmental medicine, honorary
28 senior lecturer. I also teach part-time in the School
29 of Optometry and Visual Performance.

30 **MR POWER:** Would the Tribunal be right to understand in addition
31 to all that, all of those things you do, you're also a

1 registered and practising medical practitioner?

2 **DR BLACK:** Yes. I have for many use undertaken quite a lot of
3 medicolegal work, particularly in relation to accident
4 compensation claims, always acting for the patients in
5 many cases, challenging decisions of insurers.

6 **MR POWER:** Yes - -

7 **DR BLACK:** Usually successfully, and I also in recent years, as
8 I'm sort of towards the end of my academic career, I've
9 been doing more clinical work and I do see specialist
10 patients referred by general practitioners and other
11 specialists, and I also do - - I am also now doing some
12 general practice work or primary care work really in the
13 town or country in which I live quite regularly.

14 **MR POWER:** Thank you. Now, turning to the Cherry Tree Windfarm -
15 -

16 **MEMBER:** Can you recall, Dr Black, the matter you were involved in
17 in Victoria?

18 **DR BLACK:** Yes, sir. It was an Application by Optus for a mobile
19 telephone site in - - I think it was Melbourne. I'm not
20 certain. Certainly, I'm sure it was Optus.

21 **MEMBER:** Yes - -

22 **DR BLACK:** And it was in the 1990s.

23 **MEMBER:** Was it before this Tribunal or was it - -?

24 **DR BLACK:** Yes, it was, sir. I don't recall VCAT.

25 **MEMBER:** No - -

26 **DR BLACK:** That it was the Environment Court.

27 **MEMBER:** The Administrative Appeals Tribunal, I think it was
28 called.

29 **DR BLACK:** Yes, that rings a bell, sir.

30 **MEMBER:** All right.

31 **DR BLACK:** I've been much more recently in New South Wales, most

1 recently in New South Wales, sir.

2 **MEMBER:** Yes.

3 **MR POWER:** Turning to the Cherry Tree Windfarms proposal Dr Black,
4 you have visited the location of the proposed windfarm?

5 **DR BLACK:** Yes, I have.

6 **MR POWER:** And you had prepared a written statement dated the 14th
7 of January 2013?

8 **DR BLACK:** Yes, I have.

9 **MR POWER:** And you have the witness statement. On the first page
10 you set out - - you summarise your area of expertise,
11 cross-referencing some matters in Annexure A.

12 **DR BLACK:** Yes.

13 **MR POWER:** And, in part three you describe your instructions from
14 the proponent?

15 **DR BLACK:** Yes.

16 **MR POWER:** You set out in Part 3.2 some of the documents and 3.3,
17 some of the documents and reports that you have prepared
18 in your evidence?

19 **DR BLACK:** Yes.

20 **MR POWER:** And, in doing that, you have familiarised yourself with
21 the objections and statements of grounds made by a
22 number of the submitters who have raised complaints
23 about issues of concern about health.

24 **DR BLACK:** Yes, sir, I have.

25 **MR POWER:** And since preparing this witness statement, have you
26 reviewed any other documents or materials?

27 **DR BLACK:** I have reviewed further submissions that have been
28 presented to the Tribunal or as they had been sent to me
29 by the Applicant.

30 **MR POWER:** Yes. And, in Part 4 you set out at 4.1 a summary of
31 your findings?

1 **DR BLACK:** Yes - -

2 **MEMBER:** And then at 4.2 you have outlined how you have structured
3 the rest of your statement.

4 **DR BLACK:** Yes - -

5 **MR POWER:** I just wonder if I can take you to page 3 and the
6 heading of "Audible Noise."

7 **DR BLACK:** Yes.

8 **MR POWER:** Can I ask you to just take the Tribunal - just
9 summarising it if that's convenient for you - just the
10 nature of the evidence discussed regarding the
11 complaints or concerns that have been expressed about
12 air noise in the proposal.

13 **DR BLACK:** Yes. I noted that a number of submissions had raised
14 concerns about excessive or constant noise, and that the
15 concerns related to the possibility that these could be
16 unhelpful to their health or that of their family,
17 friends or their livestock. And, some were concerned
18 about the possibility of cumulative noise from other
19 sources.

20

21 I go on to just describe the types of noise which can
22 arise from wind turbines, but the aerodynamic noise
23 relating to the airflow, interruption of airflow and
24 turbulence created by the blades, and also the potential
25 for mechanical noise created by the rotating machine.
26 And, essentially I conclude that in a modern, well - -
27 well maintained machine, the only significant noise is
28 the noise which is carried - - which is created by the
29 disturbance of airflow and noise carried downstream by
30 the turbine.

31

1 I noted that the nature and magnitude of the noise has
2 been modelled, and also that relevant experts have
3 produced reports, and I have seen these reports. I also
4 noted that there are predictions which have been made of
5 the sound pressure levels downstream from the turbines,
6 and in fact all around the turbines, and that these have
7 been compared with the New Zealand Standard, which is
8 [Indistinct] 6808 which I am familiar with. I should
9 add, that I was not involved at all although I am a
10 member of Standards New Zealand and I have been involved
11 in a number of standards. I was not involved in the
12 development of that standard.

13 **MR POWER:** Yes - -

14 **DR BLACK:** Because that exercise is essentially acoustic
15 engineering.

16 **MEMBER:** In speaking about the standard - -

17 **DR BLACK:** Yes, sir - -

18 **MEMBER:** Are you able to tell us what the rationale for that
19 standard is?

20 **DR BLACK:** Yes, sir. The basis of the standard is that undertaken
21 by the World Health Organisation. And, the rationale
22 for the standard is an intention to provide protection
23 against adverse health effects for the whole of the
24 normal population.

25
26 Any standard, and therefore public health should if
27 possible - and in this case it is possible - protect the
28 whole of the population, although, if there are,
29 literally, hypersensitive people in various ways, a
30 public health standard usually can't protect them and is
31 also not the best way of doing it.

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So, the standard is intended to provide protection for everybody, but it is acknowledged that if there were individuals with specific susceptibilities outside, really the possibility of a standard of this type, and other measures, have to be taken, and I deal with that in my evidence, sir.

MEMBER: So, what percentage of the population, just in broad-brush terms, might fall into that category?

DR BLACK: Well - -

MEMBER: Is it one percent or ten percent or five percent or - -?

DR BLACK: It would be much less than five percent. The standard would absolutely protect both five percent by definition because the scientific studies on which it is based, have that number as the basis of confidence in the way in which studies are designed.

However, because the standard incorporates safety margins over and above that, I would expect the standards to achieve better than 99 percent protection. I would be surprised if it didn't achieve a 100 percent protection against directly caused adverse health effects.

MEMBER: And you've referred to the scientific studies on which the standards are ultimately based.

DR BLACK: Yes - -

MEMBER: Which was the World Health Organisation study, presumably. What are they, generally?

DR BLACK: They are the WHO guidelines. We reference them in my evidence, I think. Actually, more particularly, the reference in the standard.

1 **MEMBER:** Yes - - I don't know where they are.

2 **DR BLACK:** WHO guidelines from about ten years' ago, and also more
3 recently there are European [Indistinct] guidelines
4 which are intended for Europe but are a very complex and
5 quite sophisticated document which, although not
6 intended for use outside Europe, has been a useful
7 source of academic information for standard-setting
8 organisations around the world.

9
10 So, the WHO guidelines themselves are guidelines.
11 They're not intended to be standards, as such. So, the
12 idea - and I have been involved with WHO a lot so I'm
13 familiar with this process - - the idea of setting a
14 guideline is to give information on which relevant
15 authorities around the world can set a standard, and
16 that is exactly what happened in this case.

17 **MEMBER:** Yes. What is the general nature of the data on which the
18 guidelines were formulated? Was it surveys or - -?
19 Modelling or - -?

20 **DR BLACK:** That's a bit beyond my immediate recall, sir, because
21 really that's acoustic engineering - -

22 **MEMBER:** Yes - -

23 **DR BLACK:** And really I'm a practising physician and I rely on
24 this sort of information. I have reviewed it.

25 **MEMBER:** Yes - -

26 **DR BLACK:** It's not at the front of my mind at the moment, but I
27 could think about that during the day - -

28 **MEMBER:** All right - -

29 **DR BLACK:** And just come back to it. I think that the Tribunal
30 might have better advice on that from the acoustic
31 engineers.

1 **MEMBER:** Yes. You see, we've heard a deal of evidence in this
2 case concerning people who live in proximity to wind
3 farms - -

4 **DR BLACK:** Yes - -

5 **MEMBER:** Suffering various symptoms.

6 **DR BLACK:** Yes.

7 **MEMBER:** Sleep disturbance. You probably know the gamut of the
8 sort of complaints that you get. Would the existence of
9 those sorts of complaints in Europe have provided the
10 impetus for the formulation of these guidelines, or was
11 it something else?

12 **DR BLACK:** The European night [Indistinct] guidelines were very
13 particularly initiated to really minimise sleep
14 disturbance.

15 **MEMBER:** Yes - -

16 **DR BLACK:** That was the specific reason for them. So, sleep
17 disturbances is an extremely important issue.

18 **MEMBER:** Sleep disturbance from wind turbines or sleep disturbance
19 generally?

20 **DR BLACK:** No, sleep disturbance generally. The European studies
21 did not - - the WHO studies did not address wind
22 turbines specifically. They looked at noise from a wide
23 variety of sources, particularly transport, roads and
24 rail, and also they have also been extensively used in
25 the precinct of airports. And, that's an area where I
26 have done some work in New Zealand and several airports
27 in the game applying different New Zealand standards in
28 that case but also with the same origin.

29 **MEMBER:** Yes, I understand.

30 **MR BLACK:** Sorry.

31 **MR POWER:** No, that's quite all right. Just before we leave that

1 topic, if I could take you to page 5 of your witness
2 statement.

3 **DR BLACK:** Yes - -

4 **MR POWER:** I think that's from your written evidence actually. If
5 I could show that to you.

6 **DR BLACK:** After Annexure 7, yes.

7 **MR POWER:** Do you see Item 7 there?

8 **DR BLACK:** Yes.

9 **MR POWER:** When you were referring to the guidelines?

10 **DR BLACK:** Yes.

11 **MR POWER:** Which informed the preparation of the New Zealand
12 standards, that document you were referring to?

13 **DR BLACK:** Yes. That's the original one, but that's the one
14 intended for worldwide use.

15 **MR POWER:** Thank you.

16 **MEMBER:** Is that in Volume 3, Mr Power?

17 **MR POWER:** It is. Volume 3. I think it may be in Volume 5.

18 **MR QUINN:** Volume 4, Tab 91.

19 **MEMBER:** Thank you, Mr Quinn.

20 **MR POWER:** Thank you. Just on the topic if I can take you back to
21 page 3, Dr Black.

22 **DR BLACK:** Yes.

23 **MR POWER:** You were discussing the New Zealand standard. Are
24 there any other matters you wish to draw the Tribunal's
25 attention to regarding audible noise?

26 **DR BLACK:** Yes. As I say in my evidence, my conclusion in this
27 case but also drawn from other, many other windfarm
28 applications that I've looked at, both looking at them
29 before and after they were - - during the design phase
30 and after they were built, is that to the extent that
31 noise effects might arise these would be, if any, a

1 direct issue of amenity rather than public health. So,
2 I have not seen cases where the standard is met where
3 there are direct effects on health such as sleep
4 disturbance. There are cases where the presence of a
5 windfarm is detectable by being able to see it or being
6 able to hear it if you listen for it, and some people,
7 prior to the development of a facility, regard this as
8 being - - as having an impact on the amenity of where
9 they live. And, many people, in my experience, after
10 the turbines are built, say within a year or so that
11 they never notice them. But, there are some people who
12 say that every time they hear them it reminds them that
13 they are there, and they still don't like them. But,
14 that's not a direct effect on health. That is an effect
15 on amenity.

16 **MR POWER:** Now, on page 4 you discussed the topic of noise and
17 sleep by reference to the WHO guidelines which I think
18 you have already discussed.

19 **DR BLACK:** Yes.

20 **MR POWER:** Down towards the bottom of that page you discuss the
21 fact that - - you mention the fact that individuals near
22 wind farms can sometimes claim poor sleep as a result of
23 the facility.

24 **DR BLACK:** Yes - -

25 **MR POWER:** And such an effect does occur in situation such as
26 psychological sensitisation.

27 **DR BLACK:** Yes - -

28 **MR POWER:** Could you describe to the Tribunal what you mean by
29 that.

30 **DR BLACK:** Yes. Psychological sensitisation, a term which is
31 increasingly discussed in occupational and environmental

1 medicine, refers to the phenomenon whereby a person can
2 associate a stimulus such as a sound or in other cases a
3 smell, or sometimes a visual image, with something which
4 they have found noxious, and it may well be in something
5 which has actually been noxious to them and damaging to
6 them. And then, that trigger results in a cascade of
7 distressing symptoms which can - - which usually take
8 the form of anxiety. And, particularly in people who
9 have a predisposition to anxiety, in other words, an
10 underlying tendency to it which is quite common or
11 another psychological difficulty such as depression,
12 then if they - - if a person then becomes sensitised to
13 something in the environment which distresses them they
14 can - - they can have an escalation of their symptoms.

15
16 I've had a lot of experience in this area, and the
17 sensitivities that arise in work-related medicine, which
18 are chemicals and also to minor electrical stimulus, so-
19 called electrical hypersensitivity, and I have found - -

20 **MEMBER:** Things like transmission lines?

21 **DR BLACK:** Sorry?

22 **MEMBER:** Things like transmission lines?

23 **DR BLACK:** No, no, sir. I'm talking about cases where people
24 perceive that they are exceptionally sensitive to
25 stimulus from the electricity so, for example, for some
26 people a very minor static electricity discharge or a
27 very minor sensation of the presence of a small electric
28 current as is commonplace on a dry day, that sort of
29 thing.

30 **MEMBER:** Yes - -

31 **DR BLACK:** Can for some people be very distressing. And, for many

1 years there's a vast body of literature which - I have
2 been involved with this area for many years - looking at
3 the possibility that such people might have a higher
4 level of actual sensitivity from a physiological point
5 of view, in other words, people might be hypersensitive
6 to detect it, but in fact, they're clearly not. There's
7 papers and published studies which have proven this,
8 that they are psychologically sensitised to - - in terms
9 of their response to stimulus. So, a stimulus which to
10 me I might not even notice, to another person could be
11 very distressing. And, that is the case with
12 environmental developments and changes, that some people
13 can become sure - - they can become convinced, and not
14 through any intention to be malicious or anything other
15 than a genuine concern, but they can become convinced
16 that a development such as a wind turbine is going to
17 harm them, and then, any trigger which simply alludes
18 them or reminds them of the presence of it, can then set
19 off a cascade of symptoms.

20
21 We call that, in environmental medicine, a "signal
22 level." That is, all they need to receive is a signal
23 which alerts them to the fact that something is there.
24 It's not a level which actually causes a direct
25 physiological effect such a sleep disturbance. That's
26 the important difference.

27 **MEMBER:** But, it has the same impact as though it was
28 physiologically based?

29 **DR BLACK:** It could do, sir, yes. It could actually have a reason
30 effect in some cases, because it could result in people
31 becoming quite distressed.

1 **MEMBER:** And there is an expression, "perception is reality?"

2 **DR BLACK:** Yes, that's true. But, it then doesn't go on - - you
3 can't then go on to say that the solution is the same.

4 **MEMBER:** Yes - -

5 **DR BLACK:** And that's really an important point.

6 **MR POWER:** Just on that point, what is the - - firstly, in terms
7 of public responses to psychological sensitisation, what
8 is the nature or what are the public health responses
9 which could be available, and as - - through the
10 planning system?

11 **DR BLACK:** The most important factor, by far, is the avoidance of
12 or [Indistinct] of this information, because, by far,
13 the greatest problem in cases of psychological
14 sensitisation - and I noticed that people often - - in
15 not really the medical literature but in other
16 literature some people refer to it as the "placebo
17 effect" which is not a term I would use in medicine
18 because I'm more focused on the patient really, and so
19 I'm more interested in what's going on in the patient
20 and ways to actually help the patient. But, in terms of
21 public health intervention, correction of misinformation
22 to avoid the evolution of anxiety, which then can be
23 triggered. Then, if it does trigger, correction of that
24 misinformation.

25
26 The fact is that in most cases - and by "most" I mean
27 the vast majority - it corrects itself because most
28 people who have fears at the development stage of
29 something, find that when it's finished, and it becomes
30 commonplace, and accepted and something that's just
31 there, they get on with their lives and forget about it.

1 **MR POWER:** Now, is that always going to be the case, Dr Black?

2 **DR BLACK:** No, it's not always going to be the case.

3 **MR POWER:** All right. And finally, before we leave that topic you
4 referred to signals.

5 **DR BLACK:** Mm, mm.

6 **MR POWER:** What's the major of those signals that might prompt the
7 sensitised response to the wind farm or the other form
8 of development that might make someone anxious or
9 unwell?

10 **DR BLACK:** Anything that reminds people that it's there. So, if
11 they - - if people see it, if people sleep with the
12 window open on a hot night and can hear it in the
13 distance, they may say, "I can hear that. I don't like
14 it. It's making me feel anxious because it reminds me
15 that it's there." That does - - that can happen.

16 **MR POWER:** Okay. If we move on through - - has the Tribunal had
17 an opportunity to read Dr Black's statement may I
18 enquire?

19 **MEMBER:** Yes.

20 **MR POWER:** Okay. Then I might take you, Dr Black, to page 5 just
21 very briefly, seeing the effects on children and
22 learning and noise sensitivity. Are there any
23 particular matters which you would wish to draw to the
24 Tribunal's attention?

25 **DR BLACK:** Well - -

26 **MR POWER:** [Indistinct].

27 **DR BLACK:** The effects on children and learning are really - -
28 really occur if the mechanics of the learning process
29 are disturbed or distracted. And so, that's really a
30 straight forward thing. I mean, children will learn if
31 they can - - providing they can hear what's going on,

1 providing their interaction between themselves in the
2 learning process is not disturbed. And so, it's really
3 quite simple to work out levels which have to be avoided
4 so that children can learn. And, I mean, children learn
5 successfully in schools adjacent to busy roads where
6 there's quite a lot of noise. Children accommodate
7 quite a significant amount of noise, but nonetheless,
8 WHO guidelines have said that children's learning is
9 sufficiently important that the level of interfering
10 noise within an environment should be limited and given
11 some guidelines which are there, which are very helpful
12 and I absolutely support.

13
14 But, that's not really - - that really is a relatively
15 straightforward matter of competing noise. It's not
16 really a matter of inducing pathology.

17 **MR POWER:** And then on pages 5 to 6 you deal with some of the
18 submissions that have been raised expressing concerns
19 around noise sensitivities such as migraines and
20 tinnitus. Are there any particular matter you wish to
21 draw the Tribunal's attention to there?

22 **DR BLACK:** Yes, well, this is where - - this is where it does get
23 quite into my area of interest.

24
25 Firstly, with hyperacusis, that is very acute, sensitive
26 hearing, although they notice that they have - - the
27 real variation in human hearing is not particularly
28 great. As in most biological things, there aren't
29 people with enormously sensitive hearing. There is a
30 spread of - - there is a distribution. In fact, you
31 know, probably we all have our best hearing when we're

1 born and as we go through life it gradually
2 deteriorates, mostly caused by crude effects of everyday
3 noise. And, by noise I mean motor cars, motor mowers,
4 you know, significant noise which in our society we are
5 all exposed to.

6
7 And, in fact, people with hyperacusis are not really the
8 issue here at all because the extent to which
9 hyperacusis occurs is absolutely covered in the
10 calculations done by WHO and ISO, and the whole spread
11 of human acute hearing acuity is covered by the
12 standards, without a doubt.

13
14 So, I say at the bottom of the last paragraph on page 5
15 that like most things [Indistinct] it's best designed to
16 protect all individuals in the normal population ranging
17 from the most sensitive to the least, and that's quite
18 an important point really.

19
20 With people who face the issue of migraine, the
21 important point about - and, you know, there are other
22 conditions, but when migraine is so common, that it is
23 worth discussing. And, it's important to say that people
24 who have migraine do not have more sensitive hearing
25 but, you know, people with migraine will say things
26 like, you know, if a pin drops, my head hurts. That's
27 probably not quite true but, you know, I understand what
28 they're saying. And, that is true. I mean, people who
29 have migraines do find that just everyday noise will
30 make their condition worse and that therefore they have
31 to seek a quiet environment.

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However, the levels of control in the standard are way below everyday household noise and so really people with migraine, whilst acknowledging the issue, certainly are not going to be adversely affected by this, unless, of course, they lie down with their migraine and they can hear the wind farm and the windfarm makes them anxious, which might make the migraine worse.

But, having said all that, I must say that in my experience of going back to communities with windfarms, a lot of people, the majority of people, will say, "Oh, yes, I sometimes hear it. I quite like it. You know, it just sounds like the wind in the trees. It's quite a pleasant sound. It doesn't worry me at all. I've just got used to it." You often hear that. It's a common response in communities where people can hear turbines. And, they also say most of the time I can't hear it, I and can only hear it when the wind is blowing in the right direction. And, that would fit with the physics as we know it.

MEMBER: Is that the whoosh, whoosh, sound?

DR BLACK: No, sir, the whoosh, whoosh, is really a characteristic of the blades passing - -

MEMBER: Yes - -

DR BLACK: The post, and that is a relatively near field phenomenon. You generally don't hear - - that's not carried by the wind.

MEMBER: Right - -

DR BLACK: That far. So generally the whoosh, whoosh, is generally only within hundreds of metres, at the most, from the

1 site.

2
3 The sound which is carried by the wind is the sound of
4 the turbulence over the blades, which is essentially the
5 air flowing over the blade and the noise there creating
6 pressure on one side and pressure [Indistinct] goes off
7 the trailing area of the blade and then the air wind
8 symbols into a laminar flow. And, it is a laminar flow
9 within - - you know, within 100 or 2 metres. But there
10 is - - the vibration created by that wind assembly, or
11 by the destruction to it at the leading edge, is carried
12 on the wind as sound pressure, and that's the sound
13 that's carried.

14 **MEMBER:** What is the sound?

15 **DR BLACK:** The sound is what is, in physics terms described as
16 "white noise." It's broad spectrum sound which results
17 from essentially air, currents of air circulating and
18 mingling and interacting with each other. It's
19 analogous really to the sound of wind in trees, because
20 when wind blows through trees, again the leaves and
21 branches dismantle the laminar flow and so the air
22 straight off the wind often flows in a very - - broad
23 leaf pattern. And then, something hits something and
24 it's taken apart and I suppose at the other side it
25 reassembles into a laminar flow.

26
27 And, the wind flowing over a turbine blade is exactly
28 the same as the wind flowing over an aircraft wing
29 because, in fact, the turbine blade is an aerofoil, just
30 like an aircraft wing. The physics is the same.

31 **MEMBER:** Yes. Some people have described it as similar to the

1 noise of a propeller driven aircraft going on and on and
2 on.

3 **DR BLACK:** Well, the greatest noise of a propeller driven aircraft
4 is the engine's noise - -

5 **MEMBER:** Yes - -

6 **DR BLACK:** And so - -

7 **MEMBER:** It's a mechanical noise.

8 **DR BLACK:** It's not similar to that, with respect. It would be
9 similar to the noise of a propeller driven aircraft - -

10 **MEMBER:** With the engines turned off?

11 **DR BLACK:** Yes. It's not even that, sir. It's really no worse
12 than the noise from a glider - -

13 **MEMBER:** Yes - -

14 **DR BLACK:** Because a glider is flowing through the air - -

15 **MEMBER:** It's a sort of a hiss?

16 **DR BLACK:** Yes, yes. Because when a glider goes through the air,
17 the area hits the leading edge of the wing, flows over
18 and under the wing, and if you'd like to think of it,
19 the air over the wing is stretching and the air
20 underneath is not and therefore the air on the top of
21 the wing is thinner, so the air underneath pushes up. I
22 mean, that's a great oversimplification, and it's right,
23 but it's the way in which we think about it. It's a
24 useful way to think about it. And then, because the air
25 is of different density, as it leaves the trailing edge
26 of the wing, or the turbine blade, then it has to put
27 itself back together again.

28 **MEMBER:** Yes - -

29 **DR BLACK:** And it does form that whoosh. So, that really would be
30 the best analogy. You really can only hear that if you
31 are in a glider.

1 **MEMBER:** Yes. Thank you, doctor.

2 **MR POWER:** Pages 6 and 7, and 6 to 8, you discuss the issue of
3 infrasound and frequency sounds and we've heard a lot
4 about that over the last four weeks.

5 **DR BLACK:** Yes.

6 **MR POWER:** I would ask you to take the Tribunal to the key issues
7 as you see them in that discussion.

8 **DR BLACK:** Yes. Well, the point about our hearing is that our
9 hearing has evolved from the systems in primitive
10 animals, fish, to detect the difference in balance
11 between both sides of the body so that you can stay
12 upright, the lateral line system. So, we now have
13 adapted that ability to measure pressure in our ears and
14 sense it for hearing, and in order to do that our ears
15 have become explicitly sensitive to changes in sound
16 pressure level in a range which is useful for hearing,
17 which is essentially from about 20 hertz, up to about 10
18 kilohertz. So again, when you are very young, you can
19 hear higher, 16, 17, maybe 18, even 20 for some people.
20 When you get to my age you can't really hear above about
21 9 or 10. But, the low frequency generally remains
22 intact.

23
24 Below that - - and so the ear consists of the tympanic
25 membrane or ear drum, and a mechanical chain of bones,
26 the ossicles or levers which are effectively a
27 transducer, the purpose of which is to change the
28 magnitude of movement which happens in the air, into
29 kind of movements which then, effectively, control the
30 field pressures in the inner ear, which is turned into
31 electrochemical symbols for the brain.

1
2 So, we have - - one of the things that the ear does
3 quite effectively is to limit the amount of energy which
4 can be transferred from the inner ear, and it has a
5 quite sharp cut off and frequency response and at these
6 lower frequencies it actually does that with these
7 little muscles that are attached to the bone, so that if
8 you get a change in the ear drum, these muscles come
9 down and say no, I'm not going to move that, because
10 that would damage the inner ear.

11
12 So the ear is - - and the ear is the part of our body
13 which has evolved to hear. And, so it really doesn't
14 hear much - - it doesn't really hear anything below 20
15 hertz.

16
17 Having said that, if you get sounds which are loud
18 enough below 20 hertz, you may well get some response in
19 the ear, and the reason for that is pretty well any
20 sound is - - is not a pure sound wave. It's not pure. I
21 mean, if you have something that's 6 kilohertz, it's not
22 going to be a pure sound wave of six kilohertz. And, by
23 - - it's actually - - it doesn't really matter, but what
24 we know is that in high frequency, complex sound, it is
25 often made up of a number of fundamentals. And, then,
26 looking at that the other way, if you get a sound at a
27 lower frequency it will have harmonics. So, they are
28 normally multiples of the frequencies.

29
30 So, if you pluck a piano string, a little c, you will
31 get harmonics that, you know, are an octave above it, an

1 octave being double frequency, and that's how music
2 works on that.

3
4 And so, if it was an 8 kilohertz, for example, noise,
5 there wouldn't be some 16 and some 32 and some 64, for
6 sure, unless it was an absolutely pure sound wave, which
7 it wouldn't be. And so, that sometimes confuses people
8 to say that if it's loud enough you can hear it at low
9 frequencies, and that's because you're hearing the
10 harmonics, which you won't.

11
12 Going back now to the source, as I've described, the air
13 goes over the blades and vibrates, and then creates this
14 vibration, and that, of course, is a physical phenomenon
15 which is occurring and which you would expect to have
16 quite a broad spectrum because there are - - the energy
17 is occurring across the spectrum at which the air is
18 moving.

19
20 And so, yes, there will be - - you can hear the sound of
21 that wind down to 20 hertz, and the reason why it's down
22 to 20 hertz is because that's where you stop hearing it,
23 but that energy does go down below that.

24
25 And so, when we measure - - when I say "we," the
26 audiostatisticians, measure the noise, they will use
27 measuring instruments which are designed to be analogous
28 to human hearing, and they cut off where the ear cuts
29 off.

30
31 For the sake of probably best doing this now, I would

1 say that because our ear sensitivity is very different
2 at low frequencies to high frequencies, the sound
3 instruments are deliberately weighted to be analogous,
4 and that's why they use A weighting. But, A weighting is
5 only in use if you're trying to effectively simulate the
6 response of the human ear. So, as soon as you're not
7 dealing with hearing, A weighting has gone. It's
8 useless. It's pointless. In fact, it's misleading.

9
10 And so, it's necessary then to - - I mean, the first
11 principle would be to still go with raw weighting and
12 just measure the raw sound pressure level, which, I
13 would expect, in the case of - - and in fact is proven
14 to be the case, would carry on below the frequency of
15 audible noise, you know, for some distance down to quite
16 low frequencies.

17
18 And, there had been - - because of the importance of
19 doing this, the acoustic engineers have developed
20 another system which is dBG, which is intended to be
21 able to measure the - - intended to provide some useful
22 numbers below 20.

23
24 Now, that gets into acoustics and out of my real area,
25 and I can't talk much about the application of dBG,
26 because I don't really deal with that in my work. But,
27 it is the appropriate thing.

28
29 I would, because I stick to things that I'm familiar
30 with, just use linear measurements of some pressure,
31 which in fact are not all that different.

1
2 Some people - - now, I've acknowledged on page 7 - -
3 I've also talked quite a bit about the work of Dr Salt.
4 Dr Salt has done some work in which he has shown that -
5 - I would say he hasn't proven but nonetheless his work
6 is very good and very interesting, that, essentially
7 that the response of the ear at one frequency - and this
8 is low frequencies - can be influenced by sound of
9 another, particularly that sound below the threshold of
10 hearing, although you can't hear it, might influence the
11 perception of sound above it which actually would make
12 sense from first principles anyway. But, I mean, that
13 had not been really demonstrated before and, I mean, his
14 work is valuable.

15
16 But, the difficulty with the way in which Dr Salt's work
17 has been used in this area, stems from - - partly from
18 the fact that he has said, well, there is a problem out
19 there. Perhaps this is the solution. The difficulty
20 with that is there's no proof that there is a problem
21 out there. So, of course the researchers are inclined
22 to, you know, find a practical application for their
23 research which helps to get it supported, and we all do
24 that. But, we have to be very cautious about this and
25 say make sure this isn't a solution looking for a
26 problem. Because, we really have to focus on whether,
27 in fact, that is a problem.

28
29 And so, I acknowledge Dr Salt's work as good science,
30 properly written up and published, but it really doesn't
31 change our understanding of the physiology of

1 infrasound.

2
3 We do know in occupational medicine - and I'm going
4 ahead to page 8 if that's all right?

5 **MR POWER:** Yes.

6 **DR BLACK:** That low levels of vibration below the level of human
7 hearing can have profound physiological effects. So,
8 the one that we see - - we still see reasonably often is
9 vibration disorders, hand and arm vibration disorders
10 from people using tools and equipment whereby the
11 vibration has an effect on the nerves and blood vessels
12 in the hands and fingers and causes vibration, white
13 finger disorder, which unfortunately still happens.
14 Funnily, it happens in Australia actually in mining.
15 I've seen a lot of cases that have come from mining in
16 the UK.

17
18 And so, that's a - - the actual level that that's
19 happening at is thousands, many, many thousands of times
20 higher than the levels we're talking about here, or the
21 levels of vibration in the air.

22
23 If the levels - - what I'm saying is that if the level
24 of infrasound was in the same order of magnitude, that's
25 within a factor of really 3 dB or 10 times the - -
26 arithmetically, as it goes below the threshold of
27 hearing - - sorry, it's not very clear. What I'm saying
28 is if we have a level of - - a level of linear sound
29 pressure level at 20 hertz, then I would expect that the
30 level of - - the sound pressure level going down from a
31 windfarm would be more than about three dB of that

1 level. It would be similar to that level. I can't be
2 certain. You would need to talk to acoustic engineers
3 to be certain about that.

4
5 But, the level at which the disorders occur is - - would
6 be 30, 50 dB higher than that, which is huge. In
7 arithmetic terms we're talking - -

8 **MEMBER:** Getting back on what you were saying about Dr Salt - -

9 **DR BLACK:** Yes - -

10 **MEMBER:** I understand you to say that one of the problems with his
11 research is that he assumes a problem that doesn't
12 exist?

13 **DR BLACK:** Yes.

14 **MEMBER:** But, if you have a number of people in proximity to a
15 windfarm complaining about what they perceive to be the
16 impact of that windfarm, don't you have a problem?

17 **DR BLACK:** You have a problem, sir, but you haven't necessarily
18 got evidence of the mechanism of or even the cause of
19 that problem. And, I probably - - I mean, I'm happy to
20 discuss it now if you want me to or we'll probably come
21 to that in talking - -

22 **MEMBER:** Don't let me take you out of order.

23 **DR BLACK:** No, thank you, sir. I'll obviously be guided by you.
24 But, I think there's quite a lot to discuss about that,
25 but if we can back to talking about studies in
26 epidemiology, that would be helpful. I think there were
27 some important issues there.

28
29 I'm certainly not wishing to downplay Dr Salt's work.
30 He's obviously a careful scientist who has published
31 some published some interesting work.

1 So, what I'm saying is that the hand-arm vibration
2 disorders, we also see whole-body vibration disorders
3 and we see those - - I see them sometimes in operators
4 of heavy earthmoving machinery, and they normally at
5 that level, manifest as back problems, but they have
6 also occurred in - - a classic example is in the crew of
7 - - during the Cold War, bombers that were in the air
8 for days sort of running around waiting to drop atomic
9 bombs on the other side, but that was a very stressful
10 environment, because people lived in those very noisy
11 and vibrating aircraft, and those people did experience
12 whole of body vibration disorder. Again, huge levels in
13 terms of - - and they did actually did - - some of those
14 people did actually have organ damage caused by
15 vibration of the organs in their bodies. So, those
16 effects occur at very high levels of vibration.

17
18 The point here is that the threshold that we're talking
19 about is the threshold set by an organ which has
20 specifically evolved to detect tiny levels of sound
21 pressure level, the ear. And, that is a long way below
22 the level at which other parts of our body can detect
23 vibration because it is actually moving parts of the
24 body.

25
26 So, I think that probably is what I have to say about
27 that.

28 **MR POWER:** And, on page 9 you discuss visual effects.

29 **DR BLACK:** Yes. Yes. Well, again, this is an area I have gone to
30 a lot.

31

1 Part of the concerns about this have arisen because in
2 many countries such as the USA and in the low countries
3 of Europe the way in which wind turbines are used is as
4 a source of local power. And so, in countries like
5 Austria and Belgium, Holland, wind turbines are just
6 distributed through the community and they are often - -
7 they're not really on windfarms. They're often quite
8 close to houses. And so, it is - - you can actually
9 have a turbine blade turning - - you know, occupying
10 quite a large part of the visual field and also the part
11 between the sun and your house. And of course, I
12 suppose you might say Holland and Belgium have had that
13 for centuries with their mills.

14
15 And so, there have been some issues which people have
16 been concerned about and they are the possibility of
17 flicker caused by the blades moving and - - and strobing
18 has been raised. And, I just clarify those terms.
19 Flicker really means if the path of light has been
20 interrupted so if something is going past that light
21 there I would perceive that as being a flicker on my
22 paper here.

23
24 Strobing refers to when two rotating objects interact
25 with each other and cause a - - and then cause a
26 secondary flicker caused by the interaction of them.
27 And, that can then happen over a frequency which is
28 different to and usually higher than the frequency
29 caused by the turbine. Because, turbines do rotate
30 generally quite slowly. And so, the concept of flicker
31 depends really on what part of the turbine. Because,

1 although the hub is rotating quite strongly, the
2 velocity of the turbine - because the blades are huge -
3 is quite high. And so, it depends what part of the
4 turbine is actually causing the flicker.

5
6 The other one is wind, which has been described as the
7 FPB, the manner in which light reflects from the turbine
8 blade is specular, rather than diffuse. Specular means
9 like a mirror, and of course you know, the old sending
10 Morse with a mirror from a distance. Well, if you've
11 got a shiny turbine blade, sooner or later the angle of
12 it might end up such that it acts like a mirror and
13 sends off, you know, like a Morse signal in a cowboy
14 movie. And, that certainly has happened. And, you
15 know, people can find that irritating, even a driving
16 distraction, and it's best that that doesn't happen.

17
18 And, the way in which you do that is to ensure that
19 turbine blades have a diffuse rather than specular
20 surface. And, that's a matter which the manufacturers
21 have looked at in a lot of detail and dealt with, and is
22 certainly something which is as a matter of practice,
23 turbine blades should not have a specular surface.

24
25 The flicker - well, the flicker really is a matter of
26 how close the turbines are to the viewer. And, if the
27 turbine is 100 metres from a house the flicker is quite
28 a possibility. If flicker is - - if the turbine is 10
29 kilometres from the house, even if the turbine was in
30 the direct path of the skylight or sunlight, it would
31 not cause flicker because the light finds other ways

1 around that interruption and so you don't see flicker.

2
3 And so, in the context of windfarms such as we see in
4 New Zealand and this one in Australia, flicker is not
5 really an issue. But, having said that, it is also
6 something that needs to be thought about and it's
7 certainly not something that I would say just forget
8 about it. Flicker - - windfarms should be designed so
9 that flicker doesn't happen. My understanding - I have
10 looked at that in this one - and I certainly am
11 satisfied that I can't see how there could be flicker or
12 strobing from this development because of the large
13 distances involved and because of the proximity of
14 residential and other properties within - - in a light
15 path from it.

16
17 The other thing is that the flicker is, of course, a
18 soft flicker and because the speed - - the flicker would
19 be caused by the blade passing a source of light. And,
20 along the length of the turbine blade, it's actually
21 moving at a different speed and so it's soft flicker.
22 It's not like a shutter opening and shutting. It's
23 actually a soft change so, again, it's not a pulse
24 swath, which is the type of flicker which really does
25 cause people, you know, to be annoyed.

26
27 We've always had people who, quite understandably and
28 reasonably, raise concerns about epilepsy, because there
29 are - - first of all, there is the quite well-known case
30 of Japanese children who have had hundreds of cases of
31 epilepsy caused by flicker on a TV program years ago.

1 Flicker at the right frequency and the right colour
2 which occupies most of the visual field can precipitate
3 epilepsy in people who aren't necessarily predisposed to
4 it. But, to do that it's got to really be a specific
5 colour and it's got to occupy at least a quarter of the
6 visual field of the person. So, it's not anywhere near
7 that and it's also got to be a sharp, one-off pulse.
8 And so, we are nowhere near that. And so, the issue of
9 epilepsy and wind turbulence just isn't plausible.
10 Of course, again, I've had parents raise with me, and
11 again perfectly reasonable, that they have to be careful
12 because of their epileptic children, had been driving
13 along the road passing a row of trees and the child
14 looks at the trees and sees the flickering. It can
15 sometimes cause a seizure. It can, so - -

16 **MEMBER:** Causes - -?

17 **DR BLACK:** Causes a seizure in epileptic people. It has been
18 known. But, that is a sharp one-off pulse, and the
19 situation would be that the skylight behind the trees,
20 you're driving along and you're getting a sharp light,
21 on, off, on, off in the whole of the visual field of the
22 observer. That can't happen with wind turbines and
23 certainly when they are kilometres away it's such a tiny
24 part of the visual field there really is no visual sharp
25 flicker. There is no visual flicker, actually, at all.

26
27 So, I understand the concerns, but they are not
28 plausible causes of health effects, and I've never seen
29 or heard of - - I've had reported in me cases where
30 somebody has said yes, I've heard of a case of epilepsy,
31 and I was in the UK and I investigated it right down and

1 it actually had nothing to do with the wind turbine. I
2 mean, there was a wind turbine there and an epileptic
3 child there, and the epilepsy did not happen when
4 looking at the turbine. It was the proximity. The fact
5 that there was a wind turbine apparently had been
6 associated with the fact, but there was no visual
7 effect. So, I have never heard of - - there's certainly
8 nothing in the scientific literature and there's no
9 reports of epilepsy caused by wind turbines.

10 **MR POWER:** Thank you, Dr Black. On page 10 you discuss mental
11 health and stress.

12 **DR BLACK:** Yes.

13 **MR POWER:** And, the Tribunal has heard submissions of pandemics of
14 - -

15 **DR BLACK:** Yes.

16 **MR POWER:** People who live in the vicinity of the proposed wind
17 farm site and informed the Tribunal about their post-
18 traumatic stress disorder. In one instance a witness
19 explained how he had reacted - - had a very adverse
20 reaction from a wind farm at night time.

21 **DR BLACK:** Mm, mm.

22 **MR POWER:** Can I ask you to just take the Tribunal to the key
23 issues you discuss on page 10, but perhaps also bear in
24 mind the particular example about the gentleman who
25 reacted to the illuminated windfarm at night.

26 **DR BLACK:** Yes. Firstly, I would say post traumatic stress
27 disorder is a - - it's a controversial diagnosis and
28 it's a difficult one because it's a diagnosis which is
29 about the cause rather than about what we are actually
30 see in the paper which is not very helpful in terms of
31 providing help or management of a patient. So, it's one

1 that some might say as a clinician yes, all right, but
2 let's find out what's really going on here.

3
4 But, typically people with post-traumatic stress
5 disorder have had events in their lives which have been
6 extremely distressing or literally terrifying, and it
7 goes back to the First World War, awful things which
8 have happened to people. And, the consequence of that
9 has been psychological or really psychiatric disorders
10 which have been caused or induced in those people which
11 caused them to be anxious, caused them to have attacks
12 of anxiety and of course often is associated with
13 depression, and cause people to seek quite
14 understandably and reasonably, an environment which is
15 highly predictable and one in which they feel that they
16 are safe, and which - - and that they therefore find
17 something which is outside their normal experience or
18 outside the safety of that environment which they have
19 become accustomed to, therefore that there is likely to
20 be a noxious effect on them. And, it is very distressing
21 for people and is very difficult and a very real
22 problem.

23
24 So, the gentleman that I've had described to me,
25 obviously was a fit gentleman. I know nothing about his
26 medical history but I'm sharing that, you know, if he's
27 had post traumatic stress disorder, possibly for
28 something like war service. He may find that something
29 new and sort of strong and particularly - - something at
30 night where, you know, you think there is - - if you
31 can't see all of it, you can only see the lights. You

1 see it moving. It's difficult to perceive distance.
2 It's even difficult to see exactly what it is and it's
3 the sort of thing that would scare people. And, it can
4 actually scare anybody, and most people say I wonder
5 what that is, you know, and just work it out. But, if
6 you are challenged in that way or you have anxiety or
7 you're a child, you know, something like that can be
8 terrifying. So, that's probably the mechanism by which
9 that occurred.

10
11 But, the end piece, that's the bit where I would
12 normally be looking for the diagnosis and, you know,
13 people like myself normally use the DSM, the Diagnostic
14 Statistical Meaning, which is the standard way of
15 diagnosing psychiatric disorders. It is likely that most
16 people describing their concerns have anxiety disorders
17 of one type or another. They may well be related to
18 depression, which is common in one out of 10 people.
19 And sometimes, really depressive disorders have
20 associated anxiety. And, people who suffer from these
21 conditions do often seek an environment in which they
22 feel that they're safe, that there's going to be no
23 change and which they felt comfortable and safe, and so
24 they may well, quite understandably, not necessarily
25 reasonably - but I don't say that in a pejorative way -
26 but they may feel that any change to the environment
27 threatens them.

28
29 And, that is it's actually quite common in development
30 proposals of this type, and I certainly have seen this
31 happen before with windfarm developments.

1
2 I saw it in one where I had the - - I don't mind saying
3 the one, it was the Tuyuku (?) one in New Zealand, where
4 some residents who were from quite distant towns but who
5 would have seen the turbines, and the concern was
6 actually drawn to my attention by one of the local
7 general practitioners. And, I followed that through,
8 not with the individual patients, but with the farm
9 being built, and the last I heard, which was well past a
10 year, was that there had been no effect and that the
11 concerns had come to nothing and the people didn't
12 notice the turbines and there was no effect. But, the
13 concern was raised.

14
15 So, again, the mitigation for this is, first, the
16 misinformation and also you can never care for people
17 who have, you know, individual disorders which are - -
18 are unpredictable and unreasonable - again not being
19 pejorative - but with concerns by controlling
20 development activities. People in this condition have
21 to be managed as individuals, which they are because
22 they're all different, and provided with clinical care,
23 and the thing about that is it works, particularly in
24 this sort of situation. It's actually very unlikely
25 that you would be able to deal with such concerns by
26 clinical care.

27
28 The most difficult situation is where a person would
29 develop an obsession - and I use that term literally in
30 a psychiatric sense. In other words, they have an
31 obsessive fear of, say, a wind turbine, and then that

1 can be quite hard. But, of course, it's really
2 important to avoid that happening in the first place,
3 because it's actually easier to stop it happening than
4 to fix it.

5 **MR POWER:** All right. Briefly you comment on at the bottom of
6 page 10 and the top of page 11 about wind turbine
7 syndrome.

8 **DR BLACK:** Yes, well, I've read - - I believe it's been written
9 about that by Dr DuPont's (?) and you know, it really is
10 - - I mean, it's pop science. It's not proper science.
11 The term "wind turbine syndrome" has been just coined as
12 a constellation of sometimes not anything like a - - I
13 mean syndromes generally have to have some, you know,
14 pretty strict rules about defining them in terms of it
15 and generally they are accepted by something like the
16 American Medical Association or some relevant body - -

17 **MR POWER:** Yes - -

18 **DR BLACK:** Well, the wind turbine syndrome hasn't even begun the
19 process of that because anybody looking at it would just
20 realise it's got no real - - it's got no [Indistinct].
21 It's the idea of it from Dr DuPont's (?) work. Dr
22 DuPont is largely I think a journalist these days,
23 anyway. And, the idea is that there is a constellation
24 of common symptoms or common reported symptoms which are
25 in relation to wind turbines that therefore are caused
26 by it. I really think that work has got no merit and no
27 science at all behind it, actually.

28 **MR POWER:** Thank you. And then on page 11 - -

29 **MEMBER:** Just before you go on, the medical profession as I
30 understand it, has coined words to describe certain
31 obsessions like an obsession with birds - -

1 **DR BLACK:** Mm, mm - -

2 **MEMBER:** An obsession with snakes - -

3 **DR BLACK:** Mm, mm - - yes.

4 **MEMBER:** Have they as yet coined one to describe the obsession
5 with wind turbines?

6 **DR BLACK:** No, sir, they haven't. And, in fact - - you're right,
7 there are a number of terms in the DSM for specific
8 obsessions - - obsessive fears - -

9 **MEMBER:** Yes - -

10 **DR BLACK:** That's what they are. Even clowns is an interesting
11 one.

12 **MEMBER:** Clowns?

13 **DR BLACK:** Yes, clowns. There are some people who are terrified
14 of clowns, absolutely you know who - -

15 **MEMBER:** Yes - -

16 **DR BLACK:** Go into a state when they see a clown. And, there are -
17 - no, there is not one for wind turbines.

18

19 And, to be honest, I have never - - I mean, I have seen
20 some of these other obsessions with, you know, spiders
21 is common. Mice is just about universal - -

22 **MEMBER:** Or [Indistinct].

23 **DR BLACK:** But, I have never seen a patient who has developed and
24 sustained obsessive fear of wind turbines to the point
25 where you would want to put a name on it, and if I did,
26 I would probably write it up.

27 **MEMBER:** Thank you.

28 **MR POWER:** Thank you. On page 11, you discuss, briefly - - or,
29 not briefly, you discuss the significance raised in
30 terms of family members who have autism spectrum
31 disorder, in fact the mother of - -

1 **DR BLACK:** Mm, mm - -

2 **MR POWER:** Children who has children who have autism spectrum
3 disorder have made submissions to this Tribunal. So,
4 are there any particular matters, bearing in mind the
5 Tribunal has read this, that you wished to take the
6 Tribunal to?

7 **DR BLACK:** It's a very interesting area because it is one that we
8 were asked to look at in relation to two developments
9 that were geographically close together and a number of
10 families had raised concerns.

11
12 I did a lot of research on it and talked to a lot of
13 experts about the area and came to the conclusion that
14 really, there was a case to answer, that, in fact, it
15 was possible that children who have autism spectrum
16 disorder who have enough to deal with in the world
17 without anything else adding to it, might find that a
18 development like a wind turbine arriving at their
19 environment could be distressing for them. And so
20 [Indistinct] and of course ASD is really quite common.
21 Depending on what figures you use, but it's as many as
22 one in a hundred children, so wherever you go in - and I
23 assume Australia is the same as New Zealand, you know,
24 if you've got a population of 100 children, which is not
25 that many, you're going to have a case, so you really
26 can't - - you really have to find a way of behaving to
27 accommodate the problem.

28
29 And again, the reaction is outside of the normal
30 population. The normal population does not have autism.
31 That isn't to say that people with autism are not part

1 of the population, but they are people who can't
2 necessarily be protected by normal environmental
3 controls. And, clearly, the way that any of the other
4 area, kids with autism are managed, is individual, in
5 clinical cases. And, that's very much the case. I
6 spoke - - in fact, one of these - - I should perhaps
7 mention, Sir, that one of these cases is the case of the
8 Mt Cass wind farm which has been before the New Zealand
9 Environmental Court, and I'll mention that, it's in the
10 public domain. There was an awful lot of discussion
11 there.

12
13 A lot of experts were consulted through my connection
14 with the university. I found people who knew the most
15 about it.

16 **MEMBER:** Was what was before the court an Application for
17 development approval or before the court on some
18 compliance matter?

19 **DR BLACK:** No, development approval, sir. It was the subject of
20 an appeal. There was a local hearing that was appealed
21 and then it went to the Environment Court. It was quite
22 a long and varied hearing. But, then, the development
23 was approved. It's going to be built sometime. I don't
24 think they've started building it. It's in North
25 Canterbury sir, North of Christchurch.

26
27 And, there's another adjacent site which is Hananui
28 which I think - - I don't think that that's quite so far
29 down the track. But, I'd have to say that the work we
30 did was actually in relation to both of them.

31

1 I found, though, people who have had long experience in
2 the area and also up-to-date researchers, the universal
3 conclusion was that where this could be an issue during
4 the phase of development, construction, that individual
5 attention should be provided for the children. And, it
6 was concluded that the most important thing was to
7 ensure that the change in the environment was explained
8 to the children, and that the real risk would be people
9 saying to the children, "See that thing going out over
10 there, that's going to hurt you" or, you know, "That is
11 bad" because that's what really can have an extremely
12 adverse effect and creating a sort of bogey out of the
13 development. And it's not just wind turbines, it's
14 anything. But, wind turbines do have this characteristic
15 where they sort of grown out of the ground and then they
16 have something on it that's moving.

17
18 And, interestingly, one of the things that came out of
19 it, one of the standard pieces of advice often given is
20 for parents with ASD kids is to put up a flagpole,
21 because children often find looking at a flag quite
22 helpful to them because it's something which moves but
23 is there and they can put their flag up and down. So,
24 to an extent - - I'm not sure to what extent that's
25 helpful, but, the context in which it was said to be was
26 that if the children were helped in an appropriate way
27 it's more likely that the development of a windfarm
28 could be a positive picture in their lives than a
29 negative one. But, as for many developments in the
30 community. So, that's as far as we got with that.

31

1 Now, I haven't looked at the principle of Asperger's and
2 actually, Asperger's is a bit of a different thing. I'm
3 not so sure about Asperger's - - would be somehow I'm
4 quite so concerned about, but having said that, I
5 haven't been involved in the clinical cases. So, I
6 think we should just stick to generic, at [Indistinct]
7 should be linked to that location and had a look. It's
8 a very long way from the nearest turbine. The turbine
9 would be an extremely small and remote part of the view
10 from that property and one which would not be at all,
11 you know, overwhelming and, in fact, you would really
12 probably have to look for them to see them. So, I think
13 to the extent that that's a visible change in the
14 environment, it's extremely minor.

15
16 But, I do acknowledge the issue. It is one that is
17 reasonably raised, and for which, you know, it is worth
18 considering in the infrastructure.

19 **MR POWER:** In anticipation of the question that Mr Chairman might
20 put to you through the witness, are you familiar with
21 the community consideration to the Bradford Hill - -?

22 **DR BLACK:** Yes, the Bradford Hill viewpoints or criteria, yes I am
23 I'm very familiar.

24 **MR POWER:** Can you explain what your understanding is.

25 **DR BLACK:** Yes. Sir Austin Bradford Hill was one of the great
26 epidemiologists and started in the 1930s and worked
27 until the 1950s, 60s, 70s with Sir Richard Bold who were
28 the people that found the link between smoking and
29 cancer. And, the Bradford Hill - - he described what I
30 call criteria now, but he described them as viewpoints.
31 But - - it's not too important. And, the reason for the

1 Bradford Hill - I will use it in criteria to avoid
2 confusion - was because what Sir Austin had said was
3 that you may have some statistically significant data
4 which seems to suggest cause and effect, seems to be
5 evidence of causation, but that alone is not proof of
6 cause and effect.

7
8 So, a statistically significant relationship does not in
9 itself prove cause and effect. You need more. And so
10 what he said is you need to stand back and look at the
11 data from some other viewpoints. And there were nine,
12 originally nine criteria. It is now generally seven.
13 But, they are - - and so he delivered - - Sir Austin
14 delivered this idea to, really, one of those meetings
15 that all of us wish we were at, The Royal Society
16 meeting of 1965 and it was published, they published the
17 proceedings shortly afterwards, and it has become a
18 central piece of work that, you know, we still use a lot
19 in teaching at medical school.

20
21 The viewpoints are the strength of the association -
22 that is, how large is the effect. So, if something has
23 a huge effect like, for example, smoking and cancer, you
24 would say, well, that's - - the association is so large
25 that it's pretty convincing.

26
27 The trick with that is that a weak association can still
28 be important. So, a strong association is more
29 persuasive, as long as you are not of course getting
30 some other source of bias or confusion, but a weak
31 association doesn't mean that it doesn't happen. And,

1 that also depends on how important the original is. For
2 example, a very weak association and a small risk of say
3 something like breast cancer can be terribly important,
4 because breast cancer is so common. So, that's one.

5
6 The second one is consistency of the observations, and
7 that is, you know, if you've got one study done one way
8 and another study done using a different methodology or
9 in a different place at a different time that starts to
10 become quite persuasive, so if you see the same thing
11 happening.

12
13 The risk of that, of course, particularly these days is
14 that if something happens in one case, even if it's
15 wrong, the nature of modern media is that it's likely to
16 influence somebody saying yes, we've got the same thing
17 here. It's like when you see that medical practice. I
18 practice a bit in a small town and often something can
19 be diagnosed and then two or three other people turn up
20 thinking they must have it. It's human nature. It's not
21 entirely unreasonable. So, you wouldn't [Indistinct]
22 and we now see it. So, for example take the wind
23 turbines syndrome. The risk is, you know, that somebody
24 describes that and somebody in another part of the world
25 sees it on the Internet and says, oh, it's the same
26 here, and really doesn't meet Sir Austin's criteria,
27 because what he would want is to have it happen without
28 any bias by other information.

29
30 Specificity is the third one, and that really is saying
31 is it really only this cause of the effect or could

1 there be other things? And, of course the great way to
2 prove specificity is to see if you can remove either the
3 effect or the person with a few of the patients, and see
4 if it goes away and comes back. Now, we do an
5 occupational [Indistinct] often. You know, you can
6 often change something. You know, something simple
7 like, you know, we get an outbreak of dermatitis and so
8 we change a hand cleaner and if the dermatitis goes away
9 it's probably that, that sort of thing.

10
11 Temporal relationship is the fourth one, and what - -
12 this is sort of self-evident really but nonetheless it
13 still is an important test, and that really is does the
14 punitive cause precede the effect. Was this there
15 before the effect. Now, you might say in some of these
16 development applications such as wind turbines but
17 others, too, sometimes you get people feeling unwell and
18 the anxiety before the actual effect there, so in fact
19 it's the idea of the development rather than the overall
20 effect on us which is causing the problem. That does
21 happen. But, you also do get the - - actually sometimes
22 you actually can test that scientifically.

23
24 A classic example of that is I've been involved a lot in
25 concerns about mobile telephone sites. There was an
26 extremely important paper published about three years
27 ago by my colleague Professor Heidi Duncan Hoffer in
28 Berlin where in the former East Germany, a town which
29 had a mobile telephone service from distant sites, and a
30 pretty unsatisfactory service, had a number of mobile
31 phone sites built and these were - - and she and her

1 colleagues studied the people in the town and their
2 concerns about these sites and collected a large
3 constellation of reported health effects, resulting from
4 the presence of these sites.

5
6 At the point of study where this had all been collected,
7 they then established that the sites had never been
8 turned on and so they found that, in fact, the reported
9 health conditions were occurring because of the presence
10 of the sites but not due to anything that they
11 transmitted. Now, that's a classic case of the
12 relationship requirements.

13
14 Biological gradients, the fifth one. And, this is
15 again, a tricky one because here we do often talk about
16 dose response, and that really means if a little bit of
17 something does a little bit for you then more of it
18 should do more. But that, of course, is not necessarily
19 the case at all. I mean, for example, the classic being
20 ionising radiation. You get 1000 people. It's a
21 fantastic effect, say something like, I don't know, an
22 atom bomb would do, and you will get - - you might give
23 two people who get leukaemia, but the rest don't. And
24 really it was not so much - - and it may well be that if
25 you had more radiation more people would have got it.
26 So, that's a dose response across a population, but
27 there's not really a dose response. I mean, that's an
28 increased effect across a population, but that's what in
29 epidemiology we call a "stochastic effect" meaning it's
30 random, and really dose response only works where things
31 work deterministically. That's the opposite to

1 stochastic. And, that means that you get more of the
2 dose the more the effect. And, the classic case of that
3 is noise hearing loss, to talk about noise. And, that
4 is that if you work in a noisy industry, that every day
5 you are exposed to an excessive amount of noise, your
6 hearing gets worse. And, that is a crude effect. It's
7 a linear dose response.

8
9 And, actually Sir Austin in his latter writing, he
10 really said for him if there wasn't a linear dose
11 response in individuals he really didn't think that
12 condition was satisfied. The problem is, in many cases,
13 the dose responses are not linear. So, that's quite a
14 difficult one but nonetheless it's there and it's
15 useful. And, that also is - - we will leave that one
16 there for now.

17
18 The sixth one is biological plausibility, and that's
19 quite a simple one, and that's it doesn't make sense.
20 In other words, this seems to be happening. Can we
21 explain how that works. Now, that's fine but of course
22 if you can't, if you can see how it works that might
23 help, but of course as long as you're not wrong. But,
24 of course, if you can't see how that works it doesn't
25 mean it's not happening. So, the lack of that does not
26 mean you are ignoring it. And, that is a really
27 important issue which is quite important for
28 epidemiology. Modern epidemiology is so sensitive that
29 if it says there is a problem, you have to behave as if
30 there is.

31

1 And, the classic case of that now, a very difficult
2 issue is the very small but nonetheless persistent
3 apparent increase in childhood leukaemia in children
4 exposed to magnetic fields from mains electricity, and
5 that's not really just over transmission lines, it's
6 magnetic fields from underfloor heating in houses. And,
7 that is a case where the epidemiology persistently says
8 that it seems to be increasing. And, every time you do
9 a study to disprove it, it tends up coming up with the
10 same answer, but it makes no sense. There is no
11 plausibility.

12
13 So, some people will say well, it can't be right because
14 it doesn't make sense. My view on that is - and I've
15 given this as evidence in environment courts in
16 Australia and New Zealand - that we can say it doesn't
17 make sense but we should still behave as if it's true
18 because we can't prove that it's not.

19 **MEMBER:** Now, that's a factor that is particularly evident in this
20 case, isn't it?

21 **DR BLACK:** I'm sorry, I missed that, sir.

22 **MEMBER:** That's a factor that is particularly evident here. There
23 is no - -

24 **DR BLACK:** There's no biological - -

25 **MEMBER:** Based on your evidence there is biological plausibility -
26 -

27 **DR BLACK:** No. So, therefore - - yes, there is no biological
28 plausibility for some of the concerns - -

29 **MEMBER:** Yes - -

30 **DR BLACK:** Unless, of course, you do accept the biological
31 plausibility of the psychological sensitisation.

1 **MEMBER:** Oh, yes - -

2 **DR BLACK:** Because to me what I am seeing in this case makes
3 absolute sense if that's the diagnosis. And, I have to
4 say also that in cases where there has been some
5 intervention or follow-up at least that also fits that
6 explanation.

7 **MEMBER:** Yes.

8 **MR POWER:** But not be a biological plausibility, the sound levels,
9 the A weighted sound levels are too high?

10 **DR BLACK:** Yes. If they were too high, they would cause sleep
11 disturbance.

12 **MR POWER:** And would there be a biological explanation and
13 causation if the source of the noise had tonal, tones?

14 **DR BLACK:** Yes. That's an interesting issue because the tonal - -
15 I had experience with - - I mean, it's in the public
16 domain so I can mention it. The Makara Windfarm in
17 Wellington is one. There were some difficulties with
18 two turbines that - -

19 **MR POWER:** I am familiar with it.

20 **DR BLACK:** Sorry?

21 **MR POWER:** I am familiar with it.

22 **DR BLACK:** Yes. So, the turbine had some faults, they had some
23 mechanical faults and they sang a bit from the
24 mechanical, and people - - the tonal sound, although it
25 was no higher in terms of - - it probably was compliant
26 - - I'm not absolutely sure of this. I think it was
27 still compliant with the standard in terms of the sound
28 pressure level but it was so characteristic that it
29 annoyed people, whereas, you know, the normal windfarm
30 noise is a natural type sound which disappears amongst
31 the rustling of the trees.

1 **MEMBER:** Which windfarm was that?

2 **DR BLACK:** It's Makara.

3 **MR POWER:** M-a-k-a-r-a.

4 **DR BLACK:** And it was owned by - -

5 **MR POWER:** Meridian - -

6 **DR BLACK:** Meridian Energy, yes. But also some of the earlier - -

7 I can't think of the name of the wind farm here but some

8 of the earlier turbines, some of the very earlier models

9 in Palmerston North had some issues there. And, the

10 issue here is that wind turbine noise generated by the

11 blades as I've described, it tends to vary with the

12 wind. It's more if the wind is blowing and it's less if

13 it's not. It's a broad spectrum, soft, rustling sound,

14 which does disappear into the natural sounds. If

15 something is wining, it's clearly not a natural sound.

16 It tends to be less dependent on - - it is still carried

17 by the wind but it is less. People don't like it, and

18 so it's something which turbine operators need to avoid

19 in the design, or which turbine manufacturers now have

20 and also if it happens it needs to be fixed, and it's

21 fixed by stopping that turbine and fixing it, not

22 putting it back on line until it's fixed.

23 **MR POWER:** I interrupted you - -

24 **DR BLACK:** That's fine. So, I did biological plausibility, and

25 Sir Austin's words, I remember him saying, does it make

26 sense. That was it.

27

28 Coherence. Does the evidence fit with what is known in

29 terms of mental history and biology. Now, that's a bit

30 like - - that one has got purged into the biological

31 plausibility one these days, and also so has the next

1 one, which is experimental evidence. And, that is going
2 to tell you if you think something's happening, and
3 that's the problem with - - that's the problem with the
4 power lines and electric fields is that experimental
5 evidence, people keep thinking they've found an
6 explanation and they repeat the study and it's not. It
7 happens all the time.

8
9 So, if you've got something that seems to be happening
10 and then you can do a laboratory experiment which
11 actually, you know, sort of replicates the effect in
12 some way, that's quite - - that's persuasive.

13
14 And, the other one, the final one, is an analogy. This
15 is where - - this is a tricky one because it can lead to
16 a lot of these misunderstandings, because what an
17 analogy is, is that if there's something similar that we
18 know is happening and if that's happening well, perhaps
19 this will too. And the classic one where that went from
20 is - - going back to the mobile phone business, because
21 radiofrequency energy is elliptical radiation, as is
22 visible light, it's all called radiation, because it is.
23 But, ionising radiation such as x-rays and gamma rays
24 has the ability to knock bits off DNA and cause
25 disastrous effects. Ultraviolet radiation has the
26 ability to cause changes in our skin and cause skin
27 cancer. So, they are banned and they are radiation, and
28 of course people say, well, therefore, radiofrequency
29 radiation is analogous but the thing is it isn't,
30 because the features from it are completely different.
31 They don't have those characteristics. So the analogy

1 thing is a trick. You've got to be sure that it really
2 is a true analogy.

3
4 And so, in summary - - that's quite a detailed
5 discussion about it all, but that is all still important
6 because we use it in teaching. It's a great way of
7 getting your head around these things and it's a very
8 valuable thing in teaching. I use this and have for 25
9 years in teaching medical students, and I still do it.

10
11 But, for professional epidemiologists it's gone a bit
12 out of favour because what they do now - - in the sort
13 of evidence-based medicine movement, what they do is
14 they simply talk about direct mechanistic and parallel
15 evidence. And, direct evidence means, you know, clear
16 proof of cause and effect. Mechanistic means like
17 experimental evidence or an explanation or if it doesn't
18 make sense. In other words, if you can say that
19 something seems to be happening and here's how it works.
20 That is evidence, so that replaces some of the Bradford
21 Hill criteria. And, the parallel evidence is the
22 analogy type thing. In other words, is there something
23 else that we know goes on so this is just another case
24 of that in another guise. So, those are the three words
25 that tend to be used.

26
27 So, you will see modern epidemiological practice that
28 don't actually go through Bradford Hill. They use those
29 three terms and they do actually replace them.

30
31 But, what is - - that actually is quite recent. That

1 was a paper published in 2009. Again, it's in the
2 Journal of the Royal Society of Medicine. I suppose
3 having started this they carried on. Howack and Dosien
4 (?) two important epidemiologists published quite a
5 good paper actually talking about the move to that.

6 **MEMBER:** And what are those three things, doctor?

7 **DR BLACK:** They are direct, sir, mechanistic and parallel. So,
8 direct replaces something where there's a clear cause
9 and effect, and that can be something like the
10 consistency and specificity. For example, if I get
11 somebody a drug for their blood pressure and it causes
12 them to have a cough - a common one does, and that's a
13 real case - and then I withdraw the drug and the cough
14 goes away, that's quite direct evidence of cause and
15 effect, and we do it in medical evidence all the time.
16 So, with something like that, that's a direct evidence.

17
18 Mechanistic means that you have an explanation for it.
19 You say, well, that caused the cough but we know it
20 affects this enzyme. But, we expect that. And so - -
21 and of course I'm talking about clinical practice, but
22 it happens in research, too.

23
24 And, parallel is like the analogy. There's something
25 else like this and really if you can be satisfied that
26 it really is similar, then it is evidence.

27 **MEMBER:** Yes.

28 **DR BLACK:** The other - - sorry, sir?

29 **MEMBER:** Just in the psychological sensitivity - -

30 **DR BLACK:** Yes, sir - -

31 **MEMBER:** The issue of taking the thing away wouldn't be proof of a

1 biological, physiological cause.

2 **DR BLACK:** No - -

3 **MEMBER:** So, it's tricky - - if it's a direct issue it could still
4 be tricky, couldn't it?

5 **DR BLACK:** Absolutely, absolutely, because - - the difficulty with
6 - - well, if you look at - - let's take shell shock in
7 the First World War, which did cause, you know, the most
8 extreme, horrible, psychological sensitisation
9 effectively but the war stopped but the disorder went
10 on. So, I mean, the real - - you certainly couldn't do
11 AB testing with something like that, no. But again, it
12 emphasises the importance of preventing things. And,
13 you know, as I said, the real culprit in causation of
14 these conditions - - and it's always the people who - -
15 well, I won't say always, but most of the time the
16 people who are predisposed is misinformation,
17 misunderstanding.

18 **MEMBER:** Incomplete information.

19 **MR POWER:** Dr Black, if I was to take you back to the first
20 viewpoint or criteria that suggests association - -

21 **DR BLACK:** Yes - -

22 **MR POWER:** Wind farms a critic might say there is a strong
23 association between windfarms and health impacts because
24 of the number of people who complain about them.

25 **DR BLACK:** Mm, mm.

26 **MR POWER:** What would be your positional view on that criticism?

27 **DR BLACK:** Well, my view on that is that that is not, in any way -
28 - it doesn't in any way provide evidence, and the reason
29 for that - - and that really goes on to the modern
30 approach to epidemiological studies because we are
31 talking here - - and what you put to me is really only

1 an epidemiological question.

2
3 And the - - as I mentioned earlier, Sir Austin Bradford
4 Hill described his viewpoints, his words, clearly, were
5 you seem to have a statistical association but that, in
6 itself, is not pre-causation. So, before you can even
7 use these you have to have a statistical association.
8 And, to get a statistical association you've got to do
9 some sort of study in which the statistics are not
10 confounded or biased. In other words, they are correct.
11 And, the way in which modern epidemiology does that is
12 to categorise studies into four levels of hierarchy, and
13 they are - - they are called levels, Level I, Level II,
14 Level III, Level IV.

15 **MR POWER:** Are you reading from a book there?

16 **DR BLACK:** Yes, I am. I was anticipating a question along this
17 line so I have that. And, I'm using a book which is
18 called Critical Appraisal of Epidemiological Studies and
19 Clinical Trials. It's in its third edition. It's by
20 Professor Mark Elwood who is probably well-known in
21 this. He was head of the Victorian cancer research for
22 quite a few years in Melbourne, based in Melbourne here.
23 He's now actually - - he went on to do a similar job in
24 Vancouver for British Columbia. And, he is now to our
25 great benefit, Professor of Cancer Epidemiology in
26 Auckland. He's one of the world's important
27 epidemiologists and he is my sort of age, 65ish and he
28 goes back to the days - - he goes right back through
29 modern epidemiology and, you know, he actually knew
30 people like Bradford Hill and Donald. So, he's come
31 through all that. This book is really about the sort of

1 moving on into modern epidemiology. We use it in
2 teaching a great deal. It's a very standard textbook.

3
4 So, I'm looking at page 100 and - - sorry, 342, which is
5 the - - and the heading is Hierarchies of Evidence.

6 **MEMBER:** What's the author's name?

7 **DR BLACK:** The book's name is Critical Appraisal of
8 Epidemiological Studies and Clinical Trials.

9 **MEMBER:** Yes.

10 **DR BLACK:** And the author is Elwood, Mark, and it's published by
11 Oxford University Press. I can give you the ISBN
12 numbers etc to Mr Power.

13 **MR POWER:** I will supply the Tribunal.

14 **DR BLACK:** Thanks. And, I'm sure Mark would not mind some copies
15 of the chapter, if it would help.

16 **MEMBER:** Level I?

17 **DR BLACK:** Level I - - well, let's start with Level IV. Level IV
18 are case series, so that's in other words I see few
19 people in my practice and in fact they seem to be - -
20 and sometimes they are really quite important. Last
21 year, I saw three cases of scarlet fever from the same
22 school. Now, I haven't seen scarlet fever for 20 years
23 and I said there seems to be some scarlet fever around
24 there, and, I mean, there was. So, sometimes a case
25 series like that can actually be leading you to do
26 something. But, sometimes they might not because the
27 assumption of cause and effect can be wrong.

28
29 Descriptive series - - sorry, descriptive studies, which
30 is saying, you know, this person looked in this area
31 and, you know, there's something down the road and they

1 ended up with this condition. We see this sort of thing
2 all the time. It's a bit like the people in Germany who
3 initially would have described concerns about health
4 effects from mobile phone sites.

5
6 Professional experience. I mean, you do get - - and
7 professional experience is not to be taken lightly. I
8 hope you don't mind me giving anecdotes, sir. I just
9 find that - -

10 **MEMBER:** No, I find it very helpful.

11 **DR BLACK:** I do, too. I mean, I had a case recently where an
12 experienced urologist - it's got nothing to do with
13 this, but an experienced urologist referred a case to me
14 in Auckland. He was from Dunedin. He said this man's
15 got - - bladder cancer. He works in an engineering air
16 conditioning for 40 years I've seen more people like
17 this from this industry. I'm suspicious that there will
18 be - - the cause of this. And so I looked into it and
19 got, you know, data sheets and exactly what he was
20 using. And in amongst it was an absolute carcinogen.
21 There was no doubt about it. I mean, there it was. It
22 was clear that he had for years used things which are
23 proven to cause cancer. So sometimes - - and I took
24 notice of the fact that this guy had been a urologist
25 for a lot of years and wouldn't have said something like
26 that if it hadn't been quite strong.

27
28 So, you know, none of these are to be taken lightly but,
29 they do not prove cause and effect. They can't.

30
31 You then get up to Level III, which is other comparative

1 studies. And, that's where often you will do a study
2 like a survey where you go around and collect cases.
3 You might actually go around and say there seems to be a
4 lot of us around here and so you go out and find out how
5 much there is. And, there is some traction there. A
6 classic case is in this city - - [Indistinct] because
7 I'm familiar with that. You might be familiar with the
8 ABC tower case where people - - there seemed to be a lot
9 of cancer in relation - - and there was something on the
10 roof. I wasn't involved with it so I don't know. But,
11 it was found there that there was a - - I think they
12 found it was a cluster but there was no causation.

13
14 Perhaps the more significant one, the more important
15 one, is that long ago Professor - - Dr [Indistinct]
16 Bruce Hocking did an interesting study in Sydney where
17 he looked at the proximity of the - - there's big radio
18 stacks in north of Sydney going back to the 1930s, and
19 there seemed to be a higher level of childhood leukaemia
20 in the area, and he linked the two in the study of
21 epidemiology. And, that seemed to be, on the face of
22 it, cause and effect, and it was really appropriate for
23 him to do that study because that was the first look at
24 that data. I mean, it was raised. There seems to be a
25 lot of childhood with leukaemia here so he said let's do
26 a study. He did a study, and there was. And then - -
27 so the next thing was another study was done to say well
28 - - and to look more deeply, and they actually found
29 that the childhood leukaemia was limited to children
30 that lived down closer to mud flats and was not - - had
31 a much stronger association with proximity to the

1 mudflats than it did to the presence of radio
2 transmitters.

3
4 Another analogous, similar case, was the work of Helen
5 Dolt in the UK, again, radio transmitters. There seem
6 to be a lot of leukaemia - - sorry, cancer around the
7 transmitter in the Sutton coalfields in the north of
8 England. As it happened, it was a BBC transmitter which
9 was a standard type. She then did a study of 22 other
10 virtually identical transmitters and found - - because,
11 you see, her initial study found that there was an
12 excess of cancer. It was more than you would expect.
13 But then she did a study of another 22 transmitters and
14 there wasn't. Therefore the Level III study that she
15 did indicated there was a problem. But as it was at the
16 Level II study that she went on to do proved, the
17 problem was not related to what appears to have been the
18 cause. So this is the progression.

19
20 So, Level II, a cohort and case-control study. And,
21 these are control studies where you actually have a way
22 of - - so if you take a case you then match it with a
23 non - - well, you take a case and match it with another
24 case that's not exposed. There are various ways of
25 doing it, but you actually control the study or you do
26 cohort studies. So, you take a group of people and you
27 follow that for 30 years, something like that. Those
28 are Level II studies.

29
30 Then, Level I are the randomised trials and those are -
31 - these are of course what are done for things like drug

1 trials where you randomise something like treatment with
2 a drug and you see them having randomised, say, the use
3 of the drug as to whether an effect pops out or not.
4 And, you know, they can cause some real surprises both
5 ways, those studies.

6
7 Now, what WHO - - with the areas like the radiofrequency
8 business is one, and many other sections, one of the
9 studies WHO has done which is enormously helpful is to
10 guide research that's done and to say - - and then to
11 say - - to set up international met analysis.

12 **MEMBER:** Yes.

13 **DR BLACK:** It would have the ability to bring in great
14 epidemiologists and to then say well what we will do is
15 do some guidelines for studies which are done all over
16 the world and that gets the coherence business, Bradford
17 Hill, and there we'll pool the data together and do
18 meta-analysis on it and we will - - in other words we
19 will take all the data and see if we can combine it and
20 that gets really powerful. So that increases the power
21 of Level II studies.

22
23 So, even Level II studies themselves can still be
24 subject to confounding and bias, and other things, too.
25 But, one way of reducing it greatly is then to combine
26 lots of studies and WHO do that all the time.

27
28 So the sort of - - it's a very long answer but I hope
29 it's helpful. The sort of data that we have from this
30 is Level IV.

31 **MR POWER:** The sort of data, do you mean data related to wind

1 farms?

2 **DR BLACK:** Yes, the sort of information that people are providing
3 to say, you know, I live near a wind farm and I get sick
4 or I know a dozen people who live here or I've been
5 around and collected, or even you know - - we've had at
6 Palmerston North a student there who had a degree - - it
7 was pretty bad research actually, but went around and
8 sort of had a questionnaire. You live near a wind farm.
9 Do you get any of the above? Tick, tick, tick and then
10 came back and said yes, and a lot of people get it and
11 so there seems to be a problem. All that could do at
12 most is to say okay, we need to do now a more critical
13 study which would be - - and that was really a level - -
14 it wasn't even really a Level II study.

15
16 If you do have - - if you asked the question here is a
17 wind farm and there seems to be a lot of sleep
18 disturbance around here, you could do a Level III study
19 and actually very carefully control - - not control,
20 sorry, very carefully collect information to establish
21 whether there was a lot of sleep disturbance around
22 there or a lot of whatever. You could do that and that
23 would be a Level III. A level III study cannot prove
24 causation, but what it can help you do is set up a Level
25 II study which then if it's properly controlled can be
26 given to prove causation.

27 **MEMBER:** But, the other side of the coin, I suppose is that it
28 could disprove causation?

29 **DR BLACK:** Oh, yes, sir.

30 **MEMBER:** In the survey that you mentioned as an example and it
31 came back with very few instances.

1 **DR BLACK:** Yes, you're right, sir, although I would say - - you
2 can't - - it's very hard to prove a negative - -

3 **MEMBER:** Yes - -

4 **DR BLACK:** You would disprove causation by not proving it. But,
5 all you've really done is not proved it. It's very hard
6 to actually do a study which absolutely - - I mean you
7 could do 10 studies in which we're trying - - you could
8 do a study in which you have a known hypothesis which is
9 either this doesn't cause that or it does and you do the
10 study. If you're known hypothesis is - - or your
11 hypothesis is that there is a relationship and then you
12 do 10 studies and it isn't, what you had to say is that
13 it's very unlikely that the hypothesis is true.

14 **MEMBER:** You've got to merge that with legal concepts like balance
15 of probabilities rather than certainties?

16 **DR BLACK:** Yes. Well, to address that, sir, because I deal with
17 that all the time because I work a lot in compensation
18 law, and that is something which causes a lot of
19 confusion. I mean, I'm very fair about it, or I think I
20 am. But, in science we use confidence levels, and so
21 what we do is we use statistical methods which say that
22 when we do a study, we're 95 percent sure that the
23 finding is right. So, if you do a study, a Level II
24 study and use the standard methodology you would say
25 there's only five percent or a one in 20 chance that the
26 result that we've got is not correct.

27
28 So - - and of course, the more studies you have the more
29 that confidence actually narrows if you've done that
30 that many times. And, that's because if you - - if we
31 used - - because in compensation law, I mean, if I went

1 and said that, you know, my medical investigation has -
2 - I've done a test in which most people who have that
3 test positive have that disease and therefore I think
4 that person has this. That would be a very
5 inappropriate medical test because we never use medical
6 diagnosis on balance of probability. We might sometimes
7 if someone - - sometimes you get something with high
8 stomach tenderness and you say well it's most likely
9 that they've got appendicitis so we better have a look.
10 These are sort of, you know, you don't go to 95 percent
11 unless you miss some. But, we don't really use balance
12 of probability there.

13
14 But, when we come to saying then I have got scientific
15 information which says that there's only really a one in
16 20 chance that people who are exposed to this agent have
17 this disease because it's not caused by that agent, so
18 there's a 95 percent chance it is caused by that agent.
19 Then when I go to the ACT court in New Zealand I would
20 then be saying that - - you know, because there's then a
21 history of exposure and also the 95 percent certainty
22 about the relationship, then I would say over the
23 balance of probability hurdle, because then what I then
24 have to do is add up all of the things which is the
25 proof of causation to 95 percent, and the history of
26 exposure which might not be quite as good as 95 percent,
27 but it might be. And, all those things. All I have to
28 do is get over the balance of probability.

29
30 But, in terms of my experience - this is a legal matter
31 so I'm not giving evidence on the law but just in terms

1 of my experience - I often do have to look at things in
2 terms of balance of probability, but in terms of medical
3 data of certainty for cause and effect we never use
4 balance of probability, we always use, you know, the
5 confidence intervals at levels like 95 percent or even
6 2.5 percent.

7 **MEMBER:** Thank you. We might give the doctor a break, and say, 10
8 to 12.

9 **MR POWER:** I've actually finished with this witness, sir so - -

10 **MEMBER:** All right. Okay. We may have a couple more questions.

11 **MR POWER:** I anticipate that.

12 **MEMBER:** Okay, well, say, 10 to 12.

13

14 [Short break]

15

16 **MEMBER:** Are you finished, Mr - - ?

17 **MR POWER:** I have, sir.

18

19 **DAVID RUSSELL BLACK, recalled:**

20

21 **MEMBER:** I think you referred to a number of what I suppose are
22 called community surveys - -

23 **DR BLACK:** Yes.

24 **MEMBER:** One in South Australia and one in New South Wales, where,
25 after the establishment of a wind farm which was, in
26 both cases relatively controversial, I understand,
27 opponents to the establishment of a windfarm did a
28 survey of their local community where they had delivered
29 in some way a questionnaire asking about whether they
30 suffered some of the effects that had been talked about
31 in association with sleep disturbance, headaches and

1 things of that sort. And, they got at least one case of
2 reasonably good - I don't have the figures on my
3 fingertips but a reasonably good return rate of people
4 who responded, significant numbers, you know, reasonably
5 significant numbers saying they were affected by sleep
6 disturbance and things like that. How would that fit
7 into your [Indistinct] that you've just been talking
8 about, that sort of survey? Just before the break, you
9 talked about - I'm not terribly sure about, but you
10 talked about a Level III study may not be evidence of a
11 causal link but may generate a requirement for further
12 research.

13
14 So, in relation to these community surveys do they fit
15 into the model that you've, first, been talking about,
16 and secondly, are they evidence of a need to do further
17 research? That's what I'm asking.

18 **DR BLACK:** Well, to answer the second question first, if I may,
19 sir, if a properly conducted Level III study found an
20 apparent excess of a definable entity of a disease, in
21 other words a specific disease which had a proper
22 diagnosis - and I mean, sleep disorder would be one in
23 an area - then that would - that is not evidence of
24 causation because there is no control of the study.
25 But, that would then be the basis for generating a
26 hypothesis for a Level II study which could then provide
27 some evidence of cause and effect.

28
29 To return to the first question, where would the surveys
30 fit in, they are Level IV studies. They really are
31 descriptive series, and although they are surveys,

1 unless they are conducted with a tremendous amount of
2 care, and, you know, with all due respect to the people
3 who did them and yes, they really weren't people who
4 were skilled in surveying and statistics. The likelihood
5 of bias creeping in - I don't mean bias in a malicious
6 sense, I mean in a technical sense, creeping into the
7 answers, is so high because there would be things like
8 selection bias of the people that were surveyed, and
9 also, you know, it would depend on the sort of community
10 feeling about the sort of investment in the outcome of
11 the survey.

12
13 Of course, there is another possibility, and that is
14 that there was a problem. I am - - mean, I am standing
15 here suggesting perhaps that - - a lot of things that
16 could be wrong with the study, but of course another
17 possibility for the study is that in this particular
18 site there might well have been - there might have been
19 a problem, and the reason why the surveys were positive
20 was perhaps, you know, people were getting disturbed.
21 So, that needs to be considered. But, of course, I
22 can't comment on that because I don't know a specific
23 thing - a thing about the specific study. But, what I
24 would say, the result of the Level IV surveys which have
25 been done would range from the potential for them to be
26 uncontrolled and biased and confounded and therefore
27 they definitely couldn't provide evidence of causation,
28 and they arrange from that to actually finding something
29 which then needed further explanation which would then
30 be a Level III, which would be a more tightly conducted
31 survey and hypothesis to go through to a Level II.

1
2 The thing that I think is most likely missing, without
3 knowing anything about the one is a proper criteria of
4 the endpoint diagnosis. So, if people are reporting a
5 particular problem you need to be - they really should
6 have been defined in terms of preferably an
7 international classification of diseases classification
8 for which there will be diagnostic criteria, and then
9 the people should have - - you know, effectively
10 patients or people should have met that criteria. That
11 is, if you include - if you add up a whole lot of things
12 that are different the sum means nothing.

13 **MEMBER:** Would sleep disturbance of itself be a sufficient
14 description?

15 **DR BLACK:** If - sleep disturbance in itself, if people are
16 reporting - I mean, there's two sorts of sleep
17 disturbance. There is falling asleep and awakening.
18 But if - and so they are two different things.

19 **MEMBER:** This seems to be more awakening at night.

20 **DR BLACK:** So, awakening - and awakening would be a more powerful
21 indicator of a problem because the difficulty for the
22 [Indistinct] can be caused by a variety of, you know,
23 disorders including anxiety and worry, and actually
24 being woken from sleep is - - usually has a cause.

25 **MEMBER:** Yes.

26 **DR BLACK:** So, if there was a convincing - if there was convincing
27 evidence of a case or a case series of waking from
28 sleep, it would be quite easy to go on and then do a,
29 you know, a tightly conducted Level III study to
30 establish whether there really - I mean, the question
31 then is there seems to be a lot of people getting woken

1 from sleep around here. The question is, is that so?
2 Not the question is, is that caused by something? Now,
3 you can't take both those steps at once.

4 The first question is are there a lot of people in this
5 area getting woken from sleep? And, if the answer to
6 that is yes, then what you'd need to do is design a
7 study which related then to the proximity of the wind
8 turbine but probably found a control group somewhere
9 else that was similarly out of the way other than the
10 turbine, to see whether you could begin to prove cause
11 and effect. But then of course [Indistinct] you know,
12 you would say, well, if that seems - - if that does seem
13 to be - if your Level III study says there seem to be a
14 lot of people getting woken then you would say does the
15 thing - does this comply with the standard? And, that
16 would be the next question to ask.

17
18 Because, if the Level III found that there were, then
19 you would say well, given what we know and the fact that
20 we do quite a lot of data about what wakes people, if
21 you then found that people were regularly, you know,
22 being exposed to noises of 50 dB, well, you wouldn't
23 really go any further, it affects the problem.

24 **MEMBER:** But, if it did comply with the standard where do you go
25 then?

26 **DR BLACK:** If it did meet the standard then, effectively, a study
27 which found that there was a problem would be actually
28 showing that the standard was wrong.

29 **MEMBER:** Yes.

30 **DR BLACK:** And, you know, I mean, I have to say that given the
31 amount of input data into the standard, and the fact

1 that there are many other standards that use the same
2 data and have not been found wrong, that is very
3 unlikely. So, if you are then going to do a Level II
4 study which found that people were being woken, despite
5 apparent compliance with the standard, I guess my first
6 reaction to that is is this really complying with the
7 standard or are we missing something?

8 **MEMBER:** Yes - -

9 **DR BLACK:** You know, for example, is it only complied with if it's
10 measured? I would be not second guessing the standards
11 are wrong. I would be looking for non - - you know,
12 looking for some feature of non-compliance that hadn't
13 been discovered or some other effect some other noise,
14 effectively.

15 **MEMBER:** So, what's the difference between the - if the Level III
16 standard confirms what the Level IV survey has shown,
17 then you move to a Level II study, how does that differ
18 from the Level III study - -?

19 **DR BLACK:** The Level IV only suggests - it doesn't show. The
20 Level IV study suggests something that might be worth
21 doing in a more formal study.

22
23 The question for the Level III study would be there seem
24 to be a lot of people around here being woken from
25 sleep. The question is, is that so? In other words, in
26 this group of 232 people, are more people being woken
27 from sleep than you would expect in 232 people in the
28 normal population?

29 **MEMBER:** Yes.

30 **DR BLACK:** It would be either reasonably easy to look at that. It
31 would be reasonably easy to look at the level of sleep

1 disturbance in average Australians living in an
2 analogous - I mean, you would probably find some
3 research in which you could look at the sleep pattern of
4 average, you know, of Australians, and so we would
5 expect in this group of people we would expect, you
6 know, 15 percent of people to be woken asleep by the
7 fact that they've got prostatism or, you know, various
8 effects that wake people from sleep.

9 **MEMBER:** But, if your Level III study does sort of confirm what
10 your Level IV study is showing - -?

11 **DR BLACK:** The Level III study would confirm or deny - -

12 **MEMBER:** Yes - -

13 **DR BLACK:** That there were a lot of people being woken from sleep,
14 but it would actually not look at causation.

15 **MEMBER:** No, but if it confirms then you go to Level II - - ?

16 **DR BLACK:** Yes. If the Level III confirmed that a lot of people
17 would be woken from sleep more than you would expect - -

18 **MEMBER:** Yes - -

19 **DR BLACK:** Then the next question is what is the cause? So, then
20 you set up an hypothesis. The cause of this might be the
21 wind turbine.

22 **MEMBER:** Yes.

23 **DR BLACK:** So then, the next thing, the purpose of the study would
24 be to see if the turbine did comply and if there was
25 something that had been missed. But then, if not, the
26 next thing would be to do a Level II, but hypothesis is
27 that there are a lot of people being woken from sleep
28 here, more than we would expect in the average
29 Australian population. There is a wind farm nearby. Is
30 the wind farm the cause of this observed effect? And,
31 if it was, and it was compliant with the standard, then

1 that would cause somebody to have to say, well, is the
2 standard right?

3 **MEMBER:** Yes.

4 **DR BLACK:** Is the standard providing adequate protection.

5 **MEMBER:** How do you put that study together? How do you actually
6 identify cause and effect between your level - -?

7 **DR BLACK:** Because you - in your Level III you have established
8 the problem, the effect. I mean, I'm not going to cause
9 and effect because it might not be an effect but you
10 establish the fact that there is a problem.

11 **MEMBER:** Yes.

12 **DR BLACK:** So, then what you do, you then set up a hypothesis that
13 there is a cause - -

14 **MEMBER:** Yes - -

15 **DR BLACK:** And then, what you have to do is you have to set up a
16 study in which you study the people in that population
17 who had proximity to the putative cause and you would
18 have to control those cases from people from another
19 population who didn't have exposure to that cause and
20 see if there was a difference.

21 **MEMBER:** Yes.

22 **DR BLACK:** In other words, what you would say is that this is a
23 population exposed to a wind turbine. You find another
24 population that isn't, but as far as you can tell in
25 every other way are the same - -

26 **MEMBER:** Yes - -

27 **DR BLACK:** And then you say are these two different populations?

28 **MEMBER:** It might also be a function of proximity to the wind
29 farm.

30 **DR BLACK:** Yes. But then, of course, you could then introduce
31 into the study the concept of dose - -

1 **MEMBER:** Yes - -

2 **DR BLACK:** Dose gradients and exposure, but that is much more
3 complicated. But then, you wouldn't do that, you
4 wouldn't really go into a study, a true study, without
5 actually having some numbers to really want to have look
6 at - you would want to try and quantify numbers because
7 I mean, to go into - - because, I mean it would be quite
8 a business to do a study like that.

9 **MEMBER:** Yes.

10 **DR BLACK:** You would really need to have it done by somebody like
11 the epidemiologist at Monash. You know, there's plenty
12 of people in Victoria who would be, you know, very, very
13 well qualified to do such a study.

14 **MEMBER:** Yes.

15 **DR BLACK:** But, it would be quite a big job and it would not in
16 itself be definitive. I mean, one study, you know,
17 would still have the one in 20. You would still have -
18 - you know, you would still expect that - - there would
19 probably be outcomes which were not - one of the
20 problems with doing this sort of study is that you
21 invariably get outcomes that come out of the study which
22 were not part of the question, and part of the
23 discipline of epidemiology is that you set up a study to
24 answer the study question, and the result of the study -
25 the only result of the study is the answer to that
26 question, prove it or disprove it, but then, a lot of
27 other things come out. And, what people who aren't so
28 familiar with using a [Indistinct] are inclined to do is
29 to take those others that come out and say here you are,
30 that proves something else, and it doesn't. All it does
31 because - -

1 **MEMBER:** So you may be asking the wrong question?

2 **DR BLACK:** Well, the thing is that those other things - those
3 other things could have occurred by chance and in effect
4 you would expect there is a 1 in 20 chance that they
5 would, and so you say they mean nothing, except what
6 they might do is to say you need another study, which is
7 why universities like this sort of thing so much because
8 out of one study comes another 20. It's good for
9 business. But, I mean, it is quite relevant to use non-
10 statistical findings from one study as an hypothesis for
11 further study. Although, it's a waste of time. It's not
12 worth doing that but if you still haven't answered your
13 study question. It's really important to ask the right
14 study question in the first place, and then, you know,
15 pursue it. I mean, so, it would be quite worthwhile
16 doing sequel studies, because, as I was saying before if
17 you then - - where you've still got the, you know, one
18 in 20, but the more studies that you get, you can
19 tighten that confidence up.

20
21 Now, I would add - you haven't asked me this, nobody has
22 asked me this question, but I would add, I do think that
23 doing some studies like this in Australia and New
24 Zealand would actually be quite worthwhile.

25 **MEMBER:** Yes.

26 **DR BLACK:** I have discussed this with the universities. And in
27 fact I have discussed it as it happens with Professor
28 Harold (?) because the literature about windfarms around
29 the world is pretty flaky, really. A lot of it is not
30 good quality really. And, it would be of interest and
31 value to both scientists, legal practitioners, and also

1 I'm sure the windfarm industry, for that matter, to have
2 some better data.

3
4 I mean, one of the things in the standard-setting is the
5 idea of closed loop statistics so you set a standard.
6 You then comply with it. You then check that you are
7 complying with it, which is very important because if
8 you don't check that you are complying, the whole thing
9 could go bottoms up. And then you should - - part of a
10 closed loop is to check the outcome. So, if the idea of
11 a standard is the outcome, that is, that you prevent
12 sleep disturbance, then closed loop testing of that
13 should be (a) to check that you are complying with the
14 numbers; and (b) that you are complying with the
15 intention.

16 **MEMBER:** Do you know anything about the study that has recently
17 been proposed by the South Australian Environment
18 Protection Authority?

19 **DR BLACK:** No, sir, I don't.

20 **MEMBER:** Could I just ask you, Dr Black, what's been the
21 experience in Europe, if any, in relation to complaints
22 about wind turbines of the similar type that we have
23 been discussing?

24 **DR BLACK:** The answer is, sir, that there aren't really similar
25 types, because in Europe wind turbines are generally
26 used not on a wind farm but they are generally used in
27 much more densely populated areas and spread through the
28 population. So, the experience is that issues like
29 flicker are of more importance than they are here.
30 These are things which certainly which have to be
31 carefully controlled, but the experience is, for

1 example, the low countries where turbines are of a
2 similar type to this survey, not exactly the same type,
3 but often distributed through communities and are found
4 to be acceptable and only a matter of usually metres or
5 hundreds of metres away from dwellings.

6
7 There are - - there has been a little bit of published
8 work, and Spain, which is not very good quality, and
9 Denmark, which is better quality, about this issue, but
10 nothing that really - there's really nothing that's been
11 done that I'm aware of that's probably put as much work
12 on it as the New Zealand standard so that as it's New
13 Zealand it just so happens that there was - - because of
14 the development of really big windfarms in New Zealand -
15 - but the reason why windfarms suit - wind farms, not
16 turbines - suit countries like New Zealand is because
17 New Zealand has a lot of hydroelectricity and the thing
18 is a windfarm of course only generates when the wind is
19 blowing but that means you can effectively use the dams
20 as batteries.

21 **MEMBER:** The wind is always blowing in New Zealand.

22 **DR BLACK:** Well, often it's - it certainly seems to be at my
23 place, sir. So as long as the winds are blowing and the
24 turbines are generating, you then can slew the water
25 from the lakes.

26 **MEMBER:** Yes - -

27 **DR BLACK:** And in the UK, the Ffestiniog dam system, they actually
28 have a system in Wales where they actually pump water up
29 into a lake to store it. You can generate power because
30 they have a lot of nuclear base load and so it's a
31 little bit hard to adjust them up and down so you need

1 an ability to - - you need a system which can respond to
2 it quicker, to demand. So, what they do is actually
3 push water up into the lakes, the lakes of Ffestiniog,
4 at Ffestiniog in Wales and then of course they've got
5 effectively a hydro system. Now, in New Zealand we
6 don't need to do that because we've already got a lot of
7 water in the lakes. But, if we can conserve that water
8 in the lakes when the wind is blowing - - and so the
9 windfarms in New Zealand are ideally part of the
10 national grid. So, they can be in quite remote places
11 and just simply feeding into the baseload, and the
12 baseload of the New Zealand system is the dams,
13 geothermal, a little bit of thermal. And so, the
14 windfarm actually works well.

15
16 In Australia, I don't really know that much about
17 Australia. But, I know you have the Snowy Mountains
18 system and I know that Australia has a lot of coal
19 generation. So in Australia I would - I'm perhaps
20 outside of my expertise here but I think the windfarms
21 might contribute more to baseload than perhaps they do
22 in New Zealand, but I'm not sure of that.

23 **MEMBER:** And, the situation with the low countries in Europe is
24 that two months into the individual turbines - -

25 **DR BLACK:** Yes - -

26 **MEMBER:** You know, the particular village - -

27 **DR BLACK:** They generate local power - -

28 **MEMBER:** Generate a power for that village - -

29 **DR BLACK:** Yes, they do, yes, they do. And in fact, even in New
30 Zealand - and I mentioned the [Indistinct] farm, which
31 is one of the really big ones, in terms of looking at

1 that you could say - - to take up the observation of the
2 ones in New Zealand, it certainly is up there, and
3 probably most of the time the townships around that area
4 are being supplied by the windfarms.

5 **MEMBER:** Mm, mm.

6 **DR BLACK:** Because of the fact that it is a - you know, there are
7 turbines which are very elevated and quite remote and
8 getting a lot of wind and most of the time they're
9 generating and the amount of power consumed in that area
10 is not that great. But, I know that because I was
11 involved also in the design and construction of the
12 transmission line in and out of there, and I know that
13 there really is - you know, it's actually [Indistinct]
14 there's not a heck of a lot of power going in and out
15 and a lot of that power is used locally in that case.

16
17 But, other windfarms, for example the central - some of
18 the central North Island areas where there is almost no
19 population, and at their sole purpose is to feed them to
20 the national grid.

21 **MEMBER:** What's been the experience in North America? Have they
22 had the same - -?

23 **DR BLACK:** I don't know too much about it, to be honest. I know
24 that in North America there are some big windfarms
25 proposed. I know that, and in fact operating. And, of
26 course, I know that there have been - - there's a
27 significant sort of group of people moving around the US
28 who are concerned about it and led by a few individuals
29 like Dr [Indistinct].

30
31 I've spoken to my colleagues in the equivalent of the

1 college, in other words, specialists in the area,
2 medical specialists like me. Most of them say they have
3 never really been involved in it.

4 **MEMBER:** Yes.

5 **DR BLACK:** So, I delivered a paper on this area at the Brisbane -
6 - when we had the - - I'm the President of the
7 Biophysics Society at the moment and so I've used my
8 plenary session at Brisbane last year to deliver a paper
9 on wind turbines, and it was interesting because there
10 were a lot of people practising biophysics all over the
11 world. And, most people with analogous qualifications
12 and practices were not really being involved. Some of
13 them thought they would quite like to be. But, I don't
14 know if that fits different issues, different problems
15 and different ways of solving them. I really don't
16 know.

17 **MEMBER:** All right. Now, Mr Dabtick (?) have you got any
18 questions?

19 **MR DABTICK (?):** No.

20 **MEMBER:** Mr Quinn?

21
22 **CROSS-EXAMINED BY MR QUINN:**

23
24 **MR QUINN:** Thank you, Mr Chairman. Dr Black - -

25 **DR BLACK:** Sorry.

26 **MR QUINN:** You said you had done work in relation to windfarms and
27 the planning aspect in New Zealand?

28 **DR BLACK:** That's right, sir.

29 **MR QUINN:** Okay, and given evidence in relation to windfarms in
30 New Zealand?

31 **DR BLACK:** Yes.

1 **MR QUINN:** In how many cases have you given evidence to before?
2 **DR BLACK:** It would be more than 10.
3 **MR QUINN:** Ten?
4 **DR BLACK:** Well, I did say more than 10.
5 **MR QUINN:** More than 10?
6 **DR BLACK:** Yes. It would be - you know, I really can't count off
7 the top of my head but there would be some in the
8 planning stage. That's resource management yields and a
9 few in the Environment Court.
10 **MR QUINN:** Okay. Have any of those cases involved 3 megawatt
11 turbines on 100 metre towers with six metre blades?
12 **DR BLACK:** Certainly, some of them have got three megawatt
13 turbines. I'm not sure about the 100 metre towers, to
14 be honest. Possibly not. I would need to check, and
15 that's probably not very helpful. So, the answer has to
16 be I don't know.
17 **MR QUINN:** Now, I just want to take you to your statement.
18 **DR BLACK:** Yes.
19 **MR QUINN:** If I can, at page 3. I take you to the fourth paragraph
20 under the heading [Indistinct].
21 **DR BLACK:** Yes, Sir.
22 **MR QUINN:** You make this statement - you say that the New Zealand
23 standard is intended to eliminate the possibility of any
24 physiologically caused health disturbances from noise.
25 Do you have a copy of the New Zealand standard with you?
26 **DR BLACK:** Yes, I do.
27 **MR QUINN:** Volume 3, Tab 61. If you were taking that part of the
28 New Zealand standard and it says, "Compliance with that
29 standard eliminates the possibility of any
30 physiologically caused health disturbance from noise."
31 **DR BLACK:** I doubt if it does say that. I know it's intended to

1 because I know the basis of it from the WHO data, but
2 this is really a standard designed by acoustic
3 engineers, and it is the standard designed to enable
4 compliance and measurement. And, I don't think the
5 standard really makes statements about medical
6 endpoints.

7 **MR QUINN:** All right. Can I take you to page 7, please.

8 **DR BLACK:** Yes.

9 **MR QUINN:** And the forwarding standard.

10 **DR BLACK:** Yes.

11 **MR QUINN:** Do you see the second paragraph?

12 **MR BLACK:** Yes.

13 **MR QUINN:** In the first sentence it tells us that it does not
14 state evidence that provide absolute protection for
15 residents in audible wind farm standards. Do you see
16 that?

17 **DR BLACK:** Yes, it says, "Guidance is provided on noise limits
18 that are considered reasonable for protecting sleep and
19 amenity from wind farm sound received at noise sensitive
20 locations," yes.

21 **MR QUINN:** So, from that statement, would it be fair to say that
22 the New Zealand standard admits of the possibility of
23 sleep disturbance from a wind farm?

24 **MR QUINN:** Yes, I think it would be fair to say that the Standards
25 New Zealand have allowed for that. And, of course, the
26 reason for that is - - the process for setting standards
27 is one where a wide group of people is sought, and I am
28 aware of people who are involved in the standard and
29 there were quite diverse views in the group of people
30 that worked on the standard, and I would expect in order
31 to achieve agreement on publishing a standard that a

1 statement like that would have been required by some
2 interests in the committee.

3 **MR QUINN:** The statement that you made at paragraph 4 - -

4 **DR BLACK:** Yes - -

5 **MR QUINN:** On page 3 is not supported by what appears in the
6 forward?

7 **DR BLACK:** No, it's not.

8 **MR QUINN:** It's not. Thank you.

9 **MEMBER:** Look can you - - guidance is required by noise limits
10 that are considered reasonable for protecting certain
11 amenity, so where do you get the proposition you put to
12 him that - - in order to protect sleep?

13 **MR QUINN:** The only proposition I put is that the Black statement
14 says that it is designed or intended to eliminate the
15 possibility of any physiologically caused health
16 disturbances from noise. I've taken Dr Black to
17 paragraph 2 of the forward and he's agreed with me that
18 it doesn't make that statement. And, he admits of the
19 possibility that there will be sleep disturbance.

20 **MEMBER:** But, where do you get it from that sentence or even from
21 that paragraph?

22 **MR QUINN:** It's only, Sir, referring to a reasonable standard.

23 **MEMBER:** Yes - -

24 **MR QUINN:** It doesn't suggest that it eliminates sleep
25 disturbance, with respect.

26 **MEMBER:** No.

27 **DR BLACK:** If I could help, I'm agreeing that the forward allows
28 for that possibility, and because - - and the reason for
29 that it is, having had a lot of experience with
30 standards, inevitably that sort of all embracing
31 acceptance of a description of a standard is recorded -

1 - is necessary to achieve agreement on a standard.
2 Specifically, I am giving my opinion, my view, that the
3 standard, having regard to the basis of it, which is the
4 WHO numbers, does provide complete protection for the
5 normal population, and that is my opinion.

6
7 That is also my understanding of the methodology which
8 has gone into the design of that standard.

9 **MR QUINN:** Now, Dr Black, before you talked about scientific
10 studies on which the New Zealand standard was based - -

11 **MR BLACK:** I - -

12 **MR QUINN:** Studies - -

13 **DR BLACK:** Studies, sorry - -

14 **MR QUINN:** Alluded to what was done with the World Health
15 Organisation in Europe. Is that correct?

16 **DR BLACK:** Sorry, I didn't mean to interrupt. It's not really
17 studies. I mean, the studies - there are studies that
18 the World Health Organisation have used. The World
19 Health Organisation has then provided an analysis of
20 those studies to provide a guideline so that people like
21 Standards New Zealand can then produce a national
22 standard.

23
24 So, the World Health Organisation documents in
25 themselves are not studies in the sense of research,
26 they are analysis and collation of the current state of
27 scientific knowledge.

28 **MR QUINN:** I will come back to the standards in a moment.

29 **DR BLACK:** Okay.

30 **MR QUINN:** On page 4, if I can take that out, the page of your
31 statement. The last paragraph, on page 4, we see - -

1 DR BLACK: Yes - -

2 DR QUINN: You make the statement that Mr Turnbull's evidence
3 makes it clear that modern wind turbines do not use
4 special audible characteristics - -

5 DR BLACK: Yes - -

6 MR QUINN: And then you talk about significant modulation - -

7 DR BLACK: Yes.

8 MR QUINN: Or tonal complexes.

9 DR BLACK: Mm, mm.

10 MR QUINN: May the witness have in front of him a copy of LG 76.
11 That is the volume.

12 DR BLACK: Thank you. Yes, I've got that book.

13 MR QUINN: And, I might swap that over, sorry. May I approach the
14 witness? Could we go to Tab 11.

15 DR BLACK: Yes. That's the [Indistinct].

16 MR QUINN: That's fine. That's the document. And, if I could ask
17 you to turn to the body of the document, Dr Black,
18 paragraph 1.

19 DR BLACK: Yes.

20 MR QUINN: It says that the turbines in this case were installed
21 in 2011 - -

22 DR BLACK: Mm, mm - -

23 DR QUINN: Have you got that? These people were living in a home
24 about 2.5 kilometres from these turbines.

25 DR BLACK: Mm, mm.

26 MR QUINN: And, if we could then go to the next page, paragraph 6.
27 It is on page 2.

28 DR BLACK: Yes.

29 MR QUINN: And, evidence is given here about tonality being found
30 in wind turbine noise.

31 MR QUINN: Yes, I've got that. I read that.

1 **MR QUINN:** And, towards the back of the statement, are a series of
2 [Indistinct]. They are not numbered. But on the last
3 of them it says marked SKR 2?
4 **DR BLACK:** Yes, I've got that.
5 **MR QUINN:** They are an update on compliance [Indistinct].
6 **DR BLACK:** Yes.
7 **DR BLACK:** I take you to page 4 of that document.
8 **DR BLACK:** Yes, I've got that, the tonality assessment.
9 **MR QUINN:** The tonality assessment, and I ask you to note the top
10 dot point where it says, "[Indistinct] found tonality in
11 a location two kilometres from the nearest turbine" and
12 the next point refers to the wind speeds between three
13 metres and [Indistinct].
14 **DR BLACK:** Mm.
15 **MR QUINN:** Could I take you back to paragraph 21 of the affidavit,
16 please.
17 **DR BLACK:** Yes.
18 **MR QUINN:** Could you read that out loud, please?
19 **DR BLACK:** It says, "During the recommencing on 7th of March 2012
20 the turbine noise at our home has been dreadful at times
21 and has been very annoying at night disturbing our
22 sleep. Brendan Ryan of AGL rang me on the 13th of March
23 2012 in response to an email I had sent Mr Alshrager (?)
24 that morning and I told Mr Ryan that having just two
25 turbines turned off is not helping us nor our
26 neighbours. I then asked him to turn off all the
27 turbines at night."
28 **MR QUINN:** Right. That's not the first time we've heard people
29 living near wind turbines complaining about sleep?
30 **DR BLACK:** No, it's not.
31 **DR BLACK:** And, these people are 2 and-a-half kilometres away from

1 the turbines. I note that.

2 DR BLACK: Mm.

3 MR QUINN: This wind farm, assuming those turbines have been
4 constructed in 2011 - -

5 DR BLACK: Well, I have no knowledge of what they are.

6 MR QUINN: All right - -

7 DR BLACK: I can't assume that, but I mean, I accept it from what
8 you're telling me.

9 MR QUINN: And assuming they are a modern wind turbine - -

10 DR BLACK: If you say so - -

11 MR QUINN: Assume that at the moment. We have evidence of a tonal
12 problem in a modern wind turbines, don't we?

13 DR BLACK: Yes.

14 MR QUINN: Thank you. And, in relation to what was read out in
15 paragraph 21, these people are farmers.

16 DR BLACK: Mm, mm.

17 MR QUINN: Living 2 and-a-half kilometres from the turbines.

18 DR BLACK: Yes.

19 MR QUINN: Have you met Australian farmers?

20 DR BLACK: Yes, I have.

21 MR QUINN: Is "hypersensitive" a word that you would use in
22 relation to Australian farmers generally?

23 DR BLACK: Not generally, but it's not impossible.

24 MR QUINN: Right. If you can come back to your statement, please.

25 DR BLACK: Yes.

26 MR QUINN: And, page 6, please, the second paragraph. Do you see
27 that paragraph, the second last sentence, you made a
28 statement that, "Usually the distant sound of a wind
29 turbine heard one to 2 kilometres as similar
30 characteristics to noise which would actually be used
31 for masking" - -

1 **DR BLACK:** Yes.

2 **MR QUINN:** Where is the evidence to support that statement, Dr
3 Black?

4 **DR BLACK:** It's my known knowledge of the type of view - - noise
5 used for masking, on which I have some experience, which
6 is white noise of a level which is just above the
7 perceived level of tinnitus, which is equivalent to
8 exposure of around between 30 and 50 dB, so that's my
9 clinical experience.

10 **MR QUINN:** And even as to wind turbines - -

11 **DR BLACK:** Mm, mm.

12 **MR QUINN:** Where is the firm research to relate the masking noise
13 that you're talking about to wind turbine noise that was
14 inside homes, for instance?

15 **DR BLACK:** There's none. I'm not aware of any. It's an explanation
16 from my clinical experience of the characteristics of
17 the noise which I would - well, more than I would
18 expect, that I have heard and I'm aware can be heard
19 from wind turbines in the distance, usually compliant
20 with the standard. In other words, this was a
21 [Indistinct] and the level at which masking noise is
22 set. Masking noise is generally set to be just above the
23 level of usually tinnitus which people hear, and it's
24 white noise and the noise of turbines as we discussed
25 earlier, the whooshing noise is white noise. That's why
26 I say it's [Indistinct].

27 **MR QUINN:** You have described it as a whooshing noise.

28 **DR BLACK:** Mm, mm.

29 **MR QUINN:** And it comes under the descriptions of other people.
30 Have you ever lived for any length of time within the
31 proximity of a wind farm?

1 DR BLACK: No.

2 MR QUINN: Were you provided before you gave evidence with a
3 statement from Mr David Mortimer?

4 MR QUINN: Yes.

5 DR BLACK: So you have read it?

6 DR BLACK: Yes.

7 MR QUINN: You are familiar with the statement?

8 DR BLACK: No. I've read it, but I'd need to refresh it.

9 MR QUINN: All right. I take you to 2.6 at 16. You don't have a
10 copy with you?

11 DR BLACK: I - - yes. I could find it. I have but it would
12 probably take me a while to find it.

13 MR QUINN: I will just you one then.

14 DR BLACK: Thank you. Yes, I confirm I have read this, but it's
15 not at the front of my mind so - -

16 DR BLACK: This gentleman lives with his wife 2.5 kilometres from
17 wind turbines and has given evidence to this Tribunal
18 about the impacts on him - -

19 DR BLACK: Yes - -

20 MR QUINN: And his wife - -

21 DR BLACK: Yes - -

22 MR QUINN: And one of the topics that he describes is particularly
23 tinnitus - -

24 DR BLACK: Yes - -

25 MR QUINN: And he referred in this evidence-in-chief, "Tinnitus
26 was something that increased with" - - sorry, I will
27 withdraw that. It increased during the period that he
28 was living at home - -

29 DR BLACK: Mm, mm - -

30 MR QUINN: Next to the wind turbines, and diminished when he went
31 away.

1 **DR BLACK:** Mm, mm.

2 **MR QUINN:** Would that be consistent with some factor in his home
3 causing tinnitus?

4 **DR BLACK:** No. Tinnitus is an endogenously developed condition.
5 It's a condition in which noise which arises in the
6 hearing organ, inside the ear, usually in the inner ear,
7 Cochlear or in the nerves, is heard. It's a very common
8 condition. A lot of people have it, and it's quite
9 variable, and in fact the only - there are two
10 environmental causes for the exacerbation of tinnitus.
11 One of them is anxiety and stress and an increase in
12 blood pressure. Often people who have a volatile blood
13 pressure, the blood pressure rises; the tinnitus gets
14 worse. The other is exposure to noise, so, people, for
15 example, a farmer spent a day on his tractor he might
16 well find that he had tinnitus that night. Tinnitus is
17 most noticed under quiet conditions.

18 **MR QUINN:** In relation to tinnitus, is it exacerbated, by, for
19 example, low frequency noise?

20 **DR BLACK:** No.

21 **MR QUINN:** So low frequency noise has no impact on tinnitus?

22 **DR BLACK:** Low frequency audible noise?

23 **MR QUINN:** Yes.

24 **DR BLACK:** It certainly isn't exacerbated by it. It also is
25 probably not masked by it. So, low frequency noise
26 which truly was low frequency, if you heard that and if
27 you had tinnitus you would properly hear the tinnitus as
28 well, whereas a more broad-spectrum noise would be more
29 likely to mask the tinnitus.

30 **MR QUINN:** All right. In this case, the system - among other
31 symptoms - is described by Mr Mortimer as occurring when

1 he could not hear the turbines operate - -

2 DR BLACK: Yes - -

3 MR QUINN: When he was inside his home.

4 DR BLACK: Yes.

5 MR QUINN: Would that be consistent with what you just said?

6 DR BLACK: Yes.

7 MR QUINN: And, on page 6 just in relation to tinnitus, the last -

8 -

9 DR BLACK: Page 6 of Mr Mortimer's - - ?

10 MR QUINN: I'm sorry, page 6 of your statement - -

11 DR BLACK: Okay. Sure. I'm sorry, I closed it. Yes.

12 MR QUINN: One of the causes you talk about - this is in the

13 second paragraph under the heading Tinnitus - -

14 DR BLACK: Yes - -

15 MR QUINN: You talk about psychogenic disorders in association

16 with depression and anxiety. Do you have that?

17 MR QUINN: Yes.

18 MR QUINN: So, there is a neurological cause for tinnitus. Is

19 that right?

20 DR BLACK: Yes.

21 MR QUINN: And it includes depression and anxiety?

22 DR BLACK: Well, it's not really neurological, that's really

23 psychological and psychogenic, yes.

24 MR QUINN: And - -

25 DR BLACK: But there is a neurological cause as well, which is

26 essentially overactivity of the Cochlear and nerve, yes.

27 MR QUINN: All right. Tinnitus has a symptom which is described

28 by a considerable number of people - -

29 DR BLACK: Yes - -

30 MR QUINN: Living next to wind turbines. You have heard that?

31 DR BLACK: I have heard that said often, yes.

1 **MR QUINN:** So, is it the case, the explanation here, is that
2 living next to a wind farm causes anxiety and depression
3 in the first instance, and that that causes the
4 tinnitus?

5 **DR BLACK:** It might, but I think the more likely explanation is
6 that if people are living close to a wind turbine and
7 they are listening for it, if you're listening to quiet
8 noise it's likely that you will hear tinnitus. I mean,
9 the trick with living with tinnitus, which, you know, as
10 many people have to do, is to ignore it more.

11 **MR QUINN:** I suffer from it and I - -

12 **DR BLACK:** Yes, so do I. And so, if you can go through your life
13 just ignoring it and some people - I had one patient
14 once who once said that, you know, I quite like it
15 because I wake up in the morning and it reminded me I
16 was still alive. People say things like that. They say
17 it's sort of the sound of their brain running. And,
18 observations like that are quite helpful, because they
19 can speak of it in perspective.

20
21 There are actually studies done about tinnitus. It's
22 quite interesting. They have shown that the level of
23 tinnitus - - there's ways of measuring the perceived
24 levels of tinnitus, and studies have been done to show
25 that the level which will literally drive some people to
26 suicide, and the level which people are able to just
27 ignore, are the same.

28 **MEMBER:** Is there any cure?

29 **DR BLACK:** There is a - - the short answer is no. You can stop it
30 by injecting one of those - - to test for it to make
31 sure you haven't got the wrong thing - to inject a local

1 anaesthetic like Zilocaine in the patient which damps
2 down the noise and it will stop it in its tracks, but
3 you can't do that all the time. People have tried lots
4 of different drugs, but I would say no. Anybody who
5 invents that would make a fortune.

6 **MR QUINN:** All right. So, just coming back to Mr Mortimer's case
7 - -

8 **DR BLACK:** Yes - -

9 **MR QUINN:** His evidence was clear that he could hear wind turbines
10 inside his house.

11 **DR BLACK:** Yes - -

12 **MR QUINN:** And the tinnitus worsened when he was at home.

13 **DR BLACK:** Yes - -

14 **MR QUINN:** Is that, on those facts, I suppose listening for the
15 noise or being anxious, perhaps?

16 **DR BLACK:** Well, it might be. But, I mean that's requiring - I
17 mean I don't want to - - I don't really want to
18 categorise a submitter as being anxious of it without
19 other evidence that he is. He has - - he clearly has
20 tinnitus, and the way in which he describes it is
21 consistent with being able to hear it, not necessarily
22 without anxiety. That is a possibility, mm.

23 **MR QUINN:** Another possibly is low frequency noise as one
24 possibility.

25 **DR BLACK:** Not as a cause, no, not at all. But, what I am saying
26 is that if you listen to a sound source, and listen to
27 it carefully, and it consisted of low frequency noise,
28 it would not mask tinnitus, because to mask tinnitus you
29 need a noise which is of a similar frequency, and most
30 tinnitus is at quite a high frequency, normally about
31 two or three kilohertz.

1 MR QUINN: Right.

2 DR BLACK: So, I can understand if somebody said when I hear the
3 low-frequency noise I can also hear my tinnitus, and I
4 would expect that.

5 MR QUINN: Is it like a coupling mechanism? Is that the way to
6 think about it?

7 DR BLACK: No, it's two different things.

8 MR QUINN: One with the other, the low-frequency noise accompanies
9 the tinnitus?

10 DR BLACK: It's not a coupling mechanism. It's two different
11 stimuli. There is the - - the ear is working and
12 hearing the low-frequency noise and the tinnitus is
13 still there because it's not being masked.

14 MR QUINN: All right, thank you.

15 DR BLACK: And it may well be that if the person is adjusting
16 their attention and their hearing to hear the low-
17 frequency noise that the tinnitus becomes more dominant.
18

19 I mean, one of the things tinnitus patients often say is
20 that when I listen hard to hear something, I hear my
21 tinnitus.

22 MR QUINN: I take you to page 6.

23 DR BLACK: Six, yes.

24 MR QUINN: And, the last paragraph, you referred to studies
25 relying - - you referred to infrasound at levels
26 [Indistinct] by dBG, have that statement?

27 DR BLACK: Yes - -

28 MR QUINN: Can you take us to any standard guideline or criteria
29 that purports to set a safe limit for infrasound?

30 DR BLACK: No, I can't. I don't think there - - I'm not aware of
31 one that is in recent jurisdictions that I work in.

1 MR QUINN: And - -

2 DR BLACK: But, there certainly are standards that set safe limits
3 for vibration but by contact, because the generally
4 accepted view is that the only hazard of low frequency
5 vibration is in things like vibration like finger
6 disorder and whole body vibration.

7 MR QUINN: So, when you are contacting things like a vibrating
8 machine or - - ?

9 DR BLACK: Yes - -

10 MR QUINN: [Indistinct].

11 DR BLACK: I'm not aware of a standard for infrasound, in other
12 words, for vibration within the air.

13 MR QUINN: By the same token, is there any standard guideline or
14 criteria that purports to set a statement of low-
15 frequency noise?

16 DR BLACK: Yes, but of course as part of overall standards. I
17 mean, the WorkSafe Standards in Australia, the
18 Department of Labour Standards in New Zealand for
19 example, set a standard for total noise because noise
20 energy has a crude effect - -

21 MR QUINN: A total sound energy?

22 DR BLACK: A total sound energy across the whole audible spectrum.
23 In other words, the total sound energy which the ear is
24 able to conduct through to the Cochlear all adds up and
25 if it's enough, causes damage.

26 MR QUINN: As you said, you're familiar with the New Zealand
27 standard. The New Zealand standard doesn't set any
28 limit for low frequency noise, does it?

29 DR BLACK: No, not that I'm aware of. No, it sets an overall
30 standard for total noise exposure.

31 MR QUINN: All right.

1 **DR BLACK:** To prevent noise induced hearing loss.

2 **MR QUINN:** Right. And dBA, I think you had some criticism and you
3 might have even used the word "useless" in your evidence
4 this morning, the dBA being useless - -

5 **DR BLACK:** The DPSS, it's useless if you're not talking about
6 sound that is being picked up by the ear.

7 **MR QUINN:** Right. And, dBA is not a measure of low-frequency
8 noise, is it?

9 **DR BLACK:** It's - dBA is used as an appropriate weighting for
10 noise down to a low limit of hearing.

11 **MR QUINN:** I don't want to take you out of your area of expertise,
12 but you seem to have strayed to some degree. In
13 relation to dBA - -

14 **DR BLACK:** Yes - -

15 **MR QUINN:** If you were setting out to measure low-frequency noise
16 you wouldn't set out to measure it in terms of dBA,
17 would you?

18 **DR BLACK:** I would if it was audible. If the issue was audible
19 noise or noise induced hearing loss I would use dBA, but
20 if I was measuring noise below audible I would not use
21 dBA.

22 **MR QUINN:** All right. I take you to comments you made on page
23 seven in your statement. It's the second paragraph.
24
25 Actually, I'll take you to the first paragraph. In the
26 first paragraph you are talking about concerns about
27 infrasound and low frequency sound. Do you have that?

28 **DR BLACK:** Mm, mm.

29 **MR QUINN:** And the last sentence, there are references made in the
30 submissions to the properties of A weighted figures and
31 the lowest audible frequencies. Do you see that?

1 DR BLACK: Mm, mm.

2 MR QUINN: And then there is an indication of sound pressure with
3 the infrasound levels. "Regarding [Indistinct] I agree
4 with that point. A weighting is only relevant when
5 considering hearing response and as soon as other
6 effects have been considered a return to linear
7 measurement should be made." Do you have that?

8 DR BLACK: Yes.

9 MR QUINN: Now, is that you in the second paragraph agreeing with
10 the proposition that A weighted figures are not
11 appropriate to look at the lowest audible frequencies?

12 DR BLACK: No, that's - - not at all. What I'm saying is that A
13 weighting - - what A weighting does is adjusts for the
14 response of the ear. And so, as the ear goes down to
15 those low frequencies, it becomes much less sensitive.
16 In other words, the mechanical apparatus in the ear
17 transmits much less energy through to the inner ear, and
18 so the A weighting is appropriate as long as you are
19 considering audible sound, which is sound which is
20 conducted through to the ear.

21
22 But, if you're interested in any other effects of the
23 sound, then unless you are concerned with the sound
24 that's been conducted through the ear, A weighting is
25 inappropriate.

26 MR QUINN: All right. And, then you go on and talk about dBG in
27 that same paragraph and you say, "A return to the linear
28 measurements should be made."

29 DR BLACK: Yes - -

30 MR QUINN: And you then say, "A special measurement curve for this
31 purpose has been arrived on, which expresses dBG." - -

1 **DR BLACK:** Yes - -

2 **MR QUINN:** dBG, is that a linear measurement?

3 **DR BLACK:** Not completely, no. But, it's closer to linear at the
4 lower frequencies. But, it's not a linear measurement,
5 no. I don't know a great deal about dBG. I've not - -
6 because that's an area for the sound engineers. So,
7 I've never used - - I've never undertaken dBG
8 measurements. I don't know much about it.

9 **MR QUINN:** All right.

10 **DR BLACK:** Because I've never done low-frequency sound
11 measurements. My experience with doing sound
12 measurements is for the purposes of noise induced
13 hearing loss in occupational medicine, so I'm less
14 familiar with that.

15 **MR QUINN:** Just to be clear, dBG isn't a linear measurement, is
16 it?

17 **DR BLACK:** It's not completely linear, no. I mean, the only
18 linear measurement is linear. But, most audiometers in
19 fact don't have dBG on them.

20 **MR QUINN:** Right.

21 **DR BLACK:** And so in the instance of dBG you would use linear and
22 as long as you were of course satisfied the audiometer
23 went down below 20, which it possibly doesn't, and I
24 would suggest that if someone was using dBG, they would
25 need to be quite familiar with them.

26 **MR QUINN:** And to your knowledge dBG is not something that's not
27 measuring at very low frequencies for the A weighting -
28 - ?

29 **DR BLACK:** I [Indistinct] somewhere. My understanding is that dBG
30 has limits once it gets down to very low frequencies,
31 well, below, yes. I mean below 10 hertz. That is my

1 understanding but I really think that the Tribunal has
2 got better advice than mine on that.

3 **MR QUINN:** All right. Now, in paragraph 4 on the same page you
4 talk about Professor or Dr Salt's recent work.

5 **DR BLACK:** Yes.

6 **MR QUINN:** In your reference list, you've got a reference to a
7 paper of his in 2010 - -

8 **DR BLACK:** Yes - -

9 **MR QUINN:** That's the work you are referring to in your fourth
10 paragraph?

11 **DR BLACK:** Yes.

12 **MR QUINN:** And, in your paragraph 4, you concede that there is a
13 substantial evidence base for Dr Salt's work?

14 **DR BLACK:** Not - I wouldn't put it that way. What I'm saying is
15 that I think that Dr Salt's work is clearly carefully
16 done, well recorded and is - - rather than say
17 substantial, say that his work is important and, you
18 know, will probably be influential so - -

19 **MR QUINN:** So, just to be fair, about halfway through that
20 paragraph you see in square brackets 19.

21 **DR BLACK:** Yes.

22 **MR QUINN:** And in the last line the last part of that line,
23 "[Indistinct] substantial evidence based argument" and
24 that's a reference to Dr Salt.

25 **DR BLACK:** That's a slightly different - - yes, there is a
26 slightly different statement. I'm not saying there is
27 substantial evidence. I'm saying that the evidence - -
28 that the argument is substantial and it's based on
29 evidence.

30 **MR QUINN:** It's based on evidence?

31 **DR BLACK:** Yes, which is what I mean, yes.

1 **MR QUINN:** Then you refer to the Waubra Foundation at the bottom.
2 I go to Tab 16 on that.

3 **MEMBER:** Are you finished with LT 76 at the moment?

4 **MR QUINN:** At the moment, yes.

5 **MEMBER:** That is behind Tab 16, is it?

6 **MR QUINN:** Yes. We have a paper there from Dr Salt. This is a
7 later reference or later work subsequent to the 2010
8 referred to.

9 **DR BLACK:** Yes.

10 **MR QUINN:** Can I take you in the body of the document to Section
11 3.3 - -

12 **DR BLACK:** [Indistinct]. Yes.

13 **MR QUINN:** Have you got that?

14 **DR BLACK:** Yes, I've got that.

15 **MR QUINN:** This is the second paragraph.

16 **DR BLACK:** Mm, mm.

17 **MR QUINN:** And, in this study Dr Salt says he's looking at the
18 low-frequency responses of the ear and he deals with a
19 spectrum components from 12 to 125 hertz.

20 **DR BLACK:** Yes.

21 **MR QUINN:** And then, considers the impact of the measured
22 physiological impacts from those frequencies.

23 **DR BLACK:** Mm, mm.

24 **MR QUINN:** You can see that. He is considering here, is he not,
25 both the impact of inaudible infrasound and audible low-
26 frequency noises, isn't he?

27 **DR BLACK:** Yes, he is, and that's the thrust of a lot of his work.

28 **MR QUINN:** I take you to the next page.

29 **DR BLACK:** Yes.

30 **MR QUINN:** And the last paragraph starting with, "It is well
31 documented."

1 DR BLACK: Yes, got that.

2 MR QUINN: That. Could you read that out, please.

3 DR BLACK: "It is well documented that people find noise with
4 prominent low-frequency content annoying. In the context
5 of wind turbine noise it is known that larger wind
6 turbines can generate high levels of low-frequency noise
7 and infrasound. The concern arising from the work that
8 we report here is that the cochlea apex of people
9 exposed to such low-frequency sound will be stimulated
10 to a far greater degree than is suggested by the initial
11 A weighted sound level. A demonstration of sounds in
12 the range of 40 to 45 dB may be causing intense
13 stimulation of the cochlea apex has not previously been
14 appreciated." Do you want me to keep going?

15 MR QUINN: Please.

16 DR BLACK: "This may account for why the influence of low-
17 frequency noise on humans is greater than that estimated
18 from spectral measurements and why consideration of
19 noise crest factors is appropriate. The fact that
20 special measurements - - sorry, the fact that special
21 stimulation" - sorry, I'll start again. "The fact that
22 a typical stimulation is maximal when medium and high-
23 frequency components are absent from the sound, may also
24 be important to wind turbine noise effects. It is known
25 that people's houses attenuate sound frequencies in the
26 audible range but have little influence and they even
27 increase infrasound and low-frequency sound levels. As
28 for long periods of exposure to wind turbine noise from
29 an otherwise quite environment such as a quiet bedroom,
30 seems to represent a condition in which apical
31 stimulation would be maximised. Intense stimulation of

1 the cochlea apex certainly has an influence on human
2 physiology. On this basis we think that the concept of
3 what you can't hear can't hurt you, is false.
4 Similarly, potential mechanisms by which low-frequency
5 sounds could influence percipient physiology which are
6 being ignored by some. Our measurements show that the
7 ear generates large electrical responses to low
8 frequency stimulation, suggests that the effect of low-
9 frequency sound on people living near wind turbines
10 should not be dismissed by those with little
11 understanding of how low-frequency sounds, indeed,
12 affect the ear. More research on this topic is
13 necessary to enlighten the scientific, medical and legal
14 communities, and the public, some of whom are being
15 chronically exposed to these sounds."

16 **MR QUINN:** Dr Black, is there anything you would disagree with in
17 the passage you just read out?

18 **DR BLACK:** Yes, I mean, the thing I disagree with is that it
19 really is a mechanism to explain a problem without
20 evidence that the problem is there. I mean, the problem
21 is reported people are saying - people are suggesting
22 that they are having a problem with low-frequency sound,
23 low frequency sound from wind turbines that are low
24 audible and Dr Salt as a result of his considerable
25 knowledge of physiology is proposing an explanation.
26 But, there is, actually, no evidence that there is a
27 problem.

28 **MR QUINN:** Well - -

29 **DR BLACK:** There are Level IV reports of a problem but it doesn't
30 prove it exists.

31 **MR QUINN:** So, I come back to the evidence.

1 **MR QUINN:** Okay.

2 **MR QUINN:** And I would ask you to go to Tab 10 in this book,
3 please.

4 **MEMBER:** When Dr Salt is referring to low-frequency noise is he
5 referring to inaudible noise or audible noise?

6 **DR BLACK:** Well, I think he is, sir, because - -

7 **MEMBER:** Which is it?

8 **DR BLACK:** Dr Salt - I think what Dr Salt's research has shown is
9 that it's possible that noise below the frequency that
10 you hear it might have an influence on the perception
11 and processing of noise above the audible frequency.

12 **MEMBER:** Yes.

13 **DR BLACK:** And the likely - which he doesn't mention - but the
14 most likely explanation for that, in my view, is that
15 what is actually happening is that a harmonic or below
16 frequency is coming through. But, I can't prove that.
17 I mean, that's just me suggesting.

18

19 I mean, the thing is, what Dr Salt is doing here, very
20 helpful actually, is opening the scientific discussion.

21 **MR QUINN:** And he's doing this in the passage that I took you to
22 in relation to frequencies which are audible - -

23 **DR BLACK:** Yes - -

24 **MR QUINN:** In addition to the understood to be inaudible
25 frequencies below - -

26 **DR BLACK:** Yes - -

27 **MEMBER:** Twenty hertz.

28 **DR BLACK:** Yes, he is.

29 **MR QUINN:** I would ask you to go to Tab 10, please.

30 **DR BLACK:** I'm familiar with this paper.

31 **MR QUINN:** You are familiar with this paper?

1 DR BLACK: Yes, I've seen this paper before, yes.

2 MR QUINN: Had you seen it before and you completed your statement
3 for this case?

4 DR BLACK: I didn't - I think I read it. I can't say I took it
5 into account in - I didn't reference it, sorry.

6 MR QUINN: I couldn't find it in your references.

7 DR BLACK: No, but I have seen that.

8 MR QUINN: Now, you're familiar with the program. Even from the
9 head note, I think you'd agree with me that this appears
10 to be of particular relevance in relation to wind
11 turbine noise audible effects. Would you agree with
12 that?

13 DR BLACK: It's - - yes, it contributes to the literature, yes.

14 MR QUINN: Can I take you to page 3730 of the paper, please.

15 DR BLACK: Mm, mm.

16 MR QUINN: [Indistinct]. There is a column on the left.

17 DR BLACK: Mm, mm.

18 MR QUINN: And, at the second paragraph, you see, "At this place."
19 Do you see that paragraph?

20 DR BLACK: "The present project?" I see it at the top, before,
21 "Below frequency."

22 MR QUINN: The next paragraph.

23 DR BLACK: Yes, "At this place."

24 MR QUINN: And then, about halfway through that paragraph you see
25 a sentence saying, "Infrasound and - - "

26 DR BLACK: Halfway through that paragraph, "Infrasound and now
27 frequency sound are often not properly distinguished,"
28 yes.

29 MR QUINN: Read on.

30 DR BLACK: "And as a peculiar consequence low-frequency noise is
31 frequently rejected as the cause of nuisances just

1 because infrasound can be discarded, usually
2 [Indistinct] above. Infrasound is still often claimed
3 inaudible and sometimes even low-frequency noise where
4 it is reported that both can only be heard by especially
5 sensitive people, which is all wrong."

6 **MR QUINN:** I stop you there. Is that important in discussions
7 about the impacts of noise on windfarms to make it clear
8 that we are discussing audible low-frequency noise in
9 one case, as distinct from what can be said about
10 infrasound in another?

11 **DR BLACK:** Yes, it is, because the assumptions about the effects
12 of audible noise are the effects of disturbance, affects
13 on amenity, and they are limited to the physiological
14 endpoints that we know.

15
16 But, as far as we know, there are no physiological
17 effects of infrasound at similar frequencies but that is
18 a separate consideration. And, you are right, it is - -
19 they should be considered separately and not merged
20 together.

21 **MR QUINN:** That might be a convenient time.

22 **MEMBER:** Yes. Do you have any - can you give us any indication of
23 how long you are likely to be Mr Quinn?

24 **MR QUINN:** About another hour and-a-half.

25 **MEMBER:** We will say 2.15 then.

26
27 [Luncheon adjournment]
28

29 **Upon resuming at 2:27 pm:**
30

31 **MEMBER:** Yes, Mr Quinn?

1 **MR QUINN:** Thank you, Mr Chairman. I am still at the paper that I
2 handed to you before lunch. That's the paper on
3 [Indistinct] Do you have that?

4 **DR BLACK:** Yes, I do, thank you.

5 **MR QUINN:** Can I take you to page 3735. In the left-hand column
6 about halfway down, there is a passage going, "It is
7 important to note."

8 **DR BLACK:** Yes.

9 **MR QUINN:** Could you read that out, please.

10 **DR BLACK:** "It's important to note that for several turbines the
11 highest level for one third octave band is 250 hertz
12 although when A weighted levels are regarded, it is thus
13 beyond any doubt that the long frequency part of the
14 spectrum plays an important role in the noise at the
15 neighbours and that the low-frequency sound must be
16 treated seriously in any assessment of noise from large
17 turbines."

18 **MR QUINN:** Before lunch, we put the proposition about
19 distinguishing between infrasound and low-frequency
20 noise and I think your evidence was to the effect that
21 it is important to do that as identified by these
22 [Indistinct].

23 **DR BLACK:** Yes, it is, to distinguish between infrasound and low-
24 frequency noise.

25 **MR QUINN:** All right. Can I take you to 3736 in the papers.

26 **DR BLACK:** Yes.

27 **MR QUINN:** And, what is set out under the [Indistinct].

28 **DR BLACK:** That's right.

29 **MR QUINN:** There were some measurements taken indoors next to a
30 windfarm and they distinguished two groups. Perhaps I
31 will summarise what it is.

1 DR BLACK: Mm, mm.

2 MR QUINN: They looked at one set of houses where the external
3 limits were 35 dBA - -

4 DR BLACK: Yes - -

5 MR QUINN: And another group where the external limits was 70/44
6 dBA, and they distinguished those two groupings.
7

8 Could I just take you a moment to see what they have
9 done reading perhaps the first column under the
10 [Indistinct].

11 DR BLACK: Yes, I've skimmed through that.

12 MR QUINN: And in the next column, it starts talking about the
13 hearing threshold line which I think you are familiar
14 with. I think you have already referred to it today.

15 DR BLACK: Mm, mm.

16 MR QUINN: That would be the molar hearing threshold line. You
17 would be familiar with that?

18 DR BLACK: Can you show me where that is.

19 MR QUINN: Sorry, at the hearing threshold line you can see in the
20 graph, which is Figure 11 - -

21 DR BLACK: The dashed line, yes.

22 MR QUINN: And that's what they're referring to.

23 DR BLACK: Yes, I can see that.

24 MR QUINN: Are you familiar with the hearing threshold levels that
25 have been identified by audiologists and acoustic
26 people?

27 DR BLACK: Well, I am familiar with the concept of hearing
28 thresholds. They are - - they vary depending on why
29 they have been defined but I'm certainly familiar with
30 the concept of hearing thresholds.

31 MEMBER: All right. Now, if you look at just the graph, Figure 11

1 tells us that this is the graph related to the external
2 levels of 35 dBA. Can you see the levels which are
3 measured between about 100 hertz - -

4 **DR BLACK:** Yes - -

5 **MR QUINN:** And 200 hertz - -

6 **DR BLACK:** Mm, mm.

7 **MR QUINN:** That are above the hearing threshold line?

8 **DR BLACK:** Yes, I can see that, yes.

9 **MR QUINN:** And, is that not telling us that there is a significant
10 amount of audible low-frequency noise inside that house?

11 **DR BLACK:** Yes, it is.

12 **MR QUINN:** Now, if we look at Figure 12, Figure 12 relates to a 44
13 dB external level and again has the hearing threshold
14 and in that case, it is expected that some measurements,
15 the measurements above the hearing threshold start to
16 occur about 33 of 34 hertz. Do you see that?

17 **DR BLACK:** Yes.

18 **MR QUINN:** And they continue all the way across to 200 hertz. Do
19 you see that?

20 **DR BLACK:** Yes.

21 **MR QUINN:** And again is that as we saw in on the first graph a
22 significant level of low-frequency noise indoors?

23 **MR QUINN:** It's a significant amount of low-frequency energy
24 indoors. Whether it's significant from the point of view
25 of noise is not something - -

26 **MR QUINN:** Could it be outside your area of expertise to comment?

27 **DR BLACK:** Mm, I'll do my best. It's - - I would agree that it is
28 significant. Whether it's harmful or [Indistinct -
29 coughing] - - it's hard to say in isolation based on
30 that data.

31 **MR QUINN:** And just coming down to Figure 11 that will rate to 35

1 dBA external levels of that house when noise is
2 considered.

3 **DR BLACK:** Yes.

4 **DR BLACK:** And, you are aware that Mr Turnbull made dBA
5 predictions in relation to this proposal?

6 **DR BLACK:** Mm, mm.

7 **MR QUINN:** And are you aware that he made predictions in relation
8 to 33 dBA external for a number of residents,
9 particularly resonance 37 and 75 - -

10 **DR BLACK:** Yes.

11 **MR QUINN:** And in one case has made external level predictions in
12 the order of 40 dBA. Are you aware of that?

13 **DR BLACK:** Yes.

14 **MR QUINN:** Now, I take you to 3742 in the papers. And, at 3742
15 you see the conclusion. [Indistinct]. Do you have that?

16 **DR BLACK:** I'm sorry, I didn't hear that.

17 **MR QUINN:** I'm sorry, at 3742 there is a heading Conclusion in the
18 right-hand column.

19 **DR BLACK:** Yes, I've got that; thank you.

20 **MEMBER:** I'm sorry, 37.

21 **MR QUINN:** 3742 is Conclusions.

22 **DR BLACK:** Yes, I've got that.

23 **MR QUINN:** Could you read out the first paragraph, please.

24 **DR BLACK:** "The results confirm the hypothesis that the spectrum
25 of wind turbine noise moves down in frequency with
26 increasing turbine size. The relative amount of a
27 lesser low-frequency noise is higher for large turbines,
28 2.3 to 3.6 megawatts than for small turbines, less than
29 2 megawatts. The difference is significantly different
30 that one third octave bands in the frequency range 63 to
31 250 hertz. The difference can also be expressed as a

1 downward shift of the spectrum of approximately 1/3 of
2 an octave. A further shift of similar size is suggested
3 for turbines in the 10 megawatt range."

4 **MR QUINN:** I will stop it there, Dr Black. Is there anything that
5 you see in your research that would contradict that
6 finding?

7 **DR BLACK:** No; in fact, it makes sense to me.

8 **MR QUINN:** Yes, but - -

9 **DR BLACK:** And it makes biophysical sense that would be the case.

10 **MR QUINN:** And, at the engineering level, the larger the turbine
11 the lower the frequency?

12 **MR POWER:** I object to that question. I mean, it's an engineering
13 question appropriate for someone like Dr [Indistinct]
14 perhaps and is not appropriate for this witness to
15 answer in this way.

16 **MEMBER:** Well, I think the witness can do that for himself, Mr
17 Power. If it's beyond his expertise he will say so. If
18 he's got an answer he will give the answer.

19 **DR BLACK:** Well, it is beyond my expertise, Sir. But, I have
20 given my opinion because it seems to be self-evident.
21 But, it is not within my expertise really. I probably
22 shouldn't have answered it.

23 **MR QUINN:** Perhaps I will take you to the next paragraph,
24 immediately in the paragraph [Indistinct]. Would you
25 take note of that paragraph and read out that paragraph,
26 please.

27 **DR BLACK:** "Where the outdoor sound pressure that is in the
28 relevant neighbour distances are considered the higher
29 low-frequency content becomes even more pronounced.
30 This is due to the air absorption, which reduces the
31 higher frequencies a lot more than the lower frequencies

1 even if when A weighted levels are considered. A
2 substantial part of the noise is at low frequencies, and
3 for several of the investigated large turbines the one-
4 third octave band, the highest level is at all below 250
5 hertz and is thus beyond any doubt that the low-
6 frequency part of the spectrum plays an important role
7 in the noise at the neighbours."

8 **MR QUINN:** Is there anything in your research to contradict that
9 finding?

10 **DR BLACK:** No, but there really wouldn't be because issues like
11 the absorption of sound in the air, that is getting well
12 past my - - I would accept the advice of acoustic
13 engineers for that type of thing.

14 **MR QUINN:** All right. Now, you referred earlier to guidelines for
15 community noises [Indistinct] document of 1990. Do you
16 have a copy of that?

17 **DR BLACK:** I do, but it would probably be quicker to be shown
18 that.

19 **MR QUINN:** It is at Tab 91.

20 **DR BLACK:** Do you want me to look for it?

21 **MR QUINN:** Does the Tribunal have it?

22 **MEMBER:** Yes.

23 **MR QUINN:** No, I can't - -

24 **MR QUINN:** I have an extract of it.

25 **MEMBER:** Yes.

26 **MR QUINN:** I have just given you an extract so it's not the
27 complete document.

28 **DR BLACK:** No, I understood that.

29 **MR QUINN:** The passages I would like you to refer to, start at
30 page 27 of that document and the following paragraph
31 starting "private studies."

1 DR BLACK: Mm, mm.

2 MR QUINN: And - -

3 DR BLACK: So is that, "Other studies suggest - -"?

4 MR QUINN: I am sorry, I beg your pardon. I take you to page 28.

5 About halfway along the page you refer to special

6 attention. Do you see that?

7 DR BLACK: Yes, I've got that.

8 MR QUINN: Would you read out that paragraph, headed Special

9 Attention.

10 DR BLACK: "Special attention should also be given to the

11 following considerations: noise sources, in an

12 environment of low background noise level, for example,

13 night traffic and suburban residential areas,

14 environments where a combination of noise and vibrations

15 are produced, for example railway noise, heavy duty

16 vehicles, sources with low-frequency components,

17 disturbances may occur even though the sound pressure

18 level dealing with exposure is below 30 dBA."

19 MR QUINN: This reference document is the document, is it not,

20 upon which the New Zealand standard limits are set,

21 isn't it?

22 DR BLACK: It is. It is a document which was influential when

23 seeking the wind farm standard, yes.

24 MR QUINN: And, where it refers in the first paragraph (a) to low

25 background noise level, do you understand rural Victoria

26 to be in an area with a low background noise level?

27 DR BLACK: Yes.

28 MR QUINN: And, in paragraph (c) when talking about sources with

29 low-frequency component, do you see that?

30 DR BLACK: Yes.

31 MR QUINN: I've taken you to the graph which showed low-frequency

1 components inside homes with external levels of 35 dBA.

2 **DR BLACK:** Mm, mm.

3 **MR QUINN:** It is perhaps outside your area of expertise, but those
4 frequencies, I suggest, as part of this consideration
5 need to be considered or be given special attention
6 according to this document.

7 **MR QUINN:** Yes, that would be a reasonable - - it would be
8 reasonable to draw that from this document.

9 **MR QUINN:** Thank you. Can I take you to page 40. I'm not quite
10 sure - - there are a couple of pages there.

11 **DR BLACK:** Yes, page 40 is there.

12 **MR QUINN:** And, you will see the heading, "Sleep disturbance
13 [Indistinct]." Do you see that?

14 **DR BLACK:** Yes, I've got that.

15 **MR QUINN:** Can I take you to the second paragraph where it says,
16 "When noise is continuous." Do you see that?

17 **DR BLACK:** Oh, yes, I've got that, yes.

18 **MR QUINN:** Could you read the second sentence out starting with,
19 "When the."

20 **DR BLACK:** "When the noise is composed of a large proportion of
21 low-frequency sounds, a still lower guideline barrier is
22 recommended because low-frequency noise, for example
23 from ventilation systems can disturb residents' sleep,
24 even at low sound pressure levels. It should be noted
25 that the adverse effect of noise partly depends on the
26 nature of the source, the special situation
27 [Indistinct]."

28 **MR QUINN:** All right. Can I ask you then to go to the Waubra
29 Foundation book which is the black covered volume,
30 please at Tab 15.

31 **DR BLACK:** "Characterisation of noise in homes affected by wind

1 turbine noise."

2 **MR QUINN:** That's right. I will come to the conclusion in a
3 moment. What this survey was about - have you not seen
4 this document before?

5 **DR BLACK:** No, I haven't.

6 **MR QUINN:** That occurs as a set of measurements taken inside a
7 home, 2.5 kilometres from wind turbines at a place
8 called Waterloo.

9 **MR QUINN:** Mm, mm.

10 **MR QUINN:** And, concurrent with that the resident recorded the
11 noise levels and they were subsequently related back to
12 the noise levels inside the home. All right. That's
13 the abstract [Indistinct]. Can you tell us what the
14 study was about.

15 **DR BLACK:** Can I just be given a moment to read that extract?
16 Yes, thank you.

17 **MR QUINN:** I just take you to the summary and conclusion on page
18 5.

19 **DR BLACK:** Mm, mm.

20 **MR QUINN:** If you could read to yourself the first paragraph in
21 this paper.

22 **DR BLACK:** Yes.

23 **MR QUINN:** Would you read now the second paragraph starting with,
24 "Measurements taken" - -

25 **DR BLACK:** "Measurements taken in a single resident's home near a
26 windfarm show an increase in the overall mean Z
27 unweighted and C weighted sound level with annoyance
28 rating. No increase was, however, observed in the mean A
29 weighted sound level and this is due to the majority of
30 the acoustic energy being contained in the lower
31 frequencies. In particular, the energy levels within

1 the 10 to 30 hertz span were observed to increase with
2 the annoyance weighting. Additionally, significant
3 amplitude modulation was detected in the noise signals.
4 However, no trend with annoyance was observed."

5 **MR QUINN:** No, there's nothing in your research which would
6 contradict that finding, is there?

7 **DR BLACK:** No. But, again, there probably wouldn't be because I
8 have not done research of that nature. That's really
9 acoustics.

10 **MR QUINN:** It is.

11 **DR BLACK:** Mm, mm.

12 **MR QUINN:** But, it suggests, is it not, that low-frequency noise
13 is related to annoyance, whereas the higher frequencies
14 are not.

15 **DR BLACK:** It does suggest that, yes.

16 **MR QUINN:** Thank you. Can I take you back to your statement on
17 page 7, please. And, the fourth paragraph, about
18 halfway through the paragraph - -

19 **DR BLACK:** Mm, mm - -

20 **MR QUINN:** You start with this sentence, "I accept that there are
21 some open scientific questions in this area at least
22 incorrect." Sorry, "At least from a theoretical point of
23 view. However" - this is your conclusion. I want to
24 focus on that - -

25 **DR BLACK:** Mm, mm - -

26 **MR QUINN:** You conclude that, "The conventional approach remains
27 correct" you say for two reasons and you give those
28 reasons and I will not refer to them yet.

29 **DR BLACK:** Yes.

30 **MR QUINN:** And, the conventional approach that you refer to, where
31 is that dealt with in the New Zealand standards?

1 **DR BLACK:** Well, the conventional approach is to accept that sound
2 is - can be measured down to the - can be measured
3 safely and usefully down to the end of the threshold of
4 hearing, to the lower frequency threshold of hearing, in
5 other words about 20 hertz, by the use of the effects of
6 DV A weighted sound pressure recordings.

7 **MR QUINN:** Where does this conventional approach you have been
8 talking about appear in any standard in relation to low-
9 frequency noise?

10 **DR BLACK:** Well, it is in any standard. I am [Indistinct] and I
11 would expect that any standard that described a
12 methodology for noise measurement would include the
13 conventional approach, and I understand that there is an
14 Australian standard, but I've never used it because I
15 don't examine it, but I would expect that if we used
16 that, I mean, it is - what I am describing as a
17 conventional approach would be any instructions which
18 would come with a - - they are more relevant.

19 **MR QUINN:** All right. And, which standard, criteria or guideline,
20 sets the safe limit for continuous exposure to low-
21 frequency noise?

22 **DR BLACK:** That's not really the way to look at it, with respect,
23 because the issue is disturbance and the effects of
24 noise are an acute effect. There is no cumulative
25 effect of noise - -

26 **MR QUINN:** I would just come down - - will stop you there for the
27 moment.

28 **DR BLACK:** Yes - -

29 **MR QUINN:** The cumulative effect would be waking up in response to
30 a noise source, wouldn't it?

31 **DR BLACK:** Or going to sleep. It would be an effect of the noise

1 and well-being of some sort at that time, and if it was
2 sleep either falling asleep or waking up.

3 **MR QUINN:** And either of those things would be an acute event? Is
4 that - -?

5 **DR BLACK:** Correct, it would be an acute effect, yes.

6 **MR QUINN:** I take you to page 7.

7 **DR BLACK:** Of page - -?

8 **MR QUINN:** The paragraph on your statement.

9 **DR BLACK:** Page 7, yes.

10 **MR QUINN:** The third paragraph.

11 **DR BLACK:** Yes.

12 **MR QUINN:** And, it deals with the A weighting.

13 **DR BLACK:** Mm, mm.

14 **MR QUINN:** You then refer to the levels that we are talking about
15 here and saying, "A [Indistinct] magnitude conceivable
16 thresholds of physiological effects and therefore" you
17 say, "There is no possibility of adverse health
18 effects." That's your evidence.

19 **DR BLACK:** Mm, mm.

20 **MR QUINN:** And another way of putting that statement, you say that
21 health effects are impossible given the noise levels
22 identified here.

23 **DR BLACK:** Health effects directly caused by the sound, in other
24 words health effects caused in a normal person and a
25 person who is in the normal population directly caused
26 by the sound, yes, I do say that.

27 **MR QUINN:** All right. Can I ask you to take up the white covered
28 book which is L276. That is the [Indistinct]. I would
29 ask you to start at Tab 1.

30 **DR BLACK:** That's the [Indistinct]?

31 **MR QUINN:** That's the document, that's right. This is the

1 document that you are familiar with.

2 **DR BLACK:** It is a document that I have found my way through. I
3 could not say I'm familiar with it but I know what it
4 is. I know what it's about, yes.

5 **MR QUINN:** All right.

6 **DR BLACK:** It's about - a lot of the - - I'm happy to do my best,
7 but a lot of the questions that I'm being asked are
8 really questions about acoustic engineering.

9 **MR QUINN:** I'm trying to [Indistinct].

10 **DR BLACK:** No, I understand you. You are accepting that.

11 **MR QUINN:** I will try the best I can to deal with the health
12 issues.

13 **DR BLACK:** That's fine.

14 **MR QUINN:** Now, in your evidence just a second ago was to this
15 effect: an acute response to a noise source - -

16 **DR BLACK:** Mm, mm - -

17 **MR QUINN:** Would be waking up. A response to that or having
18 people who weren't getting to sleep.

19 **DR BLACK:** Yes.

20 **MR QUINN:** And would it be fair to also say excessive noise leads
21 to sleep disturbance over the long-term?

22 **DR BLACK:** Yes, but - well, yes. I mean, not so much excessive,
23 but if that event, those acute events which I think we
24 have agreed on were to be constantly repeated that would
25 result in sleep disturbance and disruption.

26 **MR QUINN:** And, over time if that were to continue or be repeated,
27 it would result in sleep deprivation?

28 **DR BLACK:** Yes, or could result in sleep deprivation, and it could
29 be a health effect, yes.

30 **MR QUINN:** All right. Can I ask you then to open up the book or
31 the World Health Organisation document.

1 **DR BLACK:** Mm.

2 **MR QUINN:** And, at [Indistinct] 7. Can I take you to that. It's in
3 the core of the introduction to the document, Roman
4 numeral 7.

5 **DR BLACK:** In the introduction? Oh, I see it, yes, Roman numeral
6 7. Yes, okay, so that's - - yes, thank you.

7 **MR QUINN:** Could you read out the first two sentences, please.

8 **DR BLACK:** "WHO defines health as a state of complete physical,
9 mental and social well-being, not merely the absence of
10 disease or infirmity. And, recognises the enjoyment of
11 the highest obtainable standard of health as one of
12 fundamental rights of every human being. Environmental
13 noises are a threat to public health having negative
14 impacts on human health and well-being."

15 **MR QUINN:** In the first sentence the health as identified by the
16 World Health Organisation involves a state of complete
17 physical, mental and social well-being. Do you see that?

18 **DR BLACK:** Mm, mm.

19 **MR QUINN:** You wouldn't disagree with the World Health
20 Organisation's definition of health, would you?

21 **DR BLACK:** I'm actually quite well-known for disagreeing with that
22 statement. I've disagreed with that statement many
23 times over the years, including in the world health
24 forums. To me that is a political statement for the
25 organisation, and when you are addressing specific
26 issues of public health protections is often unhelpful,
27 because it makes the - it means the issue we are dealing
28 with becomes diffuse and diluted from other matters, so
29 I do disagree with that statement, and I have done for
30 many years.

31 **MR QUINN:** So, you're at odds with the World Health Organisation,

1 I'm glad you made that clear. And, in your statement at
2 various points - -

3 **DR BLACK:** Mm, mm - -

4 **MR QUINN:** Your evidence is that there would be no direct
5 physiological effects with wind turbines with this
6 proposed wind farm. That's the summary of your
7 evidence?

8 **DR BLACK:** Mm, mm. It is, that's what I've concluded, yes.

9 **MR QUINN:** And, you haven't considered the impact of this windfarm
10 on mental and social well-being, have you?

11 **DR BLACK:** Yes, I have, and I have - - I also accept that if
12 someone is distressed by a change in amenity, that can
13 affect their mental well-being.

14 **MR QUINN:** Dr Black, in effect, you use mental health and stress -
15 in fact there is a section on it on page 10 - -

16 **DR BLACK:** Yes - -

17 **MR QUINN:** Effectively to dismiss claims about direct
18 physiological effects, don't you?

19 **DR BLACK:** I say that effects which are either mediated by or
20 [Indistinct] on the mental health which are related to
21 changed - perceived or actual changes in amenity are not
22 not [Indistinct]. So, in particular they are not
23 matters which can be managed by standards, compliance
24 with standards, or regulations about whether or not or
25 where you build things. That's the point.

26 **MR QUINN:** Coming back to this statement, you disagree with the
27 World Health Organisation in respect of the statement
28 I'm taking you to - -

29 **DR BLACK:** Yes, and so a lot of people do by the way, that's - -

30 **MR QUINN:** [Indistinct] but you do.

31 **DR BLACK:** Yes, I do.

1 **MR QUINN:** And this statement includes reference to mental well-
2 being.

3 **DR BLACK:** Yes.

4 **MR QUINN:** Do you include mental well-being as part of a
5 definition of health?

6 **DR BLACK:** Yes, I do.

7 **MR QUINN:** Thank you. I ask you to turn the page then to Roman
8 numeral 11.

9 **DR BLACK:** To which, my - -?

10 **MR QUINN:** Roman numeral 11 in the World Health Organisation
11 document. Do you see the coloured box, noise, sleep and
12 health. Do you see that?

13 **DR BLACK:** Yes.

14 **MR QUINN:** Would you read out those two sentences, please.

15 **DR BLACK:** "There is plenty of evidence that sleep is a biological
16 necessity and disturbed sleep is associated with a
17 number of health problems. Studies of sleep disturbance
18 in children and shift workers clearly show the adverse
19 effects. Noise disturbs sleep by a number of direct and
20 indirect pathways, either at very low levels,
21 physiological reactions, increase in heart rate, body
22 movements and arousals, can be reliably measured. Also,
23 it was shown that awakening reactions are relatively
24 rare, occurring at much higher level than the
25 physiological reactions."

26 **MR QUINN:** I stop you there. Do you take issue with the World
27 Health Organisation in respect of any of those
28 statements?

29 **DR BLACK:** Yes, I do, and in fact, those are - - those are
30 interesting points which they have raised, but they are
31 - - the direct relevance of those the setting of

1 standards is not widely accepted, is not fully accepted,
2 and also it is not intended that this document - -
3 intend this document to be used as a general guideline
4 for setting standards.

5 **MR QUINN:** Dr Black, your evidence has been that the New Zealand
6 standard - -

7 **DR BLACK:** Mm, mm - -

8 **MR QUINN:** Its levels are set wholly and solely on the work of the
9 World Health Organisation's recommendations, is it not?

10 **DR BLACK:** Not quite. The New Zealand standard is based on the
11 guidance of the World Health Organisation guidelines.
12 It takes advice from them and it takes them into
13 account. The point about WHO, is WHO doesn't intend to
14 seek prescriptive standards for member countries. It
15 intends to seek guidelines so that member countries can
16 set their own standards, which has happened in this
17 case.

18 **MR QUINN:** All right. Can I ask you to turn the page, Roman
19 numeral 12. Could you just read to yourself four dot
20 points and I will ask you questions about that.

21 **DR BLACK:** Yes.

22 **MR QUINN:** Okay, the first four dot points are talking about noise
23 induced sleep disturbance.

24 **DR BLACK:** Mm, mm.

25 **MR QUINN:** Problems with insomnia.

26 **DR BLACK:** Mm, mm.

27 **MR QUINN:** Increased heart rate.

28 **DR BLACK:** Mm, mm.

29 **MR QUINN:** And makes the statement sleep is a biological
30 necessity, and disturbed sleep is associated with a
31 number of adverse impacts on health. Starting with the

1 first dot point, do you disagree with that statement?

2 **DR BLACK:** Sleep is a biological necessity and disturbed sleep is
3 associated, so I agree with that first statement.

4 **MR QUINN:** So you agree with the first statement. Thank you.

5 And, what about the second proposition?

6 **DR BLACK:** I agree with the first part of it before the colon.

7 The increase in heart rate and sleep state changes are
8 the subject of ongoing research and may not be directly
9 linked to sleep deprivation. So, there are a two either
10 [Indistinct] in that sentence, some of which are self
11 evident and some of which are still subject to
12 scientific discussion.

13 **MR QUINN:** But, the World Health Organisation prefaces that
14 statement with this statement: there is sufficient
15 evidence for those matters.

16 **MR QUINN:** Mm, mm.

17 **MR QUINN:** Do you say there is insufficient evidence?

18 **DR BLACK:** Well, I think there is sufficient evidence to consider
19 them but I don't think there is sufficient evidence to
20 be certain about the implications of them. But, I don't
21 - the problem is the - - my real problem is with the
22 increase in heart rate, the idea that you can measure
23 heart rate during sleep and regard that as being an
24 indicator of a disturbance is far from established.

25 **MR QUINN:** All right. The third dot point. Do you have an
26 agreement or disagreement with that?

27 **DR BLACK:** Night noise exposure causes self reported sleep
28 disturbance. I agree with that. An increase in medicine
29 use. That's likely because people are likely to use
30 medicines to help them sleep. Increase in body
31 movements. That's - I don't think there is - I don't

1 think the relevance of that is established, because body
2 movements and sleep are tied up with sleep stage and
3 environmental insomnia, that's a term which really
4 doesn't have a - it's not a term which is in the
5 literature as a entity so I disagree with including that
6 term.

7 **MR QUINN:** All right. What about the fourth dot point?

8 **DR BLACK:** Well, it's a bit strongly worded, but it's probably
9 right. I mean, if I was writing that I would probably
10 say it may also lead to further consequences, so I think
11 that's probably written a bit strongly because - - but
12 - - by saying that I would say that people with noise
13 induced sleep disturbance don't always get further
14 consequences on their health and well-being, but they
15 may well.

16 **MR QUINN:** Leave that document for the moment. I've finished with
17 it. Put that aside. Now, page 9, point 6 - -

18 **DR BLACK:** On my evidence?

19 **MR QUINN:** Page 9 of your statement.

20 **DR BLACK:** Personal effects?

21 **MR QUINN:** Sorry, it's page 10. I beg your pardon.

22 **DR BLACK:** Of my statement?

23 **MR QUINN:** Yes, it is. The sixth paragraph.

24 **DR BLACK:** Now, you say the sixth paragraph?

25 **MR QUINN:** The sixth paragraph, that's right, at the top of that
26 page - -

27 **DR BLACK:** Regarding both Mr Kelly and Mr Belson?

28 **MR QUINN:** That's right.

29 **DR BLACK:** Mm, mm.

30 **MR QUINN:** Now, in paragraph 6 you argue that there will be no
31 direct effect on the health of people like Mr Kelly and

1 Mr Belson. That's your argument no direct effect on
2 their health?

3 **DR BLACK:** Mm, mm.

4 **MR QUINN:** What about indirect effects on their health?

5 **DR BLACK:** As I said, if people are unhappy because of anything,
6 they will misplace because of the perceived change in
7 the amenity of where they live, that unhappiness could
8 result in an effect on their health.

9 **MR QUINN:** Just typically, what about sleep disturbance? The
10 World Health Organisation says that's a direct health
11 effect - -

12 **DR BLACK:** Mm, mm - -

13 **MR QUINN:** Do you agree with the World Health Organisation in that
14 respect?

15 **DR BLACK:** I agree that sleep disturbance does have the potential
16 and does cause adverse effects on people's health, yes.

17 **MR QUINN:** Thank you. And what about annoyance from audible
18 noise? Is that a direct or indirect health effect?

19 **MR QUINN:** Annoyance is not a direct health effect. Annoyance is
20 - if people are annoyed that's within the range, the
21 normal range of human emotion, and that affects the way
22 in which they perceive the amenity of their
23 circumstances. So, if people are annoyed that can
24 result in a change in their mental state which in turn
25 could have an effect on their health. But, it's not an
26 inevitable or direct effect.

27 **MR QUINN:** And the change might manifest as anxiety, would you
28 say?

29 **DR BLACK:** Yes, if people are annoyed, they may become anxious.

30 **MR QUINN:** And if anxiety is not treated or the aggravating factor
31 is not removed, anxiety can progress into depression,

1 can't it?

2 **DR BLACK:** That's a complicated question, but I think it's
3 probably a reasonable thing to say. It would - -
4 anxiety - - sustained unresolved anxiety can result in
5 a reactive depression, but it's more common to see
6 people who have anxiety as a consequence of an
7 underlying or endogenous depression. So, when you see
8 anxiety, you often look for depression underneath it
9 which is often a biological depression which was there
10 in the first place, but that's probably not particularly
11 - - I think to address the idea that you put to me, I
12 think it is true to say if someone became annoyed,
13 persistently annoyed, persistently anxious, they could
14 then become despondent, which is on the way to being
15 depressed, but that is a reactive depression which is
16 different to a major depressive disorder. In the
17 international classification diseases system, a major
18 depressive disorder has a biological cause.

19 **MR QUINN:** I think, just to bring you back to some of your
20 evidence this morning was the statement you made that
21 the effect on sleep - -

22 **DR BLACK:** Mm, mm - -

23 **MR QUINN:** And anxiety is even worse than direct effects. Is that
24 your evidence?

25 **DR BLACK:** Oh, it depends on the direct effects. I mean, the
26 effect on sleep from anxiety - - the person who suffers
27 from significant anxiety can not sleep at all. But, a
28 person who is subject to a lot of noise may not sleep at
29 all either, so it really is proportional.

30 **MR QUINN:** So, it's a matter of degrees?

31 **DR BLACK:** Yes, degrees, I agree.

1 MR QUINN: So, if - just for example, there was a particular noise
2 source and it was annoying.

3 DR BLACK: Yes.

4 MR QUINN: Accept that for the moment.

5 DR BLACK: Yes.

6 MR QUINN: It may cause sleep disturbance in its own right. You
7 accept that?

8 DR BLACK: If it was annoying, if it was just annoying, then it
9 would most - - more likely cause a person to fall asleep
10 than awakening.

11 MR QUINN: All right.

12 DR BLACK: But, with that qualification, I agree.

13 MR QUINN: And, if in a case of the anxiety that is being
14 generated by that noise source, the anxiety would
15 increase, would it not, if you were unable to escape
16 from that noise source.

17 DR BLACK: Yes, that's right.

18 MR QUINN: And as we said, anxiety is one of those features that
19 is either concurrently or a causal factor in depression.

20 DR BLACK: Reactive depression.

21 MR QUINN: Reactive depression. May the witness please be shown
22 LG 74. It is a paper from - -

23 MEMBER: From Dr Levison - -

24 MR QUINN: [Indistinct] what we know and what we don't know and
25 what we'd like to know. Have you seen this paper
26 before?

27 DR BLACK: Yes, I have.

28 MR QUINN: All right. Can I take you to page 95.

29 MEMBER: Which page?

30 MR QUINN: At 95, sorry. Got that?

31 DR BLACK: Yes.

1 **MR QUINN:** Under the heading Low Frequency noise and Stress, would
2 you read that paragraph out, please.

3 **DR BLACK:** "Any persistent and unwanted sound, low frequency or
4 high-frequency is a stressor. Unfortunately,
5 conventional methods of dealing with environmental noise
6 stressors are A weighted, which means that the presence
7 of disturbing low frequency noise may not be detected.
8 The absence of a measurement requirement for noise
9 control officers to pursue the source of low-frequency
10 noise in turn leads to long-term stress effects in the
11 low-frequency noise of the complainant."

12 **MR QUINN:** I will stop you there. Have you anything in your
13 research, to contradict that statement?

14 **DR BLACK:** Well, yes, because I don't understand why the A
15 weighting is brought into it because A weighting is
16 still - - that really would be saying that A weighting
17 is wrong. I mean, A weighting still finds the noise.
18 It just adjusts the level of the noise to the equivalent
19 with the human response.

20 **MR QUINN:** It adjusts the frequencies in lower spectra?

21 **DR BLACK:** Yes.

22 **MR QUINN:** And attenuates them so that they're not shown in the
23 sound present of [Indistinct]. Isn't that correct?

24 **DR BLACK:** No, it just shows them at lower - it makes them - it
25 shows them as lower because it equates - - it changes
26 their importance to match them with human response.
27 It's the same reason why you have a loudness button on a
28 stereo amplifier. If you turn the volume down, the way
29 in which we respond to the sound is different to if you
30 turn it up.

31

1 Now, the way in which the human ear responds varies with
2 level and the frequency, and A weighting is an attempt
3 to make sound pressure levels - - apply equivalent
4 criteria to different frequencies in accordance with
5 human response.

6 **MR QUINN:** If you go to the third paragraph. I may not have
7 marked it, but halfway through the second paragraph you
8 see a sentence starting, "Constant low-frequency noise."

9 **DR BLACK:** Yes, "It has been classified as a background stressor,"
10 yes.

11 **MR QUINN:** Would you read that, please.

12 **DR BLACK:** "Whilst it is acceptable under the effects of
13 cataclysmic and personal stress to withdraw from coping
14 with normal daily demands, this is not permissible when
15 exposed to a low-level background stress although
16 adequate reserves of coping ability lead to the
17 development of stress symptoms. In this way chronic
18 psychophysiological damage may result from long-term
19 exposure to an audible low-frequency" - -

20 **MR QUINN:** No, you've jumped ahead - -

21 **DR BLACK:** Sorry, "To an audible low-level."

22 **MR QUINN:** Low level - -

23 **DR BLACK:** Sorry, you're right, "To an audible low level, low-
24 frequency noise, which is left uncontrolled despite
25 complaints."

26 **MR QUINN:** If I could stop you there. In that capacity Professor
27 Levingthorn (?) is considering continual low-frequency
28 noise, isn't he?

29 **DR BLACK:** Yes, I think so.

30 **MR QUINN:** And considering it at a low levels, isn't he?

31 **DR BLACK:** He seems to be, yes.

1 **MR QUINN:** Is there anything in your research which contradicts
2 the passage which you have just read out?

3 **DR BLACK:** Yes, well, I think he's making a number of statements
4 there which are not particularly evidence-based. And,
5 indeed, there is quite a - - there's quite a broad
6 statement, so I - but in the end he's saying chronic
7 psychophysiological. I don't know what
8 psychophysiological damage is, so, I don't - I don't see
9 that paragraph as particularly scientifically useful
10 because I don't know what he means by chronic
11 psychophysiological damage.

12 **MR QUINN:** Just as a general proposition, we are talking about
13 stresses in the passages here talking about unwanted
14 noise being a stressor. Do you accept that?

15 **DR BLACK:** Potentially. Unwanted noises can be stressors, yes.

16 **MR QUINN:** And, this respected author, an expert on low-frequency
17 noise infrasound - -

18 **DR BLACK:** Yes - -

19 **MR QUINN:** Tells us that low-level, low-frequency noise, will
20 result in chronic psychophysiological damage. You don't
21 understand what he means by that. Isn't he talking
22 about anxiety leading to other consequences?

23 **DR BLACK:** Well, he should - - he may well be, in which case he
24 should have said psychogenic, because anxiety is not
25 psychophysiological.

26 **MR QUINN:** Psychogenic is a term that you have use repeatedly in
27 your - -

28 **DR BLACK:** Yes - -

29 **MR QUINN:** [Indistinct].

30 **DR BLACK:** Well, it's a correct term to use.

31 **MR QUINN:** And, it would be a fair proposition, would it not, that

1 human well-being depends upon avoiding anxiety and
2 stress?

3 **DR BLACK:** Well, human well-being doesn't attain to avoiding
4 anxiety because anxiety is quite an important part of
5 well-being and involves - - human well-being really
6 involves being able to resolve anxiety, and if you can
7 resolve anxiety you can avoid stress. I mean, anxiety is
8 built into us as a warning that we need to do something,
9 and I mean, the healthiest, mentally healthiest people
10 are able to deal with anxiety. If you can't deal with
11 anxiety, you end up with stress.

12 **MR QUINN:** In your paragraph which is on page 10, your paragraph
13 says - -

14 **DR BLACK:** Yes - -

15 **MR QUINN:** You talk about providing inaccurate information
16 regarding health effects, and if that is corrected - -

17 **DR BLACK:** Mm, mm - -

18 **MR QUINN:** Most people who would acclimatise to the presence of a
19 facility and will not suffer the long-term effects of
20 stress. Do you have that - - ?

21 **DR BLACK:** And that is my - yes, that is my opinion.

22 **MR QUINN:** And so I'm just trying to understand what you're
23 advocating there. Are you advocating some kind of re-
24 education program for people living next to windfarms?

25 **DR BLACK:** It's not so much re-education. But, I'm advocating
26 that people who are in communities where windfarms are
27 proposed need to - it's important that they are given
28 accurate information, particularly as they are often
29 subject to a lot of inaccurate information, and the fact
30 that they have - - rather than call it re-education, I
31 think it's important to make sure that people in

1 communities where windfarms are built, have access to
2 accurate information.

3 **MR QUINN:** I think they deal with [Indistinct] about what accurate
4 might mean, but you can talking here about correcting
5 attitudes, aren't you? That is what you are advocating?

6 **DR BLACK:** I'm not - I'm talking about correcting inaccurate
7 information.

8 **MR QUINN:** So, then you are talking about an education program for
9 people living next to windfarms?

10 **DR BLACK:** I'd hesitate to call it educational. I'd call it
11 information.

12 **MR QUINN:** All right. You then assert in your last passage in
13 that sixth paragraph that most people will acclimatise
14 to the presence of the facility and will not suffer any
15 long-term effects of stress.

16 **DR BLACK:** That is my - that's my - -

17 **MR QUINN:** Opinion - -

18 **DR BLACK:** Opinion. It's also may experience. So, that's my
19 evidence, yes.

20 **MR QUINN:** Could you take the Tribunal to the evidence to support
21 that assertion. Where is the evidence for that?

22 **DR BLACK:** That evidence is not easy to find, and it's an area
23 where, as I have said more times, I would really support
24 there being some scientific - some well designed and
25 well conducted scientific research, in this part of the
26 world, Australia and New Zealand, to look at that,
27 because the research that has been done so far is not
28 been sufficient to determine it. So, I am giving that
29 even based on my own experience and opinion, and it's
30 not based on epidemiological. The only type study that
31 would really establish that would be epidemiological

1 studies, and they do need doing.

2 **MR QUINN:** All right. You were asked about whether you knew
3 anything about the South Australian [Indistinct] are you
4 aware of that?

5 **DR BLACK:** No.

6 **MR QUINN:** What's proposed is that there be acoustic testing - -

7 **DR BLACK:** Mm, mm - -

8 **MR QUINN:** Concurrent with sleep studies, concurrent with health
9 studies, in a community that's been long affected by
10 windfarms. Is that the type of research you are talking
11 about?

12 **DR BLACK:** No, it's not, because that's combining too many things
13 at once so it would end up confusing.

14
15 The first thing - you made the statement that in the
16 community affected by windfarms, the first thing would
17 be to have a proper diagnosis of what are the putative
18 effects to then establish if there is an excess of those
19 effects in the community. If there then is, there needs
20 to be a study as to whether those effects which have now
21 been established, are related to the presence of the
22 windfarms.

23
24 So, you could only do that in stages. But, if it was
25 made to do a study like that in one study, it would be
26 so confounded that I doubt that it would be helpful.

27 **MR QUINN:** No doubt they will have your expert assistance on the
28 conduct and structure of their studies. I take you back
29 to Volume 76, which is the white volume.

30 **DR BLACK:** Thank you.

31 **MR QUINN:** Tab 7. Sorry [Indistinct]. Sorry. There are so many

1 books. [Indistinct]. Tab 7. The [Indistinct] black
2 book the Waubra Foundation book, Tab 7, Mr Chairman, I
3 apologise.

4 DR BLACK: I have it.

5 MR QUINN: You have it?

6 DR BLACK: No, sorry, Tab 6?

7 MR QUINN: Tab 7; I apologise.

8 DR BLACK: [Indistinct].

9 MR QUINN: That's right. This is the Waubra Foundation.

10 DR BLACK: Oh, the Waubra. I apologise. Tab 7.

11 MR QUINN: Just before you go into this, you have given some
12 evidence about the different levels or hierarchy of - -

13 DR BLACK: Hierarchical evidence, yes.

14 MR QUINN: All right. Now, this study was the Masters
15 [Indistinct] at the University of Adelaide.

16 DR BLACK: Mm, mm.

17 MR QUINN: Basically at a windfarm called Waterloo. It gives some
18 detail about the number of questionnaires. [Indistinct]
19 75 questionnaires were delivered and then five
20 kilometres from the windfarm and they received a
21 response rate of 64 percent.

22 DR BLACK: Mm, mm.

23 MR QUINN: That would be a reasonable response rate for that kind
24 of survey, would it not?

25 DR BLACK: Yes, it would.

26 MR QUINN: And, they went through the survey. If I could take you
27 then to what is headed up page 3 of the document. It is
28 page 3. Can I ask you to read out the centre paragraph,
29 the survey results.

30 DR BLACK: "[Indistinct] show that overall more than 70 percent of
31 respondents claimed that they had been negatively

1 affected by the windfarm noise. Thirty-five percent of
2 the respondents stated that they had been moderately
3 affected, and 19 percent claimed that they had been very
4 affected. In total, more than 50 percent of the
5 respondents indicated they had been very or moderately
6 immediately affected by windfarm noise. This is higher
7 than evidence gathered on previous studies. A windfarm
8 noise research in the early 1990s of three European
9 countries showed that the rates of residents who were
10 annoyed by windfarm noise was 67 percent, and the
11 research in the Netherlands in 2007 highlighted that the
12 rate of residents living within 2 and-a-half kilometres
13 of a windfarm who were rather or very annoyed by
14 windfarm noise was only eight percent."

15 **MR QUINN:** I will stop you there. Now, in terms of the hierarchy
16 of the research, this is not at the point of causal, is
17 it?

18 **DR BLACK:** No, it's not, it's not even - it's just Level IV.

19 **MR QUINN:** All right. If you go to the bottom paragraph on that
20 page, please.

21 **DR BLACK:** Mm, mm. Yes.

22 **MR QUINN:** A survey. Would you read that out, please.

23 **DR BLACK:** "Also showed that 38 percent of the respondents rated
24 windfarm noise complaints to the developer; twenty-five
25 percent to the local council; 19 percent to the
26 Environment Protection Authority. Thirty-eight percent
27 of the affected residents claimed experiencing health
28 issues caused by windfarm noise while 38 percent claimed
29 that they were not sure about whether their health had
30 been damaged. Health issues mainly related to sleep
31 deprivation and headaches. The affected respondents

1 took action to address the noise caused by the windfarm
2 noise. Actions taken by those respondents are
3 highlighted by these excerpts " Is that right?

4 **MR QUINN:** That's right.

5 **DR BLACK:** "Excerpts [Indistinct] the way it is [Indistinct] to
6 protect themselves from the annoyance coming from the
7 windfarm noise. Several respondents had [Indistinct]
8 other areas where no windfarms are established. The top
9 two expectations of the affected residents were to turn
10 off the wind turbine during night-time and affected
11 residents obtaining appropriate financial compensation
12 from windfarm developers."

13 **MR QUINN:** Now, are you suggesting that the response to this
14 survey, that is to say the quality of what was reported,
15 the substance of what was reported, would have altered
16 if better information had been given to that community.
17 Is that your evidence?

18 **DR BLACK:** Yes, I would say - - I would say so. I would suggest -
19 of course, I don't know because there are a number of
20 possibilities here, and one of them has to be that
21 there's something wrong with this windfarm and it does
22 create noise and disturb people.

23 **MR QUINN:** It seems to be the case. The South Australian EPA is
24 prepared to spend three months testing it so there might
25 be something wrong, mightn't there?

26 **DR BLACK:** Yes, there might be. I mean, the possibilities here
27 are that there isn't a problem, a perceived problem, in
28 which case information could have helped, but of course,
29 if there is a problem then the information is not the
30 answer. The answer is to fix the windfarm.

31 **MR QUINN:** All right. You are not an engineer so you can't tell

1 us how we will fix the windfarm.
2
3 Can I ask you to turn to the Tab 8, please. It is
4 another survey carried out. I just want to note the date
5 of the survey which is April 2012. Do you see that?
6 **DR BLACK:** Yes.
7 **MR QUINN:** And in the introduction it says, "[Indistinct] Water
8 Windfarm commenced operation in late 2010."
9 **DR BLACK:** Mm, mm.
10 **MR QUINN:** So, don't we have a period here of what, a year and-a-
11 half.
12 **DR BLACK:** Mm, mm - -
13 **MR QUINN:** And would that be defined in which you suggest that a -
14 - community acclimatising to a wind farm should have
15 already stopped complaining and stopped having their
16 anxieties?
17 **DR BLACK:** Yes.
18 **MR QUINN:** In that period?
19 **DR BLACK:** In my experience, yes.
20 **MR QUINN:** All right, I will take you to the last sentence on the
21 page, please.
22 **DR BLACK:** What page?
23 **MR QUINN:** I'm sorry, the [Indistinct].
24 **MEMBER:** Which page?
25 **MR QUINN:** The front page, the last sentence. "Upon Examining" -
26 -
27 **DR BLACK:** So, it's upon examining the responses.
28 **MR QUINN:** Read that out, please.
29 **DR BLACK:** "[Indistinct] 55 percent of households were disturbed
30 by day time noise; 56 percent by night time noise; and
31 39 percent experienced sleep disturbance."

1 **MR QUINN:** Now, one possibility is that there is something wrong
2 with the windfarm. Is that right?

3 **DR BLACK:** Mm, mm.

4 **MR QUINN:** I want you to assume that it complies with the South
5 Australian EPA noise guidelines.

6 **DR BLACK:** I'm afraid I don't know what that is.

7 **MR QUINN:** All right. I can tell you it is exactly the same
8 criterion as the New Zealand Standard which is
9 applicable here.

10 **DR BLACK:** Okay; thank you.

11 **MR QUINN:** The distances we're talking here are up to 5
12 kilometres. Do you see that?

13 **DR BLACK:** Yes.

14 **MR QUINN:** And, if I then take you to what is the sixth page of
15 this document. It's not numbered. I apologise.

16 **DR BLACK:** One, two, three, four, five, six. So, that's the one
17 headed [Indistinct].

18 **MR QUINN:** That's right. If you look at the response rate just at
19 the top, 14 respondents out of 75 surveys and a 55
20 percent response rate. Do you see that?

21 **DR BLACK:** Mm, mm.

22 **MR QUINN:** Is that reasonably good for community surveys?

23 **DR BLACK:** The responses, yes, it is, yes.

24 **MR QUINN:** Now, can I ask you to turn to the next page. Halfway
25 down the page you see Roman numeral two in question
26 seven - -

27 **DR BLACK:** Mm, mm - -

28 **MR QUINN:** How does it disturb your household during the night?
29 Do you see that?

30 **DR BLACK:** I have got question nine, so question six, seven, eight
31 - how does it disturb your household during the night,

1 yes.

2 **MR QUINN:** Yes, how does it disturb your household during the
3 night. Can you read that out, please.

4 **DR BLACK:** It says, "Vibration of building, noise, whirring,
5 thumping, grinding, winding, drumming, constant
6 rumbling, can hear it over TV, have to keep window shut,
7 constant humming, had to relocate [Indistinct]."

8 **MEMBER:** [Indistinct].

9 **MR QUINN:** Tab 8.

10 **MEMBER:** I've got it.

11 **MR QUINN:** And, in terms of sleep disturbance you see question
12 nine?

13 **DR BLACK:** Yes.

14 **MR QUINN:** Response of 39 percent saying that they are affected,
15 and this is up to 5 kilometres. Do you see that?

16 **DR BLACK:** Mm, mm.

17 **MR QUINN:** So, answers to this survey in terms of what is detected
18 are assumed to be accurate reportage, is that there is a
19 problem with the windfarm - -

20 **DR BLACK:** Yes - -

21 **MR QUINN:** I want you to presume that it's compliant with the same
22 criteria as are applicable here. Is there a problem
23 with the noise level set by that criteria perhaps?

24 **DR BLACK:** If - - - well, I mean I'm sorry, I don't want to be
25 difficult but I have to preface my answer by saying this
26 absolutely doesn't make sense. I mean, what's described
27 here, vibration of building, hearing it above the TV at
28 five kilometres out from a wind turbine that's compliant
29 with the standards, that's just not possible.

30 **MR QUINN:** You say it is not possible. Have you been to Waterloo
31 and interviewed anybody there?

1 DR BLACK: No, of course I haven't, no.

2 MR QUINN: Could you turn to Tab 9, please.

3 DR BLACK: Yes.

4 MR QUINN: And, nine is a different windfarm, [Indistinct]
5 Windfarm Farm Survey. Do you see that?

6 DR BLACK: Yes.

7 MR QUINN: And just deal with the key findings. I will read it to
8 you. Seventy-three percent of all residents out of
9 [Indistinct] five kilometres returned the surveys, so 73
10 percent returned the survey. 85.7 percent of households
11 indicated that noise is present at their residence and
12 property during the day and/or night. 78.5 percent of
13 households were reporting sleep disturbance from the
14 noise generated from the wind energy developer.

15
16 Now, to 7 and-a-half kilometres 82.4 percent indicated
17 noise was present, day or night, and 76 percent of
18 households reported sleep disturbance.

19
20 If you had verified accounts for sleep disturbance at
21 those distances, you have to accept there is a problem
22 with noise, wouldn't you?

23 DR BLACK: It's not quite that simple. I mean, if I had verified
24 evidence of sleep disturbances and an elimination of
25 other causes of them then I would be having to look at
26 the - the biophysics of the situation, because if we
27 come back here, and if we are talking about the
28 [Indistinct] ideas this morning, I just don't find that
29 plausible.

30 MR QUINN: All right, put aside that it is plausible.

31 DR BLACK: Mm, mm.

1 **MR QUINN:** These are the reportages of the statements that have
2 been made in good faith.

3 **DR BLACK:** I don't doubt that.

4 **MR QUINN:** And there is an issue, isn't there?

5 **DR BLACK:** There is an issue about something but the issue might
6 well be to do with the quality of the way in which this
7 has been studied.

8 **MR QUINN:** A possibility. Put that aside for a moment. One of
9 your arguments is that over time, a year and two years,
10 people acclimatise to it and their anxiety and their
11 complaints fall away. That's your evidence.

12 **DR BLACK:** That is my experience and my evidence, yes.

13 **MR QUINN:** I just note the date of this survey, August 2012. Do
14 you see that?

15 **DR BLACK:** Mm, mm.

16 **MR QUINN:** And note that in the introduction we are told in the
17 first sentence that this windfarm started operating in
18 July 2009. Do you see that?

19 **DR BLACK:** Yes.

20 **MR QUINN:** So, in three years it's quite clear that this community
21 did not acclimatise to the windfarm; yes?

22 **DR BLACK:** Well, it didn't acclimatise [Indistinct] it's hard to
23 say what it is.

24 **MR QUINN:** Now, in that volume book, that is the Waubra Foundation
25 book, can I take you to Tab 24, please.

26 **DR BLACK:** Noise and Health.

27 **MR QUINN:** If you turn the page, you will see the [Indistinct]
28 impact of wind turbine noise on health and related
29 quality of life. Do you see that?

30 **DR BLACK:** Yes.

31 **MR QUINN:** Are you familiar with this document?

1 DR BLACK: Yes. I'm also familiar with the authors of it.

2 MR QUINN: You didn't refer to it in your statement?

3 DR BLACK: No.

4 MR QUINN: Why not?

5 DR BLACK: Yes, well, it's - -

6 MR QUINN: What's the difficulty with it?

7 DR BLACK: The difficulty with it is is that I think it's using
8 the HRQOL technique, the Health Assessment - the Health
9 Related Quality of Life assessment, which is a tool
10 which I don't accept is useful in environmental
11 medicine, and which I think introduces a lot of
12 variables and uncertainties, and so I don't agree with
13 the methodology that was used in this paper.

14 MR QUINN: All right. It would be helpful for the Tribunal for
15 you to have discussed it, Dr Black, would it not?

16 DR BLACK: Yes, I accept that. Since it's been raised, yes.

17 MR QUINN: If you could turn to Tab 25, please.

18 DR BLACK: Yes. Behind it.

19 MR QUINN: There is a heading on the page noise and health -.

20 DR BLACK: Noise and health again.

21 MR QUINN: Turn the page. [Indistinct] Sleep and Health. Do you
22 see that?

23 DR BLACK: Yes.

24 MR QUINN: Just looking at that heading - -

25 DR BLACK: Mm, mm - -

26 MR QUINN: That would be a document highly relevant to the topics
27 on which you have propounded, Dr Black.

28 MR QUINN: Mm, mm.

29 MR QUINN: You have not referred to it in your statement?

30 DR BLACK: No, I have not.

31 MR QUINN: I would ask you why not.

1 **DR BLACK:** It's certainly one that I have seen before.

2 **MEMBER:** In fact, it is one that you have seen before?

3 **DR BLACK:** Yes, it is. It's one - - essentially one that's come
4 out of the noise literature rather than the medical
5 literature but that story is captured by - - it's hard
6 - - as I'm sure you would understand, it's hard for me
7 to sit here and say why I didn't include some studies
8 and not others, but - -

9 **MR QUINN:** Can I take you to page 240, please.

10 **DR BLACK:** Mm, mm. Yes.

11 **MR QUINN:** Do you see a table?

12 **DR BLACK:** Yes.

13 **MR QUINN:** And, it gives the Pittsburg sleep quality index.

14 **DR BLACK:** Mm, mm.

15 **MR POWER:** Are you familiar with that index?

16 **DR BLACK:** Not really, no.

17 **MR QUINN:** Okay. All right, I won't ask you about it.

18 **DR BLACK:** Mm, mm.

19 **MR QUINN:** And, the Pittsburg sleep quality index is a study
20 method, is it not, to record sleep outcome for
21 communities?

22 **DR BLACK:** I believe so, yes.

23 **MR QUINN:** But you know nothing more about it?

24 **DR BLACK:** No.

25 **MR QUINN:** No. All right.

26 **DR BLACK:** Not off the top of my head, no.

27 **MR QUINN:** Turn to Tab 26, please.

28 **DR BLACK:** Yes.

29 **MR QUINN:** Wind farm generated noise and adverse health. Do you
30 see that?

31 **DR BLACK:** Mm, mm.

1 MR QUINN: Now, in fairness this is not a published paper.

2 DR BLACK: No, no, I understand.

3 MR QUINN: Have you seen this document before?

4 DR BLACK: No, I don't think I have.

5 MR QUINN: All right. And you also used this sleep quality index

6 - -

7 DR BLACK: Right - -

8 MR QUINN: On page 11. On page 11 it gives some numbers for what

9 the quality index was here, an operating in a windfarm

10 in Victoria.

11 DR BLACK: Mm, mm.

12 MR QUINN: Now, you may not be familiar with it but a score

13 greater than five is indicative of poor quality sleep.

14 DR BLACK: Right.

15 MR QUINN: Would you be aware of that?

16 DR BLACK: I wasn't, no.

17 MR QUINN: And, in this case, they found noise outcomes for people

18 at the windfarm and then in relation to a control group

19 outside the windfarm.

20 DR BLACK: Right.

21 MR QUINN: Would that be a significant study or survey?

22 DR BLACK: Well, potentially providing that the - I mean, if it is

23 a properly conducted case-control study it is what I am

24 talking about as the Level II study but I would need to

25 - - and I mean, the way of course to test it would be to

26 publish it but what's before me [Indistinct] may well be

27 in the process of doing.

28 MR QUINN: I understand it's up for peer review and it's currently

29 being reviewed.

30 DR BLACK: Yes, well, that would be the appropriate thing to do,

31 yes, I agree.

1 **MR QUINN:** And if it came through the peer review process and
2 satisfied - -

3 **DR BLACK:** Yes - -

4 **MR QUINN:** That would be a significant piece of research, wouldn't
5 it?

6 **DR BLACK:** Yes. If it's - - if you just look at the study design
7 - -

8 **MEMBER:** I just noticed the sentence having regard to something
9 you just said a minute ago. One limitation of the study
10 is the lack of a matched control group.

11 **MR QUINN:** There was a control group.

12 **MEMBER:** In the event, only two [Indistinct] are reported.

13 **MR QUINN:** Yes, I think that's a limitation. I might have - - in
14 fairness to this, there is a control group. It wasn't a
15 complete control group and [Indistinct] you are quite
16 right. I apologise.

17 **DR BLACK:** Well, once again, this study appears to use the quality
18 of life in general health method, which as a measure of
19 health effect I disagree with, so I probably wouldn't
20 end up agreeing with this study. In fact, I also would
21 be - well, I won't pre-empt what might happen to a
22 review, because it is what it is, and the point that I
23 have made is that - and I mean, it really applies to a
24 number of these papers is that I suppose my method is
25 more conservative and conventional, but to me it's
26 important to establish that there is a problem and it is
27 actually a consistent problem with the diagnostic
28 entity, because you can find in a community when you do
29 the [Indistinct] that there might be 6 different reasons
30 because of the socio economic, for example, because
31 people were shift workers.

1 **MR QUINN:** We could find those things if we looked, couldn't we?

2 **DR BLACK:** Yes. A study can be controlled, so the first thing to
3 do would be if you found a group of the reportedly
4 affected people the first thing to do is to establish
5 what it is that you are saying is wrong, and to
6 eliminate any other causes and then to actually
7 establish whether there is actually a problem which
8 doesn't give any other explanation.

9 **MR QUINN:** Right.

10 **DR BLACK:** And things that you could go on to in the case-control
11 study. To go on the case-control study without that,
12 would be fraught with difficulties and a shortcut to
13 that which people use are the quality of life indices,
14 which actually get rid of the requirement to having to
15 do proper diagnosis, and in my way - and in my opinion,
16 are unacceptable and result in some very poor quality
17 research.

18 **MR QUINN:** All right. You know there has been some criticism of
19 the research.

20 **DR BLACK:** Yes.

21 **MR QUINN:** And, you are ready to talk about psychogenic disorders
22 leading to sleep disturbance, the fact that there
23 haven't been or their attitudes hadn't been corrected
24 before the windfarm comes into view, those issues. Could
25 you take us - - and you used the words "reliable
26 established scientific evidence" in support of the
27 arguments I have put to you.

28 **DR BLACK:** Mm, mm

29 **MR QUINN:** Would you take us to reliable established scientific
30 evidence to support claims by your clients and others
31 the [Indistinct] that wind turbine use does not cause

1 sleep disturbance?

2 **DR BLACK:** Well, wind turbine noise can cause sleep disturbance
3 but that can be eliminated by following the appropriate
4 standards by limiting the level to acceptable levels
5 which - -

6 **MR QUINN:** And in three years of [Indistinct] it hasn't been
7 eliminated in three years of [Indistinct]. Where does
8 this elimination come from? Is that part of the
9 education program?

10 **DR BLACK:** Well, I think - I can't comment on those cases because
11 I don't really know what's going on there. As I said,
12 the distances there are so great that what has been
13 reported there makes no sense to me.

14 **MR QUINN:** Right.

15 **DR BLACK:** So, actually, I mean, I suppose what it cuts to is I
16 don't actually accept those.

17 **MR QUINN:** All right, so you are willing to reject those - -

18 **DR BLACK:** Yes - -

19 **MR QUINN:** The reportages in those surveys?

20 **DR BLACK:** From first principles, I would have to reject those
21 because they don't make - -

22 **MEMBER:** Do you know which windfarms this submission related to?

23 **MR QUINN:** The - - ?

24 **MEMBER:** The submission you have just referred to under Tab 26.

25 **MR QUINN:** Waubra. I believe it was Waubra's.

26 **MEMBER:** Waubra's one.

27 **MR QUINN:** Waubra, in Victoria. But, I will check on that. I'm
28 sorry, [Indistinct].

29 **MEMBER:** Thanks.

30 **MR QUINN:** And, using the same benchmark that you have used in
31 your statement, could you take us to the reliable

1 scientific - - sorry, established scientific evidence to
2 support the claims by the wind industry that wind
3 turbine noise does not cause any issues such as
4 headaches, dizziness or movement?

5 **DR BLACK:** You don't really have scientific evidence to prove a
6 negative. You have to have scientific evidence to prove
7 that it did happen. You'd have to start from first
8 principles, and say why would you expect it to cause
9 that.

10 **MR QUINN:** We will come to that. In another statement you have
11 made you prove a negative in a moment. On page 11, you
12 have considered the effects on children with autism
13 spectrum disorder. Do you have that?

14 **DR BLACK:** Yes, I've got that here.

15 **MR QUINN:** It is on page 11 of your statement, and the third
16 paragraph.

17 **DR BLACK:** The third paragraph is however I stated.

18 **MR QUINN:** You said that the noise is at a level readily
19 accommodated by most individuals and does not pose a
20 risk to public health.

21
22 Would you take us to the peer review research to support
23 that statement, please.

24 **DR BLACK:** I'm relying on WHO standards. WHO base standards and
25 WHO guidelines.

26 **MR QUINN:** This is the World Health Organisation who you violently
27 disagree with on topics that [Indistinct] incorrect?

28 **DR BLACK:** No, this is - - I disagree with their overarching
29 politically based statement, and the reason I disagree
30 with it, since it is raised again, is because by making
31 a statement like that, you actually make it more

1 difficult to focus in on the real mechanism of an
2 effect. If you bring in issues of social science and
3 well-being, then actually what you're trying to do is to
4 sort out cause and effect with some sort of physical
5 entity, and whether that be the research that I've done
6 that is related to radiofrequency and electric fields or
7 whether it be this - - I think it dilutes the
8 effectiveness of evidence-based science. That's why I
9 disagree with that.

10 **MR QUINN:** The answer to the question is that there is no such
11 research.

12 **DR BLACK:** Well, I - - you would probably need really to ask that
13 question of acoustic statisticians but my understanding
14 of the WHO based guidelines is that they are both
15 evidence based in the first place and also widely
16 accepted because they are widely used throughout the
17 world.

18 **MR QUINN:** The evidence on which both of those guidelines are
19 based - -

20 **DR BLACK:** Mm, mm - -

21 **MR QUINN:** Is related to traffic noise primarily, is it not?

22 **DR BLACK:** It is - well, it's noise, but the purpose for
23 particularly the second, the European noise guidelines,
24 was related to transport noise, yes.

25 **MR QUINN:** Correct, and in neither of those documents, even the
26 2009 document, consider as a topic the noise from wind
27 farms, do they?

28 **DR BLACK:** No, they don't.

29 **MR QUINN:** Thank you. On page 11, paragraph 4 - -

30 **DR BLACK:** Yes - -

31 **MR QUINN:** You argue in relation to children with autism spectrum

1 disorder.

2 **DR BLACK:** Mm, mm.

3 **MR QUINN:** And it's more appropriate to manage individual
4 behaviour to mitigate potential problems. That's your
5 argument?

6 **DR BLACK:** Well - -

7 **MR QUINN:** You use the word "manage" - -

8 **DR BLACK:** Yes, but the next word is - -

9 **MR QUINN:** It's the fourth paragraph.

10 **DR BLACK:** So however I stated earlier. No. The next one. "In my
11 opinion, the most effective way to manage the manner" -
12 I just don't like to say "manage behaviour" because what
13 it's really saying is manage the manner in which
14 children are introduced. I mean, I would rather use as
15 a broad term, manage the care of those children.

16 **MR QUINN:** One of your solutions is to put up a flagpole I think
17 was your evidence this morning.

18 **DR BLACK:** No, that's not a solution. What I said was that people
19 - - one of the solutions that is often suggested by
20 people who look after these children is that they often
21 find a flagpole reassuring. I'm not suggesting putting
22 up a flagpole.

23 **MR QUINN:** But, isn't the issue with children with these disorders
24 their behaviour? Isn't that the problem for the
25 parents?

26 **DR BLACK:** Well, that's the immediate problem. One of the
27 immediate problems. The problem with bringing up a
28 child with ASD is enormous and the real problem is to
29 optimise the child's development and well-being. You
30 know, the problems faced along the way are problems that
31 have to be dealt with but the real issue is the interest

1 of the child.

2 **MR QUINN:** And, apart from the parents who is it that you are
3 advocating should manage the impact or the manner in
4 which they would use this windfarm? Who is it that's
5 going to be responsible - - ?

6 **DR BLACK:** People who care for them which would include schools -
7 -

8 **MR QUINN:** So, schools have to deal with them?

9 **DR BLACK:** Schools have a part to play. The community in general,
10 people who care for them. Essentially what I'm really
11 saying is that probably the most important thing is to
12 avoid the children being given incorrect negative
13 messages which can cause them to become fearful.

14 **MR QUINN:** What about messages that are from their own
15 environment, with their own sensors, Dr Black? Would
16 you shut them off from those sensory perceptions?

17 **DR BLACK:** No, not at all, not at all.

18 **MR QUINN:** So, schools have to help manage the introduction of the
19 windfarm?

20 **DR BLACK:** Schools should take advice from the relevant
21 professionals, which, of course they do, and those
22 professionals should be basing their advice on evidence-
23 based science.

24 **MR QUINN:** So, we're now down to some clinical management of these
25 people's needs?

26 **DR BLACK:** Yes, we are.

27 **MR QUINN:** Who is going to fund that, Dr Black?

28 **DR BLACK:** Well, that depends on the environment. I mean, without
29 causing any difficulty here - although I suppose I might
30 - in North Canterbury part of the funding for that was
31 actually agreed to be the windfarm developer. They did

1 agree to subsidise clinical assessments for people who
2 were concerned.

3 **MR QUINN:** All right, so in addition to clinical assessments it
4 would be a windfarm developer who is paying for the re-
5 education programs to correct those attitudes. Is that
6 your evidence?

7 **MR POWER:** I object to the question. It's not what the witness is
8 saying about re-education programs.

9 **MEMBER:** What, he can deny it.

10 **DR BLACK:** Re-education is not the right term. Actually, what was
11 being done, precisely was to make independent
12 professional psychologists available to the community to
13 provide assistance, and it was done at arm's length from
14 the industry. The issue was managed by carers and by the
15 schools and psychologists. The need for it was to be
16 determined by the professionals.

17 **MR QUINN:** Right. And, it might be the developer that is calling
18 for the funding of those psychologists?

19 **DR BLACK:** The developer, which was an energy company, agreed to
20 provide support in that case.

21 **MR QUINN:** Paragraph 6 on page 11, you make the assertion that
22 there will be no impact on two boys with the Asperger's
23 like syndrome or autism spectrum disorder - -

24 **DR BLACK:** I didn't say that. I said it is very unlikely.

25 **MR QUINN:** Very unlikely, and because of the distance of six
26 kilometres.

27 **DR BLACK:** And also because, yes - - because of the distance and
28 because I believe that the development would be quite
29 remote in terms of noticing it and the location. I
30 [Indistinct] and look back at the range where they are
31 proposing.

1 **MR QUINN:** Right. You aware that one gentleman in Waterloo
2 complains regularly of sleep deprivation of low-
3 frequency noise at a distance of eight kilometres from
4 turbines?

5 **DR BLACK:** I'm not aware of that, but there is something wrong
6 with their story.

7 **MR QUINN:** Okay. To support that man's experience, Mr Cooper has
8 given evidence about low-frequency noise, turbine noise,
9 measured inside that man's house. You wouldn't be aware
10 of that, either?

11 **DR BLACK:** No, I'm not.

12 **MR QUINN:** Your assertion about there being no impacts on boys
13 with Asperger's at six kilometres is not backed by any
14 evidence, is it?

15 **DR BLACK:** No, it's an opinion.

16 **MR QUINN:** And, of course, there is no peer review, peer research
17 in relation to children suffering from those disorders
18 next to windfarms, is there?

19 **DR BLACK:** No, in fact, the whole issue arose when suggestions
20 were made in the context of the cases that I have
21 mentioned. I undertook some research on the matter,
22 substantial research on the matter, and decided that
23 there was a case to answer. It would be a very
24 worthwhile topic for some more detailed research, which
25 should be published.

26 **MR QUINN:** Can I take you to page 12 in your statement, please.
27 The third paragraph.

28 **DR BLACK:** Yes.

29 **MR QUINN:** Just refamiliarise yourself with that.

30 **DR BLACK:** Yes.

31 **MR QUINN:** And you clearly said - and I think you just said it -

1 that further research regarding windfarms might be
2 helpful.

3 **DR BLACK:** Mm, mm.

4 **MR QUINN:** But you express in that paragraph a belief that further
5 research will not identify or confirm unidentifiable or
6 unconfirmed health risks. Do you have that?

7 **DR BLACK:** Yes.

8 **MR QUINN:** Is that approach a scientific approach, Dr Black?

9 **DR BLACK:** Yes, it is, because - -

10 **MEMBER:** Would you go over to the third paragraph on page 12.

11 **DR BLACK:** It is a scientific approach, but I also understand and
12 accept why you are asking the question. I mean, your
13 concern asking the question is that I should not shut
14 out things that I don't believe - that I believe, and
15 you're right, but the reason that it is scientific
16 research is that if you were doing research on something
17 you have to look, you have to test the hypothesis that
18 something did happen but also - -

19 **MR QUINN:** But you agreed Dr - -

20 **MEMBER:** I don't think he finished his answer.

21 **DR BLACK:** All right, you have to test an hypothesis that
22 something would happen. You can't - - if you were to
23 set out on just a fishing expedition, which is a term
24 used in epidemiology, you would likely to end up with
25 something which is of no more quality than those earlier
26 questionnaires you showed me. If we just ask people do
27 you have any problems, then a lot of people will just
28 come back saying yes. What you really have to do is to
29 say - to formulate some idea of what it is you are
30 investigating.

31

1 So, I am giving my opinion that I don't - - think there
2 are other things that need to be investigated. So the
3 things that would need to be investigated are the issues
4 we have been discussing like sleep, like effects on ASD
5 children. But, I wouldn't rule out the possibility that
6 somebody may bring something else in which then could be
7 the subject of another study.

8 **MR POWER:** All right. So, just to be clear about that, what
9 you're saying, is it not, that sleep disturbance for
10 example wouldn't be an identified or unconfirmed health
11 risk in this case?

12 **DR BLACK:** Oh, no, sleep disturbance is, as I said earlier,
13 talking about closed net monitoring. The assumption that
14 is being made is that sleep disturbance has been
15 adequately controlled by the proper application of the
16 standard. I would support a study to test whether that
17 is so.

18 **MR QUINN:** All right, thank you. I misunderstood what you are
19 saying in the paragraph - -

20 **DR BLACK:** No, I can see that.

21 **MR POWER:** All right. I think you then say in that paragraph,
22 which once again is based on your belief, "It is not
23 appropriate for the wind industry to wait for proof of
24 no effect."

25 **DR BLACK:** Mm, mm.

26 **MR QUINN:** "Proving a negative is not usually feasible and
27 generally not considered a valid scientific approach."
28 That's your evidence.

29 **DR BLACK:** Yes.

30 **MR QUINN:** And, that's an opinion that you hold. Is that correct?

31 **DR BLACK:** Oh, it's a widespread opinion and there are many cases

1 for that. For example, if you look at the IR
2 classification of the causes of cancer, categories one,
3 two, three, four, I think there is one substance in
4 total in the category which says it's proven to be not a
5 carcinogen. In science, you really can only test a
6 hypothesis that a cause is linked to design a study that
7 says that a cause is nothing.

8 **MR QUINN:** In relation to that I think you mentioned earlier
9 randomised trials of drugs. You mentioned that earlier.

10 **DR BLACK:** Yes, that's right, I did.

11 **MR POWER:** And, pharmaceutical research methods are all about
12 excluding the possibility of an adverse risks, aren't
13 they?

14 **DR BLACK:** Well, yes, they are.

15 **MR QUINN:** And, pharmaceutical research is directed at proving
16 positively that there be no adverse side-effects, for
17 example, from a particular medicine?

18 **DR BLACK:** That's not quite that. It's really proven - it's
19 really directed at establishing that enough people have
20 taken the medicine without catastrophic effects that
21 it's worth using the medicine.

22
23 There are - - I mean there are many commonly used drugs
24 which I would prescribe which actually could have - -
25 will have fatal consequences in a few people.

26 **MR QUINN:** If it is mismanaged.

27 **DR BLACK:** Not if it is mismanaged. In Penicillin, it can kill
28 people if you give them to the right person and you
29 didn't know they were sensitive. The thing about
30 clinical trials is that you are - - you gain the
31 experience with them. You are not really proving that

1 they are completely safe. What you are trying to do is
2 flush out the side-effects and interactions so that you
3 can be aware of them.

4 **MR POWER:** All right. What about the safety standards for new
5 aircraft? Isn't that an area where the aircraft
6 manufacturer has to positively prove that their plane
7 won't fall out of the sky?

8 **DR BLACK:** No, they don't. They have to prove that they are - -
9 and I can speak from a lot of experience because I spent
10 eight years as Chief Medical Officer of Air New Zealand
11 so I know a lot about aviation. The aviation standards
12 really are based on experience of particular techniques
13 that create enough certainty to be satisfied that the
14 degree of risk is acceptable.

15 **MR QUINN:** But, just in relation to both of those topics I have
16 been taken you to, the pharmaceutical industry - -

17 **DR BLACK:** Mm, mm - -

18 **MR POWER:** The aircraft industry - -

19 **DR BLACK:** Mm, mm - -

20 **MR QUINN:** They are bound, are they not, by regulation to prove in
21 advance before they release a drug or market an aircraft
22 to be at acceptable safety standards.

23 **DR BLACK:** Yes, that's correct, they are.

24 **MR QUINN:** And, they have to bring proof about that and the
25 regulators demand that proof, don't they?

26 **DR BLACK:** That's right.

27 **MR QUINN:** And, if evidence exists after the event that there is
28 some safety issue, the drug's recalled, isn't it?

29 **DR BLACK:** Yes, yes, that's right.

30 **MR QUINN:** Or the aircraft's recalled to be fixed.

31 **DR BLACK:** Yes.

1 **MR QUINN:** But, you say it's not appropriate for the wind industry
2 to be safely regulated. That's your evidence.

3 **DR BLACK:** No, that's different. What I say is I don't think it's
4 appropriate for the wind industry for rates of proof of
5 no effect and the reason I say that it is that there is
6 no scientific methodology that I'm aware of for
7 establishing proof of no effect. And, the reason I'm
8 saying that is that I don't believe that the effects,
9 the plausible effects of wind turbines, extend further
10 than the potential effects that we know about which are
11 related to noise - -

12 **MR QUINN:** And sleep - -

13 **DR BLACK:** Well, noise and essentially sleep, and [Indistinct] and
14 all these that we have discussed and therefore I believe
15 that these are - these have standards which have been
16 carefully produced, which experience has shown do
17 provide a good level of protection. But, I do support
18 continued evaluation of that protection.

19 **MR QUINN:** All right. And, here, your argument is that it's not
20 appropriate for the wind industry to wait for proof of
21 safety, isn't it?

22 **DR BLACK:** My argument is that the wind industry does not have to
23 - does not have to prove no effect before using the
24 technology, but what they have to do is to use best
25 practice, as we understand it, which is based on all the
26 information they have to hand.

27 **MR QUINN:** You have got all the information coming from
28 communities like Waterloo and [Indistinct] about sleep
29 disturbance.

30 **DR BLACK:** No, I don't believe - the information we have to have
31 to hand has to be evidence-based. It has to fulfil the

1 rules required for scientific evidence, and if those - -
2 for studies like that to be accepted they would have to
3 be peer reviewed and published. Then, even then,
4 studies which are then peer reviewed and published such
5 as the paper which I have criticised by [Indistinct],
6 that they have to be considered in the context of
7 whether they do fit into an appropriate method of
8 protection.

9 **MR POWER:** I take you to - - sorry, page 12. Just the heading to
10 note that we are talking about page 12 of the statement
11 of precautionary principles - -

12 **DR BLACK:** Yes - -

13 **MR QUINN:** Can I then take you to page 13 and the last paragraph.

14 **DR BLACK:** Mm, mm.

15 **MR QUINN:** And, you refer in the last paragraph to the NHMRC Rapid
16 (?) review.

17 **DR BLACK:** Mm, mm.

18 **MR QUINN:** And you have drawn to some conclusions or made some
19 statements based on that.

20 **DR BLACK:** Mm, mm.

21 **MR QUINN:** And, your argument is that that document shows there is
22 no reason for concern. That is one of your
23 observations.

24
25 Are you aware that the NHMRC is currently in the process
26 of carrying out a further review in relation to wind
27 farm noise?

28 **DR BLACK:** Yes, I am.

29 **MR QUINN:** So, the NHMRC in that Rapid (?) review did not close
30 the book, did they?

31 **DR BLACK:** Oh, no, far from it.

1 **MEMBER:** What do you know about that review, doctor?

2 **DR BLACK:** Oh, very little, Sir. I haven't been involved in it.
3 I've only been aware of what's been out there in terms
4 of rumour butt. I have had quite a lot of experience
5 with other NHMRC reviews, and they usually are very
6 driven by the availability of evidence. In this case,
7 there really is not established practices like the
8 standards which are out there, and I have supported
9 those. But, I would expect the review to note that
10 there is not epidemiological evidence supporting those -
11 testing those standards, and I am sure that they would
12 recommend more research, as I do.

13 **MR QUINN:** Could the witness please be shown this document, the
14 Waubra Foundation, Exhibit 36.

15 **DR BLACK:** Yes.

16 **MR QUINN:** Now, these are some extracts which have been put before
17 the Tribunal from Professor Warrick [Indistinct].

18 **DR BLACK:** Yes.

19 **MR QUINN:** CEO of NHMRC.

20 **DR BLACK:** Yes.

21 **MR QUINN:** He was called upon to give evidence to the Senate in
22 relation to the topic.
23

24 The first passage, which is taken at page 84 of the
25 transcript, he says in the last paragraph, looking at
26 the possible health effects of wind farms or wind
27 turbines, they issued a public statement - -

28 **DR BLACK:** Mm, mm.

29 **MR QUINN:** Keeping it under review because, "The review that we
30 undertook of the literature showed at that time that
31 there was not a lot of high-quality peer review

1 literature" - -

2 **DR BLACK:** Yes - -

3 **MR QUINN:** And, it goes on in the next passage, " [Indistinct]
4 very aware of the high-quality scientific literature in
5 this area is very [Indistinct]." Do you see that?

6 **DR BLACK:** Yes.

7 **MR QUINN:** And, that's a fair statement, isn't it?

8 **DR BLACK:** It is, yes.

9 **MR QUINN:** And, he says, "That is why we are at pains to point out
10 that we believe that a precautionary approach should be
11 taken because if you understand the absence of evidence
12 does not mean there might not be evidence in the future.
13 It's just that at the stage the review was done it was
14 not there, so we kept an eye on the literature
15 [Indistinct] time and we are aware of some papers that
16 assist being published."

17

18 In that passage, is he not telling us that the
19 precautionary approach which you take issue with on your
20 last page is principally because the research work has
21 not been done?

22 **DR BLACK:** Yes, but I don't - I understand why he said that, but I
23 don't agree with that, because I believe that the - the
24 biophysics of what this technology is about is quite
25 straightforward. The potential effects are as they have
26 appeared. They are understood. The - - so, I don't - I
27 don't so much recommend a precautionary approach. What
28 I would say if I was making that comment is I would say
29 in the meantime, strict adherence to standards should be
30 observed and those standards should be tested. That
31 would be a more useful thing to say.

1 **MR QUINN:** The standards we are talking about, and the only one
2 that's been brought before this Tribunal by the
3 Applicant is the New Zealand standard on noise.

4 **DR BLACK:** Yes.

5 **MR QUINN:** Do you agree with that?

6 **DR BLACK:** Yes.

7 **MR QUINN:** Now, what the peak health and medical research body is
8 saying is that there should be a precautionary approach,
9 so they disagree with you, Dr Black.

10 **DR BLACK:** Yes, I accept that.

11 **MR QUINN:** You understand that?

12 **DR BLACK:** Yes, I accept that, but I wonder what they mean by a
13 precautionary approach because to me, taking a standard
14 and applying it strictly, in other words insisting on
15 strict compliance, and then ensuring that monitoring is
16 done to see whether that strict compliance results in
17 the elimination of effects is a precautionary approach.

18 **MR POWER:** Would you turn the page, please.

19 **DR BLACK:** Yes, of WE 36?

20 **MR QUINN:** Yes. On the following page is the question of
21 [Indistinct].

22 **DR BLACK:** Yes.

23 **MR QUINN:** And we have a response from Professor Anderson. Do you
24 see the entry there, "But I do not want...?" Do you see
25 that?

26 **DR BLACK:** Mm, mm.

27 **MR QUINN:** Would you read it out, please.

28 **DR BLACK:** I know - - Professor Anderson - I know the headline on
29 the public statement - -

30 **MR QUINN:** Sorry, it is marked P 87, "Professor Anderson ... but I
31 do not want - -"

1 **DR BLACK:** I do not - -

2 **MR POWER:** I do, sorry.

3 **DR BLACK:** Sorry, I'm lost.

4 **MR QUINN:** On the second page - -

5 **DR BLACK:** Yes - -

6 **MR QUINN:** Headed [Indistinct] adopting a precautionary approach -
7 -

8 **DR BLACK:** I'm sorry, I've got it. "But, I do want to make a
9 point to anybody who is relying on this Rapid review. We
10 regard this as a work in progress. We certainly do not
11 believe that this question has been settled. That is
12 why we are keeping it under constant review. That is
13 why we said in our review that we believe authorities
14 must take a precautionary approach to this. That is
15 what we say in medicine anyhow. But, this is very
16 important here because of the very early stage of the
17 scientific literature."

18 **MR POWER:** Coming back to your statement on page 13, you talk
19 about the biophysics of the interaction is well-known.
20 "Transmission of energy resulting from this, potential
21 biological effects which are well characterised and
22 understood."

23 **DR BLACK:** Mm, mm.

24 **MR QUINN:** And I think you answer no, because you take us to the
25 peer review field research that positively includes that
26 assertion in relation to large industrial wind farms?

27 **DR BLACK:** It's not there yet.

28 **MR QUINN:** I suggest to you that the reason that the NHMRC
29 advocated for a precautionary approach to be taken is
30 precisely because there is no such evidence. Do you
31 agree?

1 DR BLACK: Yes, I do.

2 MR QUINN: Now, I show you this document, please. I'm almost
3 done. I hand it up.

4 DR BLACK: Thank you.

5 MR QUINN: I've handed you a document that's hot off the press.

6 DR BLACK: Mm, mm.

7 MR QUINN: Okay.

8 MEMBER: What number are we up to? I will mark this "LG 81."
9

10 **EXHIBIT LG81...document**

11

12 MR QUINN: Time is getting short but - -

13 MEMBER: It is - -

14 MR QUINN: But this is the PowerPoint - -

15 MEMBER: Recommendation and review 2013. It is called Literature
16 Review, 2013.

17 MR QUINN: Without getting bogged down in the detail, what it is
18 setting out there is some [Indistinct] and the refer to
19 methodology and refer to the hierarchy of the research.
20 [Indistinct] causality and [Indistinct] and research and
21 the same topics that you talked about, the process of
22 research, these things [Indistinct] if you flip through
23 the document and then there is a heading about the sixth
24 page in, the study objectives. Do you have that?

25 DR BLACK: Mm, mm.

26 MR QUINN: And the objective was to search the literature
27 investigating the prevalence or absence of association
28 between wind turbines induced noise in humans. Do you
29 see that?

30 DR BLACK: Mm, mm.

31 MR QUINN: And there is a hypothesis put forward, either there is

1 or there isn't such literature. And then it takes us
2 through the research stages and a number of articles are
3 referred to.

4 **DR BLACK:** Mm, mm.

5 **MR QUINN:** And, I will take you to the key conclusion.

6 **DR BLACK:** Mm, mm. Discussion on the last page. I've got that.

7 **MR QUINN:** Discussion.

8 **DR BLACK:** Yes.

9 **MR QUINN:** And the last page is headed "Discussion" and the
10 conclusion from any discussion, "At no stage
11 [Indistinct] hypothesis [Indistinct] is - -

12 **DR BLACK:** Mm, mm - -

13 **MR QUINN:** " Weak evidence [Indistinct]." The second dot point,
14 "No published peer review study showed nonassociation."
15 That confirms, does it not, your evidence that there is
16 no such research to show nonassociation between sleep
17 disturbance and - - ?

18 **DR BLACK:** Neither have I suggested - - yes, that's right. There
19 is the - again, I go back to also there is a sound
20 methodology behind the standards which are being used,
21 but there is a lacking of closing the loop by then doing
22 the epidemiology to look at claimed continued problems
23 and see whether they really are related to the operation
24 of a windfarm.

25
26 Now, they do say here that the studies are Level IV or V
27 which is the same methodology that I've been talking
28 about here. They of course can't apply to Bradford
29 Hill, to Level IV or V and so they shouldn't have,
30 although I think do you think the context in which they
31 are talking about it is reasonable to raise it.

1 **MEMBER:** It is [Indistinct] that there is a sound scientific
2 methodology in the evolution of the standard?

3 **DR BLACK:** Yes, yes, sir. I'm saying there's a sound scientific
4 methodology behind the establishment of the levels in
5 the standard, based on a lot of research and a lot of
6 experience.

7 **MEMBER:** So, that compliance with the standard should ensure the
8 sort of protection that you've mentioned?

9 **DR BLACK:** It should, and - -

10 **MEMBER:** But, there is no direct scientific evidence that it does?

11 **DR BLACK:** [Indistinct].

12 **MEMBER:** Yes.

13 **DR BLACK:** So, it is - the need for research is to prove or
14 disprove that and the type of research, as I said here,
15 the level of - - the studies are Level IV to V and so
16 some Level III studies are going to be able to prove
17 that there is a problem before you try and associate the
18 problem with a purported cause.

19
20 And, actually really I'm looking at it deeply. I would
21 think I do agree with what's been written here, but I
22 would note that in Europe their wind turbines are
23 scattered through the community - this is from Europe,
24 this study. This is from Denmark, I think isn't it?

25 **MR QUINN:** I think if you look at some of the papers, with
26 respect, we are looking at papers from the Netherlands -
27 -

28 **DR BLACK:** Oh, okay - -

29 **MR QUINN:** USA, Canada, New Zealand.

30 **DR BLACK:** [Indistinct] we are doing this rather quickly.

31 **MR QUINN:** Sweden, USA, UK - -

1 **DR BLACK:** The point that I'm really making here is that the most
2 - - the potential solution's on the last page. They say
3 the most obvious example would be, "To locate turbines
4 in as remote a location as possible. However sometimes
5 the close proximity of residents and towns makes this
6 task next to impossible" and they say so perhaps off-
7 shore.

8
9 The point is that that is an issue in the context of
10 Europe, particularly, and perhaps other places as well.
11 The type of approach used in this part of the world is
12 towards wind farms which are [Indistinct] and remote.

13 **MR QUINN:** Right.

14 **DR BLACK:** So, one of the suggestions they've made is already
15 really covered in Australia and New Zealand.

16 **MR QUINN:** That will be a matter of submission later.

17
18 And, in your statement at page 2 you say that, "The
19 preferred policy for planning guidelines which
20 ultimately [Indistinct] 2012." Is that [Indistinct]?

21 **DR BLACK:** Page 2?

22 **MR QUINN:** Of your study, 3.3 - -

23 **DR BLACK:** Right. Okay.

24 **MR QUINN:** You certainly refer to it in your preamble.

25 **DR BLACK:** Yes.

26 **MR QUINN:** I take it you have read it?

27 **DR BLACK:** I must have if I said I referred to it, yes.

28 **MR QUINN:** I couldn't find any reference to Clause 5.1.1 in your
29 statement. Am I correct?

30 **DR BLACK:** I don't know what that is.

31 **MR QUINN:** You don't know what it is?

1 DR BLACK: Yes.

2 MR QUINN: May the witness please have this document. This is Tab
3 16.

4 DR BLACK: Right, so 5.1.1.

5 MR QUINN: I take it you have seen the document.

6 DR BLACK: Yes, I have seen it.

7 MR QUINN: One - and 5.1.1.

8 DR BLACK: I've got 5.1 - - oh, no, hang on, sorry - -

9 MR QUINN: This is on page 29.

10 DR BLACK: Yes, right. Yes, distribution to government policy
11 objectives, yes.

12 MR QUINN: That's right. So, at that page it sets out there the
13 relevant criteria to be observed in the assessment of a
14 planning application for a windfarm.

15 DR BLACK: Mm, mm.

16 MR QUINN: And, could you turn the page, please.

17 DR BLACK: Mm, mm.

18 MR QUINN: Read the passage to yourself starting, "Responsible
19 authorities must..."

20 DR BLACK: Yes. I have read that.

21 MR QUINN: Is that the first time you have read that statement, Dr
22 Black?

23 DR BLACK: No, I have read this document, but I probably skimmed
24 over it pretty much. But, I don't disagree with it.

25 MR QUINN: So you have skimmed over 5.1.1?

26 DR BLACK: Mm, mm.

27 MR QUINN: Couldn't find any reference in your statement to Clause
28 52.32 of the policy planning framework. I couldn't find
29 any reference to Clause 52.32.

30 DR BLACK: 52? What page is that?

31 MEMBER: That's another document - -

1 **MR QUINN:** [Indistinct] 52.32.

2 **MEMBER:** It's the planning scheme that applies in this case, Dr
3 Black.

4 **DR BLACK:** Well I - -

5 **MEMBER:** It is a clause in that planning scheme which specifically
6 applies to wind energy facilities.

7 **DR BLACK:** I really wouldn't - I'm not saying that's not
8 important. But, I would regard that as being something
9 outside my briefing. My focus really is on - - well,
10 really it's on medical issues - -

11 **MEMBER:** Yes - -

12 **DR BLACK:** And matters relating to planning instruments - -

13 **MEMBER:** Well, I think the main thrust of that revision so far as
14 you are concerned would be that it establishes a two
15 kilometre buffer between a wind turbine and the nearest
16 house, that's right, so the nearest existing house.

17 **MR QUINN:** Existing dwelling.

18 **MEMBER:** Existing dwelling.

19 **DR BLACK:** Is that what I'm being asked to comment on, the 2
20 kilometre buffer?

21 **MEMBER:** I think you are simply asked whether you were aware of
22 it.

23 **MR QUINN:** Yes, I am aware of it.

24 **MR QUINN:** And what you heard in the last exchange, or from
25 reading 5.2 D - - ?

26 **DR BLACK:** No, I am aware of the two kilometre buffer. I was told
27 that by the Applicant.

28 **MR QUINN:** Were you aware that 52.32 speaks in terms of wind
29 energy facilities can be located in appropriate
30 locations with minimal impact on the amenity of the
31 area?

1 DR BLACK: No.

2 MR QUINN: And before you made your statement I take it you were
3 provided with all the planning policy documents relevant
4 to noise and health?

5 DR BLACK: No.

6 MR QUINN: I have no further questions.

7 MEMBER: Mr Quinn, can you just enlighten us as to the genesis of
8 this document - that's 52.81?

9 MR QUINN: 52.81 is a literature review which came from the
10 author's medical doctor, Ian Rowe. [Indistinct] handed
11 to me this morning.

12 MEMBER: Yes.

13 MR QUINN: And have looked at all of the literature [Indistinct]
14 and [Indistinct].

15 MEMBER: Where do they come from?

16 MR QUINN: [Indistinct] further assistance on the document.

17 MEMBER: Mr Belford, do you have any questions?

18 MR BELFORD: No, I don't [Indistinct] thank you.

19 MEMBER: All right. Thank you. Mr - -

20 MR POWER: Just a couple of issues in re-examination, if I may.

21 MEMBER: Yes.

22 MR POWER: I will be as brief as I can, Sir.

23

24 RE-EXAMINED BY MR POWER:

25

26 MR POWER: Just, briefly, some questions were put to you regarding
27 your evidence about the effects on children of sleep
28 [Indistinct] disorder.

29 DR BLACK: Yes.

30 MR POWER: Particularly the effects of this proposal.

31 DR BLACK: Mm, mm.

1 **MR POWER:** Is the Tribunal right to understand that your evidence
2 on that topic is that children [Indistinct].

3 **DR BLACK:** Mm, mm - -

4 **MR POWER:** Children with that disorder are vulnerable or
5 susceptible or may react to a change to the environment?

6 **DR BLACK:** Yes, and it is children, not many people. Most adults,
7 it is children with the disorder because of the
8 potential effect on development.

9 **MR POWER:** And, what type of change can prompt that response?

10 **DR BLACK:** Anything, just a change. The building of a new house
11 next door. Changing, painting something a different
12 colour. But, I have to say that I concluded that
13 something like, you know, a wind turbine has quite a
14 strong potential - -

15 **MR POWER:** Yes - -

16 **DR BLACK:** Effect. Because, you know, it sort of appears to be
17 arising out of the ground. It is big. It has something
18 moving on it. It probably is at the end which I would
19 take quite seriously.

20 **MR POWER:** Yes. I am not suggesting you shouldn't - -

21 **DR BLACK:** Yes - -

22 **MR POWER:** But I suppose what I am trying to see if you can
23 explain to the Tribunal the nature of the change which
24 is perhaps at the higher order which might prompt that
25 adverse reaction, so a change that's confined to wind
26 farms or are there other characteristics that might
27 prompt that type of reaction.

28 **DR BLACK:** It's absolutely not confined to wind farms. It is a
29 change that could be - - the most important thing is
30 that it is a change that could be misinterpreted by the
31 child as being - and it would be particularly

1 misinterpreted if it were put to them as being something
2 which was malignant, so if a child saw something like
3 this growing, and there was a view around their school
4 or around their family that this is bad, this is going
5 to hurt you, it could be very distressing, and the
6 advice which we received from a number of specialists in
7 this area, was that it's very important to ensure that
8 that type of message does not get out into the community
9 or it might - that might harm the children. As it -
10 well, I think that's probably what I'm saying.

11 **MR POWER:** The second topic I just wanted to ask you was you were
12 taken you to a number of surveys.

13 **DR BLACK:** Yes.

14 **MR POWER:** Now, in your evidence this morning, or in your
15 evidence-in-chief this morning, you stated to the effect
16 that a survey needs to be very careful constructed - -

17 **MR QUINN:** I object to this. This is not really re-examination.
18 This is re-presenting of the evidence-in-chief. There
19 is nothing unclear about the evidence to warrant this
20 re-examination on it.

21 **MR POWER:** The purpose of the question was to - - I suppose to
22 get the witness's evidence as to whether the surveys
23 that were put to him in his cross-examination were of a
24 standard that matched the evidence that he gave this
25 morning about the type of surveys that he was - -

26 **MEMBER:** Well, as I understand it, he said that they would be
27 Level IV type status.

28 **MR POWER:** That's correct, they would be Level IV type status.
29 But, are the surveys of a standard that he would expect
30 to be satisfactory for a robust and verifiable Level IV
31 questionnaire.

1 **MEMBER:** All right, [Indistinct] the question.

2 **MR POWER:** Perhaps if I will put it that way. Dr Black, based
3 upon your albeit very brief opportunity to peruse those
4 surveys, are you able to give the Tribunal your opinions
5 on whether those surveys are of the standard that you
6 would think is necessary to be a robust Level IV type
7 investigation?

8 **DR BLACK:** Yes, at the lower end but a Level IV goes all the way
9 down. So, they are surveys asking leading questions in
10 a community in which there is concern. They are
11 notorious for having false positive answers - -

12 **MR POWER:** What do you mean by false positive answers?

13 **DR BLACK:** Well, answers answering that there is a problem. If
14 you say to people have you got a problem and link them
15 with the problem, and in a community where there is
16 concern or anxiety, people are likely to agree with a
17 proposition which leads them.

18 **MR POWER:** And, what if you were to learn that, in fact, one of
19 the surveys, being the survey at Waterloo, was actually
20 prepared and distributed by someone who was a common
21 member of that community that was concerned about this
22 wind farm?

23 **DR BLACK:** That might introduce bias in some people but not
24 necessarily everybody.

25 **MR POWER:** I understand. All right. Thank you. I have no
26 further questions.

27 **MEMBER:** In terms of a response rate - -

28 **DR BLACK:** Mm, mm - -

29 **MEMBER:** Would you expect people who are perceiving a problem to
30 be more willing to respond than those that are not
31 perceiving a problem or - -?

1 **DR BLACK:** Yes, but I wouldn't assume that. It really depends on
2 the sort of - - you know, the level of commitment of the
3 community.

4 **MEMBER:** Yes.

5 **DR BLACK:** I mean, I would use surveys like that as not having
6 much meaning in terms of the data from them but, as, you
7 know, indicating the need to perhaps do something more
8 robust, and they certainly can't be ignored. So they
9 would lead me to say well, can we do this in another
10 way. And, there would be - there are very specific
11 techniques for that sort of survey, for example, to ask
12 a whole lot of distracter questions which aren't related
13 to the purported outcomes, and biostatisticians it has
14 been acknowledged have some very skilled ways of doing
15 that.

16 **MEMBER:** And, are those schools possessed by epidemiologists or -
17 - ?

18 **DR BLACK:** Yes, and biostatisticians, they are. But a medical
19 epidemiologist would normally work with a
20 biostatistician.. And, I've worked where I do now in my
21 department, in the university, and there are - these
22 skills are readily available and really very
23 sophisticated techniques these days.

24 **MEMBER:** Anything arising out of those questions?

25 **MR POWER:** No.

26 **MR QUINN:** No.

27 **MEMBER:** All right, Dr Black. Thank you very much for your
28 contribution to the proceedings. We can excuse you to
29 return to native shores.

30 **DR BLACK:** Thank you, sir. It's been my privilege. Thank you.

31 (WITNESS WITHDREW)