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21 December 1984

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD
Glenn O. Bright
Dr. James H. Carpenter
James L. Kelley, Chairman

In the Matter of CAROLINA POWER AND LIGHT CO. et al. (Shearon Harris Nuclear Power Plant, Unit 1)	Docket 50-400 OL ASLBP No. 82-468-01 OL

Wells Eddleman's Response to Summary Disposition Motions on Contention 57-C-3 (Alerting/Notification during Normal Sleeping Hours 1am-6am)

Both Applicants and FEMA fail to address at least two key issues in this contention, namely (1) assuring that people asleep between 1 a.m. and 6 a.m. in the Harris EPZ would be "timely awakened to take sheltering action", and (2) the effect of closed windows, air conditioners, etc. on the ability of alerting systems to awaken residents in the EPZ.

10 CFR 50.47 (b)(5) requires establishment of "means to provide early notification * * * to the populace within the plume exposure pathway Emergency Planning Zone (EPZ)" (emphasis added). Notification is not provided to a person who doesn't hear it, or who is not awakened by it. (FEMA has neither received nor reviewed the Harris siren system design report -- Hoell affidavit 12/6/84, p.1)

Applicants' acoustics affiant, Dr. Bassiouni, testified on such problems in the Catawba emergency planning hearings in 1984.[1] He said air conditioners can add 15 decibel(s) to the ambient (Tr. 1852) and closed windows would produce a 15-20 decibel reduction (in signal)

[1] A copy of relevant portions of that Catawba E.Plan transcript is attached.

(Tr. 1852-53; see also Tr. 1851: there is an indoor-outdoor sound difference). Dr. Bassiouni testified that there is a substantial probability that people indoors under closed window conditions, the air conditioner on, would not hear the siren. (Tr. 1853). He also testified there is a possibility at both 60 and 70dB siren sound levels, that the siren would not be heard if the windows were open and the air conditioner on. (Tr. 1852). There is nothing in FEMA-43 (Quoted, Apps. p.6) exempting indoor areas from 60/70dB coverage.

All of this is in the context of the same type of 125-dB (at 100 feet or 30 meters distance) sirens CP&L is using for Harris. (See Catawba EP Tr. 1841-42; Applicants' Motion at 10). Dr. Bassiouni testified in Catawba that in fact, these 125-dB rated sirens drop their noise level by 25 -30 dB as they rotate (Tr. 1842-45), i.e. the signal varies between 100 -95 and 125 dB at 100 feet, and "at some location far from the siren, the 10 decibel ambient will not be met" (Tr. 1844, witness Bassiouni).

Assuming the 50dB acoustic coverage of the Harris EPZ claimed by Applicants is correct (they do not provide their substantive analysis or data with the affidavits and Motion for Summary Disposition on 57-C-3), the drop of 15 dB associated with an air conditioner, as Dr. Bassiouni testified to in Catawba, would logically result in coverage at only 35 dB -- not enough loudness to get 10 dB above ambient noise levels. (See Apps' Motion, p. 12; Bassiouni, ¶ 8) In a closed building, the drop of 15-20 dB Dr. Bassiouni testified to in Catawba would logically have the same result; having the air conditioner on in the closed building would simply make it even harder to hear the siren. Although 100% siren notification is not required by NUREG-0654 (incorporated by reference into NRC rules 10 CFR 50.47 via a footnote), a "substantial probability" that persons would not hear the siren, which applies to many people in the EPZ (those sleeping in closed houses or with the air conditioner on) is not acceptable. The alerting must occur within 15 minutes within 5 miles of Harris (NUREG-0654) and the sirens are the only means

provided to do this (except in the unpopulated area of the plant itself, Zone A). As Applicants' Pugh affidavit shows, paragraphs 4-16, the mobile siren notification can't be done in under 15 minutes (see Motion at 13: 20 to 45 minutes approx.). Pugh also provides no assurance that such sirens will in fact wake people up. It is common for emergency vehicles, sirens blaring, to pass in the night without awakening most people sleeping along their routes. Motion at full speed (see Apps. Motion fn 5, p.14) is required to cover these routes in the estimated times, and that cuts down on the time anyone not in a built-up area will be exposed to the mobile sirens. Moreover, these times are estimates (Pugh affid paragraph 3, p.2) which have not been verified in practice yet (ibid.) and there is no basis for them given.

Pugh also states only his "confident" opinion as a basis for sufficient personnel and vehicles being available to cover these alerting routes at all times. And some routes may take more than 45 minutes (see Pugh paragraph 4, p.3; paragraph 11, pp 6-7; paragraph 12, pp 7-8) based on the logically dubious assumption that all these mobile alerting units will not only be instantly available, but will be dispatched immediately upon siren activation (Pugh paragraph 2, p.2). The siren signal would have to be verified first, and the vehicles notified. This might only take a minute or two, but it would be more time than Pugh assumes.

Finally, this system is irrelevant for the reason advanced by Applicants, that it is not the primary alerting system. Moreover, it cannot meet the time requirements for the primary alerting system anywhere within 5 miles of the plant, and in some cases (see above) cannot meet the 45 minute limit within 10 miles of the plant for some zones.

Applicants' entire Mileti affidavit is likewise irrelevant because the "ripple effect" and other matters he talks about are not notification (alerting) provided by CP&L or the emergency response agencies. Dr. Mileti gives no quantitative or Harris-specific data to show that enough people will in fact be awakened (between 1 a.m. and 6 a.m. under accident conditions) to start the "ripple effect".

The clear intent of 10 CFR 50.47 and NUREG-0654 is for the alerting system to be designed to "provide early notification" (emphasis added) to the populace within the 10-mile EPZ. 100% coverage is not required, but design to cover essentially 100% is. NUREG-0654 Appendix 3 requires notification systems to provide an alert signal "to the population . . . throughout the 10 mile EPZ, within 15 minutes". This clearly means essentially 100%, and this design objective is reconfirmed in Applicants' own cite of NUREG-0654 p. 3-1 (Motion at 5), though it need not work in 100% of cases.

NUREG-0654 also requires the notification system "assure direct coverage of essentially 100% of the population within 5 miles of the site" (See Apps. Motion p.5), and that "Special arrangements will be made to assure 100% coverage within 45 minutes of the population who may not have received the initial notification" within the entire plume exposure EPZ. (emphasis added).

This last is the operative part re contention 5 7-C-3, for as shown above (pp 1-3) Applicants' own affiant Bassiouni testified that for similar sirens there was a "substantial probability" that sleeping persons in closed buildings with air conditioners on, would not hear the siren alert, and there was a possibility for sleepers with open windows not to hear it, even with 60 or 70 dB above ambient coverage. (Harris coverage is 50 dB for the whole EPZ, 60-70 in most of it, according to Applicants -- see e.g. Apps Motion at 10.)

This is not 100% coverage as required, so special means, e.g. those advocated in the contention, must be used to give 100% coverage.

The special means have not been shown to cover 100% of the EPZ within 45 minutes even based on Applicants' Pugh affidavit, and its basis is very thin: only his confidence that adequate vehicles and personnel will be available to do the notification; assumed immediate start of notification when sirens sound; estimated route coverage times not confirmed; routes often traveled at full speed (50+ mph) limiting time persons are exposed to mobile sirens; no analysis of what it takes for these mobile sirens to wake people up. Telephone alerting or tone alert radios do not have these drawbacks.

Applicants and FEMA make much of FEMA-43's leaving the choice of notification system to Applicants. But FEMA-43 is NOT an NRC rule. 10 CFR 50.47 and NUREG-0654 are the rules, and they require that 100% notification be assured. If Applicants aren't in compliance with that (and there is clear doubt of it based on their own affidavits; FEMA's affidavit adds essentially nothing to Applicants'; Dr. Bassiouni's Catawba testimony clearly undermines Applicants' conclusions here, fatally), this Board clearly has power to order compliance. That is essentially what Contention 57-C-3 seeks, and the contention should be tried to determine what notification systems are in fact required to provide the 100% notification NUREG-0654 requires.

Wells Eddleman

Wells Eddleman

P.S. another logical problem can be shown with Applicants' siren coverage estimates: There are 62 sirens for 10 mile radius EPZ (Apps' Motion p.10), The EPZ area is thus 100π square miles (314 sq mi). That gives 1 siren for every 5 square miles. Thus the mean distance between sirens should be about $\sqrt{5}$ miles, or 2.236 mi.,or 11,806 feet. A siren rated 125 dB at 100 feet will put out only 1/10,000 as much energy at 10,000 feet (dropping off with square of distance), per unit area to be alerted. Since $dB = 20 \log_{10}(Pressure/Pressure_{ref})$, this is a drop of 80 dB ($1/10000 = 10^{-4}$, i.e. $\log_{10}$ of 1/10,000 is -4; -4 x 20 is -80 dB), dropping the peak sound to 45 dB at 10,000 feet. When the siren rotates to face away from the target "hearer", it drops another 25-30 dB (Bassiouni, Catawba Tr. 1842-45), i.e.to 15-20 dB, virtually inaudible. Even 45dB is below the 50 dB required to have an audible alert tone in the Harris EPZ's low-noise areas.

STATEMENT OF FACTS IN DISPUTE
ON CONTENTION 57-C-3

1. There is no showing the primary alerting system can alert essentially 100% of the EPZ populace within 15 minutes, particularly those sleeping in closed buildings, indoors, those with air conditioners on, and even those with open windows and an air conditioner, TV or stereo on (see Catawba Tr. 1853-54 re TVs and stereos, testimony of Dr. Bassiouni, Applicants' affiant here) Indoor areas are not exmpt from 60/70dB (10dB above ambient) coverage requirements.

2. There is no showing the mobile alerting system either (a) will wake up people sleeping indoors in closed buildings or otherwise as stated in Fact 1 above; nor (b) can accomplish this for the whole EPZ within 45 minutes as NUREG-0654 requires.

3. The "ripple effect" and other alerting actions not undertaken by nor controlled by Applicants and/or the emergency planning authorities or emergency response authorities in the EPZ (& State of NC authorities) do not count as compliance with 50.47(b)(5) or NUREG-0654's notification requirements.

4. The Harris sirens, as rated, may deliver signals below 45 dB, as low as 15-20 dB when rotating away from target "hearers", in significant parts of the EPZ.

5. The alerting provided must satisfy the requirements of 10 CFR 50.47 (and NUREG-0654 as incorporated by reference in that section), and that includes waking up sleepers -- you can't notify someone who is asleep.

6. The Board has authority to enforce the provisions of 10 CFR 50.47, including authority to order the use of additional special alerting measures (e.g. tone alert radios, automatic ringdown telephones) to assure that the notification requirements of NUREG-0654, Appendix 3, and NUREG-0654 section E (including E 6) are met as required by 10 CFR 50.47.

7. The "facts" alleged by Applicants and FEMA do not adequately support summary disposition of Contention 57-C-3.

8. FEMA has not yet received or reviewed the Harris siren system design report (FEMA, Hoell affidavit, 12/6/84)

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the matter of:

DUKE POWER COMPANY, et al

(Catawba Nuclear Station,
Units 1 & 2)

Docket No. 50-413
50-414

Location: Rock Hill, S. C.

Pages: 1816 - 1968

Date: Friday, May 11, 1984

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Panel of Witnesses	Direct	Cross	Redirect	Recross	Board
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P.S. THOMAS (individually)	1828				
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EXHIBITS

Description:	Identified	Received
Applicants' EP-17: Applicants' Testimony on Emergency Planning Contention No. 9	1825	1825
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4pbl

BY MR. RILEY:

Q I assume that you are familiar with the purchase specifications of the sirens, Mr. Glover.

A (Witness Glover) I have reviewed it. I did not prepare it.

Q Do you know whether or not there's voltage sensitivity with respect to, one, frequency, and two, level of output?

A I'm not aware.

Q Well, hypothetically then, Dr. Bassiouni, if the motor is voltage sensitive, what happens to the pitch of the tone as the voltage increases? What happens as it decreases, and also what happens to the output?

A (Witness Bassiouni) What happens is the siren tone's frequency will fluctuate between 10 hertz on each side of the tone. So for instance, if you're talking about siren tone of 500, it could be 490 or it could be 510.

Q And what about the decibel output?

A It absolutely has no effect. It will be the same decibel rating, as will be for this frequency.

As far as the sound propagation, the sensitivity of this frequency will have extremely negligible effect.

Q We've just heard from Mr. Glover that one of the sirens rotates 125 decibel level, and the other at 113, does not. Is it correct to say that there is a horn associated—

with the 125 decibel model?

A Correct.

Q What is the function of that horn?

A The function of the horn is to project the high sound beam to a certain location, and rotates in a low rotation rate to cover the entire 360 degrees around the siren.

Q Now that means if one were to survey at a uniform radius around that siren in the stacked position, one would have different levels of sound intensity, depending on their position?

A Correct.

Q And if one is to rotate the siren, and these sirens do rotate, or measure some fixed position, one will find variations in sound pressure level, decibel rating.

A Correct.

Q And that is shown in Figure 4 of one of your exhibits. I believe Attachment B.

A I cannot recall the exact figure number, but I can check it right now.

JUDGE MARGULIES: While the witness is checking, let the record reflect that Mr. Broome has assumed his place with the panel. He is available for cross-examination. Prior to being called on for cross-examination, you may go over with him the assumption of his testimony.

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Whereupon,

LEWIS WAYNE BROOME

was called as a witness on behalf of the Applicant and, having been previously duly sworn, was examined and testified further as follows:

MR. RILEY: I'm sorry. It's Appendix 4 that I have reference to.

WITNESS BASSIOUNI: Thank you, that's what I was trying to check. Basically, Figure 4 is showing the sound, sound pressure level variation with time. The X axis represe the seconds, the vertical access represents the decibel in dbc.

BY MR. RILEY:

Q Would it be a fair approximation to the information that you show for six sirens in this Appendix 4, to say that there is a difference of about 30 decibels between maximum sound output and minimum sound output, as perceived at a given point while the siren is rotating?

A (Witness Bassiouni) I would say a difference of 25 decibel, rather than 30.

Q Well, in looking at a number of these, I see occasional minima of 92 decibels, and corresponding maxima of 125, 126. This is for siren 6.

A If you take the extreme minimum and maximum, yes, that's correct. If you take the average for the minimum

and the maximum, there will be between 20 and 25 decibel.

Q In other words, you're saying, if you do a bit of smoothing in the curve?

A Right, exactly.

Q All right. Now, when you're in the vicinity for a smooth value, would you say a minimum in the vicinity of 95 decibels would be reasonable?

A 95 to 100, I would say.

Q 95 to 100 would be reasonable.

A Right.

Q All right. Then that would be something like 25 decibels down from the peak intensity. And would it be inaudible in terms of the 10 decibel above criteria to catch a person's attention?

A If the siren is directed to a listener at a certain location when it's off-phase, it means the horn is directed in an opposite direction. At some location far from the siren, the 10 decibel above the ambient will not be met.

Q Does not the guidance call for a steady siren signal?

A Yes. The siren signal is steady.

Q But is not the important thing the perception of the siren signal?

A I think the guidelines are addressing the characteristic of the signal. So the signal in regards to

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location of siren is steady all the time. The effective modulation of the signal up and lower would really have a great effect on attracting people's attention. It's the same way if in a room with a very loud stereo, after a few minutes you would not pay any attention to the stereo.

If you get somebody turning the stereo on and off, you will probably have a great deal of attention to the signal. And that's the purpose of this siren.

Also, I would like to add that this concept has been used for over 100 years. These sirens have been used for peace and war, and I guess the rotation of the siren has a great advantage of attracting people's attention.

Q In reading the relevant guidelines, is there any qualification made that the steady signal applies to what is generated, rather than to what is heard?

A I don't think it specifically addresses that; if it is referring to the way it is generated, or to the way it is heard.

Q On the 113 decibel siren, if I may use that shortcut notation, there is no horn. What sort of an outlet, what sort of a sound port is there in that siren?

A There is multiple horns around the siren. They are located all around the circumference of the siren itself.

Q Do you know how many horns there are?

A I don't recall exactly, but it could be 12 or 16.

A Yes, we will. I might mention our systems for Oconee and McGuire are the same type of system as we have at Catawba, and those are based on four rpm. We are in the process of changing over Catawba from 2 rpm that we got from the manufacturer, over to a 4 rpm rate.

Q And if the decibel is 6 decibel down, the matter that I referred to earlier is translated to 4 rpm, then the period of time in which the signal will be heard at this level would be of the order 2.4 to 5 seconds, is that correct?

A (Witness Bassiouni) Correct.

Q Why do you recommend 4 rpm?

A It has been a common industry standard to use 4 rpm, so basically the recommendation was just go and have it 4 rpm.

Q Do you know what the standard is based upon?

A Based on a pure human judgment. We have done some experiments with different rpm. We got people standing at a different location and let them rate the -- or judge the signal, if we changed from 2 rpm to 3, to 4, to 5, to 6 and it was indicated that 4 is an optimum speed that most of the people say that they heard the siren very well at that speed.

Q Right. We have already talked about the indoor - outdoor difference. The ambient sound level is a factor in whether or not the outside sound will be perceived.

Is that correct?

A Right. Correct.

Q And in summertime in this part of the country, is it your understanding that many homes use air conditioning?

A Yes.

Q Do air conditioners contribute to the ambient sound level?

A Yes.

Q Could you tell us what decibel contribution they make?

A They can make an additional 15 decibel to the ambient, depending on the type of air conditioning used.

Q That means that a likely hypothesis that the air conditioner was on, the windows were open, the siren signal would not be heard if it were, say, at the 60 decibel contour?

A There is a possibility, yes.

Q At the 70-decibel contour?

A The 70 will be the chance, depending on the background noise, there will be a greater chance to be heard.

Q Now let's close the windows in the house. Please provide us with the decibel intensity reduction of outside sound for a reasonable range of the structures that you will find in this EPZ.

A The structures we'll find in this EPZ probably will have in the range of between 15 and 20 decibel reduction so if you are indoors moving from outdoors to indoors, you

will experience this kind of reduction.

Q Would it be fair to conclude then that there is a substantial probability that people indoors under closed window conditions, the air conditioner on, would not hear the signal?

A That is correct.

Q What about the contribution of normal household activities like conversation. What sort of decibel levels do we have there?

A It depends on the individual making the sound.

Q I agree.

A But I would say you could really produce a few decibels.

Q All right.

Now obviously again it depends upon the setting of the control, but what range of sound do we get from the television set?

A Once again, it is just depending on how you set up the volume for the TV set.

Q Exactly. But what is the range, please?

A I can make out of my TV 110 decibel and I can really make it as low as 55 decibel.

Q Right. Does that mean that ordinary listeners might have it somewhere in the vicinity of 60 to 80?

A Some, yes, depending on the age and the interest

among these listeners, yes.

Q Could we say something similar about stereo equipment, sound equipment?

A Yes.

Q And this again would mean that there would be a high probability -- I am saying high -- that an outdoor siren signal would not be heard?

A Yes, I agree.

Q On Page 7 of the attachment --

A Attachment B?

Q -- of Attachment B, you indicate that relative humidity has an effect on sound signals. Could you tell us what this effect of humidity is? Does it enhance or reduce a given level of signal?

A Okay. It's really not a straight line relationship. It's a combination between the relative humidity and temperature, so you've got to look at the two quantities together.

Sometimes lower humidity and a certain range of temperature will reduce the sound propogation. Sometimes higher humidity and a certain range of temperature will enhance the sound propogation.

Q Now you are, of course, familiar with the usual diurnal cycle in temperature and humidity where ordinarily humidity goes to a maximum in the early hours of the morning, and then goes to a minimum towards the close of the day. You are familiar with that?

A Yes, I am.

Q Now since you used an average value for temperature and humidity in your computer program, your computer program does not tell us about that variation; is that correct?

A That's correct. Let me add something to here.

Q Would you, please?

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A In FEMA-43 that has been used as a guideline, it specifically states on Page E-7, "Average summer daytime weather conditions may be utilized." It's the fourth line from the top of Page E-7.

Q Right. You have certainly met the FEMA standard. But what is the range in decibels between the maximum effect of the combined temperature and humidity and the minimum effect of the combined temperature and humidity?

A Okay. Specifically for Catawba?

Q That would be fine.

A For average, I would say three to four decibels.

Q Good. Thank you.

Now what effect has rainfall on signal strength?

A Rainfall will also attenuate the sound by the same kind of effect which probably you are talking about to the order of two to three decibels.

Q Right. Now when rain is striking a roof -- and of course it will depend upon droplet size and frequency -- what sort of values of additional sound can we get?

A Okay. Basically that effect, the rain falling will increase the ambient noise level. It will generate noise.

Q Right. How much?

A Okay. I cannot tell you how much. Depending on the surface, depending on other factors that you have to

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consider.

Q Would you say up to, say, 80 or 90 decibels?

A You mean additional?

Q Yes.

A No. I would say on the order of a few decibels. Once again, it depends on the drop size, and this will produce frequency in a range that is not included in the signal frequency. For instance, you have a signal of 500. Commonly, the rain will produce high ambient on the high frequency range which, in fact, would not affect your signal.

Q Have you of your own experience measured the sound level increase inside the house with open windows of a heavy rain on an adjoining metal roof? Have you measured it yourself?

A No, I haven't.

Q What about rain striking foliage?

A It will also produce ambient noise. It will add to the ambient noise.

Q What is the effect of falling snow?

A Falling snow, because the ambient noise would not be raised as much as rain, but it will add some effect to the damping of sound waves coming out of the source, which is the siren.

Q Have you some information, whether yours or literature information, on the absorption effect of falling

mgc 6-7

snow?

A Yes.

Q Could you tell us, please?

A Snow, depending on the thickness of the layer of the snow, it does have what we call an acoustic impedence absorption. And depending on your distance from the siren, depending on the heigh of the receiver, elevation of the receiver, you are basically talking about anywhere between one to two, six or seven decibel reduction.

Q Let's talk about the six decibel contour. At the 60 decibel contour, how much attenuation?

A You may get as much as six or seven decibels.

MR. MC GURREN: Your Honor, for purposes of clarification, I am wondering myself, does the witness understand that the snow has fallen, or is it in the process of falling?

Excuse the interruption. I just want the record to be clear.

MR. RILEY: I welcome the interruption, Judge. I think it's a good distinction to make.

BY MR. RILEY:

Q You are referring to snow on the ground; is that not correct?

A (Witness Bassiouni) Yes, I do.

MR. MC GURREN: I thought your question was

falling snow?

MR. RILEY: My question did, indeed, have to do with falling snow. There is some snow on the ground. There is a heavy snowfall in progress.

BY MR. RILEY:

Q Do you have any information on that effect?

A (Witness Bassiouni) No. Falling snow, in the process of snowing, I don't. But the accumulation of snow on the ground, we do.

Q Would you expect there would be attenuation due to snow particles in the air?

A Yes. Very slight. It would not affect the siren signal.

Q There is a discussion in both your Attachment B and in CBG 1-17 of the effects of wind direction and velocity on a siren signal. And as I understand it, in positions that are upwind from the siren, the signal will be deflected upward; is that correct?

A Correct.

Q Now your computer model, which shows 50, 60 and 70 decibel contours, is premised on a wind direction of -- what is it? -- 6.7 miles per hour or thereabouts from the southwest? Is it a 6.7, and it is from the southwest at a temperature of 77.4 degrees Fahrenheit and a relative humidity of 54 percent; is that correct?

mgc 6-9

A That's correct. And that's exactly what we have on Page E-7 from FEMA-43. These are the average summer daytime conditions.

Q Right. But now we're concerned about whether or not we're going to be able to alert 100 percent of the population by a siren signal within five miles within fifteen minutes.

If the wind direction is from the northeast, that will change all these contours?

A Correct.

Q Are you aware that the second most prevalent wind direction is from the northeast?

A Yes.

Q The wind velocity will be a factor, and the higher the wind velocity, the larger the effect; is that correct?

A That's correct.

Q Are you familiar with the average monthly maximum wind velocities in this region, Douglas Municipal Airport?

A Yes.

Q Are you aware that they are on the order of 20 miles per hour?

A Yes.

Q That would produce a substantial effect, then?

A Yes.

Q And in terms of the documents we now have, a person

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who might, under the conditions of your study, be exposed to a 60 decibel signal, might now be exposed to a substantially smaller one?

A It's a possibility.

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Q In the extreme case, how much lower?

A I would say on the order of 10 decibels lower.

A (Witness Glover) If I may make a point on that, Mr. Riley, what Mr. Bassiouni is not aware of is in this case where you have winds blowing from the northeast and you are considering those people up in that sector as to sound reduction the real threat or the real need for people to be aware of that situation is down in the other direction, in the southwest where the wind is blowing towards if you did any particular concerns for an emergency at that time.

So by the winds blowing down into that direction, you are actually enhancing the coverage of your system into that area.

Q Thank you.

On page 14, again of Attachment B, you describe with particularity your technique. I was just curious, what was the source of the calibrations that you used in the field?

A It is a standard calibrator. It is a tone that is produced; the brand name is written right there in the third paragraph. That produced a very accurate signal within .2 decibel.

Q Right.

I was wondering whether it was also a pitch calibrator.

A It is a pitch calibrator.