

**IN THE HIGH COURT OF JUSTICE**  
**QUEEN'S BENCH DIVISION**  
**NOTTINGHAM DISTRICT REGISTRY**  
**(Nottinghamshire and Derbyshire Deafness Litigation)**

Date: 14<sup>th</sup> February 2007

Before:

**HIS HONOUR JUDGE INGLIS**

**TONY PARKES** **Claimant**

**-AND-**

**MERIDIAN LIMITED** **Defendants**

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**JULIE MAY BAXTER** **Claimant**

**-AND-**

**MERIDIAN LIMITED** **Defendants**

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**CHRISTINE FAULKNER** **Claimant**

**-AND-**

**TAYMIL LIMITED** **Defendants**

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**STEPHANIE BAKER** **Claimant**

**-AND-**

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**TAYMIL LIMITED** **Defendants**

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**SARAH JANE MOSS** **Claimant**

**-AND-**

**TAYMIL LIMITED** **Defendants**

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**MARGARET GRABOWSKI** **Claimant**

**-AND-**

**PRETTY POLLY LIMITED** **Defendants**

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**JOAN ELIZABETH HOOLEY** **Claimant**

**-AND-**

**GUY WARWICK LIMITED** **Defendants**

**John Hendy QC, Theodore Huckle and Robert O’Leary** (instructed by Wake Smith, Sheffield) for the Claimants

**Christopher Purchas QC and Catherine Foster** (instructed by Reed Smith Richards Butler, Solihull) for Meridian Limited

**Robert Owen QC and Simon Beard** (instructed by Weightmans, Leicester) for Taymil Limited

**Robert Owen QC and Toby Stewart** (instructed by Praxis Partners, Leeds) for Pretty Polly Limited

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## **JUDGMENT**

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1. In these seven cases each Claimant claims damages for personal injuries and consequential loss arising out of her or his employment in the textile industry in Nottinghamshire or Derbyshire. The claims are in respect of damage to hearing said to have been sustained by exposure to excessive noise. The cases are seven out of more than seven hundred that have been issued. Common to all the cases is the feature that exposure was at a noise level less than 90dB(A)lepd. The Defendants say that at common law there was no liability for exposure at such levels of noise. Liability, in respect of the period before its repeal on 1<sup>st</sup> January 1996, is also claimed under section 29 of the Factories Act 1961. In each case there is a dispute about whether the Claimant has suffered noise induced hearing loss at all, and it has been necessary to consider the approach to diagnosis, and the assessment of disability in cases where the noise exposure has been of the order of what is revealed in these cases.

2. Claims for noise induced hearing loss are now well trodden ground for personal injury practitioners and courts, especially in areas where traditionally there has been a good deal of heavy manufacturing industry. The leading case of Thompson v Smiths Shiprepairers (North Shields) Limited [1984] 1 QB 405 established 1963 as the latest year after which employers could not hide behind ignorance of the effects of noise, and of the means to provide protection to employees. Mustill J in that case was not, however, concerned with levels of noise, because the noise to which the claimants in Thompson were exposed was plainly greatly in excess of 90dB(A)lepd. In some cases liability at common law has been established in respect of noise levels under 90dB(A), for example in the recent case of Harris v BRB (Residuary) Limited [2006] PIQR 10, CA. In these cases the Claimants mount a more general attack in principle on the idea that liability at common law requires exposure to noise of at least that level, and they say that liability attaches in cases of exposure from the 1960's in the whole bracket 80-90dB(A).

I will start by stating the basic facts and terminology, though that may seem superfluous to many practitioners, and have been more elegantly set out in other cases.

### **The nature of noise and its measurement.**

3. Noise is generated by pressure variations in the air. The frequency, or pitch, at which those variations occur is expressed in cycles per second, or Hertz: Hz. Since the frequencies with which sound that is relevant to the human ear extend to several thousand Hertz, the unit of a thousand Hz, or a kilohertz (kHz), is often referred to. Noise may consist of a single frequency: pure tone. Most noise existing in one place at one time, however, is more complicated than that, and consists of simultaneous sounds at different frequencies: It is broadband sound. The doubling of the frequency of sound alters the pitch of the sound by one octave, so that 2kHz is an octave higher than 1kHz, as is 4kHz than 2kHz. Middle C is 261.63Hz.

4. The loudness of a noise depends on the sound pressure level of the energy that produces it. The sound pressure level is measured in decibels (dB). The decibel scale is logarithmic, so that each 3dB increase or decrease involves a doubling or halving of the sound energy. As discussed below, the human ear is more sensitive to noise at some frequencies than at others. For that reason a simple measurement of the overall sound pressure at one frequency is of limited usefulness. It is possible to measure the sound pressure level at different frequencies, so as to build up a picture of the quality of noise in a more useful way, typically at octave intervals or bands: as for example 500Hz, 1kHz, 2, 4 and 8kHz. The outcome of octave band analysis requires a degree of interpretation. In modern times (and with the use of measuring instruments that perform the necessary calculations automatically) the pressure level across a spectrum of frequencies is expressed as a single weighted figure. The different weighting systems run from A to D, but the A weighting is most commonly used as appropriate for general industrial noise. The weighting may be considered as a curve on a graph running across several octave bands, the centre of which representing the middle frequencies is higher than each end, the low and higher frequencies. This reflects the fact that sound in the middle frequencies has greater effect on the human ear than at low or high frequencies. The weighted measurement so obtained is described as dB(A). Sound pressure

level does not equate to the level of noise as it is perceived by the hearer. A hearer will not perceive a doubled sound pressure level as involving much, if any, increase in sound. So 88 dB may not sound much louder than 85dB, though it involves twice the energy. For the hearer to think that one sound is twice as loud as another it may be that the sound has in fact to be about 10 times louder in terms of sound pressure level: for example a jump from 80 to 90 dB.

5. Apart from very loud noise which itself is immediately damaging (and with which this case is not concerned) consideration of the damage that a person may have suffered to his or her hearing involves not only the level of noise, but also the length of time of exposure to it, since damage by noise depends on the overall dose of noise received. The noise to which the human ear is exposed is not often constant, but fluctuates over any given period of time, as when a machine emitting noise is used intermittently. The averaged noise over a period of time is described as the equivalent continuous sound pressure level, designated as  $leq$ , so that someone might be exposed to 90dB(A)  $leq$  over a period, being exposed to different sound pressure levels at different times during the period. A commonly used unit of noise exposure is arrived at by measuring or calculating the dose of noise experienced during a working day of 8 hours. That sound level taken over an 8 hour day is described in dB(A)  $lepd$ , or the average daily noise exposure level. It is the same as dB(A)  $leq$  for 8 hours.

6. Since damage to the ear by noise depends on the overall dose of noise received by the ear (that is, is a product of the level of noise and the period of exposure, so that 8 hours at 90dB(A) is equivalent to 4 hours at twice the level of noise, 93dB(A)) it is necessary to be able to calculate the amount of noise an individual has been exposed to over a period of years as the dose builds up. That long term dose is the Noise Immission Level (NIL). For a period of a year the NIL is equal to the daily dB(A)  $lepd$ . For further years the NIL is increased according to the formula  $10\log(\text{years})$ , and so, in terms of expression, builds up slowly: For example, a 20 year exposure at 85dB(A)  $lepd$  will result in a NIL of 98; the same period of exposure for 80dB(A)  $lepd$ , and 90dB(A)  $lepd$  yields NIL's of 93 and 103 respectively.

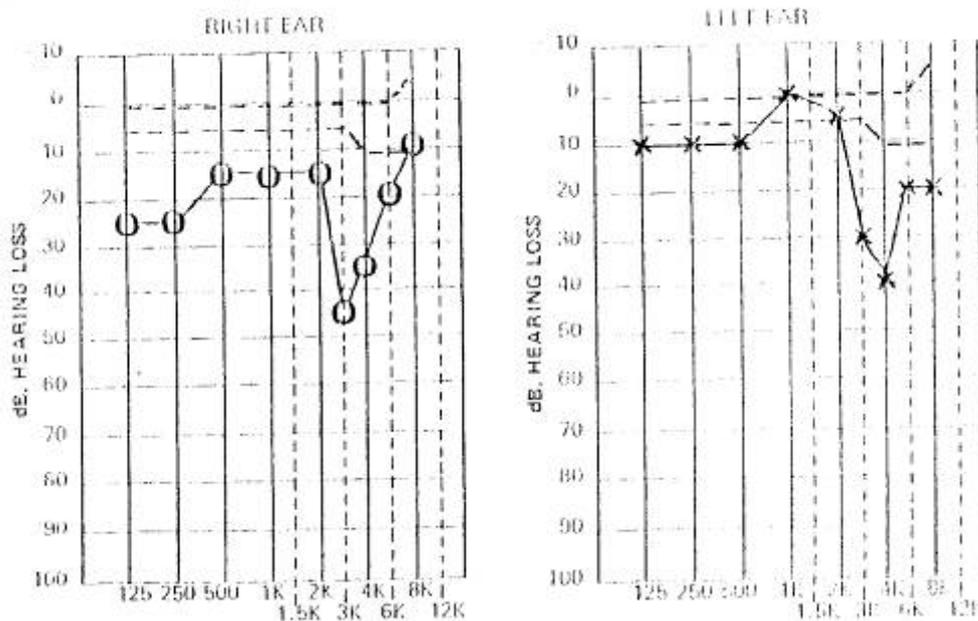
## **Noise and the human ear**

7. The outer ear funnels sounds towards the ear drum, by which the vibrations in the air are converted into mechanical vibrations. Those vibrations are conveyed by the middle ear to the cochlea. The cochlea analyses the sound (as for example into different frequencies); amplifies it; and translates those amplified and differentiated vibrations into nerve impulses which are transmitted to the brain by the auditory nerve, so producing the perception of sound.

Hair cells in the cochlea play a vital part in this process of translation into nerve impulses. Noise induced hearing loss involves by exposure to noise over time damage to the hairs which is permanent and irreversible.

8. Hearing is measured by use of an audiogram, in which is recorded the threshold of hearing of pure tone sound at different frequencies.

Expressed as a chart (it may also be expressed as a table) the result may look as follows:



If measured by air conduction, earphones are used. Measurement up to about 4kHz may also be by bone conduction by which is measured the reaction to vibration of bones in the skull. Bone conduction by passes the outer and middle ears, and attempts to measure the functioning of the cochlea directly. Noise induced hearing loss affecting the cochlea is described as sensorineural. It is to be contrasted with conductive hearing loss in which there is a decline in the function of the outer or middle ear. Such conductive hearing loss is not caused by the sort of noise levels with which this case is concerned, but may be caused by disease or infection,

or by excess wax , or by very loud traumatic noise, or other causes. Audiometry as described above requires co-operation and effort and reliability in the person being tested. The measurement of hearing therefore involves techniques to assess consistency, but there is always a significant margin of possible error. It is possible to estimate hearing by cortical electrical response audiometry (CERA), in which changes in electrical activity in the brain in response to sound is measured . That method has not been used in any of these cases. As a cross check to the reliability of an audiogram produced by air or bone conduction a speech audiogram may be taken to give some assessment of the level of disability and whether it is consistent with the thresholds as revealed in an audiogram.

9. The threshold levels applicable to individuals are often expressed as an average hearing loss (that is, an average of the number of dB by which the hearing thresholds exceed 0dB) taken over several frequencies. At different times different studies and bodies have proposed averaging different frequencies for this purpose. The main frequencies important to speech are 500hz to 4khz, though loss at 6khz has significance for high tone noise, for instance music or birdsong. As hearing thresholds increase the ability to interpret speech is progressively disabled. Threshold increases in the higher frequencies in that range tend to affect discrimination of consonants, and so may make speech indistinct without appearing to affect the overall loudness of the sound. Threshold increases in the lower frequencies are associated with vowels. Relevant threshold loss has been taken over .5, 1 and 2khz; 1, 2 and 4khz, 1, 2 and 3 khz, and other combinations. In England the most common method of averaging is over 1, 2 and 3 khz. It has the convenience of coinciding with the averages used by the DSS for disability benefit calculation. Some averages use the better ear only. The hearing in the better ear has a much greater effect on the overall level of disability than the worse ear. However, the DSS method is to average both ears in a way that gives some effect to the weaker ear: Take 4 times the average of the better ear; add the average of the worse ear, and divide the resulting figure by 5 to arrive at the overall hearing loss, or impairment. That overall loss may then be used as a tool to estimate the degree of disability resulting from the impairment constituted by the threshold hearing loss.

10. This case is concerned with the risks to workers exposed to noise where the noise levels are between 80 and 90dB(A)lepd. As will be seen

it is accepted that since 1963, or more clearly 1972, official guidance identified an unacceptable risk to hearing of workers exposed over 90dB(A)lepd, and common law liability for negligence has generally attached to employers whose employees suffered harm to their hearing through being exposed to noise at or above that level, though in some industries a later “date of knowledge” than 1963 has been arrived at in individual cases, and in others an earlier date; in a few cases also, liability has been imposed for exposure below 90dB(A). Since the present cases are concerned with exposure at such a lower level, it is necessary to set out the outlines of the evidence as it has developed about what the risks to workers are who are so exposed below 90dB(A)lepd. I will review the main features of that evidence as it has been presented in this case, then trace the history of official guidance and statutory regulation, and then deal with further material that the claimants say is relevant to what employers in the textile injury and these particular employers should have known at particular times

### **The risk to employees from exposure below 90dB(A) lepd**

11. The risk of noise induced hearing loss is assessed by reference to statistics applicable to different populations of people. The susceptibility of any individual to such loss is very variable and cannot be predicted, though serial audiometric examinations of the same person at regular intervals may pick up early signs of a decline in threshold levels and so suggest particular vulnerability. In addition to the variability in reaction to noise, the hearing of any person will deteriorate with age. Children and young people have hearing at higher frequencies than the usual scale up to 8khz measured by audiometry. Progressively, however, the threshold levels in those higher frequencies rises, and from the middle years of life that loss moves into lower frequencies and affects the frequencies in the conventional audiometric range of 8khz and below, including speech frequencies. This hearing loss of aging, known as presbycusis, is also very variable as between individuals, and in an unpredictable way, though to some extent the pattern of loss through aging, when it begins to occur, may provide some information about how susceptible an individual is to presbycusis. So two important ingredients for assessing the level of disability caused by noise: the susceptibility of the individual to damage, and the rate at which that individual’s hearing thresholds would in any event decline with age, cannot be predicted. The statistics deal with a proportion of a particular population that it may be predicted will suffer a

particular level of hearing loss by a particular time in their lives. These statistics are not applicable to an individual; though, in the absence of other evidence, they are in practice used to assess the proportion of a claimant's hearing loss that is to be attributed to noise and the proportion that is to be attributed to presbycusis, and to compare the individual to what may be expected in a chosen population of people.

12. In the 1960's research was carried out by a team led by Professor W Burns, Professor of Physiology in the University of London, and Dr D W Robinson, then Head of the acoustics section at the National Physical Laboratory into the effect of noise on employees in industry. Dr, later Professor, Robinson was to be a leading figure in this area until his death in the 1990's. The results of the research were published in 1970 by HMSO as "Hearing and Noise in Industry". The key conclusions were also presented to a multidisciplinary three day conference at the National Physical Laboratory in March 1970 given, as one of 19 papers, by Dr Robinson. The outcome of this work, as then published, was a proposal that it is possible to associate a particular noise exposure (arrived at by reference to time and noise level) with a statistical distribution of degree of impairment from noise in different percentiles of an exposed population. The resulting formula enables the construction of tables which can be referred to in order to enable the predicted effect of noise on a given exposed population to be looked up. In "Hearing and Noise in Industry" Burns and Robinson said in their summary:

Our results comprise the necessary material for a formal Code of Practice for the preservation of hearing in industry"

The authors proposed in the body of the text a limit of maximum exposure:

The limit can be set at a variety of levels according to the ultimate risk judged to be acceptable, and we suggest that it should not be set higher than 90dB(A) for a normal continuous daily exposure which is likely to persist for many years

13. Tables were first published in 1973, but in a more conveniently useable form in 1977, as the NPL tables, by Robinson and Shipton. Although some of the figures have been subject to criticism and proposed amendment, the basic approach has endured. By the time the 1977 NPL tables were published BS 5330 : 1976 had been established, based on the same Burns and Robinson formula, as a method by which can be

specified a relationship between noise exposure and the expected incidence of hearing disability. In the foreward it is provided:

Determination of a maximum tolerable noise exposure is outside the scope of this standard. It involves consideration of risk in relation to other factors. For occupational noise exposure such a limit is specified in the Department of Employment (HMSO1972) Code of Practice for reducing the Exposure of Employed Persons to Noise

ISO1999 in 1975, following a draft in 1971, also proposed a formula to be used as a predictive tool of risk to hearing from noise, but in a way unsuitable for tabulation. ISO1999 was substantially revised in 1982 and 1990, though the present ISO1999 is equivalent to the 1982 formula. Professor Lutman has extracted a small chart based on ISO 1999 (in its 1982 formula) to illustrate the effects of noise at various levels of exposure, in respect of predicted threshold loss at 4khz, the frequency most sensitive to noise:

Percentile	Noise level for 40 years (dB)			
	80	85	90	95
50 <sup>th</sup>	1.6	6.5	14.6	26.0
25 <sup>th</sup>	1.9	7.5	16.8	29.8
5 <sup>th</sup>	2.2	8.5	19.3	34.4

14. ISO1999 did not in any of its versions purport to suggest limits to tolerable exposure. The 1975 version said that that was the province of:

Competent authorities who generally demand the institution of hearing conservation programmes if limits are exceeded. In many cases 85 to 90dB(A) equivalent continuous sound level has been chosen

In the mid 1980's Dr Robinson, now Research Professor in the University of Southampton, was asked to review the experimental data as it then stood about noise exposure and hearing. In a paper published in 1987 as an HSE Contract Research Report he looked at the data, and compared the existing standards, including BS5330 : 1976 and ISO 1999. The paper gave hearing threshold levels averaged over 1, 2 and 3 khz both for otologically normal populations and for typical unselected populations. The latter is generally thought to be a more appropriate starting point as being closer to representing a wider population than the highly screened (for features other than age and noise) otologically normal population,

because the highly screened population will have better hearing. Tables from the report include Table 4.15, distributions for average hearing threshold levels at 1, 2 and 3 khz, and Table 4.16, percentages of people in those populations likely to exceed a 30dB threshold:

**Table 4.15: Distributions of the average HTL at 1, 2 and 3 kHz, for ON and TP populations, for various noise exposures commencing at age 18 yr. The distributions of average HTLs take into account the inter-frequency correlations**

Noise level dB(A)	Exposure duration yr	Value of $H_{123}$ dB re ISO 389							
		ON population				TP population			
		10%	25%	50%	75%	10%	25%	50%	75%
85	5	9.5	5.8	1.6	-2.1	13	9.8	5.8	1.9
	10	11.5	7.5	3.1	-0.9	17	12.4	7.7	3.4
	20	16.0	11.4	6.6	2.0	26	18.4	11.5	6.7
	30	21.5	16.4	10.9	5.6	35	25.0	16.3	9.9
	40	28.5	22.8	16.3	10.2	42	32.5	23.0	14.5
90	5	13.0	8.4	3.5	-0.6	17	12.2	7.6	3.5
	10	17.0	11.9	6.5	1.9	22	16.5	10.9	6.0
	20	23.0	17.8	11.7	6.4	33	24.1	16.5	11.0
	30	29.5	23.6	17.1	11.1	41	31.2	22.3	15.4
	40	36.5	30.0	22.9	16.3	47	38.5	29.3	20.8
95	5	16.0	11.0	5.4	0.9	20	14.7	9.6	5.0
	10	22.5	16.4	9.0	4.6	27	20.6	14.1	8.7
	20	31.0	24.3	17.0	10.8	40	29.9	21.5	15.4
	30	37.5	30.8	23.2	16.6	47	37.3	28.2	20.9
	40	44.0	37.2	29.6	22.6	52	44.4	35.6	26.9
100	5	19.5	13.6	7.3	2.5	23	17.2	11.4	6.4
	10	27.5	20.7	13.2	7.2	32	24.6	17.4	11.4
	20	38.5	30.6	22.1	15.2	46	35.6	26.5	19.8
	30	45.5	37.9	29.4	22.1	53	43.5	34.2	26.4
	40	51.5	44.4	36.3	28.8	58	50.3	41.8	33.0
NN	Age								
	18	7.4	3.9	0.0	-3.2	11.8	7.6	4.0	0.8
	23	7.8	4.2	0.2	-3.0	13.4	8.3	4.5	1.0
	28	8.5	4.9	0.8	-2.5	15.9	10.0	5.4	1.7
	38	11.8	7.6	3.0	-0.7	23.2	15.2	8.1	4.0
	48	17.4	12.4	6.8	2.2	31.5	21.7	12.5	6.7
	58	25.0	18.9	12.0	6.4	41.0	30.8	19.1	11.0

15. It can be seen that the noise levels go down in 5dB steps from 100 to 85. Below that is a table for non-noise exposed people which is useful for comparison purposes, because the people in the first part of the table have suffered hearing loss through the effect of age and noise combined.

Table 4.16: Percentage exceedences of the 'low fence' ( $H_{123} = 30$  dB) for ON and TP populations, for various noise exposures (including the no-noise case) starting at age 18 yr

Population type	Noise level dB(A)	Percentage exceedence				
		Exposure duration				
		5 yr	10 yr	20 yr	30 yr	40 yr
ON	NN	-	-	-	-	4
	85	-	-	-	-	(8)
	90	-	-	-	(9)	25
	95	-	-	11	27	49
	100	-	(7)	27	49	72
TP	NN	-	-	4	12	26
	85	-	-	(5)	15	31
	90	-	-	13	28	48
	95	-	(6)	25	45	67
	100	(<5)	14	40	64	82

16. There followed in 1988 tables for use in the same way that the NPL tables could be used, though for different populations, whereas the NPL tables were based on an otologically normal population, as was ISO7029 which gave predicted values for presbycusis. The 1988 tables go down to 83dB(A). In expanded tables published in 1991 there are tables for non noise exposed people, and the noise level for exposed populations start at 85dB(A). In his remarks on the tables Professor Robinson said:

There is some uncertainty as to the course of noise induced hearing loss below 85dB(A); it can only be said that lower noise levels would induce still smaller threshold shifts than the (already small) shifts associated with 85dB(A). Accordingly, no values are given for noise levels below 85dB(A).

In the previously published tables an extrapolation downwards to 83dB(A) was included, in the hope that this extension might enhance the usefulness of the tables. This extrapolation, when combined with the downward extrapolation of the percentile range to 5%, led to minor anomalies in the tables.

Professor Lutman said in evidence that Professor Robinson made a mathematical error in a formula used for his work in 1987, that related to the modelling of expected hearing loss. He was unable to say what difference that would have made if Professor Robinson had been aware of the error and corrected it. I did not understand from what Professor Lutman said that the error invalidated the general thrust of the conclusions or the resulting tables.

17. In the 1980's the Medical Research Council National Study of Hearing provided information from a large database of tested people, and the results have been used in a number of studies in which tables of expected hearing loss appear: notably Davis: Hearing in Adults. In 1992 a working group comprising in the end King, Coles, Professor Lutman (the Claimants' expert in this case) and Professor Robinson published "Assessment of Hearing Disability. Guidelines for medico-legal practice" (The Black Book). The Black Book will have to be referred to later in other contexts. Here it can be noted that the table for products of excess noise level times exposure duration did not extend to sound levels lower than 85dB(A).

18. In 1994 Robinson Lawton and Rice produced a research report for the Health and Safety Executive called "Occupational Hearing Loss from Low Level Noise". The impetus for commissioning the work came from a proposed EEC directive under which it was intended to extend regulatory control of noise from 85dB(A) to 80dB(A). The report was unable to present data based on an average of 1, 2 and 3dB, nor by reference to a threshold of disability, because of the very small threshold shifts involved. Instead the authors based their data on the 4kHz frequency alone, which is the frequency most sensitive to noise. In the executive summary the authors say:

Curve fitting procedures applied to the noise-induced threshold shift, embracing both variation in noise level and years of exposure duration, indicate a negligible effect at 75dB(A). Above that level, but below 85dB(A), long term exposure to noise has some effect but the amount of noise induced threshold shift is so small as to be practically undetectable in individual cases and only measurable in a statistical sense. Moreover it is so small as to be overshadowed by the loss of hearing associated with advancing age, whether due to natural causes or the insults of daily living

The report makes clear that the data used for hearing loss caused by noise below 85dB(A) is not direct scientific data, but depends on extrapolation from the effects of noise on people exposed at higher levels:

Direct experimental evidence of noise induced hearing loss for exposure to noise below 85dB(A) is lacking from the published scientific literature. The approach adopted here was to assemble the best available data from reports and papers covering research over the last three decades, and from standardisation documents encapsulating the received opinion of experts. From these sources a composite relationship is derived between Lepd and the

audiometric effect upon hearing, which is then extrapolated downwards to the noise levels of interest, below 85dB(A).

19. The conclusion of the report was that a reduction in the action level from 85 to 80dB(A) would be virtually without reward in saved hearing. It is right to note, as will appear later, that the European Commission was unmoved by such arguments, and, probably with the intention of coming close to the goal of allowing all employees to avoid any risk of noise induced hearing loss at all, put in place a directive that has resulted from 6<sup>th</sup> April 2006 in the first level of regulatory control, (education and the provision of protection for those who wish to use it), being reduced from 85 to 80db(A)lepd.

20. In 2000 Coles Lutman and Buffin published an article in Clinical Otolaryngology entitled “Guidelines on the Diagnosis of Noise induced Hearing Loss for Medico-Legal Purposes”. The scheme proposed for diagnosis will have to be considered later, but for the present purpose explanatory notes 6 and 7 include the following:

Note 6. At face value [the formulae] predict that even the most extremely noise resistant percentiles would suffer some degree of NIHL. They also suggest that noise exposures of low level (e.g. low 80's in decibels) and duration (e.g. only a few years) would cause small but finite degrees of NIHL in some of those so exposed.

However, their original data sources were limited to cross-sectional studies, and the evidence for such effects is weak, being extrapolations from effects measured mostly in people with around average degrees of susceptibility and large amount of noise exposure. The earlier work also exaggerated the apparent effect of small noise exposures. Moreover epidemiological studies involving low level and/or short-duration and/or intermittent exposures.... seem to indicate an occurrence of less than the expected degree of hearing loss and in smaller proportions of those exposed.

These scientific considerations have to be judged also in relation to the legal criterion of balance of probabilities and to what can be regarded as a reasonably reliable single measurement in an individual ear. At 4khz this is considered to be about 10dB. According to international standard 1999 (1990) noise exposure at 90dB(A) for 10 years, which equates to a NIL value of 100dB(A) causes a median NIHL of 11dB at 4khz (and, incidentally, about 3.5dB in the 3khz average) Hence our use of the 100 dB(A) NIL [in the guidelines]

Note 7. Lepd noise levels below 85dB(A) in fact cause very little NIHL. With low noise levels the noise immission calculations tend to over estimate the potential auditory hazard. For example, a virtually safe noise level of 80dB(A)

if heard for 20 years, would yield an apparently unsafe NIL of 93dB(A). Therefore it is recommended that lepd levels below 85dB(A) should not be taken into account in estimating total noise exposure.

21. In 2000 Professor Lutman also published a short paper in Occupational Medicine, entitled “What is the risk of noise-induced hearing loss at 80, 85, 90dB(A) and above?”

He included 3 tables, one showing the expected threshold shifts at 4khz (the most sensitive frequency for noise damage) in 5% of men after a 45 year working lifetime:

Table 2. Extreme (5th percentile) threshold shifts at 4 kHz as a function of noise level

Noise level (dB)	Threshold shift (dB)
80	2
85	9
90	20
95	35

He concluded the article by saying:

From a preventive point of view, as long as daily noise exposures do not exceed 85dB(A), the risk of hearing loss is minimal

22. Those notes to the 2000 paper may be a convenient introduction to the oral evidence about the risk of hearing loss by being exposed to noise below 90dB(A) and below 85dB(A). I deal with this area 85 to 80dB(A) separately because the evidence in the individual cases makes the area of 85-80dB(A) important, and because in the material about risk, and statutory regulation, 85dB(A) is an important feature. The risk from exposure moves, of course, in a continuum, though not in a straight line, and does not stop at any particular sound level, though there is agreement that there is effectively no risk below 80dB(A), despite the fact that the NPL tables would suggest there is. The result of some of the research material is set out above. 90db(A) is an arbitrary level, and approaching it from 85dB(A) the risk of noise induced hearing loss in some people is significant and increasing as 90dB(A) is approached. The risk going down from 85dB(A) was the subject of oral evidence.

23. Professor Lutman said the NPL tables are less accurate below 90dB(A), though reasonably accurate above that level. They tend at the lower levels to exaggerate the effect of noise, partly because the assumption that was made was that the normal hearing of young people could be taken to be 0dB, whereas in fact the threshold is higher than that, so that the effects of age are underestimated. The figures yielded by the application of the ISO 1999 formula were not subject to the same criticism, and he stood by his opinion based on them that even at 80dB(A) there is a probability that most people will be affected, albeit the damage will be minor. Asked about the 2000 paper on diagnosis he said

The context of this is trying to make a diagnosis for individuals on the balance of probability. The difficulty that occurs is that for noise levels below 85 the expectation is that hearing losses will be very small. These are measurable in population terms, and hence pose a risk. But when it comes to identifying hearing losses in individuals, they are becoming very small for that context. Therefore these guidelines were recommending, particularly in the situation where somebody has been exposed to different noise levels for different employers, that it was a reasonable rule of thumb to simply discount the levels below 85 and focus on the others. I think there is a difference between trying to apply these sorts of statistics to individuals where a sort of larger hearing loss needs to be present in order to be certain or have the probability and populations where smaller hearing losses can be estimated.

When he returned to the witness box late in the case Professor Lutman discussed by reference to Professor Robinson's work the possible shape of the way in which hearing loss tapers off at low levels. It serves to emphasise his evidence that there is no clear cut off at 85dB:

Clearly if 85dB(A) causes some hearing loss and a much lower level causes no hearing loss, there must be some sort of transition between those two possibilities.

24. Professor Lutman was, as shown above, careful in his description of the risks to hearing at exposures below 85dB(A). He could hardly be otherwise given what he had previously written. I have now mentioned his work and his evidence on a number of occasions. He was the expert witness for the Claimants dealing with a large range of matters. He is Professor of Audiology, Institute of Sound and Vibration Research in the University of Southampton. Mr Purchas QC has on a number of occasions both before and during the trial, and also in his final written

submissions sought to confine Professor Lutman's evidence on the basis that he was giving evidence outside his area of expertise. It is quite plain that Professor Lutman's expertise is very wide ranging and that he works at the forefront of the development of understanding in various areas concerning audiology, including noise induced hearing loss. The number of papers to which he has contributed and which are referred to in the evidence in this case evidences his high standing in the firmament of audiology. The one area about which his opinion is not admissible is what employers in industry should have done to discharge their duty to employees at different times, in the light of industry practice and understanding, even though it is an area about which he may have strong opinions. Nor, however, is anyone else's expert opinion admissible on that very question. The attack on Professor Lutman's expertise leaves the breadth of it unconfined.

25. The doctors, Mr McCombe for the Claimants (together with Dr Rajput for one of the cases); and Dr Yeoh, Mr Jones and Mr Parker for the various Defendants, were really concerned with diagnosis and quantification of hearing loss in the individual cases. They had nothing in the way of scientific evidence to advance in the area of what degree of noise induced loss one might expect to see as the noise level ascended through the 80's. Mr McCombe said that he did not agree that there was no risk below 85dB(A). The evidence in that area may be statistical, but "this is all statistics". There will be very little hearing loss but it will still be there at low levels. Dr Yeoh thought that estimates of likely loss were based on tenuous scientific evidence below 85dB(A), and took the view that impairment caused by noise at such levels would be so slight as not to be identifiable. Mr Jones said that the evidence came from extrapolation from larger levels of noise (and despite Professor Lutman identifying papers in which low levels of noise were discussed, from the evidence produced to me, Mr Jones appears to be right). He said that the small changes involved were undetectable in an individual. They can't be detected on an audiogram. Mr Parker said that at low noise levels he suspected that the figures in the tables lacked power: The extent of risk below 85 is not known.

26. Examples of the sort of threshold shifts due to noise that emerge from the various papers are given above. They differ, but often not by a great deal. If I have simply selected some that have come into evidence in this case, it is not to perform a task of deciding between them, which I could not do, but simply to illustrate in general the level of risk of hearing

loss caused by exposure under 90 and 85dB(A). It is not possible to ignore the statements made by Professor Robinson, and in quite recent times by Professor Lutman about exposure below 85dB(A). What is plain is that the risk of identifiable hearing loss from noise at those levels is very low, and there is a degree of uncertainty about whether the figures are robust enough to translate into actual losses to be expected in individual people at all. On the other hand, to be sure that no noise induced hearing loss at all is caused in any individual, whether detectable or not, conservation measures would be required. Nonetheless, the description given to the risk to hearing of exposure below 85dB(A) by Professor Lutman in one of the publications set out above as “minimal” is one that I accept and adopt. Above 85dB(A) the risk accelerates up to 90db(A). In the high 80’s given long enough exposure significant hearing loss may be expected in at least a substantial minority of individuals.

27. The view I have reached has implications both for diagnosis of hearing loss in individual cases, and for breach of duty at exposure under 85dB(A). The identification of particular noise levels has no part in the way that the Claimants put their case. However Mr Hendy QC recognised that if the court came to a conclusion about the degree of hearing loss expected at such noise levels, it might express that conclusion first, thereby in effect confining the case on liability to noise levels of 85dB(A) and above. I do come to such a conclusion, so that in an area where the hearing loss to be expected can be regarded as marginal, or minimal, or so small as not to be identifiable in individuals but only in a statistical sense there could in my view be no liability at common law for breach of duty in exposing employees at such levels.

28. I accept that assessment of actual risk as suggested by statistics at various noise levels is a separate question from what employers knew or ought to have known, to the extent that the common law required them to take action. If, however, the actual risk at any level was so small that no action was required of them, the fact that there may have been other information current at an earlier time which was inaccurate as to the extent of risk does not help, in my judgment, to establish liability.

### **The moves towards regulation**

29. The relevance of the information about risk at various times to the duty of employers depends on what they knew or ought to have known,

and what they should have done with the actual or imputed knowledge. In addition to the developing knowledge just discussed, therefore, there are the moves towards statutory regulation, and various other publications that are in this case. I deal first with the moves towards statutory regulation, and the events that accompanied those moves.

A final report by a government appointed committee on the problem of noise under the chairmanship of Sir Alan Wilson was published in July 1963 entitled "Noise". The committee dealt with many different aspects of noise, particularly environmental noise, but Chapter VIII dealt with occupational exposure to high levels of noise. They welcomed the fact that further research into the effects of noise had at that time been commissioned, but concluded that the then state of knowledge did not provide a firm enough basis for effective legislation.

30. In the month before the publication of the Wilson Committee report, June 1963, the Factory Inspectorate published, as number 25 of a series of Safety Health and Welfare booklets, the first edition of Noise and the Worker. The preparation of the booklet had been prompted by the interim report of the Wilson Committee in March 1963. The purposes of the booklet were said to be:

To set out the basic facts, to suggest ways in which the working environment may be made less noisy, and the harmful effects of noise on workers be prevented or mitigated, and to indicate where further information and advice can be obtained

In deciding whether they have a noise problem employers are asked to consider 6 questions: the first is whether workers find it difficult to hear each other speak while at work in a noisy environment. The others are complaints, short and long term hearing loss, higher labour turnover, and management opinion that noise is affecting production. The booklet says:

If the answer to several of these questions is 'yes' there may be a problem of excessive noise. If so, efforts should be made to reduce it, or, if it can not be sufficiently reduced.... to reduce the exposure of workers to the noise, or to provide them with ear protection...

The booklet then discusses the measurement and danger levels of noise. The "A" weighting of noise had not then been developed, or at least was not in use, so that the levels of noise discussed are set out for different

frequencies, grouped into octave bands. The result is more difficult to apply than an “A” weighted level. Under the heading “Danger levels of Noise”, the booklet says:

Before the effects of loud noise can be judged.. it is necessary not only to measure the noise, but to assess the amount of exposure to it during a normal working day or working life.

Our knowledge of the relation of noise to hearing loss is as yet too limited for it to be possible to say with certainty what amount of exposure is safe- partly because people vary greatly in their susceptibility to noise. It is generally agreed however that if workers are exposed for eight hours a day, five days a week to a continuous steady noise of 85dB or more in any octave band in the speech range of frequency (500 to 4000 cycles per second) it is desirable to introduce a programme of noise reduction or hearing conservation (This is a level of noise in which normal speech cannot easily be heard at a distance of a few feet; communication can be achieved only by shouting) Frequency as well as intensity must be taken into account; high frequencies are more dangerous than low, at the same pressure level. As the following table shows, a sound pressure level of 80dB, for example, is not considered harmful at frequencies below 1200 cycles per second, but should be avoided at frequencies above that level

Sound pressure levels at which noise reduction and/or hearing protection and conservation programmes should be introduced	
Frequency band (cycles per second)	Sound pressure value (decibels)
37.5- 150	100
150 - 300	90
300 - 600	85
600 -1,200	85
1,200 -2,400	80
2,400 -4,800	80

(These values are said to equate to about 89 dB(A), though the comparison is not exact, and only works if the noise concerned matches the profile suggested in the table)

31. Methods of noise control were then discussed: Reduction of noise at source; reduction of noise transmitted through air or structures; alteration in working arrangements; and hearing conservation by ear defenders, and periodic testing of workers’ hearing, where the noise levels to which they are exposed are at or approaching the levels in the table. The purpose of the testing is to record any change in acuity, and to

Identify and move to other work individuals who are especially susceptible to noise and who may therefore be endangered by levels harmless to the majority

The booklet included a substantial bibliography of mainly technical sources.

32. A second edition was published in June 1968. So far as it is material to employers' duties, it was really a second impression

The third edition was published in 1971, and went through several impressions. It was very soon overtaken in April 1972 by the Code of Practice for Reducing the Exposure of Employed persons to Noise. In the third edition of Noise and the Worker, "A" weighted sound levels are used, and the concept of  $leq$  is explained. The passage headed "The Danger Levels of Noise" contains the following:

## THE DANGER LEVELS OF NOISE

Exposure to excessive noise causes deafness which may be severe if the exposure is continued for a long time. Because some people are more liable to hearing loss than others and because our knowledge of the effects of noise exposure, especially exposure to intensive noise of short duration, is still incomplete it is not possible to set out a simple table of permissible limits for all types of noise. It is, however, possible to give guidance which will help to protect most people against serious hearing loss.

### Continuous and intermittent noise

When deciding whether continuous or intermittent noise is a hazard it is necessary to consider both the sound level and the number of hours of exposure per day. Unless efficient hearing protectors are worn people should not be exposed to levels of noise exceeding those set out in Table 1. For exposures of less than 15 minutes per day the permissible sound level can be increased by 3dBA for each successive halving of exposure duration, subject to an over-riding condition that no unprotected ear should ever be exposed to a sound pressure level of 135 dB or more.

Exposure duration hours per day	Maximum sound level dBA
8	90
4	93
2	96

1	99
<i>Half</i>	102
<i>Quarter</i>	105

Table 1 Levels of noise which indicate a serious hazard to hearing.

After a discussion of how to estimate a continuous equivalent sound level where noise levels fluctuate, there appears this passage:

### **Desirable Noise Levels**

Damage risk criteria should be regarded as maximum permissible levels and not as desirable levels. If possible the noise should be reduced to levels lower than the danger levels set out in Table 1 to avoid the risk to the minority of people who are exceptionally susceptible to hearing damage, and for reasons of general welfare

33. The 1972 Code of Practice was produced by a committee that included Professor Burns and Dr Robinson. The code sets out detailed requirements for controlling exposure to noise: Surveys, methods of control, ear protectors and training for their use, reduction of exposure duration, new machinery, training, and record keeping are covered. There are 9 appendices. Much of the first 4 sections are worth setting out here:

This Code of Practice deals with the engineering aspect of the reduction of noise exposure of employed persons. It does not include advice to machinery manufacturers, which will be covered separately or on the medical management of noise exposed personnel, or on the place of audiometry.

Section 1:

Scope of Code

1.1 General application

1.1.1 This Code of Practice applies to all persons employed in industry who are exposed to noise.

1.1.2 The Code sets out recommended limits to noise exposure. It should be noted that, on account of the large inherent variations of susceptibility between individuals, these limitations are not in themselves guaranteed to remove all risk of noise-induced hearing loss.

(1.2 Application to machinery)

(1.3 Relation to nuisance noise and vibration)

Section 2:

Objectives of code

## 2.1 Specification of limits

2.1.1 This Code specifies a limit for exposure to noise, and describes methods of measurement (Appendices 1 and 2) which can be used to determine whether the limit is exceeded.

(2.1.2)

## 2.2 Reduction of sound levels

As a primary aim, the Code seeks the reduction of noise exposure to below the specified limit. As a secondary aim it seeks the reduction of sound levels generally.

2.2.1 The Code indicates appropriate measures for the reduction of noise exposure which should be taken by both management and employed persons.

## Section 3:

### Summary of measures to be taken

#### 3.1 Measures to be taken by management

3.1.1 Management should accept a general responsibility for ensuring that the best practical means for noise reduction are applied.

3.1.2 The aim should be the general reduction of noise exposure. Where noise exposure less than the limits set in Section 4 are not achieved, ear protectors should be provided and their use ensured.

3.1.3 Appropriate staff should have adequate training in noise measurement and control.

3.1.4 Suitable records should be maintained.

Where it is not practical to ensure that the noise exposure is less than the limits set out in Section 4, and people must wear ear protectors, management should:

- (a) identify and mark places where ear protectors are required.
- (b) control entry into ear protection areas,
- (c) ensure that suitable ear protectors are provided and are used,
- (d) ensure that people provided with ear protectors are instructed in their care and use,
- (e) where ear protectors are worn and the limit in Section 4 may still be exceeded at the wearer's ear, ensure that exposure periods are suitably reduced.

(3.2 Measures to be taken by employed persons)

## Section 4: Limits

### 4.1 Desirable sound levels

4.1.1 The limits set out in this section should be regarded as maximum acceptable levels and not as desirable levels. Where it is reasonably practicable to do so it is desirable for the sound to be reduced to lower levels.

### 4.2 Limiting sound level

4.2.1 People should not be exposed to sound levels exceeding the limit set out in 4.3 to 4.5 below, unless they are using ear protectors which effectively reduce the sound level at the user's ear to or below the limits for unprotected ears. Note: The

allowance for ear protectors, when worn, should be calculated as described in Appendices 4 and 5.

#### 4.3 Continuous exposure

4.3.1 If exposure is continued for 8 hours in any one day, and is to a reasonably steady sound, the sound level should not exceed 90 dB(A).

#### 4.4 Non-continuous exposure

4.4.1 If exposure is for a period other than 8 hours, or if the sound level is fluctuating, an equivalent continuous sound level (L ) may be calculated and this value should not exceed 90 dB(A).

#### 4.5 Non-continuous exposure which cannot be adequately measured

4.5.1 In certain circumstances, for example where employed persons move from one area to another, it may be difficult to measure and control exposure to non-continuous sound. If the non-continuous exposure cannot be adequately measured and controlled, any exposure at a sound level of 90 dB(A) or more should be regarded as exceeding the accepted limit and requiring the use of ear protectors. Places where this level is likely to be exceeded should be clearly identified (see Section 5).

### Section 7:

#### Ear protectors

##### 7.1 General

7.1.1 When the application of means of controlling sound at source, or restriction of exposure duration, does not reduce the noise exposure to below the limit set out in Section 4, employed persons should be supplied with effective ear protection on an individual basis

Appendix 3 to the Guide proposed a method, by reference to a nomogram, for working out an equivalent continuous sound level, or leq. Instruments later readily available that worked out the leq over a period of time had not then been developed, or at least not for a mass market. In setting out the periods of different sound in order to perform the calculation, the Appendix provides:

Periods of exposure at less than 85dB may be ignored

34. The Code of Practice was widely circulated and referred to by factory inspectors. Although, as will appear, it was expected that

regulation by legislation would follow it was not until January 1990 that such regulation was put in place. There were only 2 areas where there was statutory regulation: Regulation 44 of the Woodworking Machines Regulations 1974 required reduction of noise to the greatest extent reasonably practicable and provision and use of ear protection where people are likely to be exposed to noise at or above 90dB(A)leq (8 hour). The regulations provided that the dB(A)leq should be worked out in an approved way, and the way approved was the method provided for in the 1972 Code of Practice. The Agriculture (Tractor Cabs) Regulations 1974 provided that the noise level in a cab before a certificate of approval could be given for it should not exceed 90dB(A).

35. Also in 1974 came the Health and Safety at Work Act 1974. Breach of the primary duty of employers under section 2(1) of the Act to ensure so far as reasonably practicable the health safety and welfare at work of all employees gives rise to criminal but not civil liability, but that section provided a route by which the Health and Safety Executive could and did compel employers to move towards observance of the 90dB(A)lepd limit specified in the 1972 Code of Practice.

36. In 1975 the Health and Safety Executive published a report entitled "Framing Noise Legislation". The report was prepared by the Noise Sub Committee of the Industrial Health Advisory Committee whose membership included Professor Burns and Dr Robinson, as well as representatives from both sides of industry. The same committee with some of the same membership had been responsible for the 1972 Code of Practice. The committee recommended that regulations should be made under the 1974 Act, and set out the proposed framework. They regarded the 1972 Code of Practice as the model, and followed it closely in their recommendations, including a limit of 90dB(A)leq of noise to which employees could be exposed. The report discusses the equal energy principle, by then well established, and the fact that it was therefore possible to predict the risk of hearing damage from a lifetime's exposure. In discussion of the 90dB(A) limit the report says in paragraph 19:

19 The Code's noise limit of 90 dB(A) leq has widespread international acceptance, and although it does not eliminate all risk of hearing damage, we feel it continues to be the most practicable standard, in recognition of the necessity of concentrating limited resources on workers subject to the most significant risks and of eliminating these risks as a first priority. If the limit were lowered to 85 dB(A) for example, the Factory Inspectorate survey indicates that the total number exposed would be more than twice that at 90 dB(A) and above. Prediction of risks of hearing damage at these levels, based on a lifetime's exposure of 30 or 40 years,<sup>10</sup> indicates that the proportion of an exposed population likely to suffer unacceptable degrees of impairment falls

off rapidly below 90 dB(A). The specification of a daily dose introduces a further margin of safety since it is unlikely that a large number of workers would receive the full daily limit throughout their entire working lifetime. Similar conclusions have been reached in other major industrial countries, and none of those examined in our survey has introduced a generally applicable environmental limit lower than 90 dB(A)<sup>1</sup>. Nevertheless, the question of a lower limit should be reconsidered at regular intervals. A level of 90 dB(A) is by no means ideal, and the aim should be to ensure a progressive reduction.

The industrial background at that time as discussed in the report included an estimate that between half and one million workers in manufacturing industry were exposed to noise over 90dB(A)lepd.

37. In 1978 the Health and Safety Executive produced a discussion document “Audiometry in Industry” and in 1981 2 important documents. There was a consultative document entitled “Protection of Hearing at Work” and a background document to the consultative document entitled “Some Aspects of Noise and Hearing Loss”. The background document set out the current understanding of noise induced hearing loss in detail, but the same information was contained in both papers about the relationship between reduction of noise levels over time and the incidence of serious hearing loss. The relevant part of the consultation document is as follows:

#### Risk of hearing loss due to noise

1 The risk of hearing loss is related to the level of noise exposure and the length of time a person is exposed to that level. Information on how noise affects hearing and on the scales of resulting handicap is given in reference 1. The evidence on hearing loss due to noise at work is complicated because hearing loss may also occur from other causes such as age, accident and illness.

2 Taking these difficulties into account, Fig 1 can be used to obtain an estimate of the risk of hearing loss (expressed as a percentage of persons exceeding a stated hearing loss) for a given level of noise exposure. Curves are drawn for exposure periods of 10 years and a lifetime, and for two different levels of hearing loss (30dB and 50dB).

The information given in Fig 1 may be represented in tabular form as Table 1

*Number of persons in every 100 likely to suffer 50dB hearing loss*

<i>Level of exposure (dB(A) <math>L_{eq}(8\text{ hr})</math>) years' exposure</i>	<i>Lifetime exposure</i>	<i>10</i>
100	32	17
90	11	5
80	3	1

If, for example, a population of 100 persons were exposed to a noise level of 100dB(A)  $L_{eq}$  (8 hr) for a lifetime, about 32 of them would be expected to suffer a 50dB hearing loss. If, on the other hand, 100 persons were exposed to a noise level of 90dB(A)  $L_{eq}$  (8 hr) for a lifetime, then about 11 of them will suffer a 50dB hearing loss. Thus, by reducing the noise level from 100 to 90dB, the risk of hearing loss is reduced by 21 persons in a hundred. If the same exercise is repeated for a noise level exposure of 80dB(A)  $L_{eq}$  (8 hr) for a lifetime, about 3 persons out of 100 will suffer a 50dB hearing loss. The reduction in risk of potential hearing loss at this level compared to the 90dB(A)  $L_{eq}$  (8 hr) level is about 8 persons in every 100 persons exposed.

3 In other words, reduction of the level from 100 to 90dB(A) achieves a 'saving' of 21 persons in every 100 and reduction from 90 to 80dB(A) achieves a further 'saving' of 8 persons in every 100. Similar calculations can be made for different levels, exposure durations and degrees of hearing loss.

4 It is clear from these figures that the degree of reduction of risk achieved by reducing the level from 100 to 90dB(A) is much greater than that achieved by reducing it from 90 to 80dB(A) and that the maximum benefit in terms of protection of hearing will be gained by directing the major effort at noise control towards those exposed above 90dB(A)  $L_{eq}$  (8hr). Nevertheless, it is clear that there is still a risk, albeit less, at levels below 90dB(A)  $L_{eq}$  (8 hr) and this merits appropriate action where it is reasonably practicable.



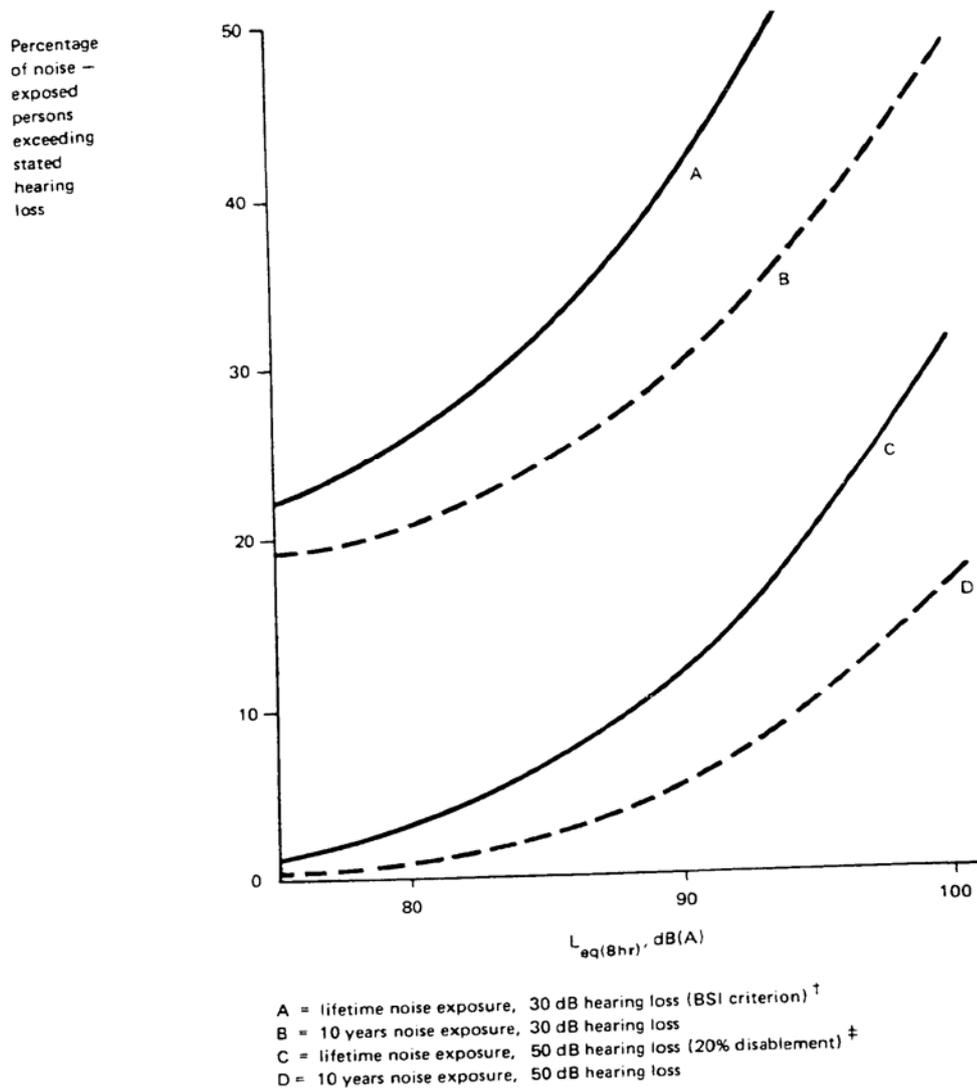


Fig 1 Hearing loss in a typical industrial population at 65 years of age (HSE estimate)\*

The above tables and graphs do not give figures or a line for a non-noise exposed population, so they do not illustrate the effects of noise alone on a population, simply the relative effects of different levels of noise over time.

38. The proposal in the paper was that the major effort should be directed at eliminating noise exposure over 90dB(A), while recognising the risk to some employees below that level. Under the heading “Proposed new legislation” the document includes:

[The Health and Safety Commission] has sought a solution in which priority in use of resources is given to those areas where risk is greatest and where expenditure of resources is given to those areas where risk is greater and



where expenditure of resources will bring the greatest benefit in reduction of the number of workers suffering loss

In considering the target that ought to be set for efforts at noise reduction, it is clear that, in the light of evidence of risk below 90dB(A)leq (8 hr) those responsible for noise reduction ought not to be relieved of all duties at levels below this. However, it is also clear that more effort should be required above this level than below it

The outline draft regulations attached to the consultation document provided that no person should be exposed above 90dB(A)lepd, but that without prejudice to that limit there would be a duty to reduce exposure at levels below 90 if reasonably practicable. The effect of the proposals about noise levels did not, therefore, depart substantially from the provisions of the 1972 Code of Practice 9 years earlier.

39. Before the consultation process was complete the European Commission on the 18<sup>th</sup> October 1982 published a draft proposal for a Council directive on the protection of workers from the risks related to exposure to noise. This draft directive, if carried into effect, would have compelled member states to legislate to set a maximum daily sound exposure level to which the ear of a worker is subjected at work at 85dB(A)lepd. The draft directive also provided for audiometric testing for those who had to wear protection in order to comply with the 85dB(A)lepd limit. These proposals from the Commission prompted vigorous debate, in which employers' organisations and unions took part. On the one side the CBI and employers sought to uphold 90dB(A) and on the other some unions supported the Commission, and others still argued for 80dB(A)lepd. The nature of the argument is captured in a debate in the House of Commons on 7<sup>th</sup> December 1983. After representations made from other countries in Europe as well as this country, the Commission in June 1984 withdrew their draft with a view to replacing it. It was replaced by less stringent proposals and led to the Noise at Work Directive of 12<sup>th</sup> May 1986. The exposure limit is to be 90db(A)lepd, but where the exposure is likely to exceed 85dB(A)lepd ear protectors were to be made available, together with information and, where relevant, training about potential risks and the wearing of hearing protection, and the opportunity for medical tests. The resulting legislation was to be brought into force by 1<sup>st</sup> January 1990. The recitals to the directive make it clear that the Commission had it in mind that the directive was an interim measure, and that it was likely to return to the subject to achieve lower noise levels still:



Whereas the current situation in the Member States does not make it possible to fix a noise exposure value below which there is no longer any risk to workers' hearing.

...whereas this Directive contains provisions which will be reviewed in the light of experience and developments in scientific and technical knowledge in this field

40. After the directive there came in 1987 an HSE consultation paper "Prevention of damage to hearing from noise at work; Draft proposals for regulation and guidance". The framework of regulation was bound to be as set out in the 1986 directive, unless the UK government were minded to derogate from the obligation, which they were not. The draft guidance to employers, in its commentary on the proposed regulation 6, a general duty to expose exposure of employees to noise to the lowest level reasonably practicable, includes this passage:

In practical terms this requirement means that... the employer will need to consider whether it is reasonably practicable to do more to control the noise level, perhaps in the longer term, to reduce any risk to hearing below [90dB(A)lepd]. There is a quantifiable risk of hearing damage from exposures between 85 and 90dB(A), and a residual though small risk below 85dB(A)

That statement in due course was to find its way into the guidance actually promulgated, and in independent publications in the early 1990's, for example the IRS Guide to the Noise at Work Regulations.

41. The 1986 Directive was carried in to effect by the Noise at Work Regulations 1989 which came into effect on the 1<sup>st</sup> January 1990. The First Action Level (85dB(A)lepd) and the Second Action level (90dB(A)lepd) were established in accordance with the Directive. Where noise exposure is likely to exceed 85dB(A)lepd a noise assessment has to be made, and records kept. In addition to the specific duties related to the action levels, there is a general duty under regulation 6 to reduce the risk of damage from exposure to noise to the lowest level reasonably practicable. The HSE Guide introducing the Regulations made clear, as appears from regulation 6 itself, that there was no cut off point, and that the general obligation applied below 85dB(A)lepd:

There is a quantifiable risk of hearing damage from exposures between 85 and 90dB(A) and a residual though small risk below 85dB(A), so in practical terms this means that in addition to the specific steps required by the Regulations, the employer will need to consider whether it is reasonably



practicable to do more to control the noise level, perhaps in the longer term, to reduce any risk to hearing from exposures below [90dB(A)]lepd]

Regulation 11 provides for adequate information, instruction and training to be given to employees where exposure at 85dB(A)]lepd is likely.

42. In the early 1990's the Commission returned to its wish for lower levels than the 1986 Directive had provided for. Ultimately the Noise at Work Directive of 6<sup>th</sup> February 2003 appeared, brought into effect by the Control of Noise at Work Regulations 2005, which came into force on 6<sup>th</sup> April 2006. The aim of the regulations, as appears from regulation 3(1), is to protect persons against risk to their health and safety from exposure to noise at work. In addition to the general duty to see that risk from exposure is eliminated at source or reduced to as low a level as is reasonably practicable, there is to be no exposure above 87dB(A)]lepd; Steps are to be taken to reduce exposure so far as practicable above 85dB(A)]lepd; where there is likely exposure over 85dB(A)]lepd, hearing protection must be provided. Where there is likely exposure over 80dB(A)]lepd hearing protectors must be made available on request. Suitable information instruction and training must be provided where 80dB(A)]lepd is likely to be exceeded. These regulations, at the end of the development of guidance that started in 1963, if they are obeyed, enable an employee to avoid any risk of damage to his hearing from noise.

### **Other material mentioned in the pleadings**

43. The other material, mentioned in the pleadings, are the work of Mrs Jean Stone in the 1970's, and the HATRA report of 1976. In the 1970's Mrs Jean Stone, a noise control and hearing conservation consultant carried out surveys for the National Union of Hosiery and Knitwear Workers. The First report was published in June 1971 and re-printed in March 1972. It is entitled "Investigation into The Effects of Industrial Noise on the Hearing of Employees in the Hosiery Industry". Tests were carried out on 87 employees, of whom she found that 55 had hearing impairment attributable to noise exposure, 23 had normal hearing, and 9 were rejected from analysis. She measured simple dB(A) levels for a number of different machines, and found significant hearing loss in workers who had been exposed to machine noise at between 80 and 90dB(A) as well as over that level.

In her second report in 1974 Mrs Stone noted, with reference to the 1972 Code of Practice, that a level of 90dB(A)]lepd was too high to give



adequate protection to some industrial workers. She described the Code as “an important first step” and said:

It is to be hoped... that the 90dB(A) level will not come to be regarded as the ultimate objective in noise control and hearing conservation”

In her third report in December 1976 she re-visited some of the persons tested in the first survey, and found that the hearing of those who in the meantime had not worn ear protection had become significantly worse than those who had. She found by interview that even slight hearing loss had an adverse effect on home and social life; that a hearing conservation programme could be effective in preventing hearing loss; and that audiometry could be carried out satisfactorily.

Jean Stone’s work was limited, but the feature of it particularly pointed to by the Claimants is the confirmation by her that some workers exposed to noise levels between 80 and 90dB(A) could be expected to suffer hearing loss in consequence and that a properly run hearing conservation programme could be effective.

44. How wide a circulation these reports had is not clear, but her work was referenced in the HATRA Research Report number 43 in 1976, entitled “Noise in the Knitting Industry” by G.M. Coles. HATRA was an industry research body based in Nottingham. Coles took 905 measurements of noise in 57 factories. The reference in this case to the measurements have been largely by Mr Hill, engineer for the Claimants, as evidence going to the question what noise individuals were exposed to. However, the methodology of Mr Coles is not fully explained in the report. It seems clear that the meter used did not give a leq figure, but that Mr Coles recorded the noise made by each machine when running. From the point of view of an employer in the knitting industry in the late 1970’s and 1980’s looking through the report, the effect would be to reveal the very wide variation in noise emitted by machines of various types, and in some circumstances by machines of the same type. In the context of the time it would be likely for many employers to point the need for a noise survey, depending what area of the industry they were working in, and whether there was an indication of noise levels over 90dB(A).



## Other documents and publications

45. In their written submissions the Claimants refer to a number of other documents that are in or referred to in the papers that add, it is said, to the body of information in the public domain and which might have informed the state of knowledge of individual employers:

- (i) The sources referred to in a paper entitled “Industrial Deafness, A review of the information available to the ordinary reasonable and prudent employer prior to 1972”, by W I Acton.
- (ii) A textbook by Professor Burns in 1968: “Noise and Man” in which were indicated expected threshold shifts at 4khz after a lifetime exposure to sound levels at 82, 80, 79 and 78 dB.
- (iii) An article by Dr H P Stout published in March 1970 for the Textile Research Associations. It contains a passage which is relied on as the sort of statement, current in the literature, alerting the reader to a risk to hearing below 90dB(A):

The noise level above which damage to hearing becomes important on continuous pressure during a normal working week is not known with certainty... but it is probably somewhere in 80-90dB(A) region for moderate frequencies. The higher the actual noise level is above the critical level the more the effect is likely to be on the operative’s hearing, and certainly levels over 95dB(A) must be regarded as hazardous.

The survey of typical noise levels includes some in the spinning and weaving industries, where noise levels were often much higher than 90dB(A). In discussing the noise levels, at another passage in the article Dr Stout says:

Of the machines examined, cards, Co-We-Knit and bobbinet lace types run at noise levels of 85dB(A) or less. These may be considered as safe from a hearing point of view...

- (iv) The proceedings of the Teddington Conference at the National Physical Laboratory in March 1970, at which Dr Robinson gave his paper explaining the equal energy principle and the establishment of formulae that enabled levels of hearing loss as a result of exposure to noise to be predicted in exposed populations. Bryan and Tempest also gave a paper entitled “Noise damage liability- evidence as to the state of knowledge”.



The conference was attended by representatives of Courtaulds.; also present was Mr Bramer, Courtaulds' expert engineer witness in this case. The Claimants' case is that by this time, 1970,

The reasonable and prudent employer will have known at this point of his ability to estimate the risk of noise damage at various levels of exposure to his working population

- (v) A paper by the British Occupational Hygiene Society published in July 1971: "Hygiene Standard for Wide Band Noise". The sub-committee responsible for this paper was chaired by Dr D E Hickish who was also at that time on the committee that produced the 1972 Guidelines. The aim of the paper was to establish a damage-risk criterion: to state what in the opinion of the committee is an acceptable degree of exposure to noise by reference to the number of people who can be expected to suffer handicap, according to their definition of a 40 dB threshold averages over .5 to 6khz), as a result. The proposed standard was expressed as follows:

A noise immission of 105dB is acceptable exposure on the basis that no more than 1 per cent of exposed persons will experience handicap due to noise after lifetime exposure. The equivalent continuous noise level which corresponds to this immission is 90dB(A) for a working lifetime of 30 years.

The paper makes it clear that if a noise immission level of 105dB is the acceptable limit, it might be reached by longer exposure at lower noise levels than 90dB(A):

The acceptable durations in years for various noise levels are:

Leq Equivalent-continuous Noise level dB(A)	Acceptable duration of exposure in years
88	50
88.5	45
89	40
89.6	35
90	30



- (vi) The 1973 NPL tables. No copy of these is available. They set out in tabular form the results of the Burns and Robinson work, but apparently in a form not as convenient to use as the 1977 Tables. The extent of their circulation during their short life of 4 years is unknown.
- (vii) The 1977 NPL Tables. These have remained. The Claimants say that anyone using them would have found significant levels of hearing loss predicted in populations exposed for as little as 10 years at 80dB(A) and above. The fact that subsequent research has shown that the degree of hearing loss in fact suffered at such levels is less than the tables predict does not, it is said, detract from the importance of the tables as alerting employers to the existence of risk.
- (viii) An editorial in the Lancet in 1979, which discusses the declared aim of the TUC to have the acceptable level of noise exposure reduced to 80dB
- (ix) Health and Safety Recommendations published in 1982 by the Knitting Dyeing and Lace Industries' Joint Health and Safety Committee. In Appendix 2 is set out a table of exposure limits. The bottom 2 entries in the table are:

Noise level	Daily exposure limit	Typical noise emissions And effects
90	8 hours	Rapier, air and water jet Looms. Heavy motor lorries
80		Recognised "acceptable" level in Britain- still deafens 18% of all workers. Hearing damage begins at this level. Typical of very busy traffic

### **The general approach to noise in industry**

46. The state of understanding of the individual employers involved in this case will be looked at below. There was evidence given by the expert witness engineers for Courtaulds (Mr Bramer and Mr Currie) about the approach to control of noise in the period from the 1970's in industry. The report of Mr Worthington for Pretty Polly and Guy Warwick is also in evidence. To Mr Bramer, the guidance in Noise and the Worker and



the 1972 Guidelines provided a “clear and consistent recommendation to employers as to how they ought to deal with noise in the workplace”. The result was that in his practice, his invariable advice until the late 1980’s, was that “the relevant level was a daily personal noise exposure of 90dB(A)”. This approach, he said, was standard during the period up to 1989 among noise professionals, and taught at training courses. In the mid 1980’s, when it appeared that EEC regulation would involve a first action level of 85dB(A) his advice changed to reflect that. He was not aware of the NPL tables before the 1980’s when he found that they were being used by medical experts writing reports for the purpose of deafness claims. He has never come across them being used in any part of industry. In evidence Mr Bramer said that he gave advice to employers in terms of complying with the 1972 Code. He was speaking to the 90dB(A) level, as were all his colleagues. He agreed that the advice would be to answer the question “Tell us how to comply with legislation and the Code of Practice”, rather than “Tell me how to avoid reasonably foreseeable risk to my workforce”. He would have recommended 90dB(A) as the cut off point, but would also have said “that does not actually stop some more susceptible people from having some small noise induced hearing loss”. If asked about risk, he would have had some difficulty, and regarded the question as more one for medical people.

47. Mr Currie said that the Health and Safety Executive and factory inspectors after the 1974 Act concentrated their advice and enforcement on the 90dB(A) level. He was not aware of any instance in which the NPL tables had been used by employers to predict the level of risk for their workforce. In evidence Mr Currie said that good practice won’t necessarily remove all risk. He agreed that there has been no very different understanding about noise induced hearing loss since the 1970’s. The first thing to look at when deciding on practices, which is what employers have to do, is to look at the guidance available.

Mr Worthington’s report is to the effect that employers looked to the 90dB(A) limit in the Code of Practice as the maximum acceptable limit, and that the Factory Inspectorate and HSE did not refer employers to the risks below that limit as risks about which they should take action. That was the practice of the day, and employers taking advice, if they did, would be referred to the standard in the Code as being what had to be observed.

48. It is clear from some of the documents referred to above that by the beginning of the 1980’s there were still many people employed in



industry exposed over 90dB(A)lepd, and that the approach of enforcement agencies was to concentrate on those people. The evidence of the engineers referred to above suggests that that was a common approach until at least into the mid 1980's. That the 90dB(A)lepd level was regarded, as is the effect of the evidence of the engineers referred to above, in industry as the touchstone of reasonable standards that should be attained is evidenced by notes published by the Wolfson Unit for Noise and Vibration Control in the University of Southampton in 1976. The notes were intended to supplement a series of seminars held round the country in the Autumn of that year entitled "Industrial Noise- The Conduct of the Reasonable and Prudent Employer". The seminars were intended "primarily for company lawyers, solicitors, insurance claims and risk assessors, safety officers, medical officers and others with interests in occupational hearing loss". The notes are therefore strong evidence of the prevailing advice being given to people in industry concerned with noise at that time. They describe the 1972 Guidelines as establishing a comprehensive "damage risk criterion" based on 90dB(A)lepd; and that they have been actively promulgated by the Factory Inspectorate. In the discussion of the emerging principles of legal liability for noise induced hearing loss the authors say:

Over the last fifteen years knowledge as to the relationship between noise and deafness has grown and become more precise....Today a reasonable employer ought to know that to expose an employee to noise in excess of 90dB(A) for eight hours or its equivalent is potentially hazardous. It also seems a fair assumption that the reasonable employer should have known of the criteria set out in "Noise in Factories" and "Noise and the Worker" by the mid 1960's"

### **The individual Defendants**

49. The particular way in which the individual Defendants were addressing the question of noise has been the subject of evidence. Some possible witnesses for each were not called, and Pretty Polly decided to call none of their lay witness evidence, having served more than 15 statements. That has prompted the Claimants to submit that the court should draw adverse inferences as discussed in particular by Brooke LJ in Wisniewski v Central Manchester Health Authority (1998) 1<sup>st</sup> April, CA. I think that the drawing of an adverse inference from failure to call available evidence always starts from the proposition that there must always be a "case to answer" before failure to adduce available evidence can be used to strengthen the opposing case. Here, I think that the limits of that approach go no further than this, that where disclosure or other evidence may justify a conclusion, the absence of evidence given from

the witness box means that there is no challenge to the drawing of that conclusion.

## **Courtaulds**

50. Both Julie Baxter and Tony Parkes worked for Meridian Limited. Meridian was a subsidiary company of Courtaulds PLC. Julie Baxter was there from 1979 to 1989, and Tony Parkes from 1968 to 1988. Both worked at the factory at Belvedere Street at Mansfield. Courtaulds was a large company, operating in six divisions. It was at one time a FTSE 30 company. Up to the early 1980's there were over 100,000 employees. By the end of the 1980's the numbers were down to 48,000, with about 20,000 in textiles. The years covered by these claims reflected the position in the clothing and textiles industry generally, as shown by the other Defendants: Years of prosperity and expansion accompanied by takeovers and consolidation, followed in the 1980's by decline as worldwide competition took its toll. That competition by the end of the 1990's led to the almost total demise of the industry in the United Kingdom, and the closure of all the factories with which these cases are concerned.

51. The main evidence for Courtaulds was given by Dr Peter Cooper, because co-ordination of the need for a better management of noise control in the Consumer Products Group, the division of Courtaulds that included clothing manufacture, fell to him in the 1980's. He said that it was in the early 1980's that the issue of noise in industry began to be widely discussed. He was not involved with noise until the end of 1982, when he was asked to form and chair what became known as the "Noise Committee". There is no direct evidence of what happened before that time. There were divisions of the company where there were high noise levels, such as spinning and weaving, and Dr Cooper said that he was aware that hearing protection was provided. There were, by 1983, claims for damages for industrial deafness coming through, and some 200 were expected to be pending by the end of 1983. One difficulty in defending them was that there had not been the systematic noise surveys that the 1972 Guidelines required. At the time that the Noise Committee was set up, the European Commission's proposal for a directive limiting noise as received by the ear of an employee to 85dB(A)lepd was current. Dr Cooper obtained information that Courtaulds Research Division had assembled about noise. There were library facilities at Coventry. What publications there were is not now known in detail. The Courtaulds disclosure comes largely from Dr Cooper himself, who preserved his own files relating to his work chairing the Noise Committee. In the first half of

1983 a memorandum was circulated widely in Courtaulds PLC from Mr Dillon-Weston, a solicitor in the legal department, and Dr Lyle, assistant Chief medical officer. It drew attention to the increase in claims, the necessity of hearing protection over 90dB(A) in all circumstances, and contains these passages:

It has been suggested that some impairment may be caused by noise levels in the range of 85-90dB(A)... We strongly recommend that hearing protectors be provided for all those who may be exposed to noise within the range 85-90dB(A)Leq

52. The noise committee met first on 17<sup>th</sup> March 1983. Amongst the material that Dr Cooper had had by then was a paper on noise circulated by Mr Crosdale, Senior Personnel Manager at Courtaulds Apparel, indicating that a number of other countries had set the maximum exposure level, or an availability of protection level, at 85dB(A). The committee set the various companies in the division the task of carrying out proper surveys of noise levels at all the factories. That process took about a year to complete. By the March 1984 meeting in nearly all factories areas over 90dB(A) and between 85 and 90dB(A) had been identified. The policy was to mark and achieve compliance in the compulsory over 90dB(A) areas, and then to designate 85-90dB(A) areas as recommended areas for protection. The 90dB(A) action was immediate. The 85-90 areas were

Rather more medium term and it was suggested that a 75% acceptance of hearing protection in recommended areas should be the aim for mid 1985

53. At a further meeting on 3<sup>rd</sup> October 1984 the 85-89 bracket was discussed at length, and the possible difficulties of attaining compliance in that area without Code of Practice backing, but a target of 80% compliance by the end of 1985 was to be aimed for. 100% compliance in compulsory areas had not yet been achieved. There was a recognition at this time, as is certainly the case, that information instruction and encouragement had to accompany the provision of ear protection. By the meeting of 12<sup>th</sup> March 1986 the EEC directive for first and second action levels had appeared, and the committee noted that their policies complied with the directive.

The above references indicate that by 1984 in the Courtaulds Consumer Products Group companies there was a policy or intended policy of making hearing protection available to employees exposed in the 85-90dB(A) range, and that the need for information and encouragement was



also recognised. There were other activities, as appears in the documents, and explained by Dr Cooper in evidence, including the steps taken to reduce noise at source by modifying in some cases individual machines. In evidence Dr Cooper accepted that the drivers for the activity from the early 1980's were proposed legislation, and the rising incidence of claims. There was no assessment of the risk to hearing caused by different levels of noise. Dr Cooper, however, understood that there would be some people exposed below 90dB(A)leq who would suffer damage.

54. Concurrently with the beginning of Dr Cooper's involvement in early 1983 Courtaulds was active in the debate stimulated by the 1981 consultation and the EEC draft directive. There is an index of correspondence, the correspondence itself apparently being no longer extant, showing a considerable level of activity. Courtaulds made written representations on 25<sup>th</sup> February 1983 against the proposed compulsory limit of 85dB(A). There were 57, 000UK employees, of whom 5000 were exposed over 90dB(A) and 12,000 to 85dB(A) and above. Courtaulds accepted the need to reduce the level below 90dB(A) where reasonably practicable "at least where there is a significant risk of hearing impairment", but made a case against a compulsory 85dB(A) limit, which was what the EEC then proposed, on economic and competition grounds. The wearing of hearing protection below 90dB(A) was said to be "increasingly burdensome, and very difficult to enforce"; it would also, it was estimated, cost several hundred thousand pounds a year.

55. Mr Brian Arthurs gave evidence. His career was spent as a design engineer with Courtaulds research. From the early 1980's he had the important function of carrying out noise surveys, and gained expertise in that area. Some of his surveys will be referred to in the evidence about individual cases. He was, however, cross examined about the material with which he had in the past been familiar. There were two filing cabinets with documents to which he could refer. He said that he could not remember individual documents (apart from the 1972 Guidelines, which he had) but when they were put to him he had, or thought he had, a recollection of seeing the Jean Stone reports and the HATRA report. In general, things like that would be dealt with by the medical department. Mr Allen Jones gave evidence about the history. He, however, did not join the textiles division as group safety advisor until 1987. I do not regard him as adding to the general picture given in particular by Dr Cooper.

56. There is no doubt that Courtaulds PLC had the resources to look beyond the 1972 Guidelines and reach their own conclusion about the nature and extent of the risks posed to the hearing of their employees exposed below 90dB(A). I do not draw any direct inference about knowledge from the fact that Dr Hugh Dennis Jones or someone else from the medical department was not called to give evidence. Dr Lyle in any event lent his name to the 1983 memorandum, together with the solicitor Mr Dillon-Weston. I think it is the fact that nobody actually considered, asked or sought to answer the question “What are the actual risks to members of the workforce exposed to different levels of noise?”. The 90dB(A) standard from 1972 was considered to be the standard that the law and good practice required. There was a clear awareness by the early 1980’s that exposure to levels of noise between 85 and 90dB(A) could be expected to damage the hearing of some workers to the extent that action was desirable at those levels. No large company who responded to the consultation document or read the background document and was aware of the EEC proposals in 1982, and one that then took part in the debates trying to fend off compulsory protection at 85dB(A) on economic grounds, but not on grounds that such levels of exposure were not harmful, could be said to be ignorant of the facts by the beginning of 1983 at the latest.

### **Taymil Limited**

57. Taymil Limited is responsible for the liabilities of a number of companies that became subsidiaries of Coats Viyella PLC from 1986. There are three claimants who worked for such companies. Stephanie Baker worked at a factory at Huthwaite Road, Sutton in Ashfield, from 1971 to 2001. Her employers were Simpson Wright & Lowe Limited, hosiery manufacturers, who by the early 1970’s became a subsidiary company of the Nottingham Manufacturing Company PLC. Nottingham Manufacturing Company, which had a number of other subsidiaries that do not come into this case, merged with Vantona Viyella PLC in 1985, and the resulting entity became a subsidiary of Coats Viyella PLC in 1986. For the last few years of Mrs Baker’s employment her employer was Coats Viyella Clothing Hosiery.

58. Christine Faulkner worked as a lockstitch machinist at a factory at Botany Avenue, Mansfield from 1973 to 1988. This was a making up factory. The factory belonged to Mansfield Hosiery Mills, which was a



subsidiary of the Nottingham Manufacturing Company, and which was therefore taken over by Coats from 1985. Nottingham Manufacturing Company were therefore responsible for the operations at Botany Avenue in the 1970's and up to the second half of the 1980's.

Sarah Moss had a number of different periods of employment and employers. She worked during various periods between 1963 and 1994 mainly at the Botany Avenue factory, but also in later years at factories operated under the umbrella of Nottingham Manufacturing Company or Coats at Ollerton and Alferton. Nottingham Manufacturing Company had over 12,000 employees in the 1970's and 1980's. Coats Viyella was a large group with 68,000 employees in the late 1980's, working in various divisions, but serious decline was already setting in.

59. There is very little disclosure of documents from Nottingham Manufacturing Company (or, for that matter, from Coats). Apart from the documents disclosed, which are noise surveys for different factories and a report from Midland Insurance in 1983 relating to Huthwaite Road, the oral evidence suggests that the only other document that may have come the way of Nottingham Manufacturing Company or its subsidiaries is the 1972 Code of Practice. There was oral evidence from Mr Douglas Watson, who from 1974 to 1988 was the group insurance and risk manager; from Mr Frederick Gage, the group works engineer from 1973 to 1989; Mr Mike Hallows, the Ollerton manager from 1970 to 1974, and who had worked at Botany Avenue, mostly in management, from the 1960's; and Mr Ivan Jones, from 1974 until 1986 the Nottingham Manufacturing personnel manager.

60. The factories in the group seem to have run largely independently, with factory management being responsible for health and safety, reflecting the origins of each factory in a separate business. There was no central health and safety function. Mr Jones said that he thought that in 1977 or thereabouts a Health and Safety policy document had been produced. He said it would probably have been destroyed "when the company folded". There is no reason to think that such a policy, if it did in fact exist, would on noise have done anything but refer to the limit of 90dB(A). The knitting shops were recognised as being the areas with possibly dangerous levels of noise, not making up areas. Of the documents referred to the first is a noise survey and accompanying documents done for Huthwaite Avenue by Midland Insurance in June 1983. Mr Watson had discussed the conclusions of it with Midland Insurance, as appears on the face of the document, though he said in evidence that he could not remember it. The survey refers to the 90dB(A) limit and suggests that all areas in the survey above 87dB(A) should be



areas where ear protection is worn until the noise is reduced by engineering methods. A number of areas were identified as having noise over that level. Proper training and instruction of staff is advised; and appended is a guide to preparing a noise control policy, in which it is suggested that any noise reduction programme should aim at reducing noise to 84dB(A) or less if practicable. There is a noise survey of Botany Avenue by Mr Graham Allin, an engineer working to Mr Gage in August 1984 in which Mr Allin refers to company policy taking 85dB(A) as the exposure threshold level. I am satisfied that there was no such policy. Mr Gage, who was a good witness was quite clear about that, and explained how Mr Allin may have got that idea from Mr Gage's view about a margin of safety below 90dB(A) so as to ensure the 90dB(A) level was achieved. Moreover, in a draft survey of the Ollerton factory written after June 1984 when the EEC proposals were changed there is no mention of such a policy. The quality of their evidence was not as good as that of Mr Gage, but both Mr Watson and Mr Ivan Jones said that the limit to be worked to was 90dB(A). There is no evidence of any steps towards protection being taken in the Nottingham Manufacturing years aimed at conservation over 85dB(A). Mr Watson said in evidence that he was aware of the EEC proposal in 1982 to reduce the exposure level to 85dB(A). He was aware of the existence of the debate about that proposal, from discussions with insurers: "It was viewed with some scepticism, I think". Coats was a large organisation. By the time they came on the scene attention, if any, must have been focused on the EEC proposals that lead to the 1989 regulations.

61. There is therefore no evidence that anyone in Nottingham Manufacturing or its subsidiaries with which this case is concerned turned their mind towards the level of risk about possible harm below 90dB(A)leq, except that Mr Watson was aware after 1982 of a debate going on about what levels would ultimately be imposed, and by the summer of 1984 it was known that though the compulsory level would remain at 90, some measures, possibly audiometry, would be imposed at 85dB(A). The 1983 Midland Insurance document is an important document, with its plain implication that the 90dB(A) Code of Practice level did not provide protection to everyone, and that a noise conservation policy should do better, but it does not provide the information that means that management at Nottingham Manufacturing were in a position of knowledge and understanding that set them apart from what I take to be the understanding of the great majority of employers, that 90dB(A)lepd was the official limit that had to be worked to. I do not think it is shown that Nottingham Manufacturing had a greater than average degree of knowledge.



## **Pretty Polly**

62. Margaret Grabowski worked for Pretty Polly as an overlocker from 1966 to 1970; 1973 to 1975; and from 1978 to 1997. Pretty Polly was always a subsidiary of other companies during these periods: Thomas Tilling Limited until 1982; Then BTR PLC until 1994; then Sara Lee UK Holdings Limited. In its heyday in the early 1980's the company had about 1500 production employees. The BTR Group at that time had over 42,000 employees.

63. Pretty Polly served a number of witness statements, but in the event called no factual evidence at the trial. They made substantial disclosure. The general documents disclosed include the final Wilson Committee Report of 1963; Noise and the Worker (1968); the 1972 Code of Practice; the second, 1974, Jean Stone report, though there is evidence from correspondence that in 1982 they had at least three of the reports; the HSC 1981 consultative document; the HSE 1987 consultative document with the draft 1989 regulations. The internal documents include a Guide to Preparing a Noise Control Policy from Midland Insurance, undated but probably from the late 1970's or early 1980's, in which it is said that an exposure to 90dB(A)lepd over a long period there is a possibility of damage to hearing, so that adequate steps should be taken to prevent this; also that a noise reduction programme should aim at reducing noise to 84dB(A) or less if practicable; a Commercial Union Risk Management Limited paper from 1977 saying "research has shown that few industrial workers will suffer serious hearing loss if the intensity and duration of exposure is controlled to allow a maximum [of 90db(A)]" and later "the exposure standard of [90dB(A) lepd] is based on the prediction that not more than 1% of those exposed to this level over a 30 year working lifetime will suffer social handicap as a result.

Levels should thus be reduced whenever possible and 90dB(A) regarded as a ceiling rather than a safe level".

64. There is a memorandum, from the works study department in about December 1982, probably written by Mr Butler who later became manager of that department, for the production manager at No 3 factory, Sutton in Ashfield, but which seems to have had quite a wide circulation, in which it was said that 90dB(A) was the maximum level, and noise at that level involved accepting a certain risk of hearing damage.



If we as a company feel that we require a zero risk of hearing damage for our employees, then no person should be exposed to a noise level of more than 80dB(A) for a 8 hour day.

There followed a table of percentage risk of hearing damage (such damage was not defined) which showed 0% at 80dB(A), and at 85dB(A) 1, 3, 5, 6, 7, 8, 9, and 10% for 5, 10, 15, 20, 25, 30, 35, and 40 years of exposure respectively. The percentages for the same periods at 90dB(A) were said to be 4, 10, 14, 16, 16, 18, 20, and 21%.

65. In 1985 there was “An assessment of Occupational Noise exposure at Pretty Polly” from John Butler, distributed to management. It contained the same table, so far as material, as the 1982 memorandum. In the conclusion Mr Butler said that with the exception of the Wepamat Straightening machines all machinery areas in the company were in excess of 85dB(A):

Even at this level we are accepting a certain risk of damage for our employees. If a zero risk of hearing damage is required, then no employee should be exposed to a noise level of more than 80dB(A) for more than 8 hours a day.

Thereafter in the late 1980's the documents are concerned with the forthcoming standards in the Noise at Work Regulations, and meeting the requirements of those regulations. Mr Butler, though he made a statement, was not called, so it is not clear where he got his information about low level exposure from and when. Some, but not all of it, is in the 1981 consultative document.

66. There is no evidence that anyone at Pretty Polly turned their mind towards any evaluation of the risks below 90dB(A) before 1982. It is not really likely that they did so. It is plain from Mr Butler's documents that by that year he had done so. Indeed, it is unlikely that a company of that size where there had been some collection of materials, and where they cannot have been unaware of the EEC proposals and the very public debate that followed, could not have known that there was a real case to be made that exposure below 90dB(A) could cause levels of hearing damage that should be guarded against. I would put actual awareness of the nature of the real risk below 90dB(A), as with Courtaulds, as having arisen by the beginning of 1983.



## **Guy Warwick Limited**

67. Joan Hooley was employed by Guy Warwick Limited from 1978 until it ceased to operate in December 1992. The company had been formed as a result of a management buy out in 1977, so Mrs Hooley worked for the company for substantially the whole of its life. By comparison with the other Defendants they were a very small company, engaged in making up operations, principally suits and trousers. They had at their height four factories, all in Nottinghamshire, at Bilsthorpe, Blidworth, Newark and Walesby, and something under 400 employees. The company went into liquidation and operations ceased in December 1992. Mrs Hooley worked almost exclusively at the Bilsthorpe factory, in the press area.

68. Although I heard evidence from Mrs Hole, personnel officer, and Mr Michael Kettle, chief engineer, that evidence was principally about noise in the factory. There is no evidence that anyone at Guy Warwick knew about the 1972 Code of Practice, or even about the Noise at Work Regulations 1989, which were in force for the last 2 years of the company's life. Mr Kettle was involved in health and safety and set up the health and safety committee. There were committee meetings at which he said in his statement the question of noise was never raised. The factory inspectors who came round periodically and the insurance representatives never raised it. No surveys were ever done. "In my opinion" said Mr Kettle, "the industry was not renowned for excessive noise". Whether, on the facts of actual noise to which Mrs Hooley was exposed, Guy Warwick were in breach of any duty to her, has to be judged on the basis that they had no actual knowledge of the relevance of noise to their operation.

## **Duty and breach of duty at Common Law**

69. The Claimants' case is that from at least 1963 employers in the position of the employers in these cases, in discharge of their general employer's duty of care, should have made available to the workforce hearing protection and appropriate information, training and instruction, where there was any real risk of damage to hearing by long exposure to noise. It is not their case that in the context of the industry with which these cases are concerned, it was reasonably practicable generally to



reduce the levels of noise at source below the levels that actually existed. They say that those steps of providing hearing protection should have been taken at all levels of noise above 80dB(A)lepd, which is a level at which they accept that professional opinion is that there is no risk, and therefore that identifying particular levels of noise above 80dB(A) is unnecessary and irrelevant. I have already found that there was no material risk against which an employer should have guarded below 85dB(A)lepd, for the reasons given above. That means that the Claimants' common law case is concentrated in the area 85 to 89dB(A)lepd. At 90dB(A)lepd and above, with which this case is not concerned, employers of any kind would not be likely to escape liability for exposure, probably from 1963 and certainly from 1972.

70. The Claimants draw a distinction between the existence of a duty of care and breach of it. They are right to do that, since the general duty of care undoubtedly existed, though breach depends upon what employers knew or ought to have known of the risk and the action they should have taken in the light of their knowledge, so the distinction does not seem to me to help greatly in the answer to the question "What should they have done?".

71. Their case is that the effect of the documents and publications referred to above is that no reasonable and prudent employer could be unaware of a risk to a significant, though small, population exposed to levels below 90dB(A)lepd and take steps to afford their employees protection. The equal energy principle was made explicit by 1970; the 1972 Guidelines themselves made it plain that 90dB(A)lepd was not to be regarded as a safe level of exposure; as the 1970's went on, with the appearance of ISO1999 in 1975 and BS5330 in 1976, the case on the public documents alone gets even stronger. To set the legal framework of their case about what should have been done, the Claimants cite a hallowed text in this area of the law, the passage in Stokes v Guest Keen and Nettlefolds [1968] 1 WLR 1776 at 1783, about general industrial practice and developing knowledge:

From these authorities I deduce the principles, that the overall test is still the conduct of the reasonable and prudent employer, taking positive thought for the safety of his workers in the light of what he knows or ought to know; where there is a recognised and general practice which has been followed for a substantial period in similar circumstances without mishap, he is entitled to follow it, unless in the light of common sense or newer knowledge it is clearly bad; but, where there is developing knowledge, he must keep reasonably abreast of it and not be too slow to apply it; and where he has in fact greater than average knowledge of the risks, he may be thereby obliged to take more than the average or standard precautions. He must weigh up the risk in terms of the likelihood of injury occurring and the potential consequences if it does; and he must balance against this the probable effectiveness of the precautions that can be taken to meet it and the expense and inconvenience they involve. If he is

found to have fallen below the standard to be properly expected of a reasonable and prudent employer in these respects, he is negligent.

Keeping reasonably abreast of developing knowledge and not being too slow to apply it would, it is submitted, have caused an employer to identify the risk to the hearing of employees under 90dB(A), and to take steps to provide protection. The risk that they would have to identify need not be a high risk: A number of authorities were cited in support of this proposition including: Bolton v Stone [1951] AC 850, HL; and the two Armstrong v British Coal Corporation cases in the Court of Appeal, in each of which Judge LJ gave the leading judgment: [1997] 8 Med LR 259, CA and (1998) 31<sup>st</sup> July, CA.

72. The Claimants also cite passages from Mustill J's judgment in Thompson. It is necessary, in my view, to be careful when transferring things said in the shipyard cases to these present cases. In the shipyard cases the fact that workers were deafened by noise in the course of their work was known to everyone. The question was, by what date should employers have found out that effective hearing protection was available and taken steps to provide it. The important passage in Thompson set out below and cited by the Claimants must be read in that context:

From what date would a reasonable employer, with proper but not extraordinary solicitude for the welfare of his workers, have identified the problem of excessive noise in his yard, recognised that it was capable of solution, found a possible solution, weighed up the potential advantages and disadvantages of that solution, decided to adopt it, acquired a supply of the protectors, set in train the programme of education necessary to persuade the men and their representatives that the system was useful and not potentially deleterious, experimented with the system, and finally put it into full effect? This question is not capable of an accurate answer: and indeed none is needed, as will appear when the scientific aspects of the case are considered...At the other extreme, I consider that the choice of a date as late as 1973 cannot be sustained. The problem, and the existence of different ways in which it might have been combated, had been well known for years; there had been devices which were both reasonably effective, and reasonably easy to wear; and if the employers did not know precisely what they were they would have had no difficulty in finding out.

All this being so, I conclude that the year 1963 marked the dividing line between a reasonable (if not consciously adopted) policy of following the same line of inaction as other employers in the trade, and a failure to be sufficiently alert and active to measure up to the standards laid down in the reported cases. After the publication of "Noise and the Worker" there was no excuse for ignorance. Given the availability of Billesholm wool and reasonably effective ear muffs, there was no lack of a remedy. From that point, the defendants, by offering their employees nothing, were in breach of duty at common law.



73. Assessment of the degree of risk, and the possible consequences of running it, leads on to consideration of whether it was reasonably practicable to do anything about it. The Claimants say that the provision of protection and appropriate instruction was not expensive or difficult, and that the Defendants have not made out an evidential case that those steps, which would have enabled workers to avoid material risks to their hearing, were too onerous to expect them to take. I agree with that part of the Claimants' case. Provision of hearing protection is not without cost. Moreover, if hearing protection were to be offered, it was necessary to accompany the offer with appropriate information about hearing loss and training in the use of the protectors, as well as administering a continuing stock and appropriate choice of protectors. There is evidence that there was resistance amongst employees to the wearing of hearing protection, which could be overcome only with the passage of time, and appropriate instruction, and leading by example from supervisors and managers. The evidence about the actual cost of protectors at various times is that they were inexpensive, and Courtaulds, though arguing against the EEC 1982 proposals on economic grounds, were able to adopt a policy from 1984 of encouraging the use of protection above 84dB(A)lepd, and taking steps at least in the later 1980's to implement the policy. The evidence does not show that at any time the cost of implementing a policy of voluntary hearing protection at levels below 90dB(A) was such that a reasonable employer could use cost or difficulty as a valid reason for not having such a policy.

74. The Claimants therefore present their case as being entirely conventional in approach: Duty, which is the normal duty of reasonable care by an employer to an employee; breach of duty, based upon what the employers knew or ought to have known were real risks of damage to hearing among some of the workforce by exposure to the levels of noise generated in their factories, and what they knew or ought to have known about the means of preventing such damage; and damage, in the case of those who did suffer noise induced hearing loss because of such exposure, because had a system of hearing conservation been in place the individual Claimants would have made use of it and therefore not have suffered the damage. In the Claimants' analysis, therefore, a damage/risk criterion such as that in the 1972 Guidelines has no relevance to the discharge by an employer of his common law duty, which is a duty owed to people in the workforce who it may be expected will suffer significant hearing loss unless given the opportunity to protect themselves, and

whose position could have been foreseen by an employer acting with reasonable care.

75. The Courtaulds Defendants submit that the absence of measures to deal with these levels of noise, where authoritative guidance in the 1972 Guidelines had already identified 90dB(A) as requiring action cannot constitute a breach of the duty of care. The 1972 Guidance established a damage/risk criterion that it was reasonable for employers to follow during the 1970's and 1980's.

76. The Coats (Taymil) Defendants and Pretty Polly submit that the employer's duty is to take reasonable care for the employee's safety, and therefore not to take unreasonable risks, not to guarantee freedom from all risk. The general practice prevailing in the 1970's and 1980's, of recognising 90dB(A) as the highest acceptable noise limit was not "clearly bad" in the terms of Swanwick LJ's test, and employers were not required to do detailed research to find out what the residual risk was below that specified level. Harris v BRB (Residuary) Limited [2006] PIQR 10, CA is cited in support of the proposition that it took special or greater than average knowledge in an employer for him to be expected to protect his workers below that level. They also submit that the people injured by noise levels under 90dB(A) are susceptible beyond the average to the effects of noise, and the Defendants, having no knowledge of who those few members of the workforce are who are so susceptible, can proceed on the basis that the employees are of normal susceptibility.

77. Guy Warwick submit that the only standard throughout the relevant period was the 1972 Guidelines. They had specified a level of risk that should not be exceeded, and an employer would be justified in taking the view from reading the document that that advice was authoritative, and had taken into account the residual nature of the risk below 90db(A) when setting the maximum acceptable limit.

78. I have been referred to cases in which the 90dB(A) exposure level has come into consideration. In Taylor v Fazakerley Engineering Co (1989) 26<sup>th</sup> May, Rose J took 90dB(A) as the maximum permitted exposure under the 1972 Code of Practice, as the standard which had to be met by the Defendants, and because he was not satisfied that the noise exposure attained that level he dismissed the action. The period of exposure in that case started in 1959, but included a period as a crane driver in a noisy workshop from 1971 to 1985. Rose J said that the essential question in relation to s29 of the Factories Act and common law



negligence is the same:

The question is, did the Defendants, by reference to the standards which ought reasonably to have been adopted by them at the relevant time, expose the Plaintiff to noise which they ought reasonably to have anticipated would or might, by reason of its level and duration, damage his hearing?

79. The evidence of what was the appropriate standard did not in that case go outside the 1972 Code. The Defendants had remained totally ignorant of the Code and any other development in good practice, but the Judge found that had they sought advice they would have been referred to the level of 90dB(A)lepd that should not be exceeded.

80. In William Thomas Mervyn Howells v British Leyland PLC (1992) 31<sup>st</sup> July His Honour Judge Michael Evans QC in the Swansea County Court found that the Plaintiff had been exposed to at least 90dB(A) between 1955 and 1964, between 1964 and 1984 to 86dB(A). He found liability from 1963, holding that Noise and the Worker and the 1972 Guidelines required surveys to be carried out and advice and hearing protection being made available, and made a specific finding that the Defendants recognised in 1972 that they ought to warn employees of the possible danger of exposure to noise over 85dB(A).

81. In Henry Joseph Cropper v Ford Motor Company Limited (1992) 17<sup>th</sup> November, His Honour Judge Sean Duncan in the Liverpool County Court found the Defendants liable at common law for noise induced hearing loss caused in the late 1960's and 1970's by exposure at 87/88dB(A)leq. He referred to a number of the publications that are in evidence in this case. He heard evidence from Dr D E Hickish, who at the material time had been the Defendants' industrial hygiene specialist up to 1988, and also Mr Hughes, a consulting engineer for the Defendants. Dr Hickish had also served on the committee that produced the 1972 Code of Practice. On the basis of that evidence he found that the Defendants knew or ought to have known that about 10% of their employees might be at risk if exposed to levels above 85dB(A)leq and that they knew or ought to have known that there was no magic safe level at 90dB(A)leq. The knowledge of the Defendants was particularly informed by the advice that Dr Hickish had given. Judge Duncan found that a hearing conservation programme supported by education should have been put in place, of which he found the Plaintiff would have taken advantage and thereby achieved complete protection.

82. In Edwin John Loy Barrand v British Cellophane Limited (1995) 26<sup>th</sup> January, CA, the test adopted was that expressed by Rose J in Taylor



and based on the 90dB(A) standard in the 1972 Code of Practice. The Plaintiff failed in the Court of Appeal, because the trial Judge had not been able, on the evidence, to find exposure to 90dB(A)lepd.

83. Harris v BRB (Residuary) Limited [2005]ICR 1680, CA is a recent decision in which Judge Peter Langan QC was upheld in being prepared to find breach of duty by the Defendants for exposing the Claimant, an engine driver, to noise in locomotive cabs between the mid 1970's and 1999. The levels of noise to which the Claimant had been exposed were over 85dB(A) leq but did not attain 90dB(A)leq. The Defendants' case in the Court of Appeal included an argument that 90dB(A)leq was the "watershed" and that should be taken as the threshold of liability. The Defendants had been warned by one of their medical officers in June 1973 that if employees were exposed at 85dB(A) for 30 to 35 years it could be expected that 6 to 8% of them could be expected to have hearing impairment, an expression used by the medical officer in 1973 in the meaning that in this case has, I think, been ascribed to disability. Neuberger LJ described it as a "real, as opposed to minimal, risk of damage". There had been other discussions in British Rail over the years about the desirability of making protection available at that level.

84. The passages that deal with the duty by employers with such knowledge to take action are in paragraphs 36 to 42 of the Judgment of Neuberger LJ:

36 Mr Leighton Williams said that the defendant has "no quarrel with the conclusion since [it has] always accepted that exposure to 85 dB(A)leq gives rise to a foreseeable risk of injury in the broad sense that all excessive noise is potentially injurious to hearing". However, as he went on to say, the mere fact that a particular level of sound is potentially injurious does not of itself give rise to a duty of care. As he put it, the existence of a duty of care "depends not merely on foreseeability of injury but whether it is just and equitable to impose the duty".

37 I do not understand Mr Hillier to quarrel with that formulation, which appears to me to be not only sensible but correct as a matter of principle. However, once one bears in mind the accepted fact that the 85 dB(A)leq level of sound involves a real risk of damage to an employee's hearing, it seems to me plainly to follow that it must ultimately be a matter which is capable, on the particular facts of a particular case, of leading to the conclusion that the exposure of an employee to that level of sound can give rise to a duty of care.

38 That observation is not intended to call into question the applicability in the general run of cases of the 90 dB(A)leq threshold. While each case must



turn very much on its facts, not least because of the “just and equitable” test accepted, indeed advanced on behalf of the defendant, it is appropriate that there should be a generally applicable standard, albeit that that standard must yield on occasion to the particular facts of a particular case. The existence of a general standard enables employers and employees to know where they stand in most cases, and therefore reduces uncertainty, and the costs and pressures of litigation.

39 Apart from Judge MacDuff’s remarks, [The court had been referred to a book by His Honour Judge MacDuff QC, in which he said “the courts have held that 90dB(A)leq is the dividing line between risk and safety... the Plaintiff must prove that he was exposed to the equivalent of noise in excess of 90 A weighted decibels for 40 hours per week”] Mr Leighton Williams referred to a code of practice published in 1972 by the Industrial Health Advisory Committee’s Sub-Committee on Noise, and the Health and Safety Commission’s Consultative Document, Protection of Hearing at Work (July 1981), both of which referred to the desirability of not exposing employees to sound levels above 90 dB(A)leq, and the Noise at Work Regulations 1989 which, while they impose some duty on employers in relation to sound above 85 dB(A)leq, require stronger action to be taken at the 90 dB(A)leq level. To my mind, these papers reinforce Mr Leighton Williams’s point, at least until the 1989 Regulations came into force, that an employer would not normally be expected to be liable to an employee who was exposed to a level of sound lower than 90 dB(A)leq, but this evidence cannot go so far as to negative in all circumstances liability to employees whose health is impaired as a result of exposure to sound below that level.

85. Neuberger LJ then cited the passage of Swanwick J’s judgment in Stokes v Guest Keen and Nettlefold (Bolts and Nuts) limited [1968] 1 WLR 1776 at 1783, and continued:

41 It may well be that a good working approach is that the 90 dB(A)leq level gives rise to a presumption: if sound is above that level, the onus shifts to the employer to show why he should not in principle be held to be negligent, whereas if it is below that level, it is for the employee to show why a duty should be imposed at all. I would, however, not wish to be interpreted as laying down any rule or principle: at best, what I have in mind is a rule of thumb, but it should be emphasised that, in even putting it that way, I am proceeding very much on the basis of the evidence and the arguments developed before us.

42 To my mind, therefore, the point which has to be ultimately resolved, in relation to what the judge identified as the first issue, is whether or not in light of the evidence and arguments before him



the judge was entitled to conclude that, on the facts of this particular case, the threshold giving rise to actual, or at least potential, common law liability on the part of the defendant to Mr Harris was 85 dB(A)leq rather than the more usual 90 dB(A)leq. In order to answer this question, it is, of course, necessary to turn to the relevant evidence before the judge. In that connection there were various different sources of evidence.

86. There may be some difficulty in applying a “just and equitable” test in as well established an area of duty as that of the employer towards his employees, rather than in a case where the court is facing a novel situation in which the existence of a duty relationship at all is brought into question. Indeed, in the application of the duty of the employer to the facts of Harris the Court, in the passages above, took, I think, a conventional approach, namely that the Court should concentrate on the actual knowledge of risk at 85dB(A) and above that the employer had. If he had or can be taken to have had knowledge of a real risk of damaging the hearing of some employees, and the circumstances were such that he could reasonably have been expected to take steps to give the workforce protection, then there will be liability.

87. There is no doubt that research into the question of what risks to the hearing of employees exposure below 90dB(A)leq posed would have yielded the answer that 90dB(A) was not a natural cut off point, and that there were risks to susceptible individuals below that level. Indeed, the 1972 Guidelines themselves made that clear. From the early 1970’s, certainly by 1976 with the publication of BS5330 and of ISO1999 in the previous year, the information was available if researched to give an indication of the level of the risk. It was a level of risk that came by the end of the 1980’s to be seen as unacceptable if not accompanied by at least voluntary protection, though the 90dB(A) limit had remained, both in 1975 and in 1981, the proposed regulatory standard in England. In the end though I am not persuaded that employers in industry who conformed to the maximum acceptable level of exposure in the 1972 Guidelines were in breach of their duty of care to their employees who were exposed over 80dB(A)lepd. In rejecting the primary case for the Claimants I acknowledge that I do not see the issue as only one of foreseeability. It would in my judgment be futile to hide behind the 1972 Guidelines for that purpose, or behind the third edition of Noise and the Worker, when the documents themselves proclaim that the level proposed will not be

safe for all workers. But good practice as informed by official guidance has in my view to be taken into account as well. The guidance as to the maximum acceptable level was official and clear. It would in my view be setting too high a standard to say that it was incumbent on employers to ignore it, and to reach and act, even as early as the 1960's, on a view that the standard set was inadequate to discharge their duty to their employees. To put it in the context of Swanwick J's judgment, complying with 90dB(A)lepd as the highest acceptable level was, I think, meeting the standards of the reasonable and prudent employer during the 1970's and 1980's, certainly until the time when the terms of the 1986 directive became generally known in the consultative document of 1987. I accept that this means that employers were not bound in the discharge of their duty to ask the question "Who are those at risk in my factory, and how big is the risk". It is a question that none of them in this case asked. But the effect of the maximum acceptable level in the Guidelines means in my judgment, that they were not in breach of their duty for not asking it.

88. There is room, however, for "greater than average knowledge" as Swanwick J put it, to inform the steps that individual employers should have taken at an earlier time than the late 1980's. At first sight it is not attractive that those who have a safety department and medical officers and take the matter of noise seriously should be worse off than those who wallow in relative ignorance, but it is an inevitable consequence of a test that depends on what an individual employer understood. On that basis, I have found that by the beginning of 1983 management both at Courtaulds and at Pretty Polly had sufficient understanding of the risks to hearing below 90dB(A)lepd to require them to take action. Both in fact say that they did so. Plainly putting a conservation programme into action, accompanied by information and instruction is not to be done in an instant, as Mustill J recognised in the passage in Thompson that I have set out above. In the case of those two employers, because of the particular state of their knowledge, I would say that they were in breach of their duty to employees who suffered damage through exposure at 85dB(A)lepd and over, without having the opportunity of using hearing protection, from the beginning of 1985.

89. In reaching the above conclusions I should record that I reject the argument made by the Defendants that since the Defendants did not know in the case of any individual that he or she was exceptionally susceptible to damage from noise their duty to act was somehow reduced. That argument is met by the point that it is not a case of not knowing of susceptibility, so that protective measures need only be directed at the average. It is known that there are some people in a workforce who will

in fact be particularly susceptible. All that is unknown is who they are. Even at 90dB(A) the protective measures are directed at a minority susceptible population. That this is the right view is, I think, supported by a passage of the judgment of Hale LJ in Jeromson v Shell Tankers (UK) Limited [2001] ICR 1223 at 1235 C-E, CA.

### **Factories Act 1961 s29**

90. This section, in force in this form from 1<sup>st</sup> February 1960 until its repeal on 1<sup>st</sup> January 1996, provided:

There shall, so far as is reasonably practicable, be provided and maintained a safe means of access to every place at which any person has at any time to work, and every such place shall, so far as is reasonably practicable, be made and kept safe for any person working there

The Claimants in each case plead that the Defendants failed to keep her or his place of work safe, and that hearing loss has resulted, with a resulting breach of the section. The Defendants in each case plead that the place of work was not unsafe, but if it was unsafe seek to prove (because on this issue the burden is on them) that it was not reasonably practicable to make it safe. The pleaded position involves a number of issues.

91. The Claimants submit that:

- (i) As to the absolute primary duty to keep the place of work safe the authorities show that the word “safe” is not to be qualified by any question of foreseeability, or any other question
- (ii) Place does not simply mean the space within the factory, but encompasses circumstances arising from activities carried on there
- (iii) Keeping the place safe for the Claimant may involve the provision of safety equipment, in this case ear protection

The submission is therefore that if the Claimant’s hearing is in fact damaged by noise and there has been no adequate provision of protection, there is a breach of the duty in the section.

92. Point (ii) above, which is a point put in contention by the Courtaulds Defendants, I take to have been decided in the context of



noise. The cases cited by Courtauld, Evans v Sant [1975] 1 QB 626 and Homer v Sanwell Castings Limited [1995] PIQR P318 both recognise that the safety of a place of work depends on factors that go beyond the building. Lord Widgery CJ said in the former case:

In so far as there are activities carried on in the place which are constant regular and recurring I can well see that they may have their impact on the question of whether the place has been made safe

93. In Kellett v British Rail Engineering Limited (1984) 3<sup>rd</sup> May, Popplewell J the section was held to apply to general noise in a workshop. Baxter v Harland & Wolff [1990] IRLR 516 is high persuasive authority to the same effect. So in my judgment where the permanent operations in a factory involve the generation of noise, the level of noise is to be considered in deciding whether the place of work is safe. The decision of Steyn J in Yates v Rockwell Graphic Systems [1988] ICR 8 provides further support for this view.

94. The first of the three propositions above raises the absolute nature of the duty, and the meaning of “safe”. The Claimants found themselves on Larner v British Steel [1993] 4 AllER 102, CA. In that case the Claimant was injured by the collapse of a structure that was in fact unsafe, and where the duty under the section was considered on the basis that the circumstances that made the structure unsafe could not reasonably have been expected to be foreseen by the employer. It was argued by the Defendants that

To establish that the place of work is unsafe, it is incumbent on the Plaintiff to prove that the danger was reasonably foreseeable by the Defendants

Hirst LJ, rejected that submission and Gibson J gave a concurring judgment, in which he reviewed cases in England and Scotland in which reasonable foreseeability of the safety of the place of work was discussed as possibly qualifying what was on its face an absolute duty. The court did not follow the statement of Diplock LJ, obiter, in Taylor v Coalite Chemicals Limited (1967) 3 KIR where he said:

A working place is safe if there is nothing there which might be a reasonably foreseeable cause of injury to anyone working there, acting in a way in which a human being may reasonably be expected to act, in circumstances which may reasonably be expected to occur



95. Not cited in Larner was the earlier decision of the Court of Appeal in Allen v Avon Rubber Co Ltd [1986] ICR 695, CA. There the court found that the edge of a loading bay that was unfenced so that a fork lift truck was able to run over it and tip up made the factory in which it was situated unsafe for the purposes of section 29(1), reversing the trial judge on that issue. Stocker LJ with whom the other members of the court agreed expressly applied the test, derived from Lord Reid's formulation in John Summers v Frost [1955] AC 740 at 766, HL:

“A part of machinery is dangerous if it is a reasonably foreseeable cause of injury to anybody acting in a way in which a human being may reasonably be expected to act in circumstances which may be reasonably expected to occur”

For the purposes of this appeal and probably in many, if not all, other cases, this test seems to me to be as apt in respect of a place of work as it is to the safety of a machine

96. I do not regard Larner and Allen as necessarily in conflict. In Larner there was no dispute about whether the structure that fell was in fact unsafe. It plainly was. The Defendants' argument was to the effect that for the section to be breached it had to be shown that the employer could have foreseen that the structure was in the state it was in. Although the statements of principle in that case are framed generally, they should be considered as being framed in that way in the context of the issue that the Court had to decide. The decision, that the state of affairs does not have to be foreseeable in order for the place to be unsafe, is of a piece with other strict liability provisions, as pointed out in the Claimants' written argument: The fact that the Defendant does not know and could not reasonably be expected to know that a piece of equipment was not in efficient working order is no defence to an action for a breach. In Allen, by contrast to Larner the court was dealing with the question whether on the known facts the place of work was safe. The effect of the ruling in Larner was stated by Hale LJ in Dugmore v Swansea NHS Trust [2003] ICR 574 at 580 to be:

[In Larner] this court held that the claimant did not have to prove that the danger which had made his place of work unsafe was reasonably foreseeable”

97. The safety of a place of work must be an objective question. It is a question that will normally arise in practice when an individual has been injured, though it is independent of any incident occurring. A factory inspector in the 1980's might decide that a place of work was unsafe for the people working there and institute a prosecution. I do not accept the



proposition advanced by the Claimants in argument that:

“The Claimant’s place of work was not safe if she sustained an injury working there”

What is safe seems to me to be an objective question of fact. The Control of Substances Hazardous to Health Regulations 1994, cited by the Claimants with reference to Dugmore did not raise the question that arises when the question is asked “Is this place safe?”, because the primary strict duty under those regulations was simply to prevent exposure to a proscribed chemical. The discussion of “securely fenced” in section 14 of the Factories Act 1961 by Viscount Simonds in John Summers v Frost [1955] AC 740, HL, cited by Mr Kent QC for Guy Warwick, does fortify me in the view that the question of whether a place of work is safe is really a jury question, to be answered in the light of all the circumstances prevailing at the time including what might reasonably have been foreseen by an employer.

98. None of the cases that have been cited in which s29 has been applied to noise raise the question what is “safe”. In Kellett the Claimant was exposed constantly to noise over 90dB(A); Baxter was a shipyard case in which there were very high levels of noise. In Thompson Mustill J decided that there was no liability under section 29, but did not develop any reasons for that finding. In the county court case of Guest v Reinforcement Steel Services Limited & Anr (1995) 25<sup>th</sup> May, His Honour Judge Moore at Sheffield found that the workshop concerned was “excessively noisy, far beyond the levels at which precautions should have been taken”. From his discussion of section 29 in the light of Larner it appears that Judge Moore took the view that the section requires that the Claimant has to be made 100% safe, provided he is doing what is reasonably expected of him, and that the defence of reasonable practicability would not help, because the factory could be made safe by ear protectors. On that basis, the noise level, provided it in fact caused injury, would not matter. For reasons given above, I respectfully disagree.

99. Nonetheless, the question of what is safe within the meaning of the section in the context of noise does not seem to me to be entirely straightforward. Whether a place of work is safe cannot depend upon the actual state of knowledge of the individual employer: The same standard must, I think, apply to Guy Warwick as is applied to Courtaulds. Moreover, reference has only to be made to the 1972 Code of Practice to see that the 90dB(A) standard is not to be regarded as safe for absolutely everybody. If liability under section 29 arises on that basis,



then the effect of the section has been generally overlooked, because it would, so construed, have provided an easy route to liability where the Claimant had suffered damage but could not quite prove the 90dB(A) level, a position that many claimants have been in. The answer would seem to be that, as contemplated by Rose J in Taylor v Fazakerley, the standard of safety in the section is governed by the general standard which ought reasonably to have been adopted by employers at the relevant time. That would be not to expose employees to a noise level exceeding 90dB(A)lepd. If I am wrong about that, and the standard of what is safe has to be judged entirely objectively without reference to the standard that should reasonably have been adopted by employers, then it would follow that liability under section 29 would fall on an employer where an employee was exposed to noise levels at and above 85dB(A)lepd and had suffered damage in consequence. But for the reasons given above I do not find that section 29 added materially to the common law duty.

100. The question of hearing protection does not therefore arise in the context of the statutory duty. I agree with Mr Purchas QC for the Courtaulds Defendants that whether a place of work is safe, and therefore the liability of the employer under the section, does not depend upon whether a particular worker chooses to wear ear protectors. I do not agree that in deciding whether an employer is in breach of duty the provision or use of safety equipment is to be ignored. The hearing protection that could have been available in the shipyard in Baxter or in the railway workshop in Kellett was plainly regarded by the Judges in those cases as something which would bear on the question whether section 29 was breached. It may be that the better view is that if the noise levels in the factory are unsafe, the employer can successfully raise and prove the defence that he has done all that is reasonably practicable to make it safe by providing hearing protection and appropriate information and training. On the approach that I have decided upon, however, the relation of hearing protection to section 29 does not arise.

101. There are other areas of these cases where important issues of principle arise. It is generally undesirable to deal hypothetically with such issues if they do not have practical impact on the outcome of the case. However, even though mindful of that, I will deal with all the main issues that have been raised. If I am wrong about breach of common law or statutory duty, then it would be necessary to go further in any event. In addition to that, as I said at the outset, these cases are seven out of a much larger number of Nottinghamshire and Derbyshire textile cases that have

been issued and which await determination. So I will deal with the other issues that have arisen.

### **The diagnosis and quantification of Noise Induced Hearing Loss**

102. Whether noise induced hearing loss can be diagnosed on the balance of probabilities is in dispute in the case of each Claimant. When the evidence came in before the trial I was surprised and dismayed by this, as being a possible factual dispute distraction from the central issue of liability for loss caused by exposure below 90dB(A)lepd. Dismay may to some extent remain, because a layman treads into the area of diagnosis, even when it cannot be avoided, reluctantly. Surprise was wrong, because at levels of noise exposure that may be expected to cause very small amounts of hearing loss if any, diagnosis is likely to be more difficult and controversial than in cases of more substantial exposure.

103. The central tool in diagnosis is the audiogram. Audiograms are taken in steps of 5dB at each frequency. They are variable and not generally exactly repeatable. Where 2 audiograms taken at about the same time vary, the results where there is variation may reasonably be averaged if the difference is not more than 10dB. Up to 10dB is therefore an acceptable margin of error. Where the difference is greater, some explanation has to be sought from the history or the nature of the audiograms, and one preferred to the other, or the process may be repeated.

104. The effect of noise induced loss interacts over time with the effect of presbycusis. Noise induced loss increases faster in the early years of exposure, and then the rate of loss tails off. When the noise is stopped, the development of the noise induced loss also stops, though the damage suffered remains. Presbycusis develops slowly at first, and then from the middle years onwards accelerates. Up to the point where loss through age attains about 40dB the effects of noise induced loss and presbycusis are broadly additive in their contribution to permanent threshold shift. In later years the effects of noise induced loss, especially small amounts of it, can be subsumed by advancing presbycusis. ISO1999 provides a formula for establishing the way in which noise induced loss and presbycusis should be treated as interacting. It is not normally possible, and is not possible in any of these cases, to know what a person's hearing thresholds were before any period of noise exposure. Armed with such information that enabled some tracing of the course of noise exposure and



age, the task of diagnosis would be much easier.

105. In addition to aging, many people suffer hearing loss for other reasons which may or may not be explicable. There may be middle ear disease, such as otitis media, or sensorineural loss caused by other disease, such as Meniere's disease. Certain drugs are ototoxic; smoking and other lifestyle habits may lead to hearing loss. In addition to causes that may be identified, many people have a degree of hearing loss for which the explanation cannot be found. Dr Yeoh said in evidence that when all the other explanations had been accounted for about 50% to 70% of cases remain with some unexplained, or idiopathic, hearing loss. Often, therefore, the doctor diagnosing hearing loss is not dealing with 2 possible elements of loss, age and noise, but also a third, the cause of which may not be identifiable. The presence of such a third cause may readily be seen in asymmetry in the audiograms between one ear and the other, because in general presbycusis and noise induced loss affect the ears more or less equally, and so result in broadly symmetrical audiograms. Although a history of adequate noise exposure is necessary for the diagnosis of noise induced loss such exposure, in the range that these cases concern, does not prove the cause of the loss. The greater the noise exposure, the more it can be used as a tool that may help diagnosis.

106. The doctors who have given evidence in this case about diagnosis and quantification of noise induced loss are all very experienced in their field. There are considerable differences of approach in both areas which have spilled over into defences of and attacks on credibility in the final submissions. In the end that is not something that helps to resolve the issues. Mr Andrew McCombe is a consultant otolaryngologist at Frimley Park Hospital in Surrey. He is a distinguished clinician and teacher, and has a considerable number of publications to his name. In the area with which this case is concerned his interest in noise induced hearing loss is reflected in papers about hearing loss in motorcyclists, and in his chairmanship of a working party in 1999 on the grading of tinnitus severity. Mr McCombe gave evidence for the Claimants in all but the case of Mrs Hooley. Dr Kaukab Rajput is a consultant audiological physician at Great Ormond Street hospital. She has specialised in audiological medicine, especially but not wholly with children, since 1992. She gave evidence for the Claimant in the case of Mrs Hooley.

107. Dr Lam Hoe Yeoh is a consultant audio-vestibular physician at St Helier hospital, and an honorary senior lecturer at St George's medical school. He gave evidence for the Defendants in the Courtaulds cases, Julie Baxter and Tony Parkes. Mr Philip Jones is a consultant surgeon in



the Department of Otolaryngology at the South Manchester Hospitals NHS Trust. He is an honorary associate lecturer in clinical otolaryngology in the University of Manchester. He has an interest in noise induced hearing loss, and the consideration of it in a forensic context. He told me he has written a chapter on it as a contribution to an unpublished book. He gave evidence for the Defendants in the Coats and Pretty Polly cases. Mr A J Parker has since 1992 been a consultant otolaryngologist at the Royal Hallamshire Hospital, Sheffield and is a senior lecturer in the University of Sheffield. He gave evidence for the Defendants in the case of Joan Hooley, but had also completed reports for the Defendants in some of the other cases.

108. Mr Jones cited the statement of principal characteristics of noise induced hearing loss made by the American Occupational Medicine Association, which would not, I think, be dissented from in general by the other experts:

1. It is always sensorineural, affecting the hair cells in the inner ear.
2. It is almost always bilateral. Audiometric patterns are usually similar bilaterally.
3. It almost never produces a profound hearing loss. Usually, low-frequency limits are about 40 dB and high-frequency limits about 75 dB.
4. Once the exposure to noise is discontinued, there is no substantial further progression of hearing loss as a result of the noise exposure.
5. Previous noise-induced hearing loss does not make the ear more sensitive to future noise exposure. As the hearing threshold increases, the rate of loss decreases.
6. The earliest damage to the inner ears reflects a loss at 3000, 4000, and 6000 Hz. There is always far more loss at 3000, 4000, and 6000 Hz than at 500, 1000, and 2000 Hz. The greatest loss usually occurs at 4000 Hz. The higher and lower frequencies take longer to be affected than the 3000-6000 Hz range.
7. Given stable exposure conditions, losses at 3000, 4000, and 6000 Hz will usually reach a maximal level in about 10-15 years.
8. Continuous noise exposure over the years is more damaging than interrupted exposure to noise, which permits the ear to have a rest period.

In 2002 the American College of Occupational and Environmental Medicine proposed some revisions to these criteria. The most material addition to the list involves the judgment of the clinician: He should keep in mind that the risk of noise induced hearing loss is considered to increase significantly with chronic exposures above 85dB(A)lepd.

109. In England Coles, Lutman and Buffin published their paper, already referred to, in 2000. The rules there proposed are, of course, only guidelines. Mr McCombe explained in evidence their origin in requests by non-specialists for guidance in the diagnosis of noise induced loss. It was plain in this case that none of the consultants giving evidence, all experienced consultants, applied the guidelines in their practice in a regular or systematic way. The guidelines send the clinician down



one of two routes of requirements. The first is R1, R2a and R3a:

R1: High frequency sensorineural impairment, at 3, 4 or 6khz at least 10dB greater than at 1 or 2 khz.

R2a: Noise exposure such that at least 50% of individuals exposed to the amount and duration of noise would be likely to suffer a measurable degree of hearing loss. That is such an exposure as to accumulate a dose of 100NIL (in the calculation of which exposure below 85dB(A) is to be ignored)

R3a: Audiometric configuration, in the form of a downward notch in the 3-6khz range. The notch should be large enough to be identified with a reasonable degree of confidence, that is where the hearing threshold level at 3, 4 or 6 khz is at least 10db greater than at 1 or 2khz and at 6 or 8 khz. In older people, where the effect of aging has already invaded the higher frequencies, or where there are other possible causes of high frequency loss, a bulge rather than a notch, as prescribed by the guidelines may be the feature looked for.

The second route starts with R1, but allows at R2b for lower noise exposure, a NIL of 90. If R2b is followed, so must be R3b: In that case, there must be a more pronounced notch of bulge than R3a; a notch has to at least 20dB to qualify, rather than 10.

110. Thereafter both routes come together in a number of modifying factors that require the judgment of the clinician. They include compatibility of the history and symptoms with hearing loss cause by noise, and complicating factors such as asymmetry, conductive hearing loss, and other causes of hearing loss. They require, in application of the "Robinson criteria" some comparison of the actual hearing loss with the hearing loss that might have been expected from age alone in a person of the same age and sex. Overall these criteria are demanding. Most of the present claimants would not surmount them. In particular the second route requires more pronounced audiographic features just in those cases where such features are likely to be less rather than more pronounced. A calculation of NIL ignoring exposure under 85dB(A) would itself be impassable for most of these cases.

111. Another feature of the guidelines may be useful not only in initial diagnosis, but in deciding what component of mixed hearing loss is noise induced. The starting assumption may be that the claimant is at the median point of the distribution of age associated hearing loss. It is possible to amend that assumption by taking two frequencies not normally affected by noise and see how they compare to the predicted hearing threshold levels for the sex and age of the claimant. Those frequencies will usually be 1khz and 8khz. The guidelines contain the relevant tables. It is possible then to reach some view about whether presbycusis is affecting the



claimant more, or less, severely than the median would predict, and so get a better idea how the actual hearing loss compares to what might be expected from age alone.

112. Mr McCombe in his introductory general report identified the need often to consider 3 possible components of hearing loss: Age, noise, and from other causes, or idiopathic if unexplained.

An essential part of the assessment is to try and remove as many variables from the picture as possible. Hopefully this leaves a situation where one is only considering the effects of age and any reported noise exposure.

In evidence in the individual cases he acknowledged that diagnosis in the present cases is a grey area but adhered to the view that there is a risk to hearing between 80 and 90dB(A), increasing, so that the nearer 90 you get the more confident you can be. As his evidence developed in individual cases he was unable to support diagnosis of hearing loss if the exposure had been as low as 80 or 81dB(A). But with low noise levels he said you don't expect to see typical findings on the audiogram. In cases of little hearing loss and low noise levels it is better to take core principles rather than rely on guidelines chapter and verse. To rely on rules means that on the edge people may wrongly not be diagnosed. It is necessary to look at the whole picture in reaching a diagnosis, including the history and description of symptoms given by the patient. As appears from some of the individual cases Mr McCombe's approach to diagnosis may put great weight on the history alone, so that even if the audiogram does not have classical signs of noise induced loss either to a significant degree or at all, he is prepared to say that a small part of the Claimant's loss will be due to noise where the exposure has exceeded 80dB(A) lepd, or at least where it has exceeded that level by several dB.

113. Dr Yeoh said that from a practical point of view noise induced loss is unmeasurable (he meant I think, undetectable, or, at least, unquantifiable) in any person whose exposure has been below 85dB(A). That is because very small threshold shifts at any level can't be detected by audiogram, so that there may be a statistical chance of loss of a very few decibels but that loss can't be identified in the individual.

114. Mr Jones presented as uncompromising in his scepticism of any possible diagnosis of noise induced loss in 4 out of the 5 cases on which he reported. He regarded the prospect of hearing loss below 85dB(A) as statistical only, so much so that if there is a notch in the audiogram at that level of exposure it is more probably than not not due to noise, because such notches, especially at 6kHz are found in people who have not been exposed to noise. The statistics of expected loss at such exposure he said were extrapolations from cases where the exposure had been at



higher levels, and so were unsupported by direct evidence. Where there is a cause of threshold shift present other than aging, whether idiopathic or not, he favoured the application of the rule of William of Occam known as Occam's razor to exclude noise induced loss on the balance of probabilities: *Essentia fit per plura, quod fieri potest per pauciora*. In his analysis of some of the audiograms he took the relevant threshold at each frequency by choosing the best from a number of different audiograms, something described indignantly by Mr McCombe as disingenuous at best and wrong at worst. His invocation of the Black Book for approval on that did not in fact help, since there taking the best threshold from several audiograms is only recommended where the difference is not more than 5db.

115. Mr Jones regarded self assessment by a patient of the effect their hearing loss as highly undesirable. Self perception, he said, especially with minor losses is not an accurate way of assessing hearing. He was criticised by the Claimants for using as an indicator of the hearing loss that might be expected in the general population the table in a paper by Lutman and Spencer. That criticism did not in fact hold water. The Lutman and Spencer figures for non-exposed female populations have not been discredited. They come out with slightly worse expectations than Davis and also other tables, but not to a significant degree. Mr Jones was undoubtedly dogmatic (for example as to the non effect of high frequency hearing loss on disability) and has a disconcerting manner of giving evidence, citing authority for propositions he is advancing at a rapid rate, thereby illustrating his wide knowledge of the material without imparting the essence of it to the listener. That is something that has led him into trouble in the witness box before. The Claimants produced, with a view to undermining Mr Jones' credibility, a case from 1992 tried by His Honour Judge Lachs in Liverpool, Hunter v Robinson Willey, in which the Judge seems to have formed an adverse view of Mr Jones. The fact, though, is that subsequent understanding has tended to show that on the main issue there being decided, the utility of the Lutman and Spencer tables, Mr Jones was right and Judge Lachs wrong. It is a warning that the manner of a witness may obscure the quality of what he says. Mr Jones presented as sceptical and in some areas dogmatic, but I nonetheless valued the opportunity to consider his contribution to the evidence in the case, as I have that of all the doctors.

116. By the end of the case Professor Lutman had been drawn into giving evidence about diagnosis at noise levels below 85dB(A), not surprisingly in view of what he had written both in the 2000 guidelines and elsewhere. He said of the case where the claimant has never been exposed over 85dB(A)

It does make the diagnosis more difficult. Most reliance is usually placed on the shape of the audiogram. In the absence of any other information, like serial audiograms for example. And so normally medical examiners would require a clearer pattern of audiometric shape which was



consistent with noise induced hearing loss when the supposed noise exposure was low, for example at 85

117. Mr Parker gave oral evidence only in one of the cases, though there are reports from him on others. He described the system he adopts for diagnosis of noise induced loss:

- (i) A credible history of noise exposure. He would normally expect to see a NIL approaching 100.
- (ii) Hearing loss reasonably in excess of expected presbycusis. He usually uses the NPL tables for this, at 50<sup>th</sup> percentile values, since most people's hearing will cluster around the median.
- (iii) Patients under 55 should show a notched or dipped audiogram between 3 and 6 khz, typically at 4khz in excess of 10dB deep, bilateral, and if there is more than one audiogram, replicated.
- (iv) Then try to separate different causes of deafness that may be present. With very significant hearing loss from other causes it may not be possible to tell if noise induced loss is present.

118. The conclusion that I reach has effect for the individual cases involved here. I understand Mr McCombe's wish to avoid people who do have a degree of noise induced hearing loss, even if it is very small, not having it diagnosed. Moreover, an approach of looking for reasons not to diagnose noise induced loss may itself lead to error. On the other hand, an approach that is likely to lead to people without such hearing loss being diagnosed with it leads to injustice in the other direction. On the evidence I have heard, it seems to me that the criteria for diagnosis of noise induced hearing loss on the balance of probability have to be robust, and cannot depend upon opinion without adequate reasons, or on a history of noise exposure alone, certainly not at levels from which little if any noise induced loss may be expected to result in any event. The general approach set out by Mr Parker seems to me probably equates to the approach of most doctors. There should be a history of noise exposure such that it may give rise to identifiable noise damage, and a clear picture on the audiogram that exhibits a notch or dip typically at about 4khz at least 10 dB deep, and bilateral unless some other condition in one of the ears has obscured the picture, even though a certain degree of asymmetry may be acceptable. The history of noise exposure considered by the doctor will usually



have to result in a provisional diagnosis, because the noise levels described by the patient may not be borne out when the engineering evidence is in. I do not accept that a history of exposure between 80 and 85dB(A) absolutely prevents a finding of noise induced loss because such loss in some degree is possible in the most sensitive percentiles of the population, but the more the exposure falls below 85 the less likely that a diagnosis can be made, and in the low 80's diagnosis will not be likely without the clearest evidence; the more it rises above 85 the greater the possibility of such a finding. A history of noise exposure in these areas alone without clear confirmation from the audiogram in my judgment is not enough. I do not accept Mr McCombe's view that because at low levels of exposure one may not get clear signs on the audiogram such signs can be dispensed with, because the result is that a diagnosis is then made substantially upon a history of exposure which is unlikely to cause identifiable hearing loss, and possibly an account from the claimant of a degree of disability. That would inevitably lead to the mistaken diagnosis of noise induced loss in many people. The absence of hearing impairment somewhere in the range 3-6khz to a degree greater than the sort of loss generally to be expected as a result of aging goes in the scales against a diagnosis of noise induced loss, particularly if that is done after adjustment from the median to account for the apparent characteristics of the claimant, but is only one feature.

119. Although a Judge treads diffidently in the area of diagnostic criteria, where there are different approaches between the doctors it cannot be avoided. I do not think that the view expressed above about the need for robustness is a view not open to me on the evidence, and in my judgment it is the right one, particularly in view of the conclusion I have come to below about the degree of impairment required for compensation. Any less firm approach will inevitably result in wrong diagnosis of noise induced loss. I should say that I have read, because a reference to it was made in the Courtaulds final submissions Professor Linda Luxon's chapter entitled "The Clinical Diagnosis of Noise Induced Hearing Loss" in "Biological Effects of Noise". Apart from illustrating the complexities in the area of diagnosis of noise induced hearing loss, it does not raise issues that have not been otherwise referred to in the case.

### **Quantification of hearing disability**

120. The quantification of loss at low levels of impairment as given on the audiogram is also in issue in these cases. It is not separable from diagnosis, because hearing loss at one or more frequencies in excess of what might be expected may be an indicator in diagnosis. Sometimes a "low fence" has been applied to disability,



so that if the hearing impairment does not reach a certain level, as measured on the audiogram, it is assumed that the impairment has not reached such a level as to cause significant disability. Low fences have been imposed for practical purposes, however, related, for example, to schemes of compensation: Thus the DSS fence was very high at 50dB before statutory compensation became payable, but was accepted as equating to a 20% disability. Other low fences have been taken at an average loss of 30dB, or 27dB. In this case Mr Parker suggested 25dB; Mr McCombe 20dB, though some disability in some individuals occurred at lower levels. Mr Jones favoured a low fence, though accepted that at the extreme edge of the normal population some disability might show itself in the area 15-19dB.

121. The average loss at the time that forensic investigation is taking place, however, may not be a complete measure of the effect of noise induced loss. If someone has suffered a small degree of loss due to noise it may have at a relatively young age little if any effect. But as presbycusis progressively develops its effect can be added to the previously ineffective noise induced loss, to produce disability at an earlier age and to a greater degree than would have been caused by age alone. After such a period of increased disability, there may come a time with substantial amount of hearing loss due to age where the element of noise induced loss is overwhelmed. So the snapshot of the position at the time of investigation does not itself tell the whole story, and is a reason not to apply a low fence mechanistically in a way that prevents any compensation. One of the classifications of disability is the Coles and Worgan classification, devised originally, Mr Jones told me, for the purpose of assessing disability for compensation in a military context. It is used by Mr Jones. It was provided in this case set alongside 2 other classifications from the past. In general there is concurrence between these systems:



Descriptive scales of hearing handicap.

HTL in dB (av. 0.5, 1, 2 kHz)	AA00 (1964)	Tempest (1977)	Coles and Worgan (1977)	
0				0
5	A - not significant	0 - no handicap (1)	0 - not significant (0%) (3) No significant handicap	
10	No significant difficulty with faint speech	or	or	
15		I - slight handicap in noise (2)	I - just significant (5%) (4) Only slight difficulty with speech in noise	
20			or	
25			II - very slight (10%) (5) Slight difficulty with faint speech only; worse in noise	30
30	B - slight difficulty only with faint speech	II - slight handicap for faint speech	III - slight (20%) As II, but 'moderate difficulty'	
35				40
40	C - mild	III - mild handicap, affects normal speech	IV - mild (35%) Frequent difficulty with normal speech, sometimes asks 'speak up', great difficulty in noise	50
45	Frequent difficulty with normal speech		V - moderate (50%) As IV, but often asks 'speak up', very great difficulty in noise.	60
50			VI - marked (65%) Difficulty in communication, not able to understand loud speech always, and never in noise	70
55	D - marked frequent difficulty with loud speech	IV - marked handicap, affects loud speech	VII - fairly severe (80%) Only understands shouted or amplified speech moderately well	80
60			VIII - very severe (90%) Shouted or amplified speech only poorly understood	90
65				
70	E - severe	V - severe handicap, affects amplified speech	IX - extremely severe (95%) Minimal speech intelligibility of well amplified speech	100
75	Can understand only shouted or amplified speech		X - total (100%) Virtually totally deaf with respect to understanding speech	
80				
85				
90	F - extreme	VI - total deafness		
95	Usually cannot understand even amplified speech			
100				
105				

- (1) Hearing loss not greater than 25 dB at 4 and 6 kHz.
- (2) Hearing loss greater than 25 dB at 4 or 6 kHz.
- (3) Hearing loss not greater than 25 dB at 3 and 4 kHz after binaural adjustment.
- (4) Hearing loss at 3 or 4 kHz between 25 and 55 dB (binaurally adjusted).
- (5) Hearing loss at 3 or 4 kHz greater than 55 dB (binaurally adjusted).



122. The Black Book in 1992 adopted a different system of estimating the effect of noise induced hearing loss, and separating it from the loss caused by age. It is quite widely used for forensic purposes. It was developed by a working party of five experts, including Professor Robinson and Professor Lutman. Professor Hinchcliffe did not sign it and disassociated himself from it at the last minute, for reasons that are unclear. Mr Jones is and has always been critical of it. It uses ISO7029, based on a highly screened population to give expected hearing loss through age, and so exaggerates noise induced loss; the scale of disability is, he says, properly regarded as a scale of impairment. It is based on self assessment by a surveyed population. The absence of a low fence means that the effect of hearing impairment is exaggerated at the bottom end. Professor Lutman accepted that there was valid criticism of the use of ISO7029. He produced during the course of the case the relevant tables from the Black Book re-worked according to what he says is an appropriate database, from Davis: Hearing in Adults. The scale of disability is based on research done for the purpose of the Black Book, and was first published separately in 1992 by Lutman and Robinson in 1992. There is no low fence, and a surprising feature, at least to a layman, is that disability starts at a threshold of nearly -10dB; at 0dB, looking at the graph published in the book and set out below, there seems to be something like a 3% disability, and at 10dB something like 6%. If, as in Professor Lutman's re-worked tables the median age associated threshold level at age 28 for both men and women is 10dB, such people may be expected to have a 6% or so hearing disability. The percentage disability as a function of age fitted to the data from the MRC study of hearing for 28 year olds is, however, given in Professor Lutman's revised Table A3 as 3%. Since in the sort of noise induced hearing loss with which this case is concerned the loss according to the Black Book is measured by disability of a very low percentage, the use of such percentages of disability for calculation of compensation causes me anxiety. The result of applying the Black Book formula may give a spurious impression of mathematical certainty in a very uncertain area, where statistics are being applied to individual cases of at most modest hearing loss. The scale used in the Black Book for converting impairment to percentage disability is set out below:



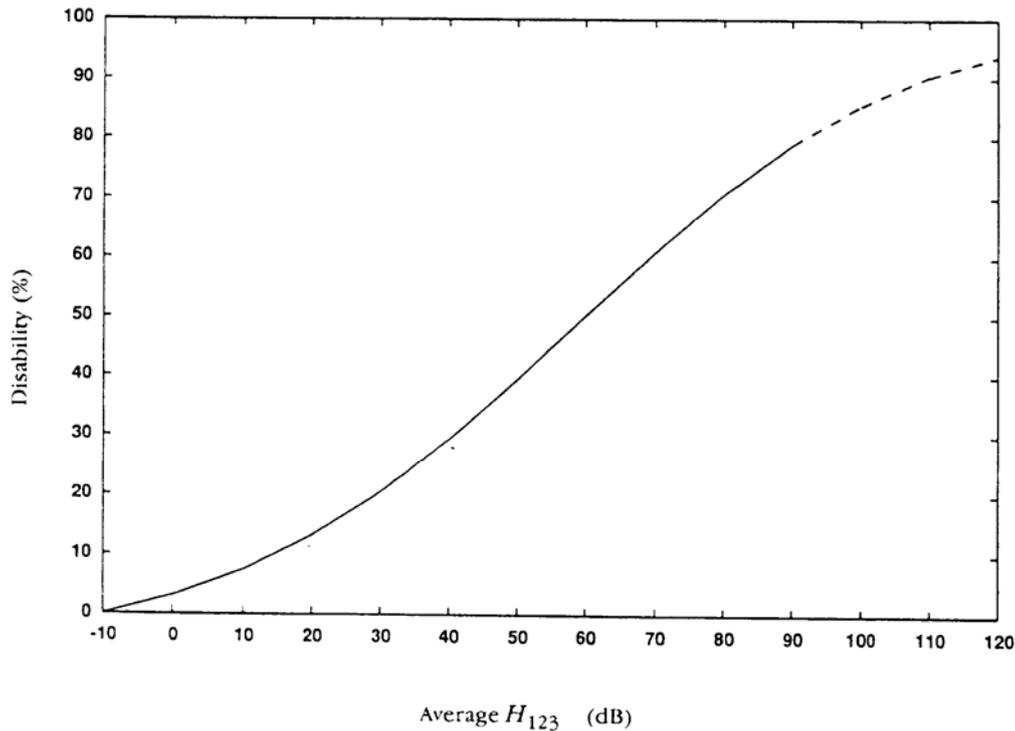


Figure 8.1 Proposed scale relation of hearing disability to hearing impairment based on Lutman and Robinson (1992). Disability is expressed as a percentage. Impairment is expressed as the average of the hearing threshold levels at 1, 2 and 3 kHz measured in the better ear. The function is shown broken for impairments above 90 dB where there was a paucity of data.

123. On the Claimants' side, Professor Lutman dealt with the effect of damage to the ear by noise both in his generic report and, in the end, in evidence. In his report he said:

The initial loss of hair cells [within the cochlea] does not cause any reduction of hearing sensitivity, since there appears to be some redundancy in the system, sometimes referred to as "cochlea reserve". Thus there will be some noise induced hearing damage without measurable functional consequences. For noise exposure, the initial damage occurs to the hair cells without a measurable hearing loss. This damage is permanent and irreversible.

While a minor noise induced hearing loss on its own may have a negligible effect on speech intelligibility, when it is combined with age associated hearing loss the effect on disability may be quite substantial. For example, a noise induced hearing loss of 10dB in a young man with otherwise completely normal hearing may be of little consequence, when that man reaches the age of 60 years the extra 10dB of hearing loss will cause greater difficulty understanding speech.

In a letter Professor Lutman said later with reference to small amounts of noise induced hearing loss suggested in an audiogram that in people with minor hearing loss a raised threshold on the audiogram, typically at 4kHz, may indicate incipient loss at lower frequencies. Such a person has probably sustained hidden damage that will become evident in later years with advancing age associated hearing loss. In a



letter in response Dr Yeoh challenged the concept that hearing loss which is hidden in audiometric terms would later cause disability. Professor Lutman responded that his proposal for a scheme in which noise induced loss shown on the audiogram evidences hidden hearing loss at other frequencies that will become effective in causing disability in time is based on research that will be published in due course. Returning to the witness box towards the end of the case, Professor Lutman dealt with this area.:

What I was trying to convey is really there is a cascade of events. When a person has been exposed to noise different frequency regions will be pushed a little bit along that cascade of events by different amounts. So, when a person gets older, even though they may not be exposed to noise any more, this will continue to push this cascade of events further in the direction of impairment. So, there may be hair cell loss at lower frequencies which have not yet shown up in the audiogram which will be aggravated by the effects of age and then will show up later in life. Whereas if a person had not been exposed to noise, they would have ended up in a better position than that

124. Mr McCombe took up the same theme in refuting the suggestion by Mr Jones that impairment at 6khz might never have any effect on hearing so as to contribute to disability. He said, noise damages the whole ear.

125. This debate, started in correspondence and carried into the witness box at the end of the case by Professor Lutman, did not arise in a satisfactory way. If there is work to be published in the future, then I think any effect on awards of damages in hearing loss cases must await such publication and peer review. I do not accept, however, the argument for the Defendants based on de minimis. The smallness of a level of risk may be relevant in assessing how an employer should act in particular circumstances. It does not prevent compensation for hearing loss being appropriate where the impairment has led or will lead to some level of disability, even if only minor. For small amounts of noise damage that will lead to awards at the bottom end of the damages scale, the key decision in my judgment is whether a real degree of noise induced impairment can be confidently diagnosed on the balance of probability. I have said in that connection where there are low noise exposures in particular that the approach to that decision, in order to pass the standard of proof, must be robust. If it is sufficiently robust, then there will be a characteristic degree of impairment, typically at 4khz, but certainly in the range 3-6khz. There is likely also to be a threshold at least at one frequency raised above what would be expected by age alone. I accept that such impairment will, either at the time of examination, or later with the development of presbycusis, result in disability that develops earlier and is more severe at the time of life it develops than would otherwise be the case. The reference to small degrees of noise induced loss being overwhelmed is misleading. In time, depending upon the degree to which presbycusis develops, it may be. But the evidence of Professor Lutman that noise induced loss and age

related loss are broadly additive at least up to about a threshold of 40dB is borne out by ISO1999, and as explained by Professor Robinson in his 1987 paper. I do not accept that impairment at 4khz (or even at 6khz in those cases where the degree of impairment at that frequency will support a diagnosis in a low noise case) is irrelevant because it will not have any practical effect on the Claimant. As to 4khz in particular I found the evidence of Dr Rajput convincing. As a result of extensive clinical experience she attaches great importance to 4khz, so much so that she used 4khz to arrive at an average in the one case she was concerned with. She was supported in that approach by Mr McCombe. Both he and Dr Yeoh included 6khz as being in the range of frequencies important to speech.

126. The fact that the effect, or full effect, of hearing loss may only be felt later is, it seems to me a proper argument against applying a low fence to the snapshot picture of impairment yielded by one audiogram, or a series of audiograms taken over a short period in a person's life. On the other hand, applying the Black Book approach to the quantification of noise induced loss where the percentage of disability as worked out in accordance with it is low, under 10% or so seems to me to lack usefulness. Where the losses are greater the Black Book approach is no doubt useful in helping to identify the proportion of the disability that may be referable to age. At the bottom end it seems to me that the crucial decision is one of diagnosis, which will not be possible without the application of a robust approach in which real impairment is evidenced.

127. In terms of the sort of award that will follow, where the threshold of diagnosis is passed, the minimum award today is likely to be in the region of £3000 without tinnitus, and if associated with slight tinnitus which is at least a nuisance to the Claimant at least £2000 more. For the case to be able to move into higher awards, the subjective assessment of disability and its social effect may be helped by a cross check to the percentage disability towards which the Black Book points. I do not accept the suggestion, if it is made, that the quantification of damage should be based on the whole of the hearing loss, including age. The approach of the Black Book is right, namely to try and equip the court with information about what proportion of the overall disability is caused by noise. What would have been the Claimant's position but for the tort has always to be considered. Those cases where it may appear that the overall hearing impairment in middle aged people has been stated by the court without overt apportionment are often cases, it seems to me, where the important element of damage was tinnitus.

## **Tinnitus**

128. Noise induced hearing loss is often though not always associated with tinnitus. Tinnitus, as Mr McCombe said in evidence, is a "vast subject". Many people have a



degree of tinnitus. There is no way to measure it. The clinician is dependent on the description of the symptoms and on the patient's description of the effect they have on the patient's wellbeing. The severity of the effect of a tinnitus signal on the patient depends in considerable part on the patient's psychological reaction to it. At one end of the scale consciousness of the tinnitus may be sporadic or something that a person adjusts to and puts up without any real difficulty; at the other there can be serious erosion of quality of life. Many people do not require treatment, but there are various methods of diminishing the effects of tinnitus, including masking the noise by mechanical means, and tinnitus therapy. At issue in these cases is when it is right to associate tinnitus with noise induced hearing loss, so as to say that when, if there is noise induced loss, the tinnitus is also caused by noise.

129. In this area there is a conflict between in particular Mr McCombe and Mr Jones, though Dr Yeoh also was prepared to deal with causation on the same basis as Mr McCombe. Mr McCombe's evidence is that tinnitus tends to be strongly associated with high tone hearing loss. That has led to the assumption, which he says is commonly made, that the cause of tinnitus can be held to be the same as the cause of high tone hearing loss:

This rationale comes from the strong association between a high tone hearing loss and the presence of tinnitus. Therefore in any given individual, whatever caused the hearing loss is likely to have caused the tinnitus by virtue of causing the damage that allowed the tinnitus to initiate.

On this basis one would therefore apportion the cause in the same way as apportioning the hearing loss.

That approach might yield to particular evidence, such as a temporal association between an event, such as a blow on the head, and the onset of symptoms. Dr Yeoh adopted the same approach:

In chronic noise exposure where hearing loss is slower in developing, tinnitus may arise as noise exposure occurs, but this is not always the case. In many cases the tinnitus does not develop until the subject is older. The aging process would cause additional cochlear damage and it is often recognised by the clinicians that, though tinnitus may not have arisen during the time of noise exposure, such exposure would have caused some cochlear damage which would contribute towards total hearing loss, and in that manner contribute towards the development of tinnitus

130. In a report commenting on Mr McCombe's evidence Mr Jones said:

...I would agree that tinnitus is associated with hearing loss and it would be reasonable to ascribe the tinnitus so far as it is associated with hearing loss, to the causes of the hearing loss



though he qualified that by the observation that since the severity of tinnitus is related to the individual's psychological response to it, the allocation of the hearing loss should take into account whatever has caused the psychological distress. In the individual cases, however, Mr Jones used the frequency at which the tinnitus matched as a tool to exclude tinnitus from being caused by noise induced high frequency loss. It is possible in some cases to try to match the frequency at which tinnitus is perceived, though Dr Gooder in written reports and Mr McCombe in evidence said that it is not a reliable process. Mr Jones said that it is well recorded in the literature that noise induced tinnitus matches in frequency to 2khz and above, so that tinnitus that is matched at lower frequencies, for example 500hz or 1khz cannot be taken to be caused by noise. Mr Jones further said that since most tinnitus is not associated with noise induced hearing loss, and it is often found in the absence of any hearing loss at all, it would be wrong to say that just because noise induced loss is present the noise must have caused or contributed to the tinnitus. He gave some references to the literature in his reports. Mr McCombe said that the only definite statistical association with tinnitus was high tone hearing loss. He did not think that that meant, and his experience did not suggest, that tinnitus that matched at a low tone, if that could be done, was not causally associated with high tone hearing loss, and so it does not matter if the matching is low or high. I was not asked to resolve this question by reference to the literature referred to. In another case the evidence might be more complete. As it is, on balance, I accept the evidence of Mr McCombe that finds support in Dr Yeoh's approach: That a conventional view is that where there is high tone hearing loss with tinnitus, it is appropriate to assume that the causes of the hearing loss are the causes of the tinnitus.

131. What is agreed is that where there is tinnitus, but it is not possible to diagnose noise induced hearing loss, it is not possible to say that the tinnitus is caused by noise, even if there is a history of noise exposure.

### **Apportionment of damage between different periods of exposure**

132. One of the issues in the case relates to apportionment of liability for disability. The Claimants' primary case on causation includes an analogy with the vibration whitefinger cases. Whitefinger is also dose based. Exposure over time to dangerous levels of vibration will initially make the employee more susceptible to symptoms, but only when his reservoir of toleration to vibration is full will he suffer symptoms. Thus he suffers no actual damage by reason of simply getting closer to the point where symptoms will arise: Smith v Wright & Beyer [2001] EWCA Civ 1069; Brookes v Sth Yorks PTE [2005] EWCA Civ 452. The



position with deafness, however, is different. Any significant permanent threshold shift caused by noise will either immediately or in the future contribute to disability. So it is necessary to apportion damage between two separate periods each of which have contributed to the loss. This was a problem confronted by Mustill J in Thompson, where the NPL tables were being used by the Defendants to demonstrate that the effects of noise were greatest in the earlier part of a period of noise exposure. The data with which Mustill J was confronted did bear out that contention, but adjustment to the graph appearing at the end of his judgment should follow, in the light of later knowledge, a flatter trajectory than he thought. A comparison of noise exposed and non-noise exposed populations continues to illustrate the effect, however, namely that the early years of exposure cause the greatest threshold shift, with the maximum effect before 15 years of exposure. Mustill J decided that the question of apportionment was in the end a jury question, and not one for calculation, but plainly made substantial, and weighted, allowance for the fact that the Plaintiffs had had many years of noise exposure before the period of culpable exposure began. In this case both Mr McCombe and Dr Yeoh thought that for the same level of noise exposure apportionment on a time basis was the best way of doing it, something that would be very convenient forensically. Mr McCombe accepted that in theory most damage was done in the early years, but said the effects will be apparent later. That of course may be, but it would not be a good reason not to apportion disability in relation to the exposure, whenever that was, that caused it. Mr McCombe said:

It is very difficult I think to try and give a weighted factor. At some point perhaps someone will look at that and there will be a weighting factor so that early years of exposure get a slightly greater weight in terms of contribution, but at this stage I think most of us would take Dr Yeoh's line, that a simple time based apportionment is appropriate

133. The Black Book, in Chapter 10 and Table A4 applies a formula for apportioning disability between different periods of exposure. It enables the user to work out the relative effects of periods of exposure at different levels of noise. For exposure during different periods to the same level of noise, however, the effect of the formula is that apportionment is simply on a time basis. Professor Lutman was not asked about this in detail. Dr Yeoh, who was Courtauld's expert witness, proposed a time basis. The issue was raised by Courtauld's in supplementary written submissions right at the end of the case. I do not think it satisfactory to come to any other conclusion than the consensus of these doctors in evidence by trying to evaluate the other evidence in the papers, point as it does to a conclusion that after the first 15 years of constant exposure, further

exposure at the same level of noise does not contribute greatly to any further permanent threshold shift. Therefore, because the oral evidence in this case was left as it was, I would take a simple time apportionment basis, recognising that in a case where the evidence is more satisfactorily developed, weighting to the first 10 or 15 years of exposure may well be shown to be appropriate.

### **Evidence of noise levels**

133. In each of the cases there is engineering evidence, sometimes disputed, and sometimes not, or not seriously, in issue. It is based on noise surveys in the factories concerned or in other analogous situations, together with a degree of interpretation, as by estimating a lepd figure from a simple dB(A) noise reading. In some cases where there are no direct surveys of the Claimant's workplace reference has to be made to other surveys, and there is a degree of the application of judgment based on the expert's experience in arriving at at least a bracket of likely exposure. Reconstructing noise levels is not a precise science. Moreover, noise levels cannot be regarded as entirely constant over a period of years. The condition of machinery, and the nature, closeness and layout of nearby machinery have a part to play. Although 3dB involves a doubling or halving of the noise pressure level variations of that order can arise in quite a small area. Nonetheless, in each case there is either substantial agreement between experts, or conflicting evidence supported by reasons that enable the court to decide between them

134. But I heard also eye witness evidence, from the Claimants, and from a large number of other former employees many of whom worked in comparable jobs to the Claimants, who attested to how noisy the environment was. Many of the witnesses have claims for noise induced deafness of their own, arising out of similar exposure. The typical description was that it was necessary to shout in order to be heard by someone nearby, at the next machine, or within a very few feet. Sometimes it was said to be necessary to use a raised voice, and that lip reading also sometimes helped.

135. Lutman and Coles tried to relate noise levels to workers' perception of how difficult it was to communicate in a place of work in the 1980's validated by obtaining evidence from workers at Rolls Royce in Derby and Players in Nottingham. The result of the survey was that at a distance of 4 feet, a normal voice could be used at <80 dB, a raised voice was necessary at 87dB, a very loud voice was necessary at 93dB, and a shout



was necessary at 99dB. It is common ground in these present cases that no Claimant was exposed to noise levels over 90dB, and probably not at levels approaching that. It is therefore difficult to reconcile these descriptions with the engineering evidence about likely noise levels, or indeed with the general run of data in historic noise surveys particularly in make up areas across a number of factories. As Professor Lutman I think accepted, anecdotal evidence is likely to yield to scientific evidence. So, I think, it does. I do not think that it is right to say that the evidence of having to shout or raise a voice was given in bad faith. Descriptions of the need to raise voices are very subjective; most of the witnesses are describing events many years ago; moreover these factories would definitely not seem quiet places, even in the less noisy making up areas. Management evidence in more than one instance is that making up areas were not noisy to the point of interfering with normal speech, though I think that a realistic piece of evidence came from Elaine Thompson describing the tights finishing section at Huthwaite Road, where the engineering evidence is agreed on a level in the mid 80's:

It was no different from if you went into, say, a noisy public house and you automatically lift your voice level up to communicate.

136. But I do not think that the decision on noise levels at any of these factories, given the scientific evidence that there is, can in these cases be affected by the lay witness evidence referred to above. I do not think it appropriate to take a level or bracket coming from the engineering evidence, and adding to it because of the description given by witnesses.

### **The individual claimants**

#### **137. Tony Parkes**

Tony Parkes was born on 8<sup>th</sup> June 1945. He was employed by Meridian at Belvedere Street, Mansfield as a rib knitter from 1<sup>st</sup> July 1968 to 18<sup>th</sup> December 1987. He had previous employments relevant to noise: From 1961 to 1963 he was a yarn lad at I & R Morley when he was in the noisy knitting shop on his estimate 50% of the time; From June 1964 to July 1966 he was a rib knitter at Pretty Polly, Kirkby Folly Road, Sutton in Ashfield, working in comparable conditions, so far as it is possible to tell, as with the Defendants. During the period of his employment by the Defendants he operated Universal and Dubied rib knitting machines, and occasionally Stoll machines.



138. As a knitter Mr Parkes would be responsible for several machines at one time, walking in the aisles between and tending them, and the work being produced by them, as required. The noise was more constant than that affecting a machinist who turns a machine on and off, but was variable depending on where he was and what he was doing at any one time. For about one hour per week the machines were cleaned with a compressed air hose, and occasionally at other times. The engineering evidence is given by Mr Hill and Mr Bramer. They had agreed after a joint discussion in July that the average daily dose during Mr Parkes' employment by the Defendants was likely to have been between the mid and upper 80's dB(A)lepd. Mr Bramer, in the light of further evidence and enquiries, has now resiled from that agreement, and contends for a level not exceeding 83dB(A)lepd.

Mr Hill in his report said that:

It is likely that the Claimant has regularly experienced a hazardous daily noise exposure level exceeding 88dB(A)lepd but unlikely to exceed 90"

139. The first source of information was a survey by Mr Arthurs of Courtaulds on 13<sup>th</sup> August 1985. There were 21 Dubied machines of which 40% were running at the time of the survey. A leq measurement came out at 83 on average, With the minimum level 75 and the maximum 91 from 2 machines which may have required maintenance. The typical spread was from 81-85. Of the area Mr Arthurs said in his report:

A1-A3 knitting. This should be designated a recommended hearing protection area. The Dubied machine area was just below 85dB(A)leq on my visit, but only approx 40% of the machines were running. The area would normally be >85 dB(A)leq for this type of machine. Typical levels at other sites are 85/87 leq for this type of machine

Mr Hill would deduct, and I understand this not to be controversial, 0.3dB from the leq level to arrive at the lepd level because of the Claimant actually being at the machines 7.5 hours and not 8. On the other hand the use of the compressed air hose was likely to add slightly to the dose (on Mr Bramer's estimate it might add as much as 0.5dB(A)lepd)

Mr Hill refers to the HATRA report where 49 measurements were taken on 49 different types of Dubied machine gave a mean level of 87.5dB(A), though the range was 81 to 90. He also referred to a survey at Botany Avenue where the survey included 1 Dubied machine emitting a level of 89dB(A). In evidence Mr Hill particularly relied on Mr Arthurs' report,



and said:

Mr Arthurs clearly had experience of this and other sites. He seems to have been competent and this report seems to have been believable and useable

But also HATRA where the machines were mainly in the upper 80's and Coats Botany Avenue factory where the background noise in the shop was 85-86 and the one Dubied machine was emitting 89dB(A)leq.

140. Mr Arthurs was asked by Courtaulds recently to re-visit his 1985 survey in the light of other evidence being put to him. He was referred to surveys he had conducted at other sites particularly Worksop, in order to uncover the basis of the opinion he had given in his report in 1985 that rib knitting noise was usually greater than he had measured. In 3 surveys over 3 years the level was generally in the region of 83 in the Dubied area, though one reading came out at 86.5dB(A)leq because of the proximity of noisier Bentley and Monks knitting machines. He said in his further statement:

Having reviewed this information from Worksop I am not now able to see the basis of my statement (typical levels at other sites are 85/87leq for this type of machine) as set out within my report dated 10.9.85. I do not now have any other basis that can now be supported... For coming to such a conclusion and I can only conclude that I was in error in doing so. It may be that I had taken into account the isolated reading of 86.5leq from the 14.08.83 survey, in which case there was no proper basis upon which to do so.

He was unable to remember all the relevant factories he had surveyed, some of which were small. In evidence Mr Arthurs said that he may have looked at the room at the time of his survey and seen that some of the machines were not running and taken a precautionary approach. He thought now that the recommendation paragraph was badly written, and does not tally with the Dubied readings. When asked if he was saying that his recollection of typical levels is better in 2006 than 1985 when he wrote it, he said that he could not comment at this stage.

141. Late in the case there was disclosed a survey done by Mr Arthurs at a mill at Hawick on 29<sup>th</sup> June 1983. The dB(A)leq averaged from a number of machines is given as 83.5/86. The loudspeaker system was loud in the knitting and one or two other areas, and the spread reflects the position with the loudspeaker both off and on.

Mr Bramer for the purpose of his more recent report, and recantation from the joint statement originally made, took a measurement from one Dubied machine where the average leq was 80.9dB(A). He would add

another 2 dB for ambient noise to come out at 83dB(A)leq. In evidence Mr Bramer said that the main noise was from the machine being tended, but that the nearest other machine would contribute to the noise by 2db, and that other more distant machines didn't alter the level significantly, so that it was not right to assume as Mr Arthurs had originally that having 60% of 21 machines not working would have made a difference. The only readings on Dubieds at the time of his original reports came from the Arthurs survey. In addition to his own measurement of one Dubied machine, he had now seen the Worksop reports and concluded:

All the good readings I've got suggest the low 80's: 82-83dB(A)lepd, and certainly below 85.

142. In my judgment the evidence that is now available seems of good quality, and justifies a revision downwards of the original agreed levels in the upper 80's. There remain Mr Arthurs' original comments and consequent recommendation for protection, based on a wider experience than can now be recalled in detail, and an addition for the compressed air hose. Mr Parkes evidence in his statement is that there was no radio in the rib knitting section. Mr Michael Staley for Courtaulds said that the Stoll machines were very noisy but running not more than 5% of the time, and the evidence has concentrated on the Dubieds, without dealing with Universal machines as to which there seem to be no data. It is not possible to say that for any period Mr Parkes was exposed to greater noise than the evidence about the Dubied machines reveals. The evidence leads me to the view that the general exposure of Mr Parkes more probably than not was in the region 83 to 84dB(A)lepd but not generally exceeding that. The likely level of exposure was of course very close to 85dB(A)lepd, and anyone trying to be sure that a 85dB(A) level was not breached would, as was the case with Mr Arthurs in his report, be likely to suggest that the area should be treated as being over 85dB(A) out of caution. If asked, though, is it proved that Mr Parkes was regularly exposed to noise at 85dB(A)lepd or over, I have to answer no.

143. Mr Parkes was exposed to noise at Meridian from 1<sup>st</sup> July 1967 to 18<sup>th</sup> December 1987. He had earlier exposure as a yarn lad from 1961-63, and from 1964-66 as a rib knitter at Pretty Polly. He was also in the TA for 3 or 4 years. Although in the infantry he says that he fired his rifle on a minimal basis, a magazine a few times a year. The doctors are not inclined to attach importance to that, on the basis that the information is correct, and there is no evidence to challenge that view.



144. Evidence about diagnosis was given by Mr McCombe and Dr Yeoh. In his statement Mr Parkes described his hearing loss as more a problem noticed by other people than by himself. In 2002 he was referred by his GP to hospital after being apparently hard of hearing at a well man routine check. To Mr McCombe Mr Parkes described low pitched whining tinnitus for the last 4-5 years, not really affecting sleep or concentration. He thought he had poor hearing in both ears and difficulty with conversation against background noise. To Dr Yeoh he described problems with conversation and TV volume for the last 4 years, with left sided buzzing tinnitus that did not bother him.

145. There have been 4 audiograms in recent years: After the well man check referral; 24<sup>th</sup> October 2004 by Mr Welch when the claim was first being investigated; 10<sup>th</sup> March 2006 for Dr Yeoh; and 29<sup>th</sup> April 2006 for Mr McCombe. The results are complicated and may be seen in tabular form below, though the 2004 entries do not show right ear bone conduction, because in that ear at that time the air-bone gap was not material:

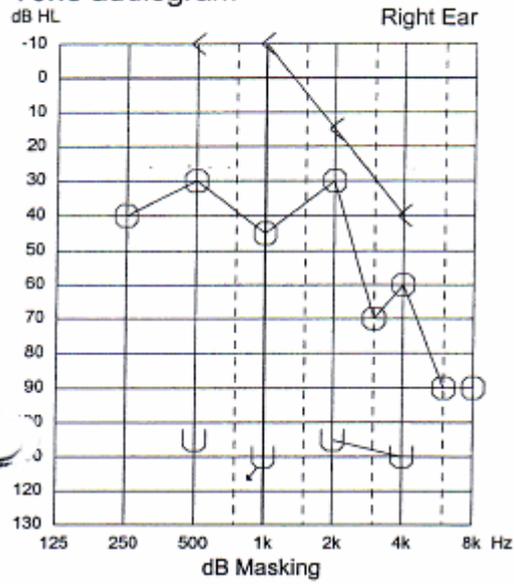
	Right				Left			
	5.11.02	24.10.04	10.3.06	29.4.06	5.11.02	24.10.04	10.3.06	29.4.06
250 Hz	40	10	40 (10)	45	45	20	50 (25)	45
500 Hz	30 (-10)	10	40 (15)	35 (20)	25	20	30(20)	25
1000 Hz	45 (-10)	15	45 (10)	50(30)	35	25	40 (30)	35
2000 Hz	30 (15)	15	35 (30)	40 (40)	50	45	60 (60)	55
3000 Hz	70	50	75 (40)	75 (40)	75	70	70 (45)	65 (55)
4000 Hz	60 (40)	55	70 (>60)	70	80	55	70 (55)	70
6000 Hz	90	60	85	85	80	65	80	75
8000 Hz	90	40	95	>100	75	60	90	90

The audiograms themselves are set out below:

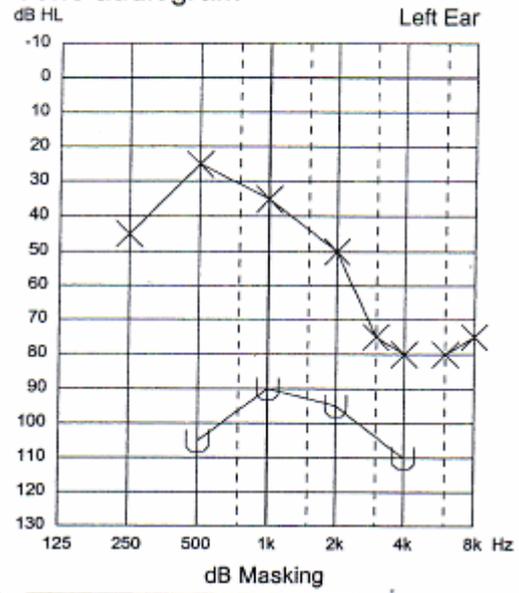


2002

Tone audiogram

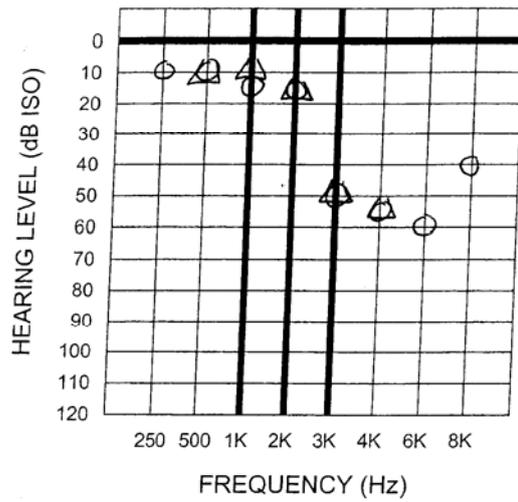


Tone audiogram

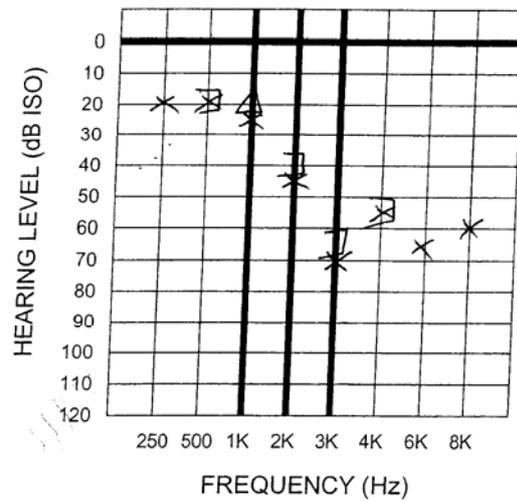


2004

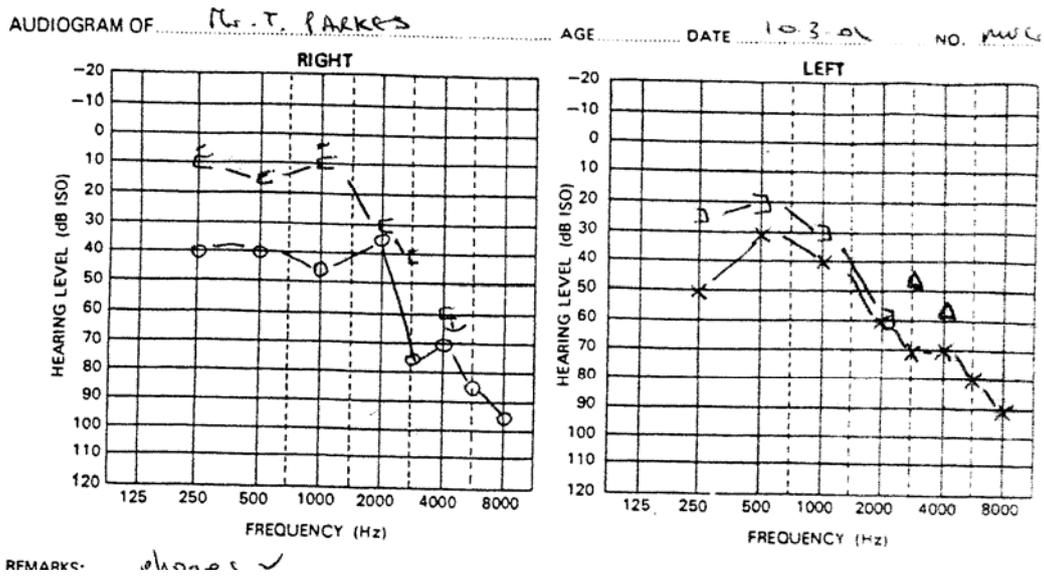
RIGHT



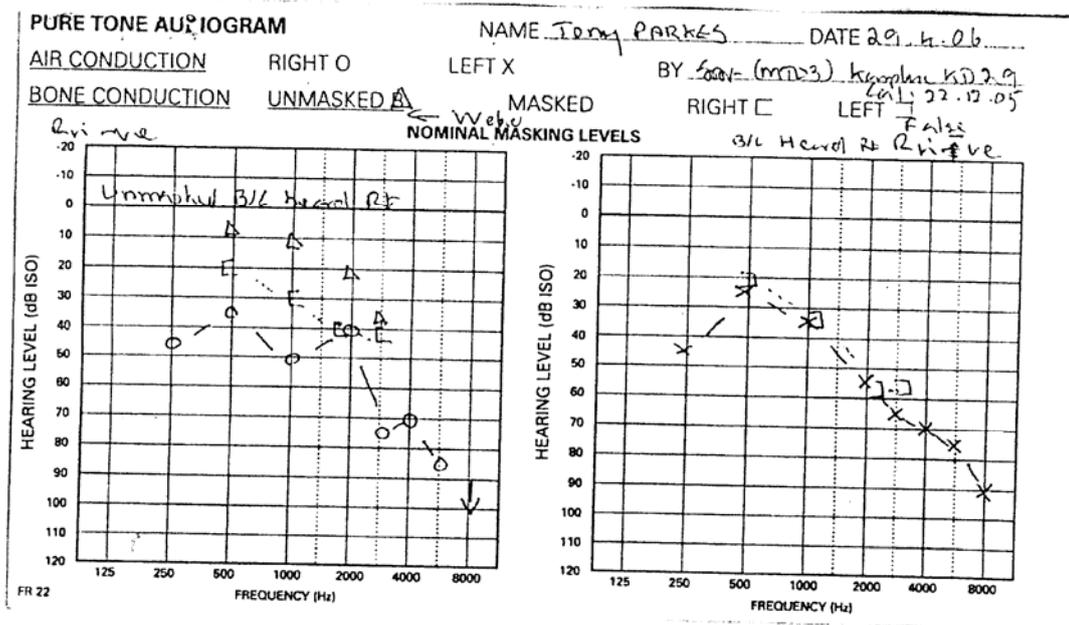
LEFT



March 2006



April 2006



146. There is considerable asymmetry and also rapid change in hearing levels in the period of 4 years covered, change too rapid to be explained by aging. Mr McCombe says that Mr Parkes displays bilateral hearing loss far in excess of what would be expected from age alone. He thought that there was a noise induced component, but that an additional cause was chronic otitis media. He would choose Mr Welch's audiogram in 2004 as best reflecting Mr Parkes' longer term hearing: It had the best quality and seems to have been taken at a time when Mr Parkes was temporarily unaffected by disease that affected him both in 2002 and 2006. Using the right ear at that time he calculated by application of the



Black Book a total disability of 16% of which the non age related component in his better ear, which he ascribed to noise, was 9%. From his 2006 audiogram, Mr McCombe took the same noise component, but the overall disability was now showing at 38%, and the additional 22% he ascribed to otitis media.

147. Dr Yeoh in his report set out the complicating factors, which could be lessened, he said, by taking bone conduction figures since any middle ear loss would then be disregarded. Applying the Black Book to these figures based on bone conduction in the better right ear in 2002 he arrived at a noise induced hearing disability of nil. He reduced the aggregate dB for 1, 2 and 3 khz by 9dB for what he called socio-economic factors. Applying the same approach to his 2006 audiograms the exercise on the same basis yielded an overall disability of 13% from which had to be deducted an expected age related disability of 7%, leaving 6% to be otherwise accounted for. In his report he said:

On the balance of probabilities I am of the opinion that Mr Parkes has a hearing loss that is due to middle ear disease, the aging process, constitutional causes and noise damage, if the Claimant had been exposed to excessive levels of noise, for example above 85 dB(A) for an 8 hour day.

148. Professor Lutman said that the technique of subtracting decibels from the aggregate before any Black Book calculations are done is wrong, though he acknowledged that it was recognised that a different database for age related loss could be thought more appropriate than the one used in the Black Book. He also said that simply choosing to take the bone conduction figures where there is an air-bone gap is also wrong. The reasons he says that are discussed in the Black Book at and after page 43, with a proposed approach where there is an air-bone gap at page 45. The size of the gap in the 2002 audiogram used by Dr Yeoh, however, is so great that applying the formula at page 45 of the Black Book increases the conductive hearing loss to an even greater level than Dr Yeoh assumed.

149. In their joint statement the doctors said

The causes of the Claimant's hearing loss would be mainly presbycusis unidentified causes and middle ear disorder. We agree that if the court concludes that the Claimant has been exposed to sufficient levels of noise to result in noise damage then a modest component of the sensorineural hearing



loss would be due to this causation.

They agreed also that there was a theoretical risk to hearing from noise exposure over a prolonged period to noise levels between 80 and 90dB(A), the risk being greater at levels close to 90 than 80. They did not agree on the best audiogram to take in order to try and quantify non age related loss. Dr Yeoh said that the best was the 2002 bone conduction, and Mr McCombe 2004. Whichever audiogram is thought to show the level of sensorineural loss better, however, none of the audiograms help with diagnosis. The Defendants have plotted some of the audiograms on a graph together with the area between the figures given by Davis for 25<sup>th</sup> and 75<sup>th</sup> centile populations for age related loss. That does not seem to me to be a useful exercise when it is not possible to say, all his other problems apart, which percentile even roughly Mr Parkes should be on. For someone to lie between the 25<sup>th</sup> and 75<sup>th</sup> percentiles does not help materially to decide if they are showing a particular degree of non age related loss.

150. In evidence Mr McCombe said that he relied on the history of noise exposure:

For 20 years it is more likely than not that there would be noise damage

He accepted that the shape of the audiograms did not help to show noise damage (though the 2004 audiogram having a 5dB notch at 4khz would provide, he thought, some support for the diagnosis). The more recent audiograms show substantial falling away at the higher frequencies. He relied on his view that at the sort of noise levels involved even if under 85 for a 20 year period he would expect some component of noise induced hearing loss, even if the audiogram was incapable of showing it.

151. Dr Yeoh in evidence said that he thought the hearing loss was caused by presbycusis; middle ear disorder that was the cause of the conductive loss; but also a considerable idiopathic component. He said the bone conduction readings of 110 at 500khz in 2002, 10 in 2004, and 15 in 2006 were not a pattern that was the result of middle ear problems but of unexplained sensorineural loss. He stuck to his agreement with Mr McCombe that if Mr Parkes had been exposed to a sufficient amount of noise a modest component of the sensorineural loss could be due to noise. His model of 6% disability in 2006 resulted from an analysis of just age and noise, and so did not attempt to quantify an idiopathic component which he believes is there. Looking at 2002 he thought there was no noise induced impairment shown. He adhered to the view that the 2004



audiogram was the odd one out and should not be used. He thought it might not have been done under ideal conditions. His modified version of the Black Book exercise in 2004 would result in a non age loss of 5%. (using Professor Lutman's new tables it comes out at 9%)

He applied to the possibility of there being a component of noise induced hearing loss his view that between 80 and 85dB there could be a risk of harm but that it would be so small as to be immeasurable. Both risk and measurability he thought could not be established below 85. He thought estimates were made on tenuous scientific evidence below 85.

152. In the end, the only basis for saying that there is a degree of noise induced loss is the history of exposure. It was not suggested by either doctor that the substantial falling away of hearing in the higher frequencies was caused by noise. Although Dr Yeoh did not resile from his agreement in principle he would not subscribe to an element of noise induced loss if exposures were under 85dB(A). Moreover, I do not think it possible to say that there is identifiable noise induced loss from a history of exposure alone at the levels with which we are concerned here. A robust approach to diagnosis must mean that it is not proved on the balance of probabilities that Mr Parkes has suffered noise induced loss. If, in addition to the levels of noise not shown to reach 85dB(A), other causes of loss, including middle ear disease and another unexplained causes of loss are all in play the audiometric picture in my view makes it impossible to say that Mr Parkes has suffered significant impairment, still less disability, due to noise.

### **Julie May Baxter**

153. Julie Baxter was born on 4<sup>th</sup> July 1963. She left school at 16 in July 1979 and worked as a shoulder linker for some months for Mansfield Hosiery Mills (ultimately Taymil) at Botany Avenue, Mansfield. She was a trainee for all or part of that period. Taymil are not Defendants in respect of Mrs Baxter. She then began her employment with the Defendants on 19<sup>th</sup> November 1979 as a shoulder linker at their Belvedere Street Mansfield factory. She used a Mathbirk Linker machine until she left about the end of 1994. She then spent less than 6 months with Alan Payne Limited, also linking, before returning to the Defendants as a linker. Shortly after her return she changed jobs. She moved to the knitting shop and was for the rest of her employment a runner on, or bar



filler, sitting at a table near to a knitting machine. She left on 1<sup>st</sup> April 1989. She therefore has some 6 years with the Defendants as a linker and 4 years as a runner on, and was exposed to noise as a linker for an aggregate of about 9 months with other employers.

154. Noise evidence has been given by Mr Hill for the Claimant and Mr Bramer for the Defendants. As to the latter period when she was a runner on they are agreed that she was likely to have been exposed to daily noise levels in the low 80's lepd, and that the level is unlikely to have exceeded 85dB(A)lepd. As to the period as a linker, there is some difference between them. Mr Hill says that the daily exposure level would be in the region of 84-86dB(A)lepd; whereas Mr Bramer does not believe her exposure would have exceeded the low 80's.

155. Mr Hill places some reliance on the HATRA figures. He recognises that the basis of measurement is not clear, and that the number of measurements is very small as well as there being considerable variation. The HATRA figure for a Mathbirk Linker is a spot dB(A) reading of 86.5dB(A). There is an issue about how much of the time Mrs Baxter would have had her machine running. The Defendants say 40 or 50%; she says 60 or 65%. Mr Michael Staley, factory manager at Belvedere Street, accepted that she could have achieved that figure but said that that would put her in the top 15-20% of operators. Mrs Baxter's on time must have varied, but I am prepared to find that she had a better than average time of over 50% but under 60%. Based on the HATRA figures Mr Hill says that 50% would amount to 83.5dB(A) and 60% to 84.3dB(A). To that may be added radio noise for part of the day (probably something over 5 hours) for which he would add 1-3dB(A). Hence the possibility of a daily lepd in the region of 86.

156. The other evidence, from surveys, suggests a markedly lower level of noise. There are a number of different Mathbirk machines and identifying ones comparable to the Claimant's machine is not possible. Mr Kilbourn did a survey on this site in 1983. Linking machine noise with the radio on ranged from 70-80 background noise to 80-86dB(A) with the machine running. In 1985 Mr Arthurs did a survey. He recorded leqs only if they came out over 85 and he did not record any specific readings, on that basis, for Mathbirk linkers. Mr Bramer himself says that his own experience of Mathbirk linkers showed them to be in the range 68-78dB(A)leq. More recently Mr Bramer tested the noise made by one Matbirk linker running. The noise level with the machine working was 81.5dB(A) and the leq over a full cycle was 76dB(A)leq.



157. I do not accept the full attack made on the HATRA figures that they are several dB too high generally, possibly, as Mr Purchas QC speculated, because the meter was not calibrated properly. There were measurements over many different factories and Mr Hill's cross checks with measurements by himself with comparable machines to some of those covered in the survey has generally borne out the levels. But it is impossible to ignore the fact that a range of other information suggests a significantly lower figure than the HATRA figure. Moreover in making a lepd calculation Mr Hill is generous as to the noise of the radio in order to get to the range he does.

On balance I find that the dB(A)lepd level during Mrs Baxter's time as a linker with the Defendants exceeded 80dB(A)lepd but that it did not exceed about 83.

158. . I find that Mrs Baxter did not wear and did not have the opportunity to wear hearing protection. The evidence about this is conflicting. At senior management level a decision may have been made at some stage to make hearing protection available at 85dB(A) and to move to compulsory use in 1987. The direct evidence does not bear that out as to the knitting shop at Belvedere Street. It is plain from an informal questionnaire in July 1987 that protection had not been provided and that the workforce were being asked if they would use it if it was. The overwhelming majority said they would. The Claimant says she never had ear protection or saw it though she remembered a knitter who had cotton wool in his ears. Sheila Clarke who worked in the knitting shop remembered compulsory protection being brought in in the late 1980's but nothing before that. She appeared a good and clear witness. Julie Edwards remembered compulsory protection coming in but not a voluntary period. By contrast Mr John Payne remembered voluntary protection brought in about 1987 but that it was not compulsory before he left in 1989. The Claimant left at the end of March 1989. The evidence is not in an entirely satisfactory state and the recollection of individual people of events, or non events, more than 15 years before is likely to be variable and unreliable. On balance I find that hearing protection was not made available to the Claimant.

159. In an audiogram taken on 16<sup>th</sup> November 2003 Mrs Baxter was found to have a binaural hearing loss averaged over 1-3kHz of 10.33dB. Dr Yeoh's test taken on 3<sup>rd</sup> April 2006 on the same basis came out at 11.33dB. The history that Mrs Baxter gave in her witness statement was:



54. I confirm that I was having problems with my hearing from about 2001/2002. I noticed difficulty hearing the ringing of the doorbell and of the telephone. I also found it difficult to have a conversation on the phone.

55. It was at this point that I began to have to turn the sound volume up on the television.

56. I also find it difficult having one on one conversation, particularly in the presence of noise in the background. I noticed that when people were speaking to me I did not catch everything that they said. I tended to start staring at their lips almost lip reading.

57. I have noticed a buzzing noise, mainly in the left ear. Sometimes it delays me getting off to sleep. This happens only a few times a month. I do not think it is a significant problem. I have noticed this for several years. I never thought anything of it or sought any medical treatment.

58. I certainly never thought my problem was significant. I decided to pursue the claim when I saw and advert being run by Vendside Limited. I contacted Vendside and completed a Questionnaire. This was round about September 2003. The advert was something on the lines of asking people who had symptoms who had worked in the textile industry to contact Vendside.

160. Dr Yeoh records her as telling him that hearing problems and the tinnitus have been present for more than 10 years. In evidence Mrs Baxter said:

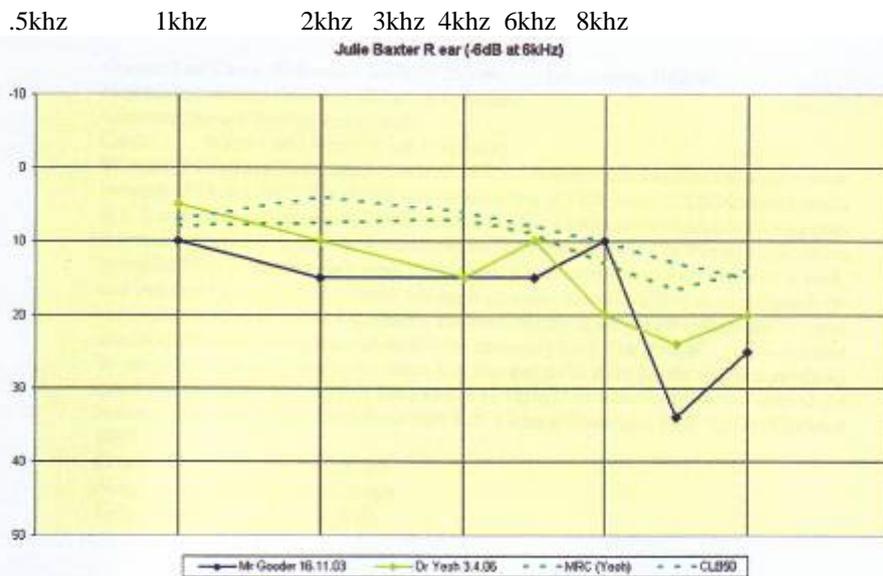
I've had a hearing problem over the last 10-12 years. Problems in a group. I can only talk 1:1, and have to look at them when you are talking. If they are in a group I don't hear half the conversation. I probably thought it was something to do with Courtaulds because of the noise and also I get a hissing in my ears, on and off. I've thought it might have something to do with Coutaulds. I didn't go to see a doctor about it about 10 years ago. I did go to the doctors with like what I thought was ear and sinus trouble but it turned out it was migraine, so whether this was due to my hearing, I did get a lot of headaches working in the knitting shop, and I did start to suffer from migraines.

I did keep going to the doctors and obviously they didn't pick it up. I went quite a few times to the doctors (and mentioned it them) and they didn't pick it up. And then eventually they picked up migraine and that was due to hearing and all the problems I was having. That is going back 10-12 years ago, it might even be a bit longer. (I did do something about it) I went to the doctors. I would have thought he would have referred me to somebody but he didn't.



I was going to the doctors with sinuses and my ears, feeling quite light headed and a bit dizzy, and I kept getting really bad pains in the head. They said ears and sinuses and I was getting migraines. I didn't say anything to the doctors about hearing loss. I thought the hearing loss might be caused by work when I used to have to turn the TV up and couldn't hear people in a group. But obviously I didn't do anything about it because I wouldn't know how to. I wouldn't know where to start. I think working in the knitting shop definitely had an impact on my hearing and the hissing that I get in my ears as well. The machines were just so loud they was ringing in your ears. I always thought it is obviously going to do some damage working in an environment that is very noisy. I don't really recall when I made the connection.

161. Mrs Baxter, as I have found, had exposure to noise as a linker over 80 dBA)lepd but not more than 83dB(A)lepd for some 6 years, and in the low 80's for some 4 years as a runner on. Medical evidence was given by Mr McCombe and Dr Yeoh, though of the two doctors only Dr Yeoh had seen Mrs Baxter personally. Mrs Baxter had been seen by Dr Gooder and had an audiogram taken in 2003. Mr Huckle has made a chart of the audiogram results, adjusted by 5dB at 6khz to take account of the effect of the TDH39 headphone at that frequency. Such an adjustment is generally appropriate in the cases considered here:





162. The average loss at 1-3kHz is 11.66, and it is bilateral without asymmetry. There is a notch at 6kHz on the right, less obvious when the threshold at that frequency is reduced by 6dB for headphone calibration level. The field speech audiometry results were compatible with the audiogram. Comparing the hearing loss at her age with a table of MRC median values the hearing loss at 1-3kHz would be 3.83dB.

163. Dr Yeoh thought that if the noise exposure had been at a level in the low 80's it would not be sufficient to cause any significant noise induced hearing loss. But he said that if the court concludes that the Claimant had been exposed to sufficient noise to cause noise damage it is probable that her hearing loss is due to a combination of the aging process and noise damage. At the request of the Defendants Dr Yeoh applied to Mrs Baxter's case the approach in the 2000 diagnosis paper and the result according to those guidelines is that a diagnosis of noise induced hearing loss is not appropriate. In particular the NIL value of 90dB or thereabouts (even taking into account exposure below 85dB(A), which the paper does not allow for) would not support a diagnosis.

164. Mr McCombe accepted that on the 2000 guidelines there would be no diagnosis, but pointed out that the high tones showed a typical notched appearance and fitted well with noise induced loss given the totality of the picture. If the noise level was stuck at about 80 "you would have to look for another explanation", but if it began to creep up above that he thought there would be a modest component of noise induced hearing loss. The statistical risk of hearing loss due to exposure at levels in the

low 80's he accepted as very small but maintained his belief on the balance of probabilities that there is a small element of noise induced loss.

165. Dr Yeoh in evidence said that Mrs Baxter's hearing was classically normal for all intents and purposes. With that audiogram and history he would be surprised to be told of that degree of hearing difficulties. He would be surprised to be told that she had that degree of hearing difficulty at 11.16dB across 1-3khz.

166. I am not satisfied that it is established that Mr Baxter has any significant noise induced hearing loss as a result of her employment by the Defendants. It has not been shown that she was exposed to noise levels that attained the mid 80'sdB(A)lepd, and I accept the view of Dr Yeoh in those circumstances that the degree of loss caused by noise, if present, would not be of a degree likely to be identifiable on the audiogram.

167. In Mrs Baxter's case alone of all these cases a limitation defence is pursued by the Defendants. In submissions they assert no more than that the claim is prima facie statute barred, and that it would not be appropriate for the Court to exercise its discretion in her favour pursuant to s33 of the Limitation Act 1980. Under section 14(1) the three year limitation period runs from the date upon which, so far as is here material, she first had knowledge that the injury in question was significant, and that it was attributable in whole or in part to her exposure to noise by the Defendants. Those known facts include facts ascertainable by the Claimant with the help of medical or other appropriate expert advice which it is reasonable, looking at the matter objectively, for her to seek. The significance of the injury is a low test, because it is assumed to be significant if the Claimant would reasonably have considered it sufficiently serious to justify proceedings against someone who did not dispute liability and who could pay.

168. Mrs Baxter's evidence was that as long as 10 to 12 years ago she attended the doctor quite a few times. Other problems were diagnosed, including migraine and sinus problems. She did not mention hearing loss at that time. Her evidence is that she did not think that hearing loss, or the accompanying mild tinnitus which is also part of the claim, was significant. Hearing loss develops slowly and is often put up with. Mrs Baxter did not know within the meaning of section 14 that her hearing and tinnitus problems were attributable to her exposure to noise by the



Defendants. I see no reason why she should have hidden her history from the doctor at any stage. In my judgment it is not established that it would have been reasonable to expect her to seek advice about the cause of her problems, which in fact involved more serious matters such as migraine and a sleep disorder, rather than seeking treatment for the ones that seemed important to her. I accept that the modern law is that somebody who has a significant injury can be expected to want to know what has caused it, but there is a difference between marginal hearing loss and a more obvious and serious condition. I find that Mrs Baxter's date of knowledge was not until she saw Mr Gooder in 2003, so that the case is not statute barred. If I am wrong about that I have to consider whether the court should exercise its discretion under section 33 to allow the case to proceed. I have not found the case statute barred, and quite how the Defendants put date of knowledge has not been developed by them. If I am wrong, however, it would be because sometime after 10 or so years ago the Claimant should have sought advice about her hearing loss and the causes of it, and would have received advice that it may be caused by her exposure at work. Giving a reasonable time for such advice to be sought and given, time would, if I am wrong, run from about 8 years ago, that is by 1998. The action was begun in July 2005, on that basis about 5 years out of time.

169. The burden of showing that it is equitable to disallow the limitation period is on the Claimant and is a heavy one, to be granted when equity demands it. Going through the list in section 33(3):

(i) The length of and reasons for delay. The delay here is assumed to be 5 years. The reason for it is that the Claimant had not attached importance to her condition to the extent of finding out about the cause of it and thinking of pursuing a claim, as to which she said she wouldn't have known where to start. There is also a very considerable chance that she would have been told in the 1990's that she did not have a claim worth pursuing if she was unable to demonstrate higher levels of noise. To apply the approach in the present cases to noise levels is to look with inappropriate hindsight on the way these claims have previously been brought. This is not a case where, put on notice that there was noise induced hearing loss, and that she might have a claim, the Claimant did nothing

(ii) The cogency of the evidence. Both parties are necessarily left reconstructing now conditions in a factory in the 1980's which is now closed. It does not seem to me, however, that either party would have been in a better position had proceedings been started by 2001. The



Belvedere Street factory has been closed and pulled down. When that was is not clear to me. In the absence of any evidence or submissions directed at prejudice, and given that the engineers on each side have been able to report by reference to survey material, and that Courtaulds have disclosed and are able to lead detailed evidence about their approach to noise in the 1980's, I do not think that the evidence on either side is substantially less cogent than if the action had been brought in time.

(iii) The extent to which the Claimant acted promptly when she knew that she might have a claim for damages. Mrs Baxter herself acted promptly when she learned of and answered the Vendside advertisement and saw Dr Gooder not long after.

(iv) Steps taken to obtain advice. She took none until she saw the advertisement.

The most important consideration is the degree to which disapplying the limitation period would prejudice the Defendants. Exercising the discretion under section 33 will always prejudice the Defendants, but here the evidence does not lead me to the conclusion that they are significantly prejudiced in their ability to defend the case. If the question had arisen, I would have applied the discretion in section 33 to allow Mrs Baxter's case to proceed.

170. I have dealt with limitation along with liability in a way that the Court of Appeal in KR v Bryn Alyn Community Limited [2003] QB 1441 cautioned against. I indicated that given the nature of this litigation I should probably do so, without adverse comment. Indeed, apart from indicating that the limitation defence is maintained, the Defendants have said nothing about it, or about the issues raised in the context of section 14 or section 33 either during the course of the evidence or in their final submissions.

### **Christine Faulkner**

171. Christine Faulkner was born on 12<sup>th</sup> January 1938. From 26<sup>th</sup> November 1973 until 21<sup>st</sup> November 1988 she worked for Mansfield Hosiery Mills on the middle floor at Botany Avenue as a lockstitcher. She normally worked on a Brother machine. In case of breakdown she might use a Pfaff. Occasionally she went on to tabbing. She had no hearing protection and says that she would have worn protection if provided and if they had told her that her hearing might be affected. She said that she



would not have thought she was suffering significant or permanent hearing loss if she hadn't seen the Vendside advertisement.

Noise level evidence was given in reports by Mr Hill for the Claimant and Mr Athey for the Defendants. Mr Hill has a bracket of 82-86dB(A)leq, and Mr Athey 79-83. Test results looked at by Mr Hill don't evidence high noise levels. A 1990 test of lockstitch machines at Courtaulds Nix Hill premises with well spaced out machines, gave a leq of 77. A 1997 Courtaulds survey gave 78dB(A)leq for a Brother lockstitch machine. Other surveys in 1990 of Juki lockstitch machines gave 77-83 and 71-82. Mr Hill referred to the HATRA survey for overlock machines, as having an on noise of 90.4dB(A). Mrs Faulkner, however, was not an overlocker. There are no surveys of Botany Avenue before 1988 except a 1984 survey of the knitting shops. Making up was not surveyed. But in the good quality GKN survey of the Ollerton factory in 1990 lockstitchers came out at 73-83dB(A)leq. A similar report on the Alfreton factory in 1990 had lockstitchers at 79-82dB(A)leq.

172. The evidence, including the 1990 surveys, strongly points to a dB(A)leq level of not more than the low 80's. In evidence Mr Hill thought that the Ollerton and Alfreton surveys understated the noise level for some reason. The radio had to be taken into account. There was piece work (though all machinists' work seems to me to have probably beendone on a piece work basis in these cases). In evidence Mr Hill said that if pressed to a single level he would say 83 but would be reluctant to go below that, 82 or 83. In the light of that evidence Mr Athey was not called. In the face of the survey evidence to which I have referred, in which nowhere are lockstitchers surveyed at coming out above the low 80's, I should not have been prepared to find exposure in the upper reaches of the bracket originally proposed by Mr Hill, and find that the average level of exposure was in the low 80's, up to 83dB(A)lepd.

173. As to the level of disability, in her witness statement in February 2006 Mrs Faulkner said that she noticed problems gradually over the last 5 years but never thought anything of it. She thought it normal for someone of her age. She did not connect it with Mansfield Hosiery Mills that she had left in 1988. When she saw the Vendside advertisement in 2003 she saw solicitors and then Dr Tungland in May 2003. Dr Tungland in his report says that in answer to questions Mrs Faulkner told him that she had then no perception of hearing impairment. She did not require the TV turned up and had no problems on a one to one basis. In evidence Mrs Faulkner said that she did have such problems and told Dr Tungland that



she had the TV high. She agreed that she wasn't aware of any real hearing problem:

Its just my husband. He'd say "turn the tele down"

When your hearing goes you don't think about it. You just think OK. Its not like your sight going when you go to the opticians.

To Mr McCombe she reported being aware of problem for about 4-5 years: TV volume and conversation against background noise She has a telephone with a volume control.

174. In my judgment Mrs Faulkner has been aware of being somewhat hard of hearing for some years, 4 or 5 perhaps. She has greater consciousness of it since 2003 when her attention was drawn to it. In any event it is getting worse with age. It amounts to a mild degree of disability. If she thought about it at all she did not connect it with here time at Mansfield Hosiery Mills, and there is no reason why she should have done so.

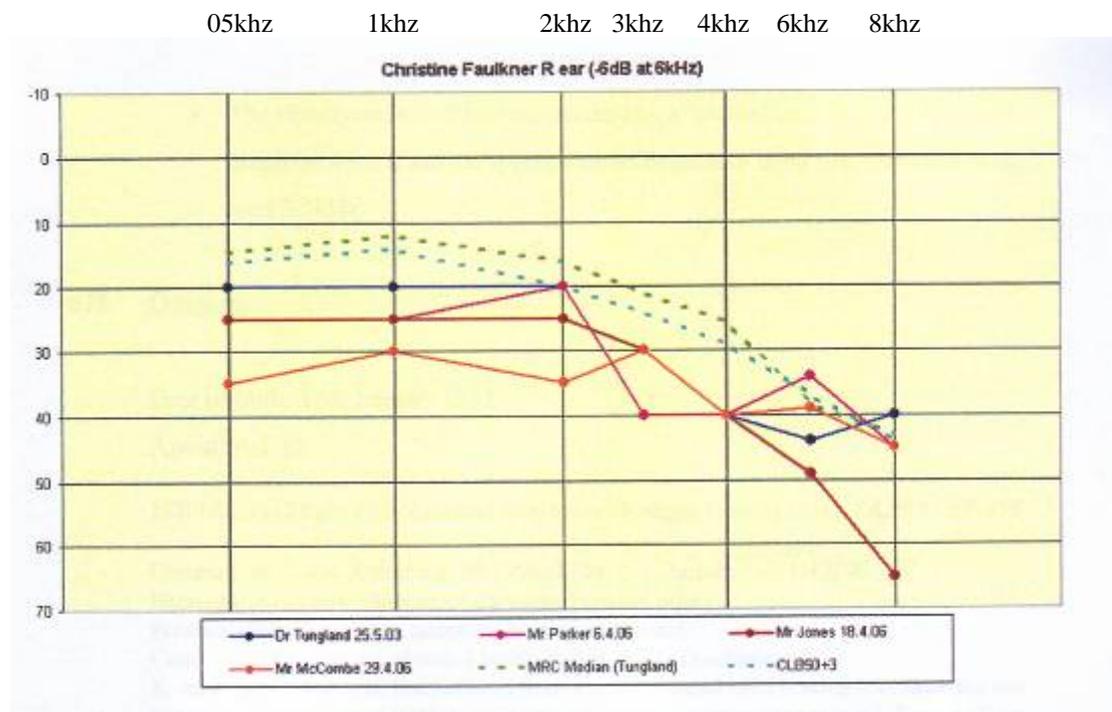
175. Mr McCombe gave evidence for the Claimant and Mr Jones for the Defendants. Mr Parker also reported for the Defendants, and Dr Tunland had done the original audiogram on referral to him in 2003. Mr Jones set out in tabular form the results of the various audiograms, as below:

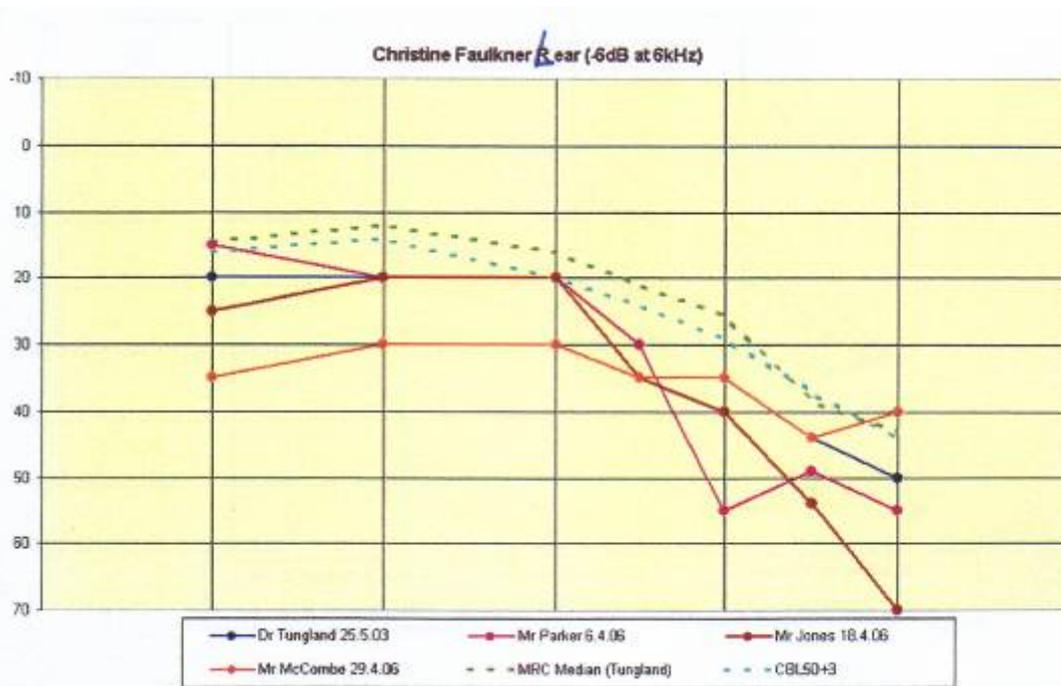


03 TR	30	20	20	20	40	40	50	40
06 PR	20	25	25	20	40	40	40	45
06 JR	25	25	25	25	30	40	55	65
06 MR	35	35	30	35	30	40	45	45
03 TL	25	20	20	20	35	35	50	50
06 PL	20	15	20	20	30	55	55	55
06 JL	30	25	20	20	35	40	60	70
06 ML	35	35	30	30	35	35	50	40

The speech audiogram 18.04.06 indicates hearing over speech frequencies  
0.5, 1 & 2 kHz averaging 20 dB.

176. Mr Huckle has plotted the audiograms, and shown also 2 median lines:





177. Mr McCombe's audiogram has an average hearing loss at 1-3kHz of 31.6dB. The Black Book calculation gives a total hearing disability of 19% from which there has to be deducted 8% for age related loss, leaving 11% non-age related. A similar calculation based on Dr Tunland's audiogram in 2003 gives figures of 14%, 7% and 7%. Mr McCombe thought that in addition to the effects of age and noise there was a third idiopathic component at work because of the amount of deterioration in the middle frequencies in the period 2003 to 2006, shown most markedly in his own audiogram. He would therefore take Dr Tunland's audiogram and adjust 7% non age related loss to 5% to arrive at a noise induced component. Mr McCombe uses the Black Book as it stands. 5% disability equates to about 5dB loss averaged over 1-3kHz. In his report Mr Parker noted that the MRC expected prebycusis loss plotted by Dr Tunland against his audiogram showed the expected loss and audiogram in close agreement. Both from that and his own audiogram he said there was no evidence of noise induced loss. Mr Jones took the best figure at each frequency from all the audiograms, but when challenged said that other recognised averaging techniques, and another database, would make no difference to his conclusion, namely that the difference between her hearing loss and the average for her age is so small that it is not necessary to suggest any noise induced loss.

178. In their joint statements Mr Parker and Mr Jones adhered to their view that there is no noise induced loss. Mr McCombe uses the formula used in most of the cases: If the Court decides that the Claimant has sufficient excessive noise exposure, then a small component of her

sensorineural hearing loss will be due to noise.

179. In evidence Mr McCombe said he would look at Dr Tunland's audiogram particularly as being better and closer to the end of the exposure period. There had also been significant deterioration in the middle frequencies in the 3 years since 2003, suggesting accelerated age related deterioration, or a third process at work. Repeating the analysis in his report, he thought that about a quarter of Mrs Faulkner's disability was caused by noise. He agrees that if Dr Tunland's audiogram was not to be relied upon, then Mr Jones was right, but saw no reason not to rely on it. Mr McCombe had said in his report that Dr Tunland's audiogram "certainly had a lot of features in terms of its configuration and shape that would suggest some noise induced component". In evidence, asked about that, he identified a high tone hearing loss; a slight bulging at 3 and 4khz; and slight recovery in the right ear at 8khz. From the description given to him by Mrs Faulkner Mr McCombe had been working on the basis that the noise levels were somewhere between 87 and 93dB(A), "hovering around 90" or in the high 80's. His diagnosis would be far less secure at substantially lower levels of exposure. Taking out the history of noise, the audiograms did not show obvious features of noise induced loss.

180. Mr Jones said that there was essentially no difference between Mrs Faulkner and normal hearing for her age. There was an adequate explanation for her hearing loss from her age alone. He agreed that if there were a larger notch at 6khz that could be due to noise, but he would prefer to see 4khz involved. There was no evidence in the audiograms of noise induced hearing loss.

181. In this case the exposure as I have found was in the low 80's up to about 83dB(A). There is no clear sign on the audiograms suggesting noise induced loss; the difference between expected loss and actual loss in the speech frequencies is not great; there is on Mr McCombe's analysis some factor, whether of rapid aging or idiopathic type, in play. It is not possible in my judgment to find that there is noise induced hearing loss proved.

### **Stephanie Baker**

182. Stephanie Baker was born on the 12<sup>th</sup> August 1956. She worked at the Simpson Wright and Lowe factory at Huthwaite Road, Sutton in Ashfield, from 1971 to 2001, but wore ear protection after 1989. From 1971 to 1985 she worked in the tights finishing section packing tights. From 1985 to 1995 she was a booton operator; from 1995 to 1997 she was packing socks handkerchiefs and tights; and from 1997 to 2001 she



was packing tights in the sock room, except for a period of about a year in 1997 to 1998 when her packing section was in a warehouse at Fulwood industrial estate while they re-organized the factory. The engineers Mr Hill and Mr Athey are agreed that during the period 1971 to 1997 the Claimant would be likely to have had an average exposure in the bracket 84 to 86.5dB(A)lepd. When Mrs Baker wore hearing protection after 1989 the effect would be to reduce the level below 80. For some 18 years, therefore, Mrs Baker is likely to have been exposed to a noise level that attained 85dB(A)lepd, but did not at any time substantially exceed that level by more than 1dB. That would, however, give her a noise immission level of 97 or 98.

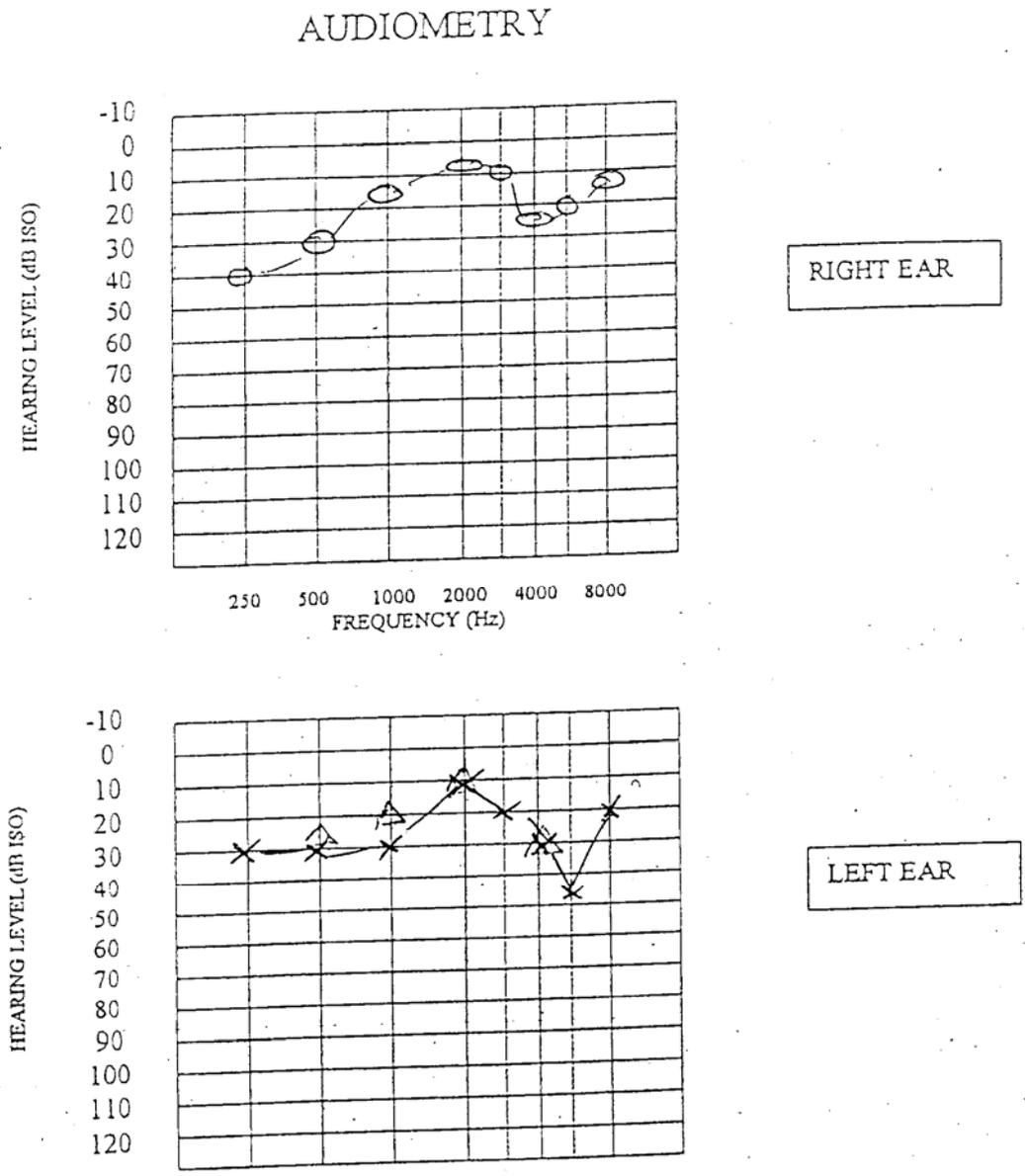
183. Mrs Baker had been to the doctor for her ears at various times: some dizziness, ringing in the ears, wax, and tinnitus in 2000 but hearing loss was not mentioned. She did not in 2000 or 2001 think that there was anything wrong with her hearing. She told Mr Gooder on 31<sup>st</sup> May 2003 that she has to have the volume of the TV turned up more than others would like, and finds conversation more difficult against background noise. For 3 or 4 years she had experienced ringing in both ears that is constant and regularly delays her going to sleep. To Mr McCombe in 2006 she gave a similar description of disability. The tinnitus she described as worse in the left ear, and she had just got used to it. She saw

Mr A J Parker in 2006, and is recorded as saying that she was not aware of a hearing problem until tested by Mr Gooder, but that having been told of it she is now aware of it. She told Mr Parker of tinnitus which he assessed as mild. To Mr Jones she described TV volume, and difficulty with the telephone and in noisy places or talking in a group. She had medium pitched ringing and whistling tinnitus for about 5 years, as described by her to Mr Jones in contrast to the other doctors, left sided tinnitus. In evidence Mrs Baker said that she didn't think there was anything wrong with her hearing in the period 2000 to 2003, but in 2003 her partner complained that she kept putting the TV up, and she saw an advert about deafness that mentioned the Simpson Wright & Lowe factory, so she made enquiries. Tinnitus she had had for longer and saw the doctor in 2000. It was in the left ear, but she has it is both now, a whooshing going on all the time. Sometimes it is a nuisance and sometimes not.



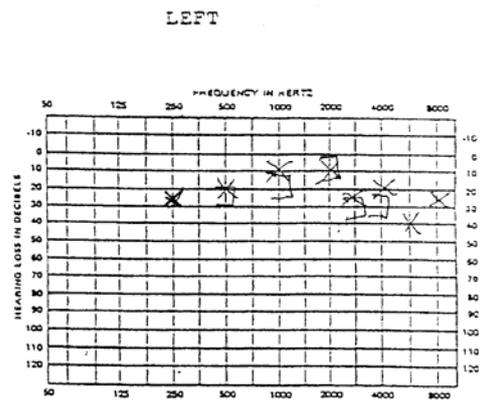
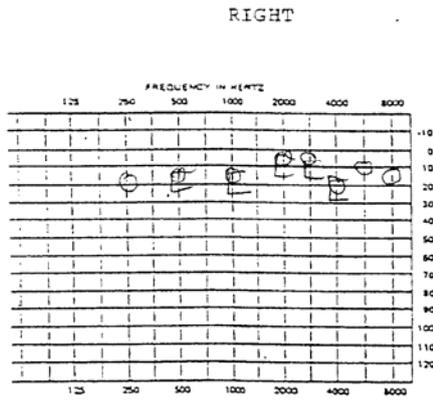
184. Medical evidence was given by Mr McCombe and Mr Jones, though there are audiograms and reports also from Mr Gooder and Mr Parker.

185. Mr Gooder's audiogram of 31<sup>st</sup> May 2003 is:



Mr Parker's audiogram of 10<sup>th</sup> April 2006 is:

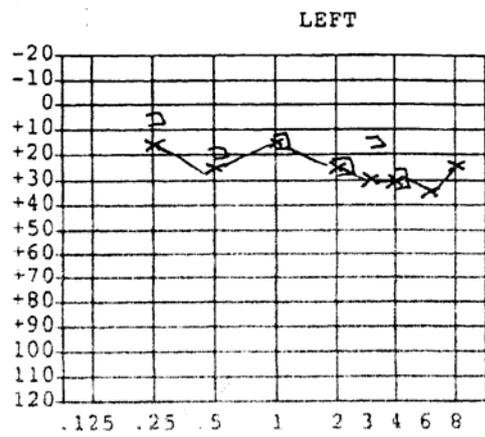
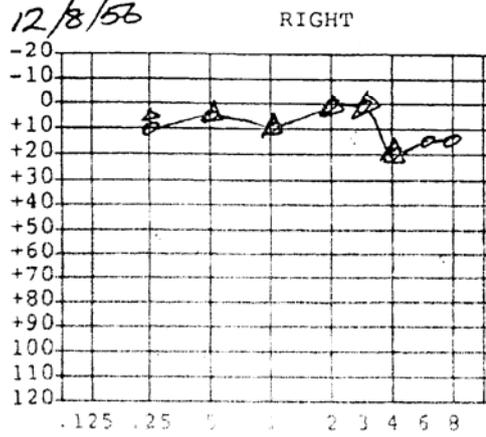




Mr Jones' audiogram of 21<sup>st</sup> April 2006 is:

STEPHANLE BAKER NOISE INDUCED DEAFNESS QUESTIONNAIRE 21/4/06

12/8/53



Mr McCombe's audiogram of 29<sup>th</sup> April 2006 is:

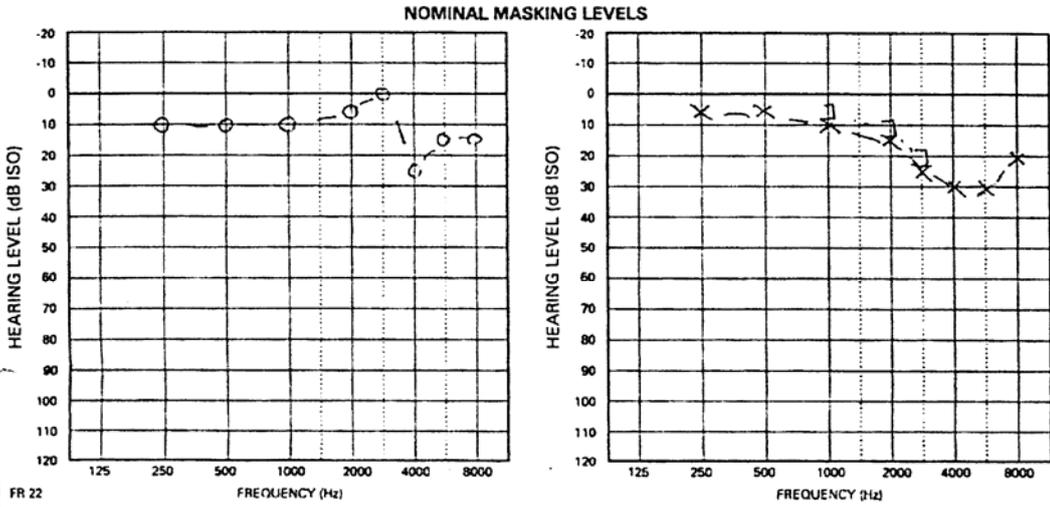


**PURE-TONE AUDIOGRAM**

NAME Stephanie BAKER DATE 29.1.06

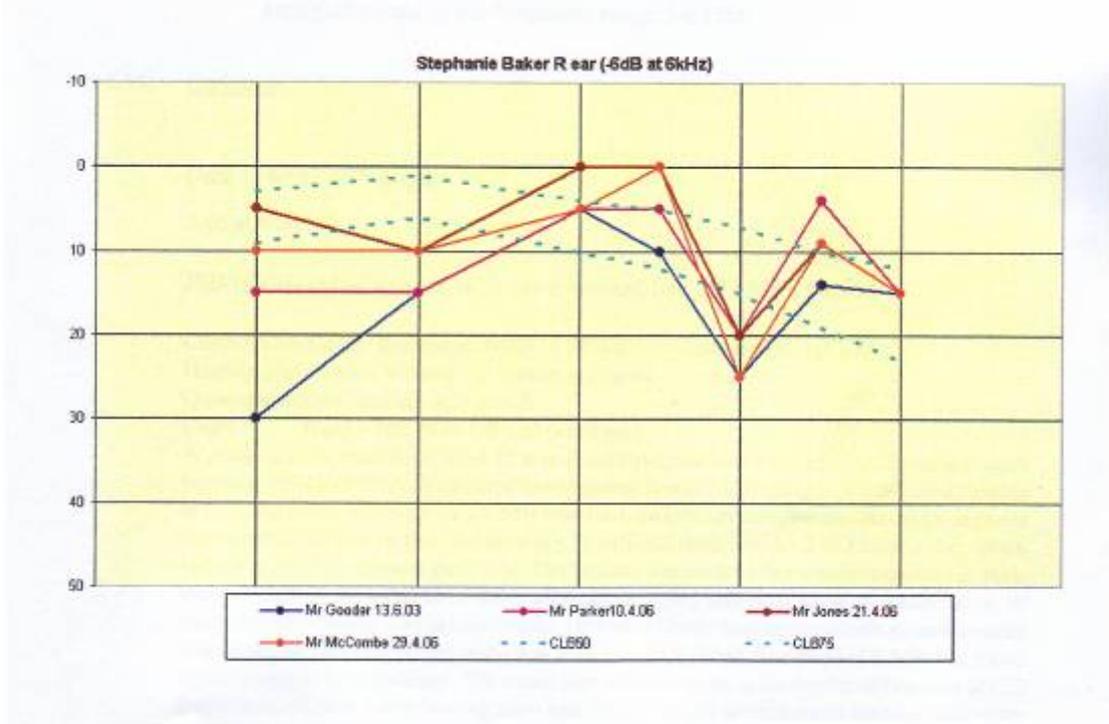
AIR CONDUCTION RIGHT O LEFT X BY SAC (MME3) Kemplac hD29

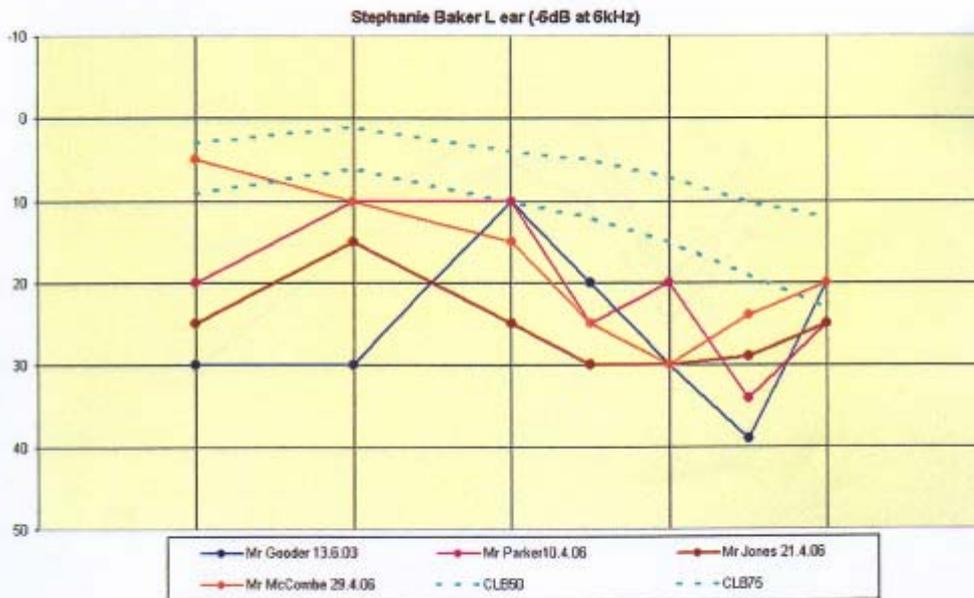
BONE CONDUCTION UNMASKED B MASKED RIGHT □ LEFT □ 6/12/05



186. Mr Huckle's composite charts are:

.5khz 1khz 2khz 3khz 4khz 6khz 8khz





187. Mr McCombe in his report described on his audiogram a fairly classical appearance of high tone and slightly notched hearing loss. Doing a Black Book calculation he came to total disability of 7%, age related disability of 4%, and non age related disability of 3%, which he ascribed to noise. To arrive at that total disability it is necessary to make use of the higher thresholds in the left ear. He attributed causation of the tinnitus in the same proportions, so that 3/7 of the tinnitus was due to noise. Mr McCombe was inclined not to accept significant asymmetry, though accepted in evidence that when Mrs Baker saw Mr Jones something other than age and noise was affecting the left ear. Mr Parker in his report said that the asymmetry was indicative of some non age and non noise loss. He thought that it was reasonable to conclude that Mrs Baker had the very earliest signs of noise induced loss, but that it had not materially disabled her.

188. Mr Jones in his report noted that the loss was asymmetrical, and said that the asymmetry did not come from noise exposure, so that there was another cause at work. He noted also that hearing levels were better now than in 2003. He thought that the left ear might be affected by Meniere's syndrome, and that the characteristics of the tinnitus make it unlikely to be due to noise exposure. She had no disability compared to the average for her age. Though the hearing impairment does not amount

to a frank disability now, to it will inevitably be added the effects of aging, so that a disability will develop at an earlier age than it would otherwise have done. The hearing loss could not be accounted for by age and noise alone, because of the asymmetry. Since some other cause of loss must be at work, the whole loss could be explained by age and the idiopathic cause, without needing to hypothesise noise induced loss. Because of the additional loss in the left ear, a diagnosis of noise induced loss should be based on the right ear alone.

189. In their joint statement Mr McCombe and Mr Jones re-iterate their respective positions, with Mr McCombe saying that if the court decides there is sufficient noise exposure a small component of the sensorineural loss is likely to be due to noise, but with Mr Jones saying:

She has a loss at 4khz in her better ear. If she has been exposed to potentially damaging levels of noise at or above 85dB this may represent a noise induced loss at 4khz at 10 to 20 dB in extent

Mr McCombe and Mr Parker made a joint statement. They agreed that if the court decides that the Claimant has had sufficient noise exposure then a small component of her sensorineural hearing loss will be due to noise. Mr Parker said that it is not possible to quantify the proportion of the tinnitus due to different causes, and that if there is any noise induced loss it has not materially disabled Mrs Baker.

190. In evidence Mr McCombe said he thought Mrs Baker a fairly classic example, easy to diagnose with noise exposure. She is relatively young, with very definite hearing loss and the symptoms that go with it. He said that the high tones and notch are not particularly asymmetrical. There is not huge asymmetry, and the picture is acceptable for generalised noise exposure. He did not agree that the right ear should be considered only. His confidence in the diagnosis did depend on the noise level. It was absolutely wrong to suggest that tinnitus that starts in one ear is not noise induced.

191. Mr Jones adhered to his view that the asymmetry was significant, but agreed that if there was enough noise exposure then the loss at 4khz on the right may be due to noise (He agreed that with enough noise some noise induced loss at 4khz was a probability). She may have impairment, but not disability. There is not much presbycusis, because 8khz is quite well preserved. The hearing on the right overall was better than average. She has no disability now, but the small loss at 4khz will have some small effect, difficult to quantify, in time.



192. Given the years of exposure at or slightly above 85dB(A) I find that I have found, and the clear pattern of the audiogram on the right at 4kHz, I accept that Mrs Baker has sustained a degree of noise induced hearing loss. I accept also that her general hearing is still good, though in time the noise induced loss will have increased effect, together with the effect of aging. I accept that she has some other condition affecting her left ear that has brought about the asymmetry on the audiograms and has resulted in her left ear hearing being worse than the right. She has slight tinnitus. Although she has been to the doctor about it in the past, I do not find it proved that she will wish to undergo therapy for it. I accept Mr McCombe's evidence that the tinnitus may be partly attributable to the noise induced loss, but that can only be established as being a small part, because of the third factor at play that has had a significant effect on her hearing on the left side.

193.. If damages were to be awarded for this slight hearing loss and slight contribution to the tinnitus then the amount that I would award for the whole of the period of her exposure by the Defendants would be £5000. That is at the bottom of the range that is appropriate for any established noise induced hearing loss with any contribution from noise towards tinnitus, and cannot in my judgment get any higher. If I am wrong, therefore, to dismiss Mrs Baker's claim on liability because her employers were not in breach of duty, the award should be £5000

### **Sarah Jane Moss**

194. Sarah Jane Moss, known as Jenny, was born on 26<sup>th</sup> May 1948. She has a complicated work history as evidenced by her NI contribution record which shows over 40 periods of employment, though there may be more continuity of manufacturing employment than appears, through her having two jobs at the same time at some periods.

195. Her principal periods of employment by the Defendants, at Mansfield Hosiery Mills or Mansfield Knitwear, are said to have been:

1963-66  
1968-70  
1971-72  
1973-74  
1990-1994.



The Inland Revenue record, however, suggests shorter periods of employment for the Defendants, particularly in the mid 1960's, a period important for her case as it has developed, when the Revenue record is that she worked of Mansfield Hosiery Mills from 1966

196. She worked mainly at Botany Avenue, but in later years at Ollerton or Alferton. In aggregate the periods of employment may have amounted to 15 years. There is clear evidence, contrary to Mrs Moss' recollection, that the last period was at Alferton and was part time, nearly 26 hours per week, starting on 10<sup>th</sup> May 1993 and ending when she resigned on 5<sup>th</sup> May 1994. Contemporaneous company records are supported by information in a doctor's letter. During this last period Mrs Moss had progressively poor health.

In addition to the aggregate of up to 15 years with the Defendants Mrs Moss had a period working for Meridian at Belvedere Street, Mansfield, from 1977 to 1980 as a mender and also for a time as a supervisor on the evening shift. A claim against Meridian has not been pursued to trial.

197. Mrs Moss' main occupation was as a mender working at a mending table, but also on her account sitting next to machinists at individual machines to check and mend faulty garments as they emerged from the machine. If work demanded it and there was no mending her evidence is that she has done a variety of jobs including lockstitching and tabbing.

198. The engineers Mr Hill and Mr Athey agree that as a mender Mrs Moss' daily leq is unlikely to have exceeded 80dB(A). Mr Athey would have contended on average for under 80. The unknown factor is the proportion of time that she spent machining when not mending, and the amount of mending time that she spent sitting next to a machinist. It is not easy to reach a conclusion about that. There is no evidential basis for saying that it made a substantial difference, and I do not find that she spent a significant proportion of her time sitting next to other people at their machines. 1 or 2 dB(A) lepd on that account might get her above 80dB(A), but not by much. A material part of Mrs Moss' employment from the point of view of noise exposure was a period or periods at Botany Avenue when Mrs Moss worked overtime in the press room after a full day's work as a mender. There is varying evidence about this exposure.

199. In the amended Particulars of Claim it is said that the Claimant:



Worked days 0730-1645 and normally also worked about 20 hours of overtime per week usually in the press room when she would operate the presses as an exception to her normal job as a mender

In her witness statement Mrs Moss said that she:

Worked lots of overtime. I have reached overtime of 15 to 20 hours per week. I worked week after week after work from 5.00pm to 10pm most evenings

In a letter written to her solicitor on 15<sup>th</sup> April 2005 Mrs Moss said:

To the best of my knowledge I worked in the press room on overtime 5pm till 10pm most evenings for 4 months. Then on and off in normal time when no mending was to be done several hours at any one time. These press machines were very noisy

In evidence she said that though she signed the letter the writing is her husband's because arthritis made it difficult for her to write. There was a mistake. It should have said 3 or 4 years, not 4 months. She said that the period of this press room overtime was between the ages of 15 and 18 when she was saving up to get married, which she did at the end of that 4 year period.

200. In a standard form questionnaire on 5<sup>th</sup> December 2003 when dealing with the number of hours worked each week Mrs Moss did not mention overtime, but said

Full time 40 hours  
Part time 25 hours

Though she did mention the press machines. In evidence she said:

Botany Avenue was where I put in most hours. For about 3 years I did a lot of overtime there because I was saving up. Every night Monday to Friday mostly for 3 years. I was working overtime in my young days when I was quite fit and healthy. If you didn't earn money through the day you went to the press room to make your money up. Probably 1963-64, them sort of years. You'd press 100's of garments in a day. I'd do 3-4 hours at a time. It was a hard job. Nobody liked doing it. The presses were very noisy. There were new presses



in the 1970's. After 1968 I was never in the press room on a regular basis. But I did do it.

201. The evidence from the Defendants was that 15 to 20 hours overtime on a regular basis was unlikely. Mr Watson was the insurance and risk manager from 1974-1988. Terence King was in management from 1981. Mike Hallams was a knitter at Botany Avenue in 1968 and in management from 1970. The first two of those witnesses were not there in the 1960's. Mike Hallams was. He said 15-20 hours overtime would be extremely unusual said there was competition for the available overtime.

202. Plainly the shape of Mrs Moss' case on the press room exposure has changed very substantially. On her own evidence now, at its highest, there were 3 or 4 years between the ages of 15 and 18: 1963 to 1967, though the Revenue record does not bear that out. She was not generally a good historian, and the letter written by her husband does not help her credibility. I accept that she may over the years have stood in on different jobs, though she puts the only significant exposure to the press room in the 1960's. On balance, I only find that she was exposed to 15 hours per week in the press room for a period of not more than a few months in the 1960's.

203. The significance of the press room exposure is that there is expert engineering agreement that the press room had a substantially greater noise level than the Claimant was otherwise exposed to. Individual surveys come out in the top half of the 80's, including a GKN survey in 1990 of a mobile supervisor at 88dB(A)lepd. The presses in the 1960's were different presses, though there is no reason to think they were quieter. An average of 3 hours overtime in addition to 8 hours as a mender, if the exposure as a mender at low levels of exposure is taken into account, would come out at a daily dose of 85dB(A)lepd. With 5 hours 86 or 87 would be reached. I find that there was probably a period of not more than a few months in the 1960's when Mrs Moss was exposed to a daily noise dose in the region of 85dB(A)lepd. Otherwise her exposure during the course of her employments by the Defendants is not shown to have exceeded 80dB(A) on a regular basis.

204. Mrs Moss' description of her disability to Mr Gooder in 2003 was that she had a usual collection of problems in hearing for the last 5 or 10 years, with bilateral tinnitus for several years, that inhibit her going to sleep. She gave a similar description to Mr McCombe in 2006, though said she had been aware of problems for 12 years. To Mr Parker she said

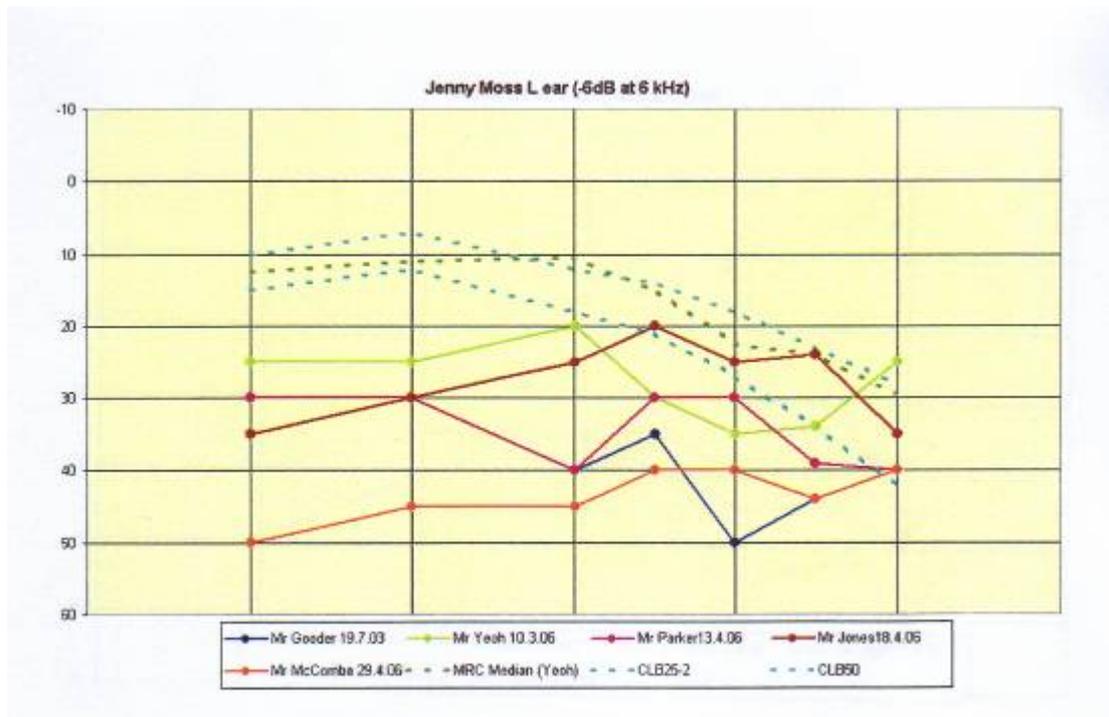


5-10 years, together with intermittent tinnitus. To Mr Jones, she described moderate hearing loss for 10 years, and some tinnitus. In evidence she said that she was aware of a hearing problem 3 or 4 years before she saw Mr Gooder. She was uncertain about the time scale, because she said that a hearing problem just creeps up.

205. The medical evidence was given by Mr McCombe and Mr Jones. Mr Gooder had seen the Claimant in 2003 and there is an audiogram from that time. There is also a report for the Defendants from Mr Parker. Mr Huckle has plotted the various audiograms:

.5khz      1khz      2khz    3khz    4khz    6khz    8khz





206. The audiograms are very variable. There is low frequency loss not caused by noise. The audiograms do not reveal any consistent pattern typical of noise induced loss. Mr McCombe in his report applied the Black Book approach to Mr Gooder's 2003 audiograms, and worked out a total disability of 19%, an age related disability of 5% leaving a non-age related disability of 14%. On his own audiogram the respective figures were 25%, 5% and 20%. But Mr McCombe, taking Mr Gooder's audiogram as the better one more likely to reflect noise induced loss, made further adjustments. He thought that there was a noise induced component, but that in addition to age there is a third idiopathic element. The reasons for this were that the audiogram is very flat, not typical of noise damage, and there had been significant deterioration since 2003. At the time of making his report Mr McCombe did not have the other audiograms. In a joint statement between Mr McCombe and Mr Parker it was agreed that the fluctuations in the audiograms were excessive for re-test variability, and were due either to variable responses to testing, or to a disorder unrelated to noise. They agree that if the Court finds sufficient excessive noise, and Mrs Moss is of average or greater susceptibility to noise, a small component of the overall sensorineural loss will be due to noise. In a joint statement between Mr McCombe and Mr Jones it was agreed that the majority of her hearing loss was caused by aging and an idiopathic cause. Mr Jones did not agree that there was any noise induced loss indicated by the audiograms. Mr McCombe held out for a small component being caused by noise if the court finds enough excessive

exposure to noise.

207. In evidence Mr McCombe accepted that he was not basing his diagnosis of noise induced loss on audiometric features, and that this was one of the most difficult of the cases, because of a big idiopathic component. He said that the whole picture should be looked at: The noise exposure that Mrs Moss describes, the symptoms that went with that (that was, a description of coming home with ringing in the ears), and hearing loss greater than one would expect from age alone. He accepted that if the noise levels were very much less than the levels he assumed, that would affect his diagnosis:

“Between 82 and 84, I think that her noise induced component would be I am going to use the word modest, but would be there, because she has history that suggests. If the history shows that her noise exposure is 80/81 think I think I would have to say I would be pushing my own credibility to stand here and try and say that it is noise induced”

208. Mr Jones’ position was that there was no indication on the audiograms of noise induced hearing loss, and that it is not sufficient to identify hearing loss and noise exposure and say, in the absence of an appropriate audiogram, one has caused the other. If the noise exposure was below 85 his position throughout was that he would not find that the noise had caused hearing loss.

209. The facts that the audiograms are not characteristic of noise induced loss and that there is a further cause of loss in play apart from age, together with exposure to noise at best in the low 80’sdB(A) except for a very short period in my judgment mean that it is not possible to find that Mrs Moss’ hearing loss is noise induced.

### **Margaret Grabowski**

210. Margaret Grabowski was born on 23<sup>rd</sup> October 1950, and was 56 on the day that she gave evidence in this case. She joined Pretty Polly from school in 1966, but did not work in noisy surroundings until she went to No 3 Factory at Kirkby Folly Road in 1968, as an overlocker on a Rimoldi machine until April 1970. She then spent 2 months doing similar work at Tudsbury’s, followed by up to a year at Towl & Cursley. She worked as an overlocker at Wood Bastow for 2 years from September 1971. She then returned in 1973 to Pretty Polly, working for them at Kirkby Folly Road until December 1975. Finally she returned to



work for them in 1978, working full time until 1988 and then part time, about 26 hours per week, until December 1997. So in all she spent about 23 years at Kirkby Folly Road as an overlocker, and something over another 3 years doing similar work for other employers.

211. Mrs Grabowski says that she worked on the same machine throughout, and that when the working area was re-configured from time to time she moved with the machine, which for part of the time was designated as No 24, though the number changed as the machine was moved. She also says that her machine was one of the noisiest, and recognised to be so.

The overlockers were on piece work, and Mrs Grabowski says that she had her machine set fast by a mechanic, and that she let the machine run on between workpieces because that was the quickest way of getting through work. The management disapproved of this practice, so that some machines had a magic eye put in, that prevented the machine from running when there was no fabric in it, though hers never did. It is not necessary to go into the speeding adjustment point, but the effect of running on would be that a higher proportion of time would be spent with the machine running, and so the overall dB(A)leq would be greater. Mrs Grabowski's evidence to this effect stands uncontradicted, since Pretty Polly decided during the trial to call no factual evidence. The engineering evidence for the Claimant was given by Mr Hill. In the event the Defendants did not adduce evidence from their expert, Mr Worthington. The effect of Mr Hill's opinion is that Mrs Grabowski's exposure would have been in the region of 85dB(A)leq when working full time, but that if she allowed her machine to run on or if her machine was noisier than the average the noise levels would be correspondingly higher. Her evidence is not contradicted, but nonetheless is to be looked at critically. I accept that her machine was noisier than the average, and that she did let it run on, though the extent she let it do so can't be known. She certainly would not have her machine on continuously through the day. Nonetheless, these two features do bring the likely exposure up, though it can't be found that she was exposed to 89dB(A)lepd constantly, which is the highest that Mr Hill would go taking into account those 2 features and the surveys from 1982 onwards. I find that Mrs Grabowski's average exposure in full time employment was in the bracket 85 to 87dB(A)lepd.

212. From sometime in the 1980's hearing protection was available and worn by Mrs Grabowski. As described the first ones, like cotton wool encased in plastic, were Bilsom plugs. Later there were sponge ones, and in the 1990's dispensers with EAR ear plugs. Mrs Grabowski said that



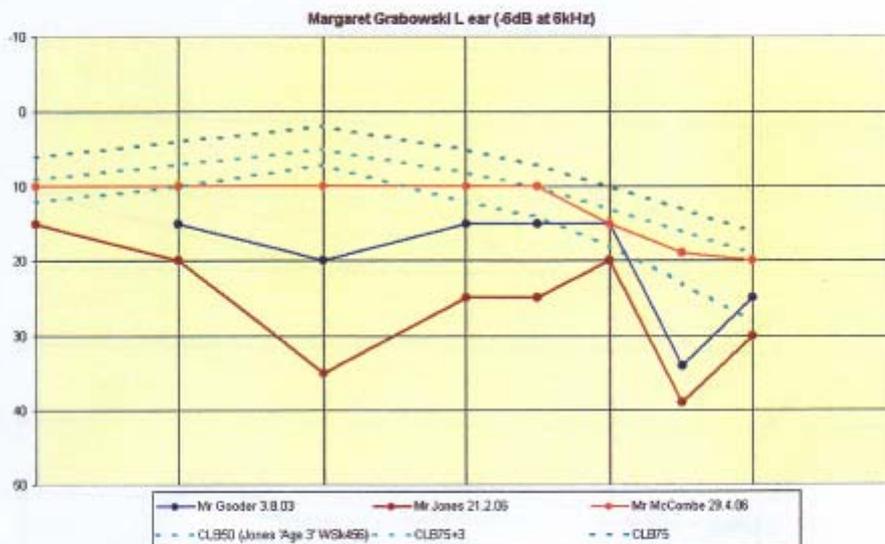
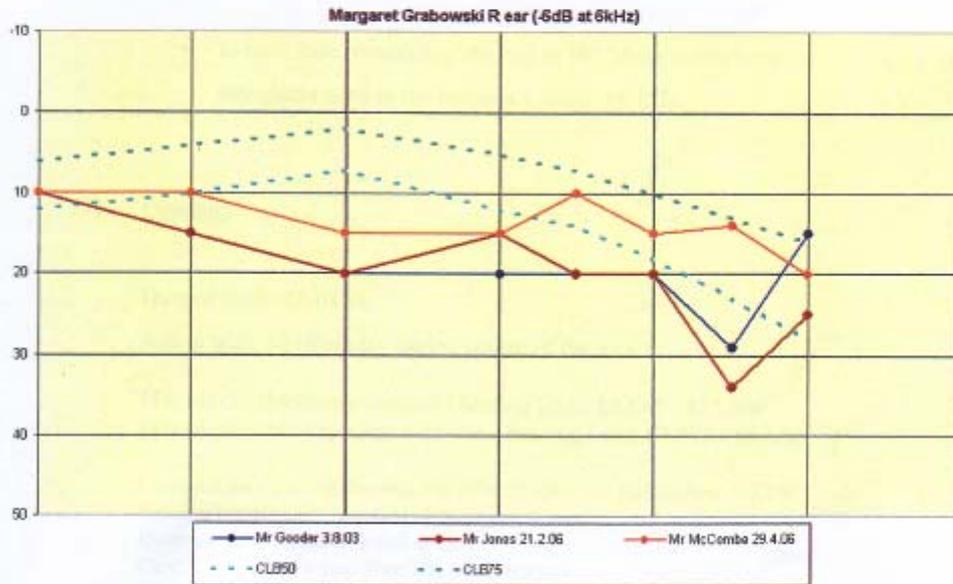
she had no instruction about how to fit them. She used to take the plastic off the Bilsom ones. They nonetheless seemed to dull the noise a bit. Her evidence that she received no instruction in how to use the plugs stands uncontradicted. There is evidence that not fitting them properly, and not using them through the whole day, greatly impaired their effectiveness. If properly worn all the types of ear plug concerned could be expected to attenuate the noise reaching the ear by 10db. Allowing, as I do, for a possible degree of inefficiency (though unless Mrs Grabowski felt they were doing some good she would not have worn them at all) I find that after she began to wear ear plugs in the 1980's she was not exposed to a noise level of more than 80dB(A)lepd. She has at times said late 1980's, and she and other witnesses have spoken of the mid 1980's. Mr J Butler carried out a noise survey in June 1985 and in his report of October that year recommended that ear protection be made available to employees exposed to noise levels in excess of 85dB(A), which suggests to me that despite his similar advice in 1982 ear protection was not then generally available in the making up areas. It seems to me consistent with the evidence of the Claimant that sometime after this report ear plugs were made available and that she began to use them. I find that she wore ear plugs from not later than the end of 1986. She was therefore exposed to noise in the bracket 85 to 87 dB(A)lepd at Pretty Polly for a total of some 13 years, plus 3 years or so taken to be about the same level of noise, for other employers. That would give her a noise immission level of about 98.

213. Mrs Grabowski answered a Vendside advertisement in the local paper and saw Mr Peter Gooder on 3<sup>rd</sup> August 2003. In her statement she said that but for the test she would not have known that she had deafness, let alone industrial deafness. She is alright talking to someone when she can see their face so she can lip read, and had difficulty with the door bell, and the television volume up higher than is comfortable for her husband. She also describes tinnitus, as being like a seashell whistling noise in her ears, that used to stop her going to sleep, though she has adjusted to it so it does not affect her so badly now. In evidence she said that the tinnitus was as if you put a sea shell to the ear, with a high pitched noise. Sometimes it goes on quite a few minutes, and sometimes only a minute or two. She is more aware of it now that she knows what it is.

214. There are audiograms from Mr Gooder 3 August 2003; from Mr Jones for the Defendants from 21<sup>st</sup> February 2006 and Mr McCombe for the Claimant from 29<sup>th</sup> April 2006. Mr Huckle's charts are:



.5khz      1khz      2khz 3khz 4khz 6khz 8khz



215. To Mr Gooder on 3<sup>rd</sup> August 2003 she described the symptoms of deafness as having been present for some 10 years, and that in addition to the above features they included difficulty on the telephone. Applying the



Black Book to his audiogram Mr Gooder found bilateral and virtually symmetrical sensorineural hearing loss, of which he put hearing loss at 10.66dB averaged over 1, 2 and 3 KHz; total disability 10%, of which 4% was non noise induced and 6% noise induced. To Mr McCombe she described a high pitched siren and low pitched sea shell noise over many years, and difficulties on the telephone and hearing the television and speech against background noise of which she had been aware for about 10 years. Mr McCombe's audiogram is very different from the others and shows less hearing loss as well as an audiogram without any characteristic signs of noise induced loss. Using the Black Book applied to the median expected loss (though the other audiograms suggest that CLB75 may be the appropriate comparator) Mr McCombe assessed her disability as 7%, with the non age related element, which he ascribed to noise, at 2%. He graded the Tinnitus as moderate, and apportioned its cause in the same proportions as the causes of hearing loss: Two seventh's due to noise. He accepted that if the Black Book figures that he used were adjusted to a different database, his audiogram might show no noise induced disability at all, but he said that Mrs Grabowski's was a nice case, one of the easier ones of all that he had looked at in these cases. He was struck by her description of her working environment. He felt very strongly that the excess hearing loss represented a noise induced element. He plainly would have been prepared to diagnose on the basis of his own audiogram, but "putting the whole picture together like pieces of a jigsaw" his opinion was strengthened by the other audiograms which showed a notched appearance.

216. Mr Jones said "This lady's hearing is normal". Her hearing loss is average for her age. It is appropriate to use Mr McCombe's audiogram as being the best, and that shows no hearing loss. Notching at 6khz is not indicative of noise induced loss. Later he said that if Mr Gooder's and Mr Jones' audiograms are accepted then the notch at 6khz could be due to noise. However, he said that it would not give rise to any disability. In the range 2 to 4khz some noise induced loss would bring forward the time of disability when aging takes effect, but not at 6khz, which he said was a frequency that had no effect on hearing ability.

217. Mr Jones said that the tinnitus as described to him, several minutes a few times a week could not be regarded as abnormal. If it was as described to Mr Gooder, then she has tinnitus. There was in fact a high frequency match on Mr Jones' audiogram. Moreover, the description to Mr McCombe of putting the snooze facility on her radio on in order to mask the tinnitus and get to sleep was one that he found compelling. The description given to Mr Gooder and to him was of tinnitus that was more



prolonged than to Mr Jones, or in evidence. Mr McCombe felt that the tinnitus was present generally, and described it as “fairly classical and typical tinnitus”, even though it might bother her only intermittently. Mr Jones said that if there had been noise induced hearing loss, and tinnitus reported to him lasting a reasonable length of time he would have said that the noise and tinnitus may be associated.

218. I do not find Mrs Grabowski’s case easy. One reason is that Mr McCombe would have been prepared to diagnose noise induced hearing loss on the basis of his audiogram, together with the history of exposure, and his audiogram simply does not support the diagnosis at all, either in terms of there being significant impairment, or in terms of the shape of the audiogram. It is an example of the approach of relying on feel and on clinical judgment which is really underpinned by a view that a number of years’ noise exposure as described means that probably there is at least a minor degree of noise induced hearing loss. For reasons that I gave earlier I do not think that that is an approach that can be adopted by the court. That is not the end of the matter, however, because the other audiograms give bilateral notches, albeit at 6khz, and the overall noise dose gives a noise immission level of 98. In the end I do not feel able to ignore Mr McCombe’s audiogram. No reason was given why it should be set aside. Even if a “take the best audiogram approach” advocated here by Mr Jones can’t be decisive, that audiogram does undermine the picture at 6khz given by the other two. I do not therefore think the evidence is clear enough to enable a real degree of noise induced loss to be established on the balance of probability.

219. On the case against Pretty Polly, therefore, I find that the Defendants were in breach of their duty to Mrs Grabowski for about 2 years in the period 1985-86, but that no damage has been proved. If it had been proved that in that period she suffered noise induced hearing loss, it would not have helped the Defendants to say that she would not have worn protection. She did so as soon as it was available to her, and I think she would certainly have worn it at any time if provision of hearing protection had been accompanied by proper information and instruction.

## **Joan Elizabeth Hooley**

220. Joan Elizabeth Hooley was born on 30<sup>th</sup> May 1959. She worked from 1975 when she left school at Mansfield Hosiery Mills at Ollerton as a presser and folder. She remained there until 1978. She has settled a claim for noise induced hearing loss against them in respect of that period. Thereafter she worked for the Defendants, Guy Warwick Limited, as a presser until the factory closed in December 1992, except for a period from April 1984 until January 1985 when she was on maternity leave. She worked for about 8 months 5-9pm, and thereafter full time. The full time hours were 8am to 5pm Monday to Thursday and 8am to 1pm on Friday. In a full day there was an aggregate of 1 hour in breaks.

221. Guy Warwick made suits: Jackets and trousers. Mrs Hooley was one of several press operators down whose line of presses a garment passed in turn, having one or more parts of it pressed by each machine. The presses were in one corner of the factory, though it was an open plan factory and the rows of other machines, mainly lockstitch machines, were nearby.

222. Mrs Hooley's exposure to noise was the subject of engineering evidence from Mr Hill and Mr Worthington. There are no noise surveys from Guy Warwick. Moreover, initially Mr Hill thought that the presses were comparable to those at Mansfield Knitwear Co, whereas they were not. Presses for jackets and trousers are different and quieter. Mr Steven Bond is and has for many years been in business supplying and servicing such presses, and he was able to identify the types of press at Guy Warwick because he used to mend their presses for them. That led to a visit to a factory in Essex where similar machines are to be found working still. The surroundings were much quieter than must have been the case at Guy Warwick. Moreover only one press was working at a time. Nonetheless readings for a cycle on each machine have been used as a starting point, and the noise levels adjusted upwards to take into account continuous working; several machines working at once; and the background of a busy factory. The presence of the wireless may also have had some effect. In the first period of her employment Mrs Hooley was using a hand iron, albeit on an ironing bed that incorporated a vacuum pump, and that is likely to have been quieter than some of the other work she did after 1985. On the other hand, if there were periods when machines ran noisy because of wear, the noise would be higher. Nonetheless there seems to me to be a consensus that the possible spread of exposure was from the high 70's dB(A) to a maximum, on a worst case



basis, in the region of 82dB(A). I do not think it possible to take the evidence further than to find, as I do, a noise level of about 80dB(A) lepd, with the possibility of the overall average exposure falling into a bracket 78-82.

223. At Mansfield Hosiery Mills, Ollerton, between 1974 and 1978 Mr Hill says the levels would have been 87-88dB(A)lepd. That is an estimate based on much better evidence. Mr Kent's attack on Mr Hill for being prepared to be selective in treatment of the evidence left the witness' credibility largely undamaged, and I take Mr Hill's estimate of exposure in those years to be right.

224. Mrs Hooley in her statement said she used to come home from work and would be shouting rather than talking, and her husband told her, so she would regulate her voice. Her hearing seemed to be okay, and after she had finished work for a little while everything seemed fine and there did not seem to be any long term damage. In 2003 her mother and sister had heard of Meridian claims and got her in the end to fill in a questionnaire and she was put in touch with her solicitors.

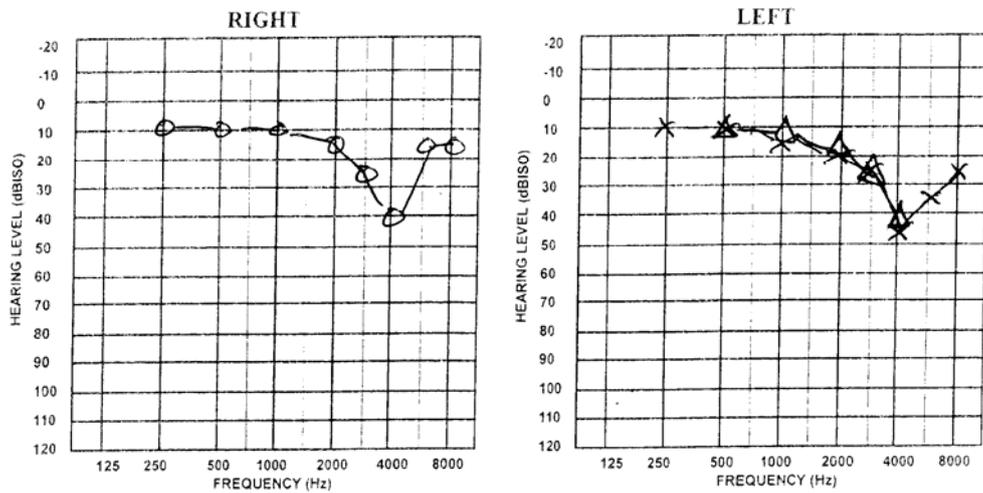
To Dr Rajput she is recorded as saying that she had difficulty with conversation against background noise, though that seems to me to have been in answer to a direct question. To Mr Parker she is recorded as saying that she had been aware of a hearing problem from sometime in the 1980's (something she said in evidence she did not tell him). She shouts, can't always understand her children, and has the television turned up high.

225. In evidence Mrs Hooley said that 10 years ago her husband used to ask her why she shouted all the time and had the television turned up. She put it down to being in a factory where it was loud and shouted when she got home. She has problems of loud talking now, and her children are indistinct, but she is not concerned about the problems, though she has been told they will get worse.

226. The medical evidence was given by Dr K Rajput, a consultant Audiological Physician at Great Ormond Street hospital, and Mr A J Parker, consultant Otolaryngologist at the Royal Hallamshire Hospital in Sheffield. There is a conflict of opinion based on differing audiograms. Dr Rajput's was the first taken, on 31<sup>st</sup> May 2003 at the Renaissance Hotel, South Normanton, a day when she was seeing a number of potential claimants who had responded to the Vendside advertisement.

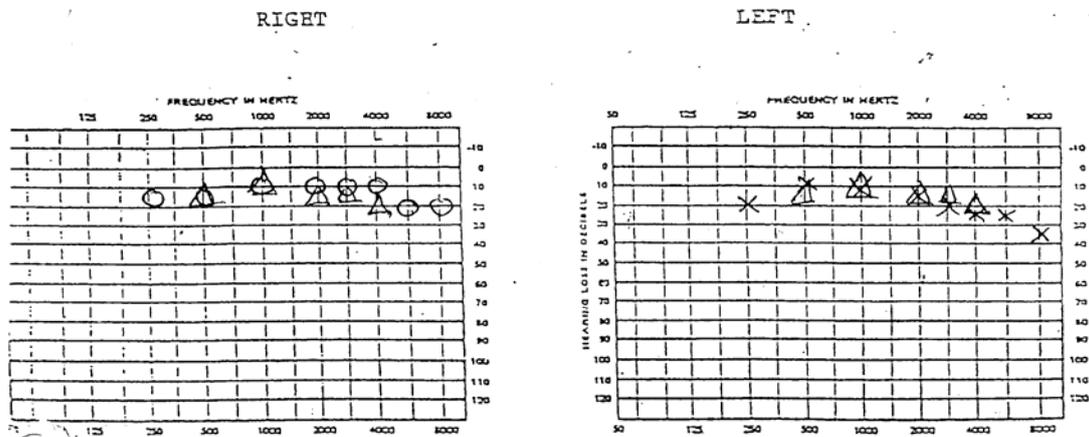


The audiograms, taken by Dr Rajput's technician, show a striking notch at 4khz bilaterally:



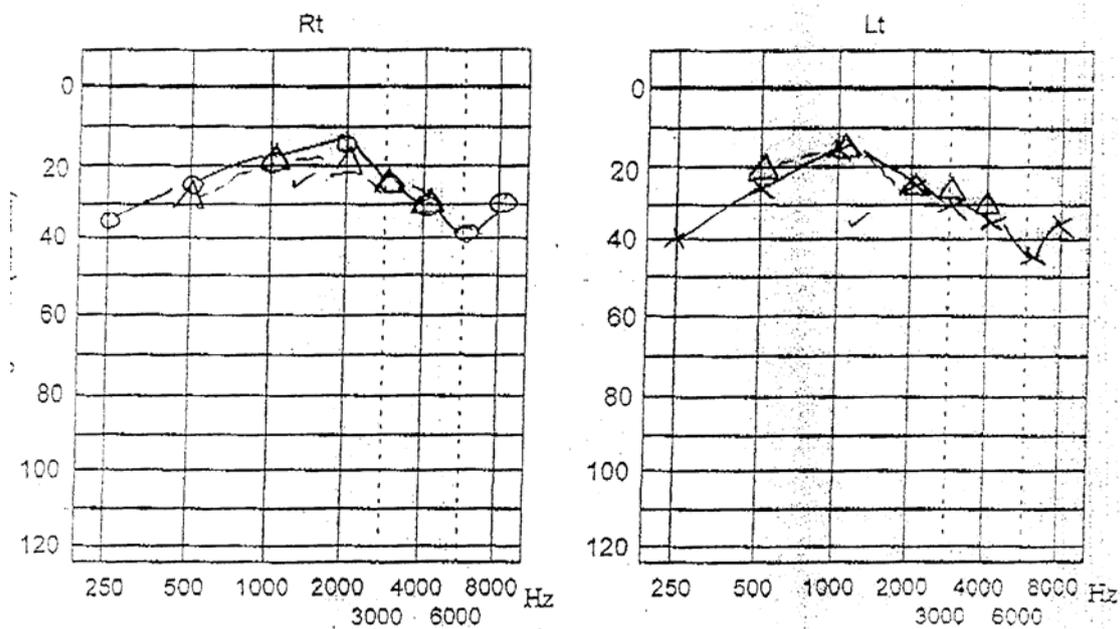
227. There is agreement that, assuming a level of noise exposure that might cause hearing loss, this audiogram is typical of noise induced hearing loss. Dr Rajput averages over .5, 1, 2 and 4khz, since from her experience in practice she attaches importance to the 4khz frequency as a speech frequency. That average gives an overall hearing loss of 19.5dB. Applying the expected age related loss from the table in the 2000 Coles and others diagnostic paper she deducts 8.5dB for aging and arrives at 11dB NIHL.

228. In February 2006 when Mr Parker took his audiogram he came out with a significantly different picture:



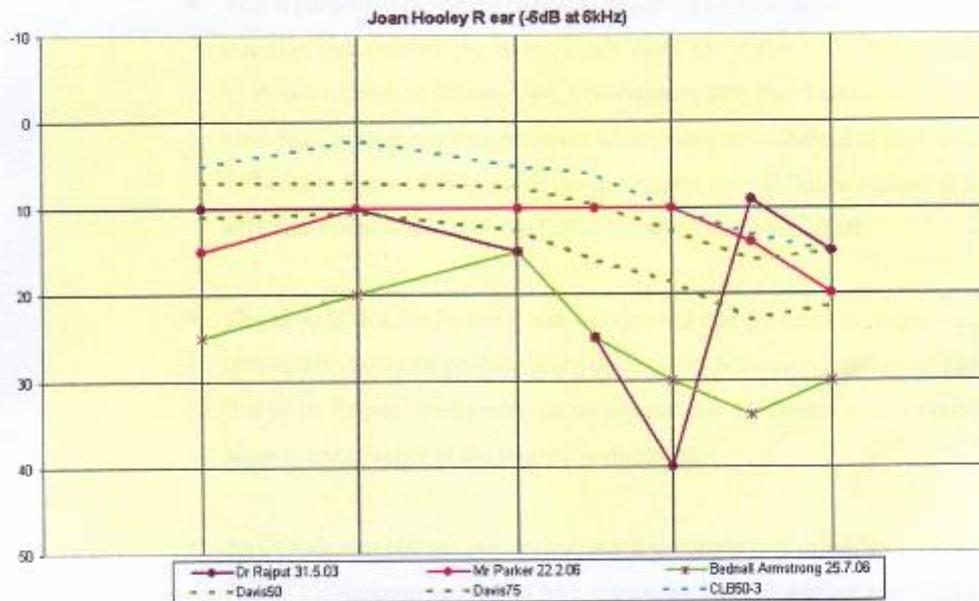
The audiogram is basically flat; it has less overall hearing loss, and tails away in the higher frequencies without a notch. Averaged over 1, 2 and 3kHz on the DSS formula the binaural hearing loss is 11dB. All the thresholds are within the range of normality for a 46 year old except for 8kHz on the left, where the 35dB loss is not caused by noise. I think that Dr Rajput would agree that if Mr Parker's audiogram reflects the true hearing levels, it does not provide evidence of noise induced hearing loss.

229. A third audiogram was therefore commissioned, which was carried out by Armstrong-Bednall Hearing and Audiology Services on 25<sup>th</sup> July 2006. The result is:



The result of all three audiograms plotted by Mr Huckle is:





230. Dr Rajput says that there is correlation between her audiogram and that of July 2006. The variations at 1-4kHz do not exceed the margin of error of 10dB; the thresholds are consistent with each other, but not with Mr Parker's; there is a notch at 6kHz; the low frequency loss may result from a cold or respiratory tract infection, but in any event does not relate



to noise. The thresholds which she is prepared to accept, worked out on the DSS basis over 1-3khz, give an overall hearing loss of 21dB, and a NIHL of 10.4dB.

231. In evidence Dr Rajput said that except for 6khz on the right her audiogram and the latest one are within the recognised margin of error. The shape and the position of the notch has changed, but a notch at 6khz though it can have other causes may be caused by noise. She thought Mr Parker's audiogram should be disregarded. Where there is such discrepancy it is not right to accept the one giving the best thresholds as being right. One of them is wrong. It is best to take the two audiograms where the thresholds match quite closely. It is less likely that 2 audiograms 3 years apart are wrong about the thresholds than one other that does not agree. Two out of three are a better guide than one out of three. Moreover, if, as she says, Mrs Hooley is showing symptoms of some hearing loss, that is more consistent with the thresholds of 2003 and July 2006, since with Mr Parker's thresholds, symptoms of hearing loss would be less likely.

233. In evidence Mr Parker said his concern about the July 2006 audiogram is the low frequency loss. It is not explained by middle ear disease, but is sensorineural. The abnormality on the right in the accompanying tympanogram is probably an artefact, caused for example by sneezing. The notch is the crux of the case. There is no consistent notch formation when the 3 audiograms are taken together. In particular the 4khz notch formation is not replicated. In the 3<sup>rd</sup> audiogram if the adjustment is made for calibration error at 6khz the notch disappears on the right and is only 5dB on the left. There is nothing about the 3<sup>rd</sup> audiogram that suggests noise deafness. Promoting the cause of his own audiogram, he said that audiometric error tends to be in the direction of deafness, because it is difficult for a person being tested to give false responses consistently in the direction of better hearing than they actually have.

234. Mr Kent, applying the 2000 guidelines to the third audiogram to select a likely percentile appropriate for Mrs Hooley's aging did an exercise to demonstrate that the hearing loss is not significantly greater than would be expected from aging alone.

235. The clash of the audiograms in this case is very striking. The levels of likely noise at Guy Warwick are such that for her to suffer noise induced hearing loss in that employment is quite unlikely. However, there was a period of 4 years exposure at Mansfield Hosiery Mills at levels of



87 or 88dB(A) which was much more likely to have caused noise induced loss, and that cannot be left out of account. In the end I am not satisfied that such loss is proved, because the notching feature of Dr Rajput's audiogram has not been repeated. Assuming, as I am prepared to, that Dr Parker's audiogram is the odd one out, because the hearing thresholds are so far out of line with those of the other two audiograms, there is still the problem that the third audiogram does not replicate the notch at 4khz. In each ear the apparent notch is at 6khz, and not 4 as on Dr Rajput's audiogram, and recovery from the low point at 6khz is only 5dB to 8khz, not a feature that can be regarded as a firm notch. If I am wrong about that, though, given that the exposure at Mansfield Hosiery Mills is much more likely to have caused noise induced hearing loss than that at Guy Warwick on the levels I have found I should not have been able to attribute the impairment to Guy Warwick in any event.

236. For the reasons given above I do not find the employers liable for damages for noise induced hearing loss in any of the seven cases.

