IN THE NORWICH COUNTY COURT **CASE NO:10PE10889**

(SITTING IN SOUTHEND-ON –SEA)

BETWEEN:

JOHN CRAN

Claimant

and

PERKINS ENGINES COMPANY LIMITED

Defendant

JUDGMENT

1 This judgment follows a 4 day hearing listed on 12th and 13th April 2012 and 22nd and 23rd October 2012. It was a case of considerable complexity requiring an analysis of conflicting medical evidence and scientific publications in an area of particular specialism. I have to say that from a judicial perspective, it is difficult to envisage a more unfortunate scenario than a case of this nature commencing on a date in April 2012 and concluding 6 months later. While I recognise the professional commitments and diaries of the medical experts and the inevitability of some delay when hearings are adjourned part heard, the lengthy delay between hearings meant resulted in considerable time spent re-reading the expert evidence given at the first hearing (all of which had been transcribed) before being in a position to continue the hearing in October 2012.

2 I am firmly of the opinion that the case management of the case from April 2012 onwards was inefficient. Had I been invited in box work to expedite the time span between the two hearings, I am sure that a more constructive listing outcome could have been achieved which would have avoided the inordinate

delay between the hearings and enabled the claimant, an elderly man, to have learned very much earlier whether or not his claim had been successful.

3 By way of final commentary, I was advised during the course of the resumed hearing in October 2012 that there was a judgment pending in the Liverpool County Court involving similar issues (and in which one of the experts in this case [Mr Andrew Parker] had given evidence). In those circumstances, I took the view that if the scope of the evidence in the Liverpool case was similar, it would be helpful for me to see the judgment in that case –even though it was a first instance case - before giving my judgment in this case. Written submissions were therefore submitted to me on 30th November 2012 after the judgment had been handed down in the Liverpool case. I was able to dispatch this reserved judgment to the parties' representatives by email on 14th December 2012.

4 **Background to the claim**

Mr John Cran ("the claimant") who is now aged 82 years, has brought a civil claim for damages alleging that as a result of his exposure to excessive noise in his workplace between 1956-1977, he suffered noise induced hearing loss (NIHL) which could have been averted had he been provided with appropriate hearing protection by his employers, Perkins Engines Company Limited ("the defendant"). The claimant's case is that he had exposure to excessive noise at work during a period of at least 20 years. In the event that the claim is successful, it is agreed that the claimant should receive general damages of £3,325 in respect of hearing loss attributable to his work conditions at the relevant time.

5 The defendant accepts breach of duty in respect of the provision of hearing protection between 1963 and 1977 when sound surveys revealed that there were noise levels in excess of 85db and often up to 90db in the factories where the claimant worked. Breach of duty (ie negligent exposure) was admitted in open correspondence on 23rd June 2011.

6 It is therefore accepted by the defendant that if the claimant can establish, on balance of probability, that any hearing loss suffered by the claimant was attributable to conditions within his workplace, he is entitled to agreed general damages. However, by reference to various audiograms undertaken by the claimant from 1984 onwards, the defendant denies that any hearing loss suffered by the claimant was caused by the conditions in which he worked. Accordingly, the critical issue between the parties which I have to decide – and which is hotly debated between the medical experts –is whether any sensori-neural deafness from which the claimant currently suffers (and which is not disputed between the parties) is consistent with excessive noise exposure or whether such hearing loss has been caused by unknown aetiology for which the defendant cannot be held responsible.

7 On the face of it, therefore, the issue is relatively straightforward. The claimant was not called to give evidence and the oral evidence was confined to expert medical evidence from two witnesses, Mr Jack Lancer and Mr Andrew Parker, both of whom are consultant ear nose and throat surgeons. With the assistance of the experts, the court was required to scrutinise numerous audiograms and I was invited by both counsel to apply guidelines which are the subject of significantly different interpretation as between the experts. I was also presented with a lever arch file containing hundreds of pages of published material and research papers upon which the claimant relied in support of his claim.

8 The experts placed reliance on the audiograms which were undertaken by the claimant in 1984, 1986,1988 and 1990. They recognised that audiograms performed on 1st July 2010 and 18th June 2011 for the purpose of preparing their respective reports did not show features typical of noise induced hearing loss and were therefore of no evidential value in relation to the claim. The experts agreed that the recent audiograms showed that the claimant had features of non-noise, non-age deafness of unknown cause which could not be quantified in terms of causation or degree.

9 **Audiogram**
An audiogram is presented as a form of graph and records hearing thresholds as part of a hearing test in which, conventionally, an individual wore a set of headphones and sat in a booth responding to emitted noises which were played at set frequencies starting at 250 hz up to 8 khz. The test depended on the reliability of the participant in responding to the noises at the various frequencies and the accuracy of the audiogram results as a diagnostic tool has come under considerable scrutiny particularly as it was accepted by both experts that the type of headphones used for testing deafness in the 1980s [TDH39 headphones] may have created inaccurate recordings. In many cases the shape of the audiogram enabled a simple diagnosis of NIHL to be made, assuming that there was a history of noise exposure. The conventional patterns was for the frequencies at 3,4 and less often 6khz to be the most seriously affected with recovery in the higher frequencies thereby creating a ski slope effect with what is called "notching" at one of those three frequencies, most commonly at 4khz. However, there are often a significant number of variables when analysing the results of audiograms undertaken a long time ago which has led to differences of expert opinion and contested litigation.

10 There have been much published data and surveys reflecting detailed analysis by distinguished scientists which has provided a yardstick for determination by the court of the likelihood of a claimant having suffered actionable NIHL in the work environment. The most recent important publication which has been central to this case has been a set of guidelines provided by Professors Coles, Lutman and Buffin from the MRC Institute of Hearing Research at

Nottingham University and published in the Journal of Clinical Otolaryngology in 2000.

11 **The Coles, Lutman guidelines**
The preamble to this important paper contains the following summary: These guidelines aim to assist in the diagnosis of noise induced hearing loss (NIHL) in medico-legal settings. The task is to distinguish between possibility and probability, the legal criterion being "more probable than not". It is argues that the amount of NIHL needed to qualify for the diagnosis is that which is reliably measurable and identifiable on the audiogram, The three main requirements for the diagnosis of NIHL are defined: R1 high frequency hearing impairment; R2 potentially hazardous amount of noise exposure; R3 identifiable high frequency audiometric notch or bulge. Four modifying factors also need consideration: MF 1 the clinical picture; MF2 compatibility with age and noise exposure; MF3 Robinsons criteria for other causation if any; MF4 complications such as asymmetry, mixed disorder and conductive hearing impairment.

12 It is the modifying factor MF4 (asymmetry) with which the court has been particularly concerned in the present case.

13 The study referred to a probable diagnosis of NIHL where there was a history of unprotected noise exposure of high level and long duration, a typical audiometric notch maximal at 3,4 or 6khz and no evident complicating factor or diagnostic competitor. However, the study also recognised that there were many other cases where the diagnosis was much less certain and where NIHL was usually accompanied by age associated hearing loss (AAHL) and sometimes additional forms of hearing impairment. The diagnostic task was then reduced to that of defining the likelihood of the presence of a component of NIHL in the overall hearing impairment.

14 Under general remarks, the authors commented:
Inevitably guidelines are a matter of judgment, They should be interpreted as guides, not rigid rules. Nevertheless, these guidelines have been derived after careful consideration of the data available and keeping in mind the legal criterion the diagnosis should be likely "on balance of probabilities" or "more likely than not".

R3(a) and (b) - the audiometric configuration requirement, required evidence of the probable presence of noise induced hearing loss if there was a downward notch in the audiogram in the 3-6khz range large enough to be identifiable with a reasonable degree of confidence. The audiometric diagram reproduced in the publication showed a typical or classical high-frequency downward notch at 4khz with recovery in the higher frequencies which would represent a strong diagnostic factor where there had been noise exposure.

However, the authors of the publication concluded that notch at high frequency had to be sufficiently large to meet a diagnosis of NIHL with the hearing threshold at 3 and/or 4 and/or 6 khz, after any due correction for earphone type, was at least 10 decibels greater that at 1 or 2khz and at 6 or 8 khz,

15 The 10dbs can be reduced by 3 dbs in certain circumstances. Note 3 on page 269 of the guidelines in Appendix A stated as follows:
If an average of two, several or many hearing threshold measurements at the relevant frequencies in a particular ear can validly be used, the "at least 10 db or greater" guideline may be reduced slightly, by up to about 3 dbs, In borderline cases, an average of all the audiograms available and acceptable for averaging should be uses in assessing the evidence for or against the presence of high -frequency hearing impairment, notch or bulge. To this end, when testing the hearing of a case that seems borderline in any of these respects, it will usually help to carry out one or more retests at the defining frequencies with repositioning of the earphones between tests. The results of each retest should be plotted on the audiogram and/or tabulated in the report.

16 Modifying factors
The category of "modifying factors" made reference to the mode, nature and age of onset and progression of the auditory symptoms including prominent temporary post exposure auditory symptoms and the fitting and use of hearing aids which resulted from recurrent noise exposure.

17 The authors of the study also stated that if the diagnosis of NIHL seemed borderline then the audiometric data should be checked for compatibility with Robinson probability tests to uncover other causation ie a scheme of statistical tests leading to eight criteria each of which was expressed at two levels of probability based on 95% and the 98% limits of normal distribution. Robinson's criterion for asymmetry could on its own be very helpful in defining whether measured left/right differences were to be considered acceptable or excessive or perhaps having some particular explanation such as asymmetrical noise exposure.

18 Note 11 stated as follows:
Note 11:
In yet other cases there is no apparent explanation for the presence of a significant NIHL-like notch or bulge on one side only. These cases are compatible with the presence of NIHL but with varying degrees of probability. For instance:

(1) if one ear meets R3(a) or R3(b) and the other ear also shows a notch or bulge but it is smaller that the 10db or 20db required then the probability of NIHL is still high.

(2) If one ear is markedly better at high frequencies and shows a significant notch or bulge but the worse ear shows little or no trace of such, then there is still a

more likely than not probability of NIHL; the greater hearing impairment in the worse ear may be due to some unidentified cause additional to NIHL and ordinary AAHL that additional disorder having hidden or obliterated the noise induced notch or bulge.

(3) In other cases where there is not much difference between the two ears at high frequencies but without apparent explanation only one ear shows a significant notch or bulge and the other shows little or no trace of one; such cases should be regarded as very borderline and be decided on the strength of other evidence eg the severity of noise exposure or of temporary post-exposure symptoms.

(4) Finally if only the worse ear at high frequencies shows a significant notch or bulge and there is little or no trace of NIHL in the better ear, then there is only a possibility of NIHL not a probability.

19 Before setting out the issues and evidence in the case, I shall refer, at this stage in my judgment, to various other research papers to which the court was referred and which were relied upon in support of the claimant's case that he had suffered from NIHL and was entitled to damages from the court.

(a) **A paper by Alberti, Symons and Hyde published in 1979** and entitled Occupational Hearing Loss –The Significance of Asymmetrical Hearing Thresholds

(b) **A paper by Chung et al published in 1983** entitled "Lateral Differences in Susceptibility to Noise Damage"

(c) **A paper by Barrs et al published in February 1994** entitled "Work Related, Noise Induced Hearing Loss: Evaluation including evoked potential audiometry

(d) **A paper by Segal et al published in 2007** and entitled "Asymmetric Hearing Loss in a Random Population of Patients with Mild to Moderate Sensorineural Hearing Loss"

(e) **A paper by Lutman &Coles published in 2009** entitled "Asymmetric seinsorineural hearing thresholds in the non-noise exposed UK population: a retrospective analysis"

(f) **A paper by Fernandes and Fernandes published in 2010** and entitled "Medicolegal Significance of Asymmetrical Hearing Loss in cases of Industrial Noise Exposure"

20 The claimant asserted NIHL could be established in the present case on balance of probability relying on Note 11 of the Coles, Lutman and Buffin guidelines (as set out above) alternatively that the asymmetrical pattern of the hearing loss as between the claimant's ears could nevertheless justify a finding of NIHL having regard to the conclusions of the authors of the publications set out above with particular reference to the paper by Fernandes published in 2010. The defendant's case, crisply put, was that the audiometric evidence on which the claimant was bound to rely in support of his claim and particularly the asymmetry shown on the audiograms did not meet the diagnostic criteria

in Note 11 and pointed to the "possibility" rather than the "probability" of NIHL in the claimant's case.

21 **The audiograms**

1984 audiogram

Mr Lancer, on behalf of the claimant, gave evidence that in the higher tones there was a significant notch in the left ear. The left ear was consistently worse than the right ear. At 6 khz, the left ear hovered at between 40-50 dbs whereas in the right ear it hovered between 10 and 15 dbs. There was asymmetric notching which was present in the left ear.

In cross-examination, Mr Lancer agreed that if a 54 year old in 1984 could hear at -10 db (4khz) in the right ear this indicated excellent hearing at very high frequencies and that this was an unlikely reading. When Mr Lancer looked at the average results on the 1984 audiogram (the peaks and troughs) he agreed with counsel that the most common notches would be at 4khz and that there was no notch at 4khz in the right ear. By comparing the averages at the frequencies 4, 6 and 8 khz in the right ear, he agreed that there was no notching.

22 Mr Parker on behalf of the defendant contended that the 1984 audiogram showed a notch in the left ear at 6 khz. The appearance was consistent with noise exposure but this was not replicated in the right ear (the less deaf ear). Looking at the 1984 audiogram, Mr Parker could not make a diagnosis of occupational noise deafness because there was a diagnostic indicator on one side only and there was no notch present in the right ear. In his opinion, if a diagnosis were to be made there would have to be evidence of symmetrical or bilateral hearing loss. The notch in the left ear had arisen as a result of a factor which produced one sided hearing loss. This did not arise where there was occupational noise exposure all around. The non-age, non-noise factor had obliterated any diagnostic indicator for noise induced heating loss. The claimant had good hearing in his right ear in 1984 -within the clinically normal range –and there were no diagnostic indicators of NIHL and very little threshold elevation after nearly 30 years of exposure.

23 **1986 audiogram**

Mr Lancer gave evidence that at 6khz there was a significant notch in the left ear with recovery at 8khz. There was no such notch in the right ear at 6khz or at any other of the higher frequencies.

Mr Parker stated that the 1986 audiogram showed asymmetric hearing loss which was worse in the left ear. The right ear showed a similar pattern from 1984.

24 **1988 audiogram**

Mr Lancer stated that at 4khz (but not at 6khz) there was a notch in the left ear. In the right ear at 6khz the hearing threshold climbed to -10 (an upward

directional movement from the dip). There was some shallow notching at 10 and 20 dbs in the right ear.
In the 1988 audiogram, Mr Lancer accepted that there was no apparent notch in the right ear if a comparison was made between the average result at 4 khz (12db) and at 8khz (16db) but there was notching in the left ear at 4,6, 8khz. Mr Parker contended that the 1988 audiogram showed that the claimant had excellent hearing in the right ear (for his age) with no features of noise deafness

25 **1990 audiogram**
Mr Lancer stated that the audiogram indicated a very deep notch in the left ear up to 8khz with some notching in the right ear at 3-4khz. There was asymmetry between the two ears. Mr Lancer agreed that an analysis of the audiogram result in 1990 did not support notching in the right ear but that there was notching in the left ear at 2,3,4,6 khz.

26 Mr Parker said that this audiogram showed no diagnostic indicator of noise induced hearing loss in the right ear .In the left ear there was a progression of hearing loss (a progression at 3khz from 15 dbs in 1984 to 42 dbs in 1990) but the right ear had remained "rock solid". In his opinion this did not equate with occupational noise hearing loss.

27 **Mr Jack Lancer**
Report dated 1st July 2010
Mr Lancer examined the claimant on 1st July 2010 when he was 80 years of age. The claimant told him that his hearing had deteriorated over a 3 year period and that he found it difficult to hear in noisy surroundings. He wore bilateral hearing aids from which he benefitted. Mr Lancer identified bilateral mixed hearing loss of moderate severity from an audiogram which he undertook in July 2010. He said that in both of the claimant's ears there was a fall off from the lower to the higher tones with a conductive element present. The hearing losses were, in his opinion, far too great to be accounted for by ageing alone.

28 Mr Lancer commented in his report:
"Notching around 3,4 or 6khz is supportive of noise induced hearing loss subject of course to the history but the absence of such notches does not exclude excessive noise as having contributed to the hearing loss, subject to certain facts in the history which include a history of excessive noise with sound intensity levels exceedings 85db and negligence on the part of the employer in not providing hearing protection…
…It has been commonplace in recent cases to refer to the Coles' criteria with regard to supportive evidence for noise induced hearing loss, however those criteria relate to uncomplicated and typical cases and cannot be applied to this case. In any event there are losses over and above what would be expected for ageing and those causes based on my experience will be due to factors I have

already referred to. It is my absolute belief that excessive noise has contributed to the hearing loss and had he not worked in noisy occupations, his hearing thresholds would have been better than they are"

29 **Oral evidence**

In his oral evidence, Mr Lancer confirmed his opinion that noise induced hearing loss had caused the claimant to suffer sensorineural hearing loss which had affected the inner ear. He said that only a minority of 80 year olds had an audiogram which was comparable to the results of the claimant's audiogram in 2010. This indicated that there was an additional cause for the results demonstrated on the claimant's audiogram. He considered that the claimant's description of a ringing in his ears while he worked for the defendant ("following finishing a shift and going home ….with the ringing starting to dull off when I had been at home for a while") was an indication that the claimant had been exposed to loud noise which had directly affected his hearing and was a "modifying factor" [ref: Coles Guidelines] to be considered in the assessment of causation in the present case.

30 Mr Lancer advised the court that he agreed with Note 11 of the Coles Guidelines (which he had referred to in his report) but he suggested that the findings of the other research papers (quoted above) and particularly Fernandes suggested that asymmetry did occur when there was "all over noise". In his opinion, from recently published papers, there was support for his view that despite asymmetry shown on the claimant's audiograms, he had suffered noise induced hearing loss. He said that in a workplace there might appear to be all over noise but in fact there might be reverberations of machines which led to one ear receiving more noise than the other ear and the ears not recovering equally (or at the same speed) from exposure to noise.

31 In cross-examination Mr Lancer agreed that in order to satisfy the diagnostic criteria for NIHL laid down in the 2000 Coles paper, all three criteria (R1-R3) had to be met. The third criteria referred specifically to the shape of the audiogram and the presence of notching in one or both ears. Mr Lancer agreed that the frequencies of 3,4 and 6khz were the ones most affected by noise exposure and that these higher frequencies had to be set against the anchor points of 1,2 or 8khz. Mr Lancer agreed that the hearing loss (or an identifiable notch or bulge) at 3,4 or 6khz had to be 10 decibels greater than at 1,2 or 8khz in order to meet the Coles criteria of "likelihood" of NIHL. He agreed that the results of the audiogram in July 2010 were very different (particularly in the claimant's right ear at 5khz) from earlier audiograms and that the audiograms undertaken in 2009 and 2010 revealed no notches or bulges which were diagnostic of noise damage.

32 Mr Lancer agreed that notching or bulging was most common at 4khz and that at the time of the claimant's recent audiograms there had been no evidence of a worsening condition at this frequency. He contended that even though the

audiograms did not produce diagnostic factors for NIHL according to the Coles guidelines, they were guidelines only and that there were many causes of hearing loss. He agreed that where the audiograms showed no significant notch or bulge, additional and unknown disorders might have disguised or obliterated the notches. He told the court that despite the best investigations, it was often not possible to find a specific cause of hearing loss. In his opinion, if someone had been exposed to noise (as the claimant had been in the present case over a substantial period) in circumstances where noise emission levels were known to cause hearing loss, it seemed "illogical" to rule out noise as being a cause (maybe one of several causes) of the hearing loss. In his view, ageing, noise and other unspecified causes were, on balance of probabilities, contributory factors in the causation of the claimant's hearing loss. The whole picture which had to be looked at to establish causation. Notches which did not appear on the (recent) audiograms may well have have been concealed as a result of an additional disorder suffered by the claimant (eg diabetes) which would mask the findings of the audiograms. He considered it very unlikely indeed that the claimant had or continued to suffer from otoscleorsis but he accepted that this disease did cause conductive hearing loss of the type shown on the recent audiograms and as such could not be ruled out as a possible diagnosis of hearing loss in this case.

33 He agreed with the suggestion from counsel that the 1990 audiogram showed the claimant's hearing in the right ear to be virtually in the normal range but that in all the audiograms between 1984 and 1990 there had been some low frequency loss. He did not accept, however, that this suggested other potentially significant causes which had affected the claimant's hearing between 1984 and 1990. Mr Lancer accepted that, aside from the words in the claimant's statement, there was no direct evidence to support a claim that for a period of one hour after work when the claimant had suffered from "ringing" in his ears.

34 Mr Lancer agreed that while some of the earlier audiograms (which were self-recorded by the claimant) produced unusual and possibly unreliable results – for example in 1984 when the audiogram showed the claimant having (a) ranges at 6khz of between 32 and 52 dbs in the left ear [also a reading at 2 dbs] and (b) erratic responses at 6 khz of between -10, +25, +5 dbs in the right ear –the evidential value of the audiogram results should not be ignored. The results were not so spurious, in his opinion, that they failed to establish a hearing threshold level. He accepted, however, that in 1984 , in view of the claimant's age at that date, it was very unlikely that he would have been able to have heard 8 db at 4khz as shown on the audiogram. Mr Lancer agreed that there were some erratic spikes shown on some of the earlier audiograms which pointed to the claimant pressing the button incorrectly

35 Mr Lancer agreed that in 1984 there was a significant difference in the hearing between the two ears at 4khz (20 dbs) and at 6khz (36 dbs). He conceded that

by applying Note 11, the audiogram findings in 1984 created a "possibility" rather than a probability that the claimant's hearing loss had been caused by noise. He also accepted that the various audiograms indicated that there was a notch in the left ear at 6khz at 40 dbs in 1984, at 45 decibels (6khz) in 1986, at 25 dbs (6khz) in 1988 and at 40 decibels (6khz) in 1990. The inconsistent reading in 1988 was probably attributable to a technical problem with the audiometer.

36 In relation to the 1986 audiogram, Mr Lancer agreed that the left ear was the worst ear and that the significant differences between the readings at 4khz and 6 khz (more than 10dbs) meant that within the guidelines there was a "possibility" of noise induced hearing loss but not a probability. The same "possibility" of noise induced hearing loss also applied to the 1988 and 1990 audiogram findings. Mr Lancer confirmed that the audiogram which he undertook of the claimant in 2010 had showed no features of noise induced hearing loss.

37 Mr Lancer said that the conclusions of the Fernandes paper were important in terms of identifying asymmetrical findings on audiograms and their association with noise. He agreed that asymmetric hearing loss was more evident in truck drivers who may have had asymmetric noise exposure. Mr Lancer did not know if the claimant had been exposed to any asymmetric noise exposure. He said that the various reports should be taken on their own merits, their findings studied even if the methodology in the different reports was different. In his opinion, the various papers indicating the presence of asymmetry when there was all over noise led him to conclude that there was a probability that the claimant had suffered noise induced hearing loss in the workplace.

38 In re-examination, Mr Lancer said that his global impression of the 4 audiograms (1984,1986, 1988 and 1990) was that the claimant had bilateral hearing loss which was worse at higher frequencies, worse in the left ear in general with marked notching in the left ear and the possibility of notching in the right ear.

39 **Mr Andrew John Parker**
Report dated June 2011
Mr Parker examined the claimant on 18th June 2011. In his written report following examination, he referred to the claimant's "significant degree of hearing loss" which was both sensorineural and conductive in nature. There was no evidence of noise deafness on the audiogram undertaken in July 2009. He referred to the earliest audiogram test in 1984 which showed "distinct notch formation" at 6khz in the left ear but not repeated on the right. The presence of asymmetry meant, in his opinion that this was not noise induced hearing loss. He reported that as time went by there was increased hearing loss in the left ear and any asymmetric notch at 4-6khz was not present on the right

side and was therefore "not representative of occupational noise exposure". Because there was evidence of significant non-age/non-noise loss it was not possible to use the thresholds at 8khz as an anchor point to determine the percentile on which the claimant lay in relation to presbyacusis. There was "reasonable evidence" to support his conclusion that the claimant had deafness from ageing and also from non-age/non-noise factors. There was no evidence of noise deafness.

40 **Oral evidence**

In his oral evidence, Mr Parker clarified that a diagnosis of noise induced hearing loss was made on the following basis:

(a) a credible history of exposure to noise on an unprotected basis
(b) a hearing loss reasonably in excess of that expected for the age of the individual
(c) audiometric evidence of noise induced hearing loss (NIHL) which was evidenced by repeatable and reproducible findings across the audiograms which went outside measurement error and was represented by bilateral hearing loss (with a very few exceptions)

He confirmed that NIHL did not progress once exposure ceased and that no new diagnosis would emerge once exposure ceased.

41 He confirmed that the 2009/2010 audiograms showed no diagnostic indicators of NIHL but did show significant hearing loss. The claimant's hearing had deteriorated very considerably. In the 2009 audiogram the claimant's hearing was so poor that some of the thresholds were outside the limit of the audiometer. The claimant could not hear noise at 100 decibels.

42 Mr Parker said that his opinion was supported by the Coles guidance and the specific note that if only the worse ear at high frequencies showed a significant notch or bulge and there was little or no trace of NIHL in the better ear then NIHL was a possibility not a probability. He challenged the report of Fernandes ("a bad report") and suggested that 200 cases or so had been pulled off the shelf by the authors who had decided that the individuals had been noise deafened. He said that Fernandes definition of asymmetry was not really asymmetry and that they had a very low hurdle for describing an audiogram as asymmetric whereas Coles and Lutman's definition of asymmetry required meeting a much higher hurdle. The Coles paper looked at asymmetry which had probably been present before noise exposure took place.

43 Mr Parker said that Coles and Lupman in their later paper had wanted to distinguish an individual who had pre-existing asymmetric hearing who was then exposed to noise (which had not caused the hearing loss) from bilateral hearing loss which had probably been caused by occupational exposure. He remained firmly of the opinion that asymmetry had nothing to so with noise.

44 In cross-examination, Mr Parker staid that he regularly gave evidence in deafness cases and that his work ratio was approximately 60% acting for claimants,40% for defendants. His opinion had remained that asymmetric results did not support a finding of NIHL. He said that in someone aged 80 there was a good chance of a notch being flattened out and that it would be rare to see a notch formation in someone of that age. He accepted that the claimant had a credible history of exposure to noise within R2 of the Coles guidelines.

45 Mr Parker said that if the claimant had had the same changes in his right ear as in the left, he would have told the court that, provided the claimant had been exposed to noise on an unprotected basis, then on balance of probabilities, he had been noise deafened in the workplace. However, there had been no changes or deterioration in the better hearing right ear from 1984-1990. In the 1986 audiogram there was virtual parity between the ears at 8khz but a significant notch in the left ear at 6khz (45db in left ear/15dbs in right ear) and asymmetry at 4khz (25db in left ear/15 db in the right ear). There was significant asymmetry between the ears in 1988 (right ear 10db at 6khz/left ear 25 dbs at 6khz). In 1988 at the higher frequency (8khz) the left ear was only slightly worse than the right ear but at 4khz there was a significant notch or bulge at 4khz with little or no trace of a bulge in the right ear. The lack of any notch or bulge in the right ear meant that there was no diagnostic indication of NIHL in that ear with a corresponding lack of diagnosis in relation to the left ear. The 1990 screened audiogram showed a right ear with near normal hearing and an unexpected deterioration in the left ear which was not (in his opinion) attributable to age or noise.

46 It was suggested to Mr Parker that an allowance should be made in respect of the testing procedure adopted in 1986/88 to reflect the fact that the TD8 headphones which were then used for audiograms sometimes showed a notch at 6khz and that the threshold could be higher at 6khz than was really the case. It was suggested to Mr Parker that if an allowance of 6dbs had been made to reflect the margin of error, then for the 1988 audiogram this would create a notch at 6khz (11-6db) in the right ear. While Mr Parker was prepared to accept the possibility of a notch in the right ear on the 1988 audiogram (and probably shown in the 1986 audiogram if it was appropriate to use 6khz as an anchor point), he reiterated his evidence that the claimant had been unable to satisfy a bilateral diagnostic indicator. He did not accept that there was a diagnostic indicator on both sides which was consistent with noise exposure the more so in respect of the left ear. He said that the claimant's situation was very different from truck drivers (the sample group in the Fernandes paper) who were a well accepted group who suffered asymmetrical exposure while driving a truck where the engine emitting significant noise had been in the cab next to the driver.

47 In relation to the Lutman paper (2009) Mr Parker said that the authors were looking to see if the two ears had different susceptibilities but that at the end of the paper, this was discounted. Their conclusion was no more than an observation that NIHL appeared to be greater in one ear rather than another. The 2708 volunteers for the Lutman paper were not noise exposed and those who had been were excluded from the survey. Lutman used 4 frequencies which was a very much more detailed and accurate analysis than that undertaken by Barrs whose paper was based only very low criteria (an assessment of asymmetry at 2khz). Similarly in the Segal paper the criterion for asymmetry was very easily satisfied and produced results which were incorrectly ascribed to an all round view. Chung in his paper had noticed differences between the hearing at 2khz and had found an inherent susceptibility of the ear to noise at 20db but this was not a sound basis for diagnosing NIHL. In Mr Parker's opinion, the authors of the papers (Chung, Barrs and Alberti) had concluded that there had been NIHL based on inadequate consideration of the individual characteristics of those who had participated in the surveys including the incidence (or otherwise) of unilateral exposure. The better methodology would have been for a panel of experienced clinicians to have appraised each of the work histories and then to have made a diagnosis from the audiometry.

48 Mr Parker said that the weight of evidence and research did not show the susceptibility of one ear to noise and he remained of the view that there was no NIHL unless there was bilateral exposure and bilateral deterioration of the hearing in each ear. Adopting the Coles guidelines, he said that if one ear met the criterion for NIHL and there was a small 2dbs bulge in the other ear, this would not meet the "likelihood" test for NIHL as set out in the Coles paper.

49 In Re-examination Mr Parker confirmed that even if allowance were made in the works audiograms for the fact that the TDH39 headphones were used which might have distorted the findings in relation to hearing loss, there was still no notch in the claimant's right ear in 1984 and 1986 at 6khz and 8khz. In 1988 and 1990 there was no notch in the right ear by reference to the 8khz anchor point and he confirmed that whether or not the headphones had been used for the earlier audiograms, there still remained no proven notch in the right ear from 1984-1990. Mr Parker agreed with the conclusions in the Lutman &Coles paper that many hearing asymmetries in the general population could be expected to be of unknown causation. He considered that the approach of Fernandes (a minimum of 15db for any one frequency between 0.25 and 6khz) was a very low hurdle to jump in order to make a diagnosis of asymmetric loss.

50 **Findings**

I have considered the evidence very carefully and I am satisfied that the presentation of the evidence by Mr Parker on behalf of the defendant was innately more rigorous and methodical than the evidence adduced by Mr

Lancer on behalf of the claimant. Mr Lancer, when preparing his report, had not seen the works audiograms spanning the period 1984-1990 and proceeded to arrive at a conclusion on liability in relation to NIHL which was at best superficial and at worst inaccurate particularly as he subsequently admitted that the two audiograms which were undertaken at the time of his report in July 2010 (air conduction and bone conduction) had no diagnostic indicators of noise induced hearing loss. In my judgment, Mr Lancer, having been advised that the claimant had been exposed to excessive noise levels during his working life and having concluded that the bilateral hearing loss in 2010 was too great to be accounted for by ageing alone, proceeded to make an assumption (which I find was unjustified on the presenting evidence) that "his (the claimant's) noisy occupations have made a contribution to the hearing loss" and furthermore that it was his "absolute belief" that excessive noise had contributed to the hearing loss.

51 Mr Lancer then proceeded in his report to use an arbitrary basis to apportion the contribution which he believed exposure to noise had made to the claimant's current hearing loss (paragraph 10.3/10.4 of his report) and which he admitted in evidence could not be assessed accurately having regard to other possible idiopathic causes for the claimant's current hearing loss. Although he referred in his report to the Coles criteria, he then proceeded to discount the applicability of the guidelines to the facts of this case on the grounds that the criteria related to "uncomplicated and typical cases" which could not be applied in the claimant's case because the hearing losses in 2010 were over and above those expected for ageing. However, when he gave oral evidence, Mr Lancer conceded the applicability of the Coles guidelines to the issue of causation in the present case. When he was taken to the four works audiograms (1984,1986, 1988, 1990) –which had not been addressed in his report –he was prepared to concede in cross-examination that in the absence of diagnostic factors and having regard to the asymmetrical presentation of the claimant's hearing as between the ears at the higher frequencies, that the evidence of noise exposure and unexplained hearing loss created a "possibility" of NIHL rather than a "probability". In my judgment Mr Lancer was bound to make these concessions having studied the earlier audiograms and I respected his professionalism in this regard. However, having made the concessions in relation to the Coles guidelines, he then set about trying to justify his conclusion that, nevertheless, on balance of probability, the claimant had suffered NIHL by suggesting that the peak values at one frequency could be compared with the trough values from another, This was not a justifiable approach to the audiometric evidence and, in my judgment, undermined his professional credibility as an expert witness.

52 I firmly reject the submission made by Ms Presland on behalf of the claimant that the audiograms complied with Note 11(1) and (2) of the Cole guidelines in that they showed clear notches in both ears and that, as such, there was NIHL. Moreover, I reject her argument based on selective scrutiny of the

audiograms that there was (a) very little asymmetry (b) that Note 11 was a "red herring" and (c) that the evidence establishes a "straightforward case of NIHL". This was not the evidence given by Mr Lancer in cross-examination where he specifically referred to the "possibility" of NIHL and I am entirely satisfied that, contrary to the claimant's contention, the audiograms (1984-90) provided no direct evidence of NIHL within the Coles guidelines.

53 I find that there was clear evidence of asymmetry evidenced by the works audiograms which required a proper and scientific analysis and explanation, Mr Lancer fell back upon general factors (eg the fact that the claimant had stated in his statement that he had had ringing in his ears) to provide justification for his "absolute belief" that the claimant's noisy work environment had contributed to NIHL. I find that, in the face of clear evidence from the audiograms and the concessions which he made in the course of his evidence that this represented a misguided attempt by Mr Lancer to find a feature of the evidence (which was entirely unsubstantiated) to justify his conclusion that the claimant suffered from NIHL.

54 For his part, Mr Parker, while robust in his view was (as I find) an impressive professional witness. I much preferred his interpretation of the various audiograms to the interpretation given to them by Mr Lancer. His evidence pinpointed the applicability and relevance of the Coles' guidelines. He was clear that the works audiograms between 1984 and 1990 showed no evidence of bilateral/symmetrical notching and that if there had been NIHL he would have expected there to be notching in both ears due to the claimant's relatively young age at the time when the audiograms were undertaken. He was also clear that there had been no asymmetrical exposure. He considered that the claimant had not suffered NIHL because there was progression of hearing loss in the left ear several years after the exposure had ceased which suggested non-noise, non-age cause for the left sided hearing loss. Having heard both experts I was entirely persuaded by Mr Parker's careful medico-scientific analysis of the issues in the case and his firm assertion that notches in the left ear which were not reproduced in the right ear during the exposure made a diagnosis of NIHL only one of several possible explanations for the claimant's hearing loss.

55 I also considered that Mr Parker's defence of his position was not so blinkered as to permit of no concessions; for instance he conceded that the 1988 (and possibly the 1986) audiograms just met the 10db requirement (R3:Coles guidelines) but only if 6khz was used as an anchor point. However, this was only one of 8 possible measures in 1988 (between 250hz and 8khz) and I endorse Mr Parker's view that this did not support an overall finding that the claimant had suffered NIHL. Mr Lancer admitted that the left ear was the worse ear in the period 1984-90 and that the absence of notching in all four audiograms in the right ear meant that Note 11 (2) did not apply. I am entirely satisfied, having regard to the Coles guidelines (which I find should inform

my evaluation of the likelihood or otherwise of NIHL in this case) that the claimant has not made out his case on causation of NIHL and that save for the isolated notches on the 1986 and 1988 audiograms (which may be unreliable and are based on an adjusted reading at 6khz), there is insufficient evidence before the court to justify a finding of "probable" NIHL as opposed to "possible" NIHL. Accordingly, Note 11 [1-3] of the Coles guidelines is not satisfied and I find that the claim sits squarely within Note 11 [4].

56 The claimant has sought to rely upon various research papers –and particularly Fernandes [2010] which drew on earlier publications –since the Coles guidelines in order to persuade the court that any asymmetrical hearing loss shown on the audiograms nevertheless supported a conclusion that the claimant suffered NIHL. I have read all the papers and have taken on board the respective experts' views given in oral evidence relating to the findings in the Fernandes publication (and other publications). I have noted in particular that the Fernandes publication was aimed at proving a connection between noise exposure and asymmetry for compensation purposes. It used the 2009 Lutman and Coles paper as a comparison but the cohorts compared were incomparable. Lutman/Coles used a definition of asymmetry as that exceeding 15db at 4 specific frequencies whereas Fernandes used either 10db at two consecutive and undefined frequencies or 15db at one undefined frequency. As a consequence like was not being compared with like and the comparison was inappropriate. Also, as pointed out by Mr Parker, the definition of noise exposure included those with "sudden induced hearing loss" which was irrelevant to the present case. I do not find therefore that the Fernandes paper [nor indeed any of the other papers] provided a sufficiently cogent analysis of asymmetric hearing loss. Nor do I find that the conclusion of the Fernandes paper was sufficiently sound for me to be persuaded that the concluded view ("in the absence of other significant clinical history or evidence of otological disease asymmetrical hearing loss is caused by noise exposure and should be included in compensation claims") should be adopted by this court as evidence for the proposition that symmetrical noise exposure might, on balance of probability, cause asymmetrical hearing loss.

57 I should state that while the HHJ Graham Wood QC in **Aldred v Cortaulds Northern Textiles Ltd** (the Liverpool case referred to at the outset of this judgment) preferred the expert evidence of Mr Zeitoun rather than Mr Parker, I am perfectly entitled, in a case where I have received a wide range of scientific opinion and heard oral evidence from experts, to arrive at the conclusion that, in this case, the testimony of Mr Parker was significantly more reliable and scientific than the evidence adduced by Mr Lancer. I should emphasise that Mr Lancer conceded several times in cross-examination that Note 11(4) of the Coles' guidelines was applicable and relevant. While in Aldred (a case which focussed on averaging results at different frequencies) the judge was entitled to prefer the evidence of Mr Zeitoun on the issue before the court in that case, the finding of HHJ Wood does not alter my concluded

opinion concerning the quality of the evidence given by Mr Parker in the present case.

58 In a written reply to the submissions, Ms Presland contended that as the claimant was exposed to noise during the 1980s, the audiograms would have changed as a result of the continued non-breach exposure. The response of Mr Cooper on behalf of the defendant (as set out in his written response) was that there had been an agreement at court that the claimant was not exposed to causative noise from 1977 onwards and that, in those circumstances any deterioration in the claimant's hearing from 1977 onwards was not due to noise exposure. Having regard to the presentation of the evidence (including an agreement that the claimant's evidence would not be challenged in respect of any exposure post 1977), I adopt the submissions advanced by the defendant in this regard.

59 Accordingly and for the reasons given above, I dismiss the claim.

HHJ Staite
14th December 2012

Alberti (1979)
1873 patients were referred for compensation assessment for presumed industrial loss. 15% had an average difference in hearing threshold between the ears of 15db at 0.5,1,2,and 4khz. An unrelated cause was found in 115 patients (6%) due to trauma in 37 cases (2%), unexplained in 32 cases (1.7%) and attributable to noise exposure in 97 cases (5.2%). The possible mechanisms for noise as a cause included shielding of one ear from noise, unequal recovery after severe noise exposure and unequal sensitivity of the ears. No treatable disorder was discovered.
The authors concluded that workplace noise did in fact produce asymmetrical hearing loss in a significant percentage of patients and that its presence should not disqualify them from a pension award.

Chung (1983)
The authors of this study looked at 1461 audiometric records of claims for noise induced hearing loss. It was found that 69 (4.7%) had a well defined pattern of hearing loss in which only 2 khz was symmetrical by 20db or more. Of the 69 cases with a 2 khz asymmetry 82.6% had worse hearing thresholds in the left ear at 2khz. In 50% f the 69 cases the asymmetry could not be accounted for even after the examination of their medical, occupational and non-occupational histories. This suggested to the authors that the left ear could be the weaker ear and more susceptible to noise damage.

Barrs (1994)
This study was an evaluation of 246 workers who had worked at a large air force base and exposed to noise from flight line activities who had undergone otologic and audiologic testing as part of a worker's compensation claim for work related noise-induced hearing loss. Standard audiometry showed a downsloping , high frequency

sensorineural hearing loss n 85% if the ears tested with only 37% having a characteristic "noise notch" at 4 or 6 khz. Asymmetric hearing loss was not uncommon with 20% undergoing magnetic resonance scanning all of whom showed mp central lesion responsible for the loss. Proven malingering was surprisingly uncommon (9%) .

Coles and Lutman (2000) ("Coles Guidelines")
This work was presented as offering guidelines in respect of a diagnosis of noise induced hearing loss butwere to be interpreted as guides rather than rigid rules. The study directed itself towards the "likelihood" of a diagnosis of noise induced hearing loss (NIHL) in terms of the legal concept of balance of probabilities in civil proceedings.

The diagnostic requirements set out in the study were the following:

R1 High frequency impairment which required audiometric evidence of high frequency sensorineural hearing impairment. This occurred when a single measurement of hearing threshold level at 3,4 or 6hz was at least 10db greater that the hearing threshold level at 1khz or 2kkz.

R2 Noise exposure -which required at least 8 hours continuous noise exposure of not less than 85db for a sufficient number of years leading to a cumulative exposure of at least 100 db(a) noise immision level (NIL).

R3 (a) and (b)
Audiometric configuration - which required evidence of probable presence of noise induced hearing loss considered to be present if there was a downward notch in the audiogram in the 3-6khz range large enough to be identifiable with a reasonable degree of confidence. Evidence for NIHL was also provided on the audiogram by a sufficiently large relative bulge downwards and to the left in the 3-6 khz range.

The diagnostic criterion was also met where there was a high frequency notch in the audiogram which was sufficiently large and where the hearing threshold level at 3 and/or 4 and/or 6 khz, after any due correction for earphone type, was at least 10db greater than at 1 or 2 khz and at 6 or 8khz.

The authors commented that in some cases there might be considerable left/right differences in the amount of hearing impairment and only one ear complied with the above-stated requirements for a diagnosis of NIHL In such instances, the user was referred to Note 11 for recommendations on how guidelines should be interpreted in asymmetrical cases.

Segal (2007)

This was an Israeli study which comprised a random selection of 429 patients with mild to moderate sensorineural hearing loss of at least 30db at one frequency. The authors found that age, handedness and sex were not found to be correlated to asymmetric hearing loss. A correlation was found between noise exposure and asymmetrical hearing loss which favoured the right ear (lower hearing threshold loss). The left ear hearing threshold was consistently found to the higher than the right ear hearing threshold level with hearing asymmetry of more than 10db found in 35% of these patients. However, noise exposure was the only factor which was found to correlate with asymmetric hearing loss in these patients with mild to moderate sensorineural hearing loss.

Lutman & Coles (2009)
This was random testing of 2708 volunteers who had no been exposed to noise in the workplace or elsewhere. The authors found that only about 1% (a "low prevalence") of the non-noise exposed adult population aged 18-80 years had asymmetry of 15db or more based on average frequencies of 0.5khz,1,2 and 4khz. The authors concluded that based on their representative screened sample, many hearing asymmetries in the general population could be expected to be of unknown causation.

The authors also commented that a substantial problem with applying an exclusion criterion for noise exposure was to define what should be regarded as excessive and having a substantial potential for causing hearing loss. The commentary continued: "even with asymmetrical industrial noise exposures, the NIHL sometimes appears to be considerably greater in one ear than the other for no apparent reason. With noise from guns or other explosive sources, asymmetry of exposure and its effects is quite common".

Fernandes (2010)
This was an Australian study of 208 individuals with hearing loss who were referred by legal practitioners for the assessment of hearing loss for compensation purposes. Diagnosis of hearing loss was based on the requisite history of substantial noise exposure at work, audiogram results (showing a shift at high frequencies with a typical notch at 4-6khz) and elimination of competing diagnoses by an ENT expert. Asymmetrical hearing loss was defined as loss of 10db or greater for two consecutive frequencies or of 15db for any one frequency between 0.25 and 6khz.

The authors of the study found that 22.6% of the individuals had asymmetrical hearing loss with the left side having the greater loss in 60% of the cases. They commented that the incidence of asymmetrical hearing loss due to non-noise related pathology was approximately 1% and that in the absence of other significant clinical history or evidence of otological disease, the ENT expert should conclude that asymmetrical hearing loss is caused by noise exposure and should be included in compensation claims.
hich there may have been an overlay of noise deafness. He commented that the Fernandes paper had a lax definition of asymmetry and had included in the cohort individuals who had asymmetrical exposure and also individuals who had been

exposed to impulse noise (eg gunfire and explosives). Fernandes did not comment on the progress or otherwise of hearing loss in the less deaf ear.