

Investigation and evaluation of the use of FM radio equipped hearing protection devices in the Australian Meat Industry

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**Investigation and Evaluation of the
Use of FM Radio Equipped Hearing
Protection Devices in the Australian
Meat Industry**

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1. Introduction

Noise Induced Hearing Loss (NIHL) is a work-related permanent injury that not only affects many Australian employees each year, but it also imposes great social costs on the society they live in as well.

As a permanent injury (NIHL) restricts the afflicted person's ability to function normally for it restricts their ability to communicate with those they come in contact with. As a consequence, their families, friends, workmates and employers are also affected by their injury.

But while Australian employers are paying their noise-injured employees millions of dollars each year in workers' compensation payments, they are also losing more millions as a result of other noise-related problems that occur in their workplaces.

Increased employee turnover and absenteeism are problems that are undoubtedly caused by job monotony and boredom, and both are problems that can be attributed to workplace noise. And while 'engineering the noise out' is commonly offered as a solution for noise problems, engineering cannot cure the social problems related to monotony and boredom.

As a cure for the monotony and boredom many workplaces either install radios or allow their workers to listen to 'Walkman'-style personal portable radios and cassette players at work. However, use of these systems can lead to other problems, for when they are used in workplaces with high ambient noise levels both systems' volumes need to be increased to such levels that their listener's noise exposure is raised above legally acceptable daily noise dose limits.

To counter this problem, a number of hearing protection device (earmuff) manufacturers have begun manufacturing earmuffs fitted with gain limited FM radio circuits. These earmuffs allow their wearers to listen to music as they work while still providing reliable hearing protection. The Bilsom 797 Radio is one of a number of earmuffs currently available in the Australian safety equipment market (See Appendix One).

Early in 1996 an agreement was reached between the management and staff of Bunge Meat Industries which saw the introduction of Bilsom 797 Radio earmuffs into their Corowa Abattoir and Boning Room. These earmuffs were to replace the various types of portable radios that were being used by the employees, as the radios had been noted as adding to their listener's individual daily noise doses.

As Bunge Meat Industries is the first Australian meat industry employer to have its employees use this type of hearing protection, the company was approached for permission to study the earmuff's introduction in order to establish whether radio equipped earmuffs could be used in other meat industry employers' hearing conservation programs.

This report examines the first six months of the earmuff's use at Bunge Meat Industries' Corowa facility. It contains the collected results of two sets of workplace sound level surveys, two sets of screening hearing tests of forty survey participants, a literature survey and a general examination of the use of these earmuffs in abattoir and boning room environments.

A copy of the documents outlining the introduction process for these earmuffs at Bunge Meat Industries is attached at Appendix Four.

2. Methodology

In order to find out what benefits or disadvantages would result from the employees' regular use of Bilsom 797 earmuffs a two stage survey was designed and implemented.

2.1 Stage One

Stage One's field research involved the pure tone air conduction (screening) audiometric testing of 50 participants who were then using Bilsom 797 Radio hearing protectors, and ascertaining the Broadband A-weighted and Linear Peak noise levels that participants were exposed to at their workstations.

During Stage One a literature search was also undertaken to examine existing research into the use of FM radio equipped hearing protectors in workplaces. This parameter was altered when it was found that no research had been undertaken in this area, and the literature search examined the use of music in the workplace and 'Walkman'-type radios.

2.2 Stage Two

Stage Two's field research similarly involved further pure tone air conduction (screening) audiometric testing of the original participants, to establish if any Hearing Threshold Level Shifts had occurred during the intervening six months.

Narrowband A-weighted third octave workstation noise exposure measurements were also carried out, to establish if noise levels at any one specific frequency was more prominent than the noise levels at other frequencies.

A benefit and attitude survey was also designed for Stage Two in order to ascertain participants' attitudes to the Bilsom 797 hearing protectors, and to their being able to have their own choice of music available while they worked.

It must be noted here that of the Project's 50 original participants, 10 were unavailable for Stage Two participation. Seven were on recreation leave, one was on maternity leave and two had left Bunge's employment. Nonetheless, it was considered that 40 participants were able to provide adequate research data, and accordingly the field research proceeded.

2.3 Analysis

To analyse the collected data the 40 participants were grouped into the four age groupings shown in Table 1.

Age	M	F	Total
15 - 24	5	-	5
25 - 34	19	-	19
35 - 44	8	1	9
45 ≥	4	3	7
Total	36	4	40

Table 1: Survey Participants Ranked By Age And Gender

The results of the research findings are discussed in the following pages.

3. Literature Survey

Literature was sourced from various research institutions in Australia, Canada and the United States of America.

Although Holmbeck's 1990 journal article mentions the use of music supplied into induction loop equipped earmuffs in a Swedish can factory (1), and Acton and Child's 1974 paper discusses research on a similar system then under development in England (2), no specific research studies were found that relate to the use of FM radio-equipped earmuffs.

This lack of formal research is probably due to the recent arrival of radio-equipped earmuffs in the safety products marketplace. Even the manufacturers, when approached for research information, were unable to provide any scientific research or survey data into the use of their 797 Radio earmuff in workplaces.

As a consequence the aim of this literature search was redefined, and it now reviews the results of research undertaken into the use of music and radios in the workplace.

Initially this review discovered that available research on these topics can be distinguished between two distinct periods: before and after 1979, as 1979 was the year the Sony Corporation introduced the 'Walkman' type personal radio and cassette player.

Further, it must also be noted that there are only a small number of research papers available on these topics in their respective periods.

Most pre-1979 research appears to have been concerned with investigating the motivational and production-related benefits of music in the workplace. This topic is comprehensively but separately reviewed by Fox and Sundstrom (3,4).

Reports dating from the late 1800's relate how employers in various industries employed singers and musicians to improve employee morale, speed up work rates, and boost productivity. This was followed in the early years of this century by the use of recorded music as record players became available.

What is considered to be the first controlled study of music's affect on factory output took place in the late 1930's, when Wyatt and Langdon's study on boredom and fatigue in factory work examined the introduction of music into a firecracker factory.

In their study music was not played continuously for the duration of the workshift. Instead, non music periods were interspersed with different schedules of recorded music lasting between 75 and 180 minutes. Wyatt and Langdon reported that when music was played productivity increased between 6.2 % - 11.3%, but that this increase was not sustained when the music ceased (5,6).

Further studies were occasionally undertaken between the 1940's and 1960's. From these studies

Sundstrom reports that the most consistent result of the experiments on music in factories is that a large majority of employees said they liked it (7), while Fox reported that 2,500 employees of Gillette Industries Ltd believed that music improved their working environment while also bringing them various benefits (8).

Sundstrom concludes by noting that managers expressed the belief that music can boost morale and relieve monotony. He suggests that the introduction of music for employee satisfaction appears likely to succeed, provided that the employees are engaged in work that demands little concentration or attention, and that the music suits most employees' preferences (9).

Post 1979 research revolves around workers' use of 'Walkman' type personal radios and cassette players in industrial situations. From the earliest 'Walkman-era' study examined it is evident that researchers have been concerned with the possible hazards involved in their use.

This is due to the nature of 'Walkman' headphones. Although different types of headphones are available, each has been designed to direct most of its sound power towards the eardrum of the user, so that they can be used in most environments without disturbing other people (10).

While researchers saw the perceived hazards as being:

1. the distraction of the user's attention;
2. the interference with their user's perception of incoming auditory communications and warnings; and
3. the possibility that users could suffer noise induced hearing loss (11),

none appear to have investigated the first two suggested hazards, although such investigations were recommended by Skrainar in 1987 (12).

Instead much of the research examined concentrates on ascertaining the sound pressure levels produced by different 'Walkman' models in order to establish whether their use can lead to Noise Induced Hearing Loss.

From the research it appears that sound pressure levels differ between the various earphone types when they are transmitting similar music styles.

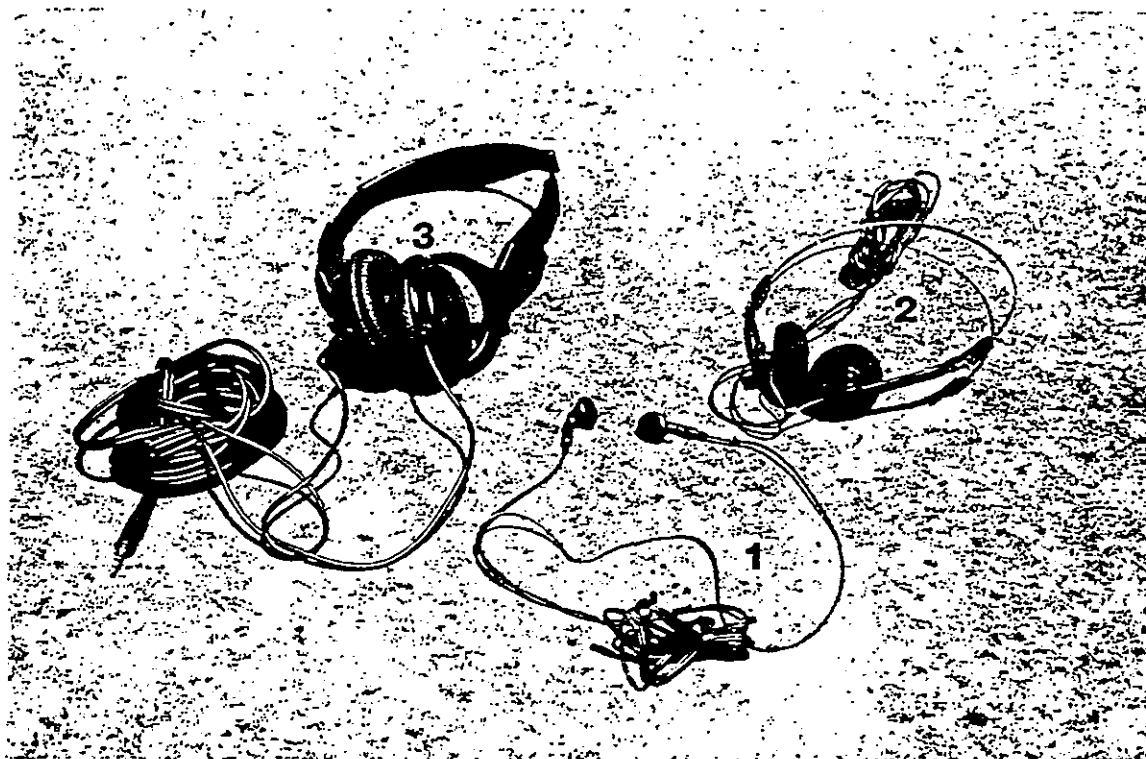
In 1982 Berger reported that the maximum continuous sound levels these devices can generate are greater than 105 dB(A) in the ear (13), while Hellstrom and Axelsson reported sound levels up to 104 dB(A) for supra-aural headphones and 126 dB(A) for semi-aural headphones (14). (Note: See accompanying photograph next page).

It further appears that users' volume preferences differ according to their musical tastes, with rock music listeners having been shown to set their volume controls higher than do easy music and talk listeners (15).

Finally, although the various researchers have obtained their results using different test methods, most agree that 'Walkman' headphones provide minimal protection from ambient noise because the headphones do not attenuate background noise.

Indeed, in circumstances where a 'Walkman's' user is listening in noisy conditions all noise sources will combine to give a cumulative effect that can significantly increase the wearer's noise exposure (16).

Such a combination may increase the user's daily noise dose to levels above their (Australian) State's regulated maximum noise exposure levels, leaving them at risk of acquiring Noise Induced Hearing Loss, and leaving their employer liable to a hearing loss compensation claim.



This photograph shows the following types of portable radio speakers.

1. Semi-aural headphones are the small speakers which fit in the concha of the external ear.
2. Supra-aural headphones are those inside foam pads on headbands which fit against the pinna.
3. Circum-aural headphones are those that surround the outside of the pinna.

4. Questionnaire Results

Each of the forty Stage Two participants was asked to complete a questionnaire immediately before each of their second hearing tests.

Comprising ten questions, the questionnaire was designed to find out the participant's attitudes towards the Bilsom 797 Radio earmuffs, and what benefits or disadvantages they identified from their use of this earmuff at work.

This section examines each question and participant's responses. In order to help with categorisation, each participant's gender was noted, and their age at last birthday was noted.

1. What is your opinion of the Radio earmuffs?

While participants were given a choice of responses ranging from Strongly Dislike through Dislike, No Opinion, to Like and Strongly Like, the only responses received were in the Like and Strongly Like categories.

Age Group	Strongly Like		Like		Total
	M	F	M	F	
15 - 24	4	-	1	-	5
25 - 34	19	-	-	-	19
35 - 44	6	1	2	-	9
45 ≥	3	3	1	-	7
Total	32	4	4	-	40

Table 2: Attitude Responses to the Bilsom 797 Radio

Overall 90 % of the sample (80% male, 10% female) reported that they Strongly Liked the earmuffs, while the remaining 10% Liked the earmuffs. When analysed by gender, 100% of female participants and 89% of males Strongly Liked the earmuffs, and

the remaining 11% of males fell in the Like category.

2. Are the earmuffs comfortable to use? Yes / No

In responding to this question 32 male and all 4 female (89% and 100% respectively) responded that they found the earmuffs comfortable to use.

The remaining 4 (11%) males who answered 'No' did so on a qualified basis, and qualified their answers with comments related to the issue of the earmuff's headbands being too tight. Notwithstanding their comments, though, all of these participants still liked the earmuffs.

3. On average, how many hours do you wear your ear muffs per day?

As many participants reported that a full shift varies in duration between 6 to 8 hours, any 6 to 8 hour work period reported was regarded as being a full shift. (See Table 3 next page.)

4. If you don't wear the earmuffs for the entire shift, why not?

Of the 6 male participants (15% of total sample) who reported that they don't wear their earmuffs for the full shift, 3 stated it was because their earmuffs were too tight, 2 because their earmuffs became hot and sweaty, and one took the earmuffs off to be able to communicate with others.

Of the 2 female participants (5% of total sample), one trains other workers and needs to communicate more easily, and the other stated that she often lends her earmuffs to those without their own radio earmuffs.

5. What is your opinion of the quality of the radio sound reproduction in the earmuff?

Each participant was given five alternatives from which to choose their answer this question.

Age Group	Full Shift (6-8 hours)		Under 6 Hours	
	M	F	M	F
15 - 24	4	-	1	-
25 - 34	16	-	3	-
35 - 44	7	-	1	1
45 ≥	3	2	1	1
Total	30	2	6	2

Table 3: Earmuff Use Per Shift

The alternatives were 'Excellent', 'Good', 'No Opinion', 'Fair' and 'Poor'.

While 1 female and 3 male participants (10% of total sample) described the radio's sound quality as being 'Excellent', the majority of participants - 30 males and 3 females (82.5%) considered the sound 'Good'. The remaining 3 males

(7.5%) thought that the radio's sound quality was only 'Fair'.

6. Which type of music do you prefer to listen to?

For this Question each participant was presented with a list of eight different types of music which they were then asked to rank according to their musical preferences. It was intended that they should rank their choices with '1' being most preferred and '8' being least preferred.

While eight choices were given, as can be seen in Table 5, opportunity was also provided for the participants to select any other type of music not noted on this list, though none did.

In responding to this question many of the participants selected only a few types of music, and then ranked the remainder as least preferred '8's. As a consequence only the first three choices selected by each have been included as being valid responses to this question.

Music Type	1st Choice	2nd Choice	3rd Choice
Rock	17	14	5
Popular	16	13	4
Country & Western	3	4	8
Heavy Metal	1	2	8
Classical	-	2	1
Jazz	-	-	2
Rap	-	-	1
Techno	-	1	2
No Choice	2	4	9

Table 4: Participants' Music choices

Rock and Popular music, as played on the most popular local radio stations (see Question 7) were the most preferred types of music, with 17 participants (42.5%) and 16 (40%) respectively selecting these as their first music choices.

It is also worth noting that during the first choice selection 1 female and 2 male participants selected no music preferences at all, each stating that they did not mind what they listened to.

7. Which radio station(s) do you listen to?

This was an open ended question, with each participant encouraged to choose as many of the six local radio stations as they wished.

B104.9 FM	34
CO FM	28
EDGE FM	20
JJJ FM	12
SUN FM	5
ABC FM	1

The responses show that many participants are not loyal to one station alone, and are willing to vary their listening choices if they are able to.

Their ability to choose was largely dependant on radio reception capability, as reception for some radio stations was better in some areas than in others.

While Albury's B104.9 FM, a local commercial popular music radio station was selected by most of the participants (85%) as it currently has the clearest signal, two newer stations, Wodonga's COFM and Wangaratta's EDGE FM, (with 70%

and 50% respectively) were also becoming alternative radio station choices for many participants.

8. What benefits have you found from using the ear muffs?

This question was intended to find out benefits the participants believe they are getting by using the FM radio equipped earmuffs.

The Questionnaire included a list of the following possible benefits the participants could get from their use of the earmuffs. The benefits were that the earmuffs:

- provide their user with hearing protection;
- relieve the monotony of work;
- reduce fatigue;
- allow their user to personally choose music which does not impact on anyone else; and
- make their user's work easier.

In their responses all 40 participants (100%) fully supported the first two propositions, many stating that their work days passed more quickly since they had been using these earmuffs. To this extent 38 (95%) agreed that the earmuffs make their user's work easier.

As each of the four most popular radio stations play varied and sometimes different types of music, the ability to make their own music selection by choosing the radio station they want to listen to was also seen as being important by 39 participants (97.5%).

The final benefit offered - that the radio equipped earmuffs reduce fatigue - was a concept that only 20 (50%) of the participants agreed with, as many reported that this was a concept they hadn't thought about.

9. Can you communicate with your co-workers when you are wearing the earmuffs?

This question was intended to provide an answer to one of the hazards perceived by Skrainar et al when they looked at 'Walkman' use in an industrial situation: that a device such as this could interfere with its user's perception of incoming auditory communications and warnings.

In responding to this Question 33 participants (82.5%) stated that they could communicate while wearing the earmuffs, and 7 (17.5%) replied that they couldn't. Of the 7 only 4 reported that they did not wear the earmuffs for an entire shift; instead they stated that they take the earmuffs off when they want to talk to others.

10. How do you hear your co-workers when you are using the earmuffs?

To help the participants answer this question two alternative answers were offered. These were that the participants either turn down volume to hear; or that they take off the earmuffs to hear.

Of the 40 participants, 35 male and 3 (95% of total sample) female participants reported that they turn the earmuff's radio down if they want to hear what other people are saying to them.

In answer to the second part of this question, 14 participants - 11 males and 3 females (35% of total sample) reported that they take the earmuffs off to hear others. This latter group includes the 1 male and 1 female who reported they don't turn down their radio to hear others.

11. What volume setting do you usually set the Bilsom 797's radio to while you are working?

This question is supplementary to the original questionnaire, and was intended to obtain information that might be linked to any participants with Hearing Threshold Shifts. It was put to those participants who were available in late January / early February 1997.

Of the 32 responses obtained, 17 (53.3%) replied that they use a $\frac{3}{4}$ to Full Volume setting, 13 (40.6%) a $\frac{1}{2}$ to $\frac{3}{4}$ Volume setting, and 2 (6.25%) Below $\frac{1}{2}$ Volume setting. Of the 4 female participants, 3 use the $\frac{1}{2}$ to $\frac{3}{4}$ Volume setting.

5. Audiometric Survey

(Note: Both sets of audiometric tests undertaken for the purposes of this project were carried out independently of Bunge Meat Industries' normal audiometric testing program. That program's records were not sighted or referred to at any time for the purposes of this project.)

The purpose of the hearing testing program carried out during this project was to establish whether the regular use of the radio-equipped earmuffs was having any deleterious effects on the hearing threshold levels (HTLs) of the participants.

5.1 Equipment Used

While Stage One's hearing tests were conducted using a Qualitone Acoustic Appraiser (Model AAP CAAV 13939-P) equipped with TDH-39 earphones, Stage Two's hearing tests were conducted using a Qualitone WR-C Portable Wide Range Diagnostic Audiometer (Model WRC-8972) equipped with TDH-39 earphones.

Subject acoustic isolation for both sets of hearing tests was achieved using a Quadrant AudioM.A.T.E. Audiometric Booth (Serial number AM-P TSB94).

5.2 Testing Procedure

Both sets of hearing tests were carried out as close as practicable to the recommendations contained in S 5.6 Audiometry And Assessment Of Results, AS 1269 - 1989 Acoustics - Hearing Conservation.

In order to establish baseline hearing threshold level data for every participant, each underwent a full screening hearing test during the Stage One visit in May 1996. In these tests every person's hearing threshold levels were measured at 0.5, 1, 1.5, 2, 3, 4, 6, and 8 kHz.

Stage Two's follow up testing program six months later also tested each participant's hearing threshold levels at every frequency as a means of assessing if there had been any significant threshold shifts.

Due to the audiometrists having only limited access to many of the participants, the hearing tests often took place later in the day, after the participants had been exposed to some noise from the radio earmuffs. However, this testing pattern was maintained in both Stages.

The author is further aware that as two audiometrists conducted the tests using two different audiometers there may also be some slight variability attributable to test technique differences between the two sets of test results.

5.3 Result Analysis

After analysis three categories of results emerged from comparing the 40 pairs of hearing tests. Please note that while the hearing audiograms have been retained, no summary of test data is included in this report for ethical reasons.

5.3.1 No Change, or "Improvement", to Hearing Threshold Levels

With 21 participants (52.5%), this category contained both those who had no change in their hearing threshold levels, and those whose HTLs appeared to have improved. Possible explanations for this are tester techniques or subject's experience in test performance.

5.3.2 Hearing Threshold Level Shift Attributable to Other Causes

Nine participants (22.5%) came into this category. Of the 9, 8 (20%) had their shifts possibly caused by various medical conditions, such as a wax occlusion or a middle ear infection.

The remaining participant's shift occurred during a period when he had not been using the earmuffs for a reasonable period of time.

Category Name	Total
1. No Change, or Improvement, to Hearing Threshold Levels	21
2. Significant Deterioration Attributed to Other Causes	9
3. Significant Deterioration Attributed to Noise Exposure	10

While these deteriorations were noted on their test audiograms, this did not make them eligible for inclusion into Category 3, given that category's criteria for attributing deteriorations solely to noise.

5.3.3 Hearing Threshold Level Shift Probably Resulting from Noise Exposure.

The remaining 10 participants (25%) had shifts greater or equal to 15 dB HTL (Hearing Threshold Level) at either 6, 4 or 3 kHz in either one or both of their ears, and with no deterioration noted below this frequency range. Their threshold shifts are believed to have been caused either by

1. the high peak levels of noise in their environment, or
2. the noise levels generated by the radios in their earmuffs.

The high peak levels of noise in the Lairage area are far in excess of those in other areas of the Abattoir. The participants working in this area were experiencing temporary threshold shifts as a result of their exposure, and now only work in this area for short periods to reduce their exposure.

The remaining 8 participants - 20% of the sample - displayed Hearing Threshold Level Shifts that could probably be attributable to noise exposure, and, in the absence of other information, could have been caused by the volume levels that these participants usually set their earmuff radios to.

This contention is further borne out by the responses of 5 of the 8 participants, as they answered the Questionnaire's Question 11 regarding radio volume setting by replying that they usually set their earmuff's radios at between $\frac{3}{4}$ and full volume.

6. Sound Level Survey Results

Sound level surveys were carried out during both site visits, with measurements being taken in accordance with the recommendations of Section 2, AS 1269-1989 Acoustics - Hearing Conservation.

Both sets of measurements were taken using a CEL - 593C1 Type 1 Real Time Sound Level Analyser, which was calibrated using a CEL - 284/2 Type 1 Calibrator before and after each set of measurements. The noise levels at various workstations was measured, with each measurement being taken as near as practicable to the ear position of the worker at the workstation.

Different measurement criteria were used for each Stage. Stage One's measurements examined the Broadband A-weighted L_{eq} noise levels at selected workstations, while Stage Two's measured the noise levels using Broadband A-weighted L_{eq} , Unweighted Linear L_{eq} and A-weighted One Third Octave L_{eq} criteria.

Although every effort was made to take Stage Two's measurements in the same positions as those in Stage One, this was not always possible, due to changes to workplace and machinery layout. Differences also occurred due to noise reducing modifications made as part of Bunge's ongoing noise reduction program.

6.1 Stage One Results

As can be seen from reference to the data contained in Appendix Three, the Broadband measurement results from the Abattoir sound level survey show noise levels varying in intensity between 94.8 dB(A) L_{eq} in the Lairage/Stickhole Shackle area and 81.3 dB(A) L_{eq} in one of the Chillers.

The Boning Room had noise levels between the Rib Top Saw Stand's 100.1 dB(A) L_{eq} (when the Rib Top Saw was operating) and 82.1 dB(A) L_{eq} at the Cryovac Packing Machine.

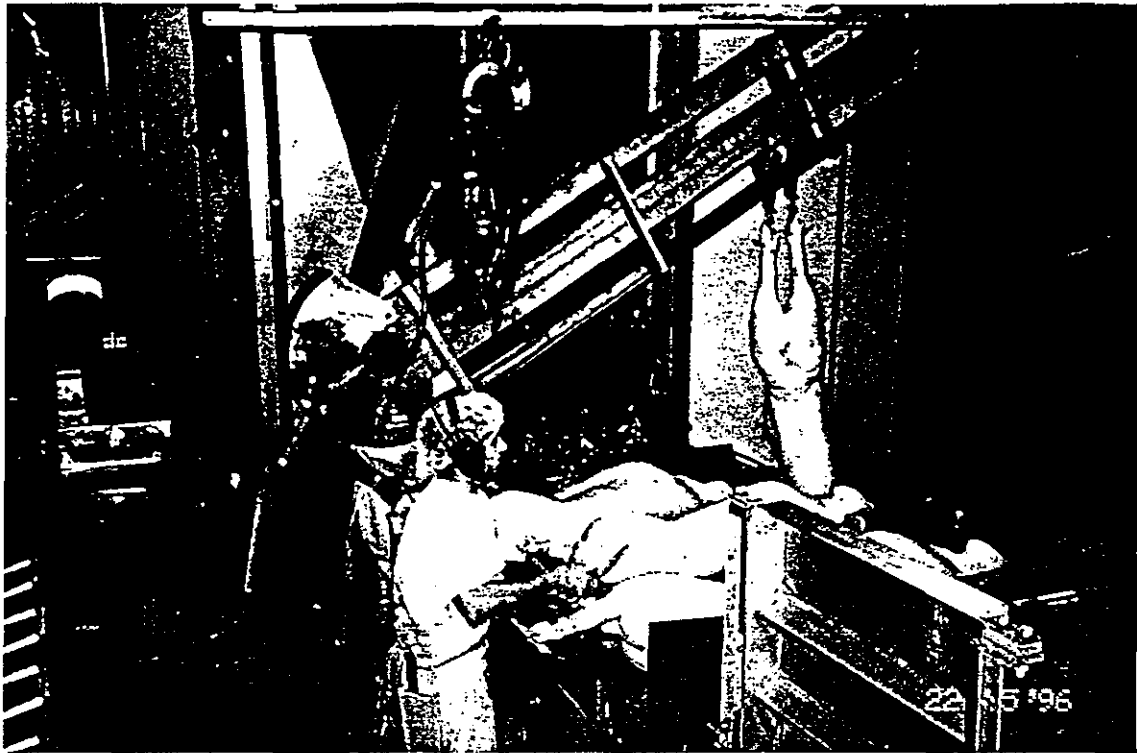
6.2 Stage Two Results

Stage Two's use of individual octave band analysis was carried out in order to discover which frequencies were more dominant in the various noise exposures.

The highest broadband noise levels in the Abattoir section again came from the Lairage/Stickhole area, at 98.8 dB(A) L_{eq} while the lowest came from the A Grade Retain and Backing Down Stand, both at 82.4 dB(A) L_{eq} .

The highest broadband noise levels in the Boning Room came from a recently installed Shoulder Saw at 99.8 dB(A) L_{eq} , while the lowest came from the packing area where the Cryovac machine had previously been situated. The noise levels here were 82.5 dB(A) L_{eq} .

A summary of noise levels, together with some sample third octave graphs, is attached in Appendix Three.



Two photographs of Abattoir staff using the FM radio equipped earmuffs



7. Discussion On The Earmuff

The Bilsom 797 Radio is one example of a number of FM radio-equipped hearing protection devices recently introduced by different safety equipment manufacturers into the Australian safety equipment marketplace.

As hearing protectors equipped with FM radios, these earmuffs are intended to replace other types of radios that workers may be using in noisy workplaces.

Because these earmuffs let their users listen to their own choice of program while protecting their hearing, they give their users a valuable benefit, for other types of radios can only provide the programming, and not the hearing protection.

Indeed, normal radios can actually add to their listener's workplace noise dose (and their chance of Noise Induced Hearing Loss) if they are too loud for too long. And radios in workplaces often have to be loud in order to be heard over the workplace's noise levels.

This section will briefly examine the relevant controlling Australian Standard for earmuffs, and will then look at any issues that may have arisen during the duration of the project. It will then conclude with a discussion on the utility of the earmuffs in daily use in Bunge's Abattoir and Boning Room.

7.1 AS 1270-1988 Acoustics-Hearing Protectors

All Hearing Protection Devices available in Australia which are of the type worn for the prevention of noise-induced hearing loss, should be made and tested in accordance with the guidelines noted in Australian Standard AS 1270-1988 Acoustics - Hearing Protectors.

As noted in the Note to S1.4.1, this Standard also includes earmuffs which are protection devices equipped with earphones. With the Bilsom 797 Radio delivering its radio's output via earphone speakers into the earmuff's internal environment, this earmuff type should be considered in terms of AS 1270-1988's guidelines (18).

7.2 The Earmuffs In Use - Issues Experienced

While these earmuffs have been enthusiastically taken up by many of Bunge Meat Industries' Corowa staff, a number of issues regarding them and their functioning have arisen out of the research findings and other events that have occurred during the duration of this project.

The first issue has regard to the sound levels that the earmuffs' radios may be producing when they are set to full volume.

This issue is raised due to the results of the audiometry survey, which although inconclusive, show the possibility that some participants may have experienced low level noise induced hearing threshold shifts (at 6, 4 or 3 kHz) as a result of the middle and high volume levels they usually set their earmuff's radios to.

If hearing threshold shifts are proven as a result of the earmuff's use, these will have occurred despite the manufacturer's inclusion in the earmuff's circuitry of 'A limiter function (which)

prevents the emission of harmful sound levels from the receiver itself, which gives the earmuff a 'Sound Level Limitation of 82 dB(A)eq'. (Quotes from the manufacturer's 'Bilsom 797 Radio' product brochure. See Appendix One)

Such losses, if proven, would indicate that certain individuals may be susceptible to noise induced hearing loss even at relatively low noise levels such as the 82 dB(A) L_{eq} that they will be exposed to if they wear their earmuffs for the full duration of their work shifts.

It must further be remembered that when these earmuffs are used in low ambient noise areas, (i.e. where daily noise dose levels are below L_{Aeq} 82 dB(A), or in areas where hearing protection is not necessary, the earmuffs radios' are their user's main source of noise exposure.

A second issue concerns the earmuff's electronics' suitability for use in abattoirs and boning rooms, as some have had circuit board corrosion problems, and circuit and earphone failures.

It is believed that although these problems were caused by the harsh environmental conditions (humidity, temperature) that exist in the Abattoir and Boning Room where the project's participants work, the problems can be solved by coating the circuits with various specialised solutions either at the time of manufacture or by third party after-market coating specialists.

7.3 Other Observations

One of the two most commonly asked questions regarding these earmuffs relates to whether users lose concentration while they are listening to the radio and as a result suffer more knife cut injuries.

To answer this question Bunge's management examined their injury statistics for both the six month period immediately before the earmuff's introduction, and the six month period of this project.

Their statistics show no increase in Abattoir and Boning Room knife cut injury levels in the six months after the earmuff's introduction compared with the previous six months, as eight knife cut injuries were reported during each period.

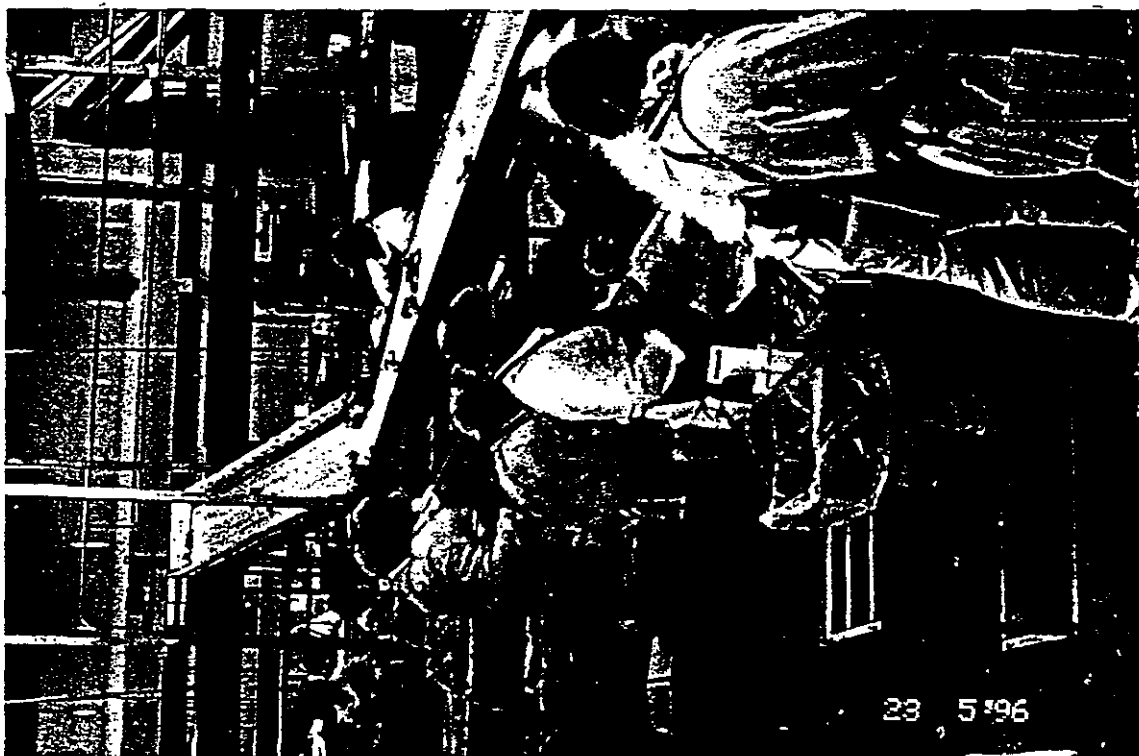
The other most commonly asked question relates to whether users can hear others and communicate while they are wearing these earmuffs.

As can be seen from the responses to the Questionnaire's Questions 9 and 10, most participants responded that they can hear those talking to them, and that they turn down the volume or remove the earmuffs when they want to listen more clearly.

In support of their responses, this author has observed that users in both workplaces invariably turn down their volume controls as soon as they are approached by others wanting to communicate with them.



Two photographs of Boning Room staff wearing the FM radio equipped earmuffs.



8. Recommendations

Analysis of this survey's data clearly demonstrates the benefits users believe this FM radio and earmuff combination gives them.

Notwithstanding these benefits, though, further examination of the collected data suggests that certain recommendations should be made regarding its use and development if this type of earmuff is to be successfully introduced into Meat Industry workplaces.

8.1 Recommendations For Users and Management.

In view of this survey's inconclusive hearing test results, (and in the absence of any externally available long term user data), it is recommended that users do not use the earmuff's radios at full volume setting.

Instead, users should set their radios at a medium volume setting that allows them to hear the radio's program at a comfortable, but not overbearing, listening level. Following this recommendation will not only reduce their overall noise exposure, but will also enhance their ability to hear other people and hear warning signals as well.

Because this type of earmuff does not provide adequate hearing protection from sudden-onset impact-type high noise levels, these earmuffs are not suitable for those working in areas such as lairages, stickholes and knocking boxes. Other more suitable types of hearing protectors are available that can be used in these areas.

Alternatively, if workers wish to use these earmuffs in those areas, management should use administrative noise controls, and should regularly rotate those users with other similarly protected users.

In order to get the maximum benefit from the earmuff's hearing protection properties, users and management are also reminded to carry out regular cleaning and maintenance checks on the earmuff's cushions, foam inserts, headband and earcups.

8.2 Recommendations For FM Radio Equipped Earmuff Manufacturers.

In view of the problems that some survey participants have experienced with the earmuff's electronic componentry, manufacturers wishing to make and sell equipment into the Meat Industry are recommended to investigate the use of component encapsulation methods to protect the earmuff's electronic circuitry.

It is also recommended that manufacturers further limit the maximum output of the FM radios fitted to these earmuffs to 80 dB(A)_{eq}, in order to reduce any risk of noise induced hearing loss from the use of these earmuffs.

9. References

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18. AS 1270-1988 Acoustics - Hearing Protectors, Standards Australia.

10. Appendices

This section contains four Appendices:

Appendix One

Bilsom's 797 Radio brochure.

Appendix Two

A copy of the Questionnaire administered in Stage Two.

Appendix Three

This is a summary of the noise level measurement results collected during both field research visits to Bunge's Corowa facility, together with some sample A-weighted L_{eq} third octave graphs from measurements taken during the Stage Two visit.

Appendix Four

This is an unedited collection of documents from Bunge Meat Industries Limited which show the historical background to the radio earmuffs' introduction into that company's Corowa Abattoir and Boning Room.

Appendix One



Bilsom[®]

797 RADIO

Protect your hearing, and still enjoy news, sport and music at work or in your leisure time by using the Bilsom 797 RADIO – the comfortable hearing protector with a built-in FM stereo radio.

Appendix Two

**MEAT RESEARCH CORPORATION - OCCUPATIONAL HEALTH AND SAFETY
BEST PRACTICE PROJECT**

EARMUFF EVALUATION QUESTIONNAIRE - NOVEMBER 1996

Participant's Age (last birthday) M / F

1. What is your opinion of the Radio earmuffs? (Circle appropriate number.)

1	2	3	4	5
Strongly Dislike	Dislike	No Opinion	Like	Strongly Like

2. Are the earmuffs comfortable to use? Yes / No

If no, why? _____

3. On average, how many hours do you wear your ear muffs per day? (Circle appropriate number)

<1	1	2	3	4	5	6	7	8	>8
----	---	---	---	---	---	---	---	---	----

4. If you don't wear the earmuffs for the entire shift, why not?

5. What is your opinion of the quality of the radio sound reproduction in the earmuffs? Circle the appropriate number.

1	2	3	4	5
Poor	Fair	No Opinion	Good	Excellent

6. Which type of music do you prefer to listen to? Number boxes in order of preference with 1 as most preferred and 8 least preferred.

- | | | | |
|----------------------|-------------------|----------------------|-------------|
| <input type="text"/> | Rock | <input type="text"/> | Jazz |
| <input type="text"/> | Classical | <input type="text"/> | Rap |
| <input type="text"/> | Country & Western | <input type="text"/> | Heavy metal |
| <input type="text"/> | Popular | <input type="text"/> | Techno |

Other - please specify _____

Appendix Three

Bunge Meat Industries Corowa

Some of the following noise levels were recorded during the first visit, and others during the second visit.

They represent the lowest noise levels recorded at each workstation during either visit.

Abattoir Sound Level Survey Results

Workstation	dB(A) L_{eq}	Workstation	dB(A) L_{eq}
Lairage / Pre-Stun	98.8	Fat Stand	84.3
Stickhole Shackler	94.8	Saw	87.8
Stickhole	91.5	Retain	83.6
Shave Table	90.3	Necks	83.7
Shave Table Shackles	90.4	Shave / Quality	84.6
Bunghole Stand	82.7	Control	83.0
Evisceration Line	83.0	Stamping	83.4
A Grade Retain	82.4	Trim	87.1
Backing Down Stand	82.4	Chillers	81.3 to 91.9
Grading	82.7	Pig Foot Room	81.7

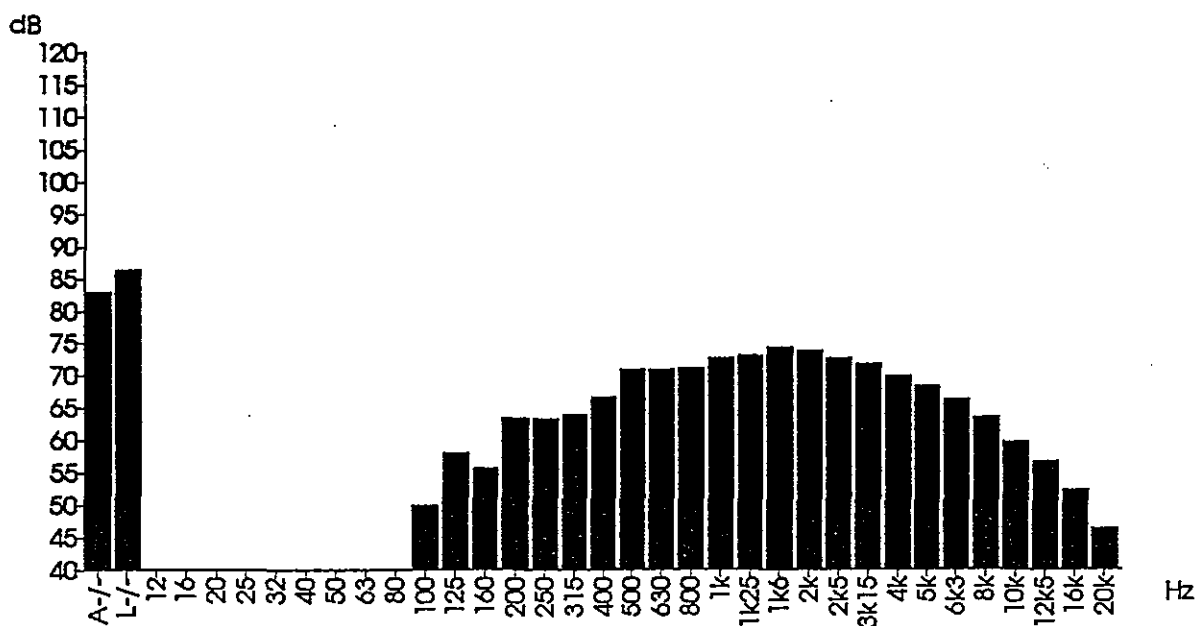
Boning Room Sound Level Survey Results

Workstation	dB(A) L_{eq}	Workstation	dB(A) L_{eq}
Upper Saw Table	82.6	Rib Top Saw	96.2
Pre-Trim	83.7	Boning Line 1	85.3
Boning Line 2	85.3	Boning Line 3	84.6
Supervac Room	83.0	Boning Room Rear	82.5

Third Octave Measurements

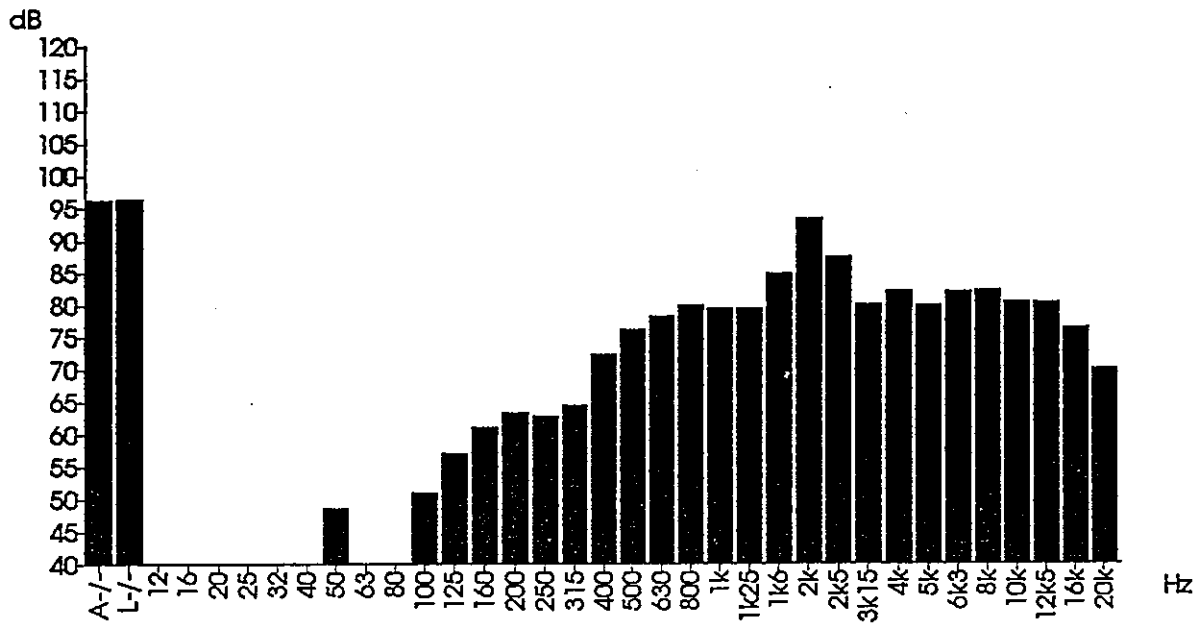
The next few pages in this Appendix provide examples of some A-weighted third octave L_{eq} levels that Bunge's employees are exposed to at the selected workstations.

Evisceration Line



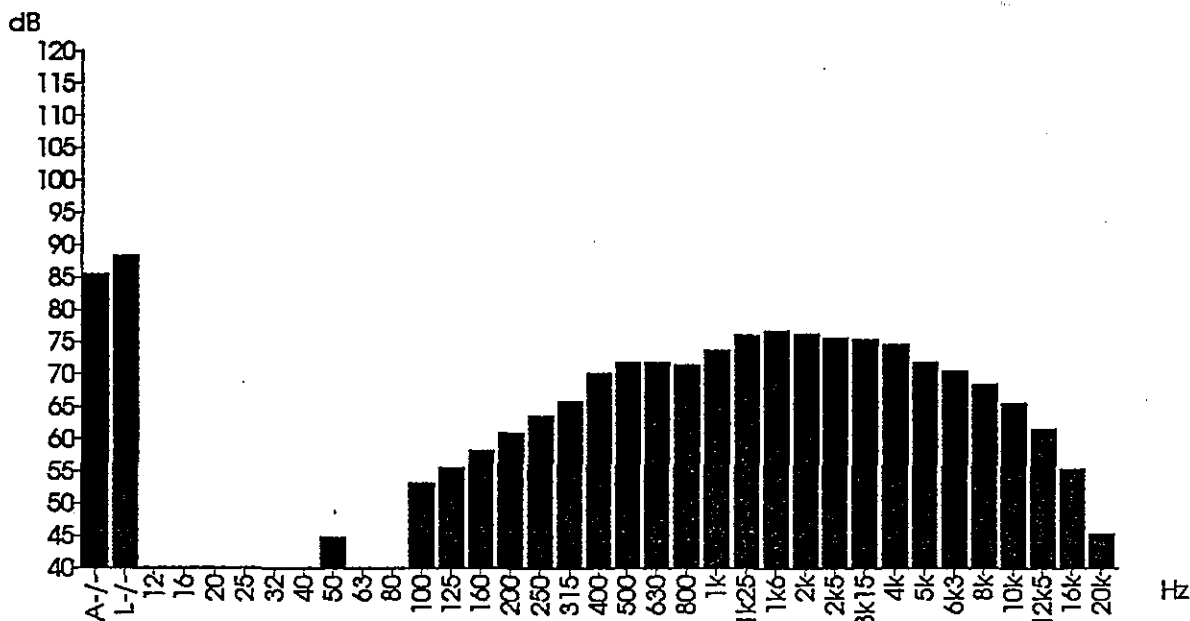
Band (Hz)	Level (dB)	Frequency weighting
Broadband	83.0	A
Broadband	86.4	L
12	—	A
16	—	A
20	—	A
25	—	A
32	—	A
40	—	A
50	—	A
63	—	A
80	—	A
100	50.1	A
125	58.1	A
160	55.8	A
200	63.5	A
250	63.4	A
315	64.1	A
400	66.8	A
500	71.0	A
630	71.0	A
800	71.2	A
1k	72.8	A
1k25	73.1	A
1k6	74.4	A
2k	73.9	A
2k5	72.8	A
3k15	71.9	A
4k	70.0	A
5k	68.4	A
6k3	66.4	A
8k	63.6	A
10k	59.9	A
12k5	56.8	A
16k	52.4	A
20k	46.4	A

Rib Top Saw



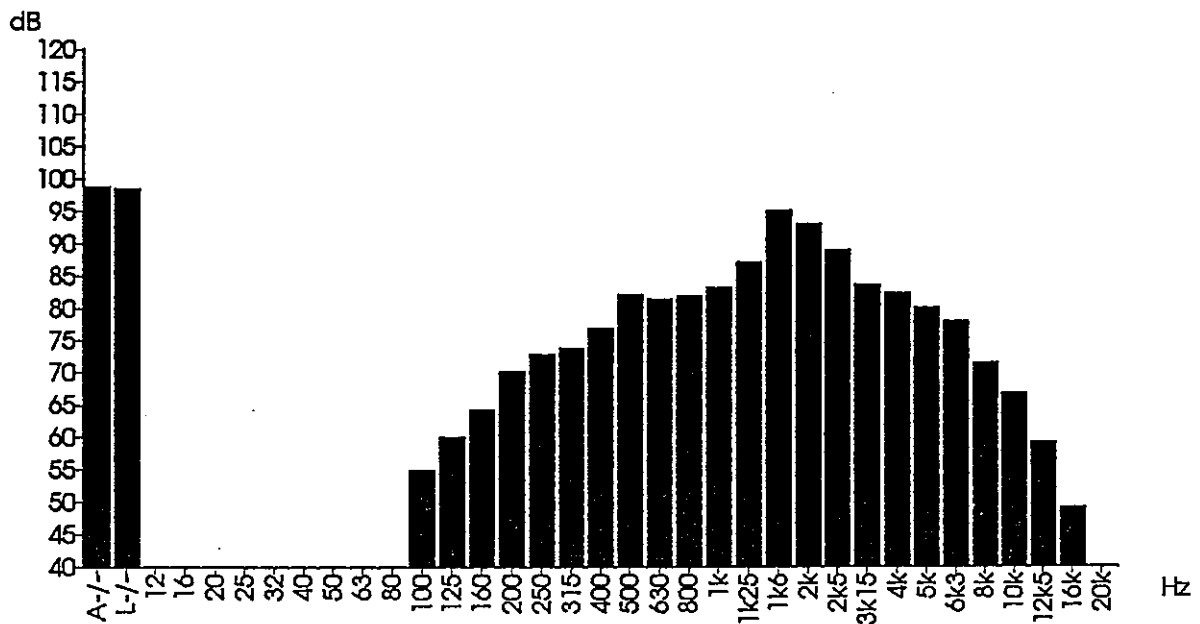
Band (Hz)	Level (dB)	Frequency weighting
Broadband	96.2	A
Broadband	96.5	L
12	-	A
16	-	A
20	-	A
25	-	A
32	-	A
40	-	A
50	48.7	A
63	-	A
80	-	A
100	51.0	A
125	57.1	A
160	61.2	A
200	63.4	A
250	62.9	A
315	64.6	A
400	72.4	A
500	76.3	A
630	78.4	A
800	80.0	A
1k	79.6	A
1k25	79.6	A
1k6	85.0	A
2k	93.4	A
2k5	87.5	A
3k15	80.1	A
4k	82.2	A
5k	80.0	A
6k3	82.1	A
8k	82.3	A
10k	80.5	A
12k5	80.4	A
16k	76.5	A
20k	70.2	A

Boning Line 1



Band (Hz)	Level (dB)	Frequency weighting
Broadband	85.5	A
Broadband	88.3	L
12	—	A
16	—	A
20	—	A
25	—	A
32	—	A
40	—	A
50	44.8	A
63	—	A
80	—	A
100	53.2	A
125	55.6	A
160	58.2	A
200	61.0	A
250	63.6	A
315	65.9	A
400	70.2	A
500	71.9	A
630	71.9	A
800	71.5	A
1k	73.8	A
1k25	76.2	A
1k6	76.8	A
2k	76.4	A
2k5	75.7	A
3k15	75.5	A
4k	74.7	A
5k	71.9	A
6k3	70.5	A
8k	68.5	A
10k	65.6	A
12k5	61.6	A
16k	55.4	A
20k	45.3	A

Lairage / Pre-Stun Noise Levels



Band (Hz)	Level (dB)	Frequency weighting
Broadband	98.8	A
Broadband	98.5	L
12	-	A
16	-	A
20	-	A
25	-	A
32	-	A
40	-	A
50	-	A
63	-	A
80	-	A
100	55.0	A
125	60.1	A
160	64.3	A
200	70.2	A
250	72.9	A
315	73.9	A
400	76.9	A
500	82.1	A
630	81.5	A
800	82.0	A
1k	83.2	A
1k25	87.2	A
1k6	95.1	A
2k	93.1	A
2k5	89.0	A
3k15	83.7	A
4k	82.5	A
5k	80.2	A
6k3	78.1	A
8k	71.6	A
10k	66.9	A
12k5	59.3	A
16k	49.2	A
20k	-	A

Bunge Meat Industries Limited's Documents

BUNGE MEAT INDUSTRIES LTD. - COROWA

INTER-OFFICE MEMO

15 September, 1994

TO: ALL PROCESSING PERSONNEL
NOTICE BOARDS SAFETY COMMITTEE MEMBERS

COPY TO: DISTRIBUTION LIST
FROM: DAVID SUTERS

*Approved Consentation
Policy*

REF:

Compliance negligible

HEARING PROTECTION

The Processing Safety Committee has accepted the proposed National Exposure Standard of 85dB(A) for all work areas.

This decision follows a proactive approach to minimise the exposure of personnel to the risk of hearing loss.

The reduced Exposure Level to 85dB(A) represents a significant reduction when it is understood that a 3dB decrease is equivalent to a halving of the sound pressure levels to which people can be exposed.

Results of the Noise Assessment Survey, (attached) present a noisy work place with all areas testing over the reduced 85dB Exposure Standard.

The first level of control is to reduce sound levels either at the source of the noise or in its transmission.

The use of Hearing Protection Devices is to be regarded as an interim protection control.

BUNGE is committed to investigate and implement controls to minimise noise levels.

Acoustic Engineers will be visiting over the next few weeks for the purpose of identifying noise sources and presenting noise reduction recommendations. BUNGE has made available our plant and resources for research as a part of the Occupational Health and Safety Best Practice Project.

HEARING PROTECTION MUST BE WORN IN THE ABATTOIRS BONING ROOM WORK AREAS FOR ALL PERSONNEL INCLUDING VISITORS AND CONTRACTORS.

A selection of hearing protection devices is available from Elaine to be personally issued. It is each individual's responsibility to care and maintain this equipment.

To eliminate the Risk of Product Contamination Ear Muffs only to be used in the Boning Room

David Suters will be available to conduct informational sessions, Managers to arrange convenient times.

BUNGE MEAT INDUSTRIES LTD

SAFE WORK POLICY

HEARING PROTECTION

BUNGE is committed to investigate and implement practicable controls which will minimise exposure to noise.

Personnel are to be encouraged to produce ideas on how noise generation can be reduced.

HEARING PROTECTION TO BE WORN IN
ALL ABATTOIRS BONING ROOM WORK
AREAS.

Ear Muffs are to be the First Choice of Protective Device.

Ear Plugs are not Permitted in areas where Product is Packaged

Hearing Protection Devices will be Personally Issued and it will be each Individual's Responsibility to care and maintain this Equipment.

Personnel are to be Provided with Information for the Correct Use and Maintenance of Hearing Protection Equipment.

NOISE LEVEL SURVEY

	dB(A) Leq
Sticking Area	96.1
Shave Table	95.5
Evisceration Line	87.2
Grading Stand	90.5
Chillers	103.3
Boning Trim Stand	90.6
Boning High Area	88.8
Boning Room Floor	86.1

DAILY DOSE

Exposure Standard 85dB(A)	
dB(A)	
85	8 Hours
88	4 Hours
91	2 Hours
94	1 Hour
97	30 Minutes
100	15 Minutes
103	7.5 Minutes
106	3.7 Minutes
110	1 Minute

BUNGE MEAT INDUSTRIES LTD. - COROWA

INTER-OFFICE MEMO

13 November, 1995

TO: JOHN ROSS DAVID WARD ALASTAIR HERBERT

COPY TO: PHIL TURNBULL NOISE COMMITTEE

FROM: DAVID SUTERS

REF:

NOISE SURVEY

Noise survey conducted November 1995 has identified that initiatives implemented by Noise Committee have reduced noise levels in some areas, particularly packing and slicing in the Boning Room and the evisceration line, Abattoirs. Committee and maintenance personnel to be congratulated on commitment and efforts.

Boning Room:

Leq dB(A)

Levels taken *without* Rib Top Saw and personal radio operating.

Boning Legs	84.9
Boning Shoulders	83.9
Netting Butts	84
Packing Shoulder Side	84.9
Packing Leg Side	84.3
Rib Top Saw operating, contributed (95-96 dB)	
Boning Shoulders	87.4
Considerable phone activity, contributed (93 dB)	
Boning Middles	88.7
Radio operating, contributed (94-95 dB)	
Strapping Machine	89.6
Boning Shoulders	91.2
No Rib Saw or radio	
Derinding High area	89.9

The Boning Room floor, (without the identified noise sources detailed) presents a work area within the current noise exposure standard of 85dB.

The Boning Room high area exposes employees to levels exceeding the exposure standard, hearing protection has to be worn at all times.

RECOMMENDATION.

- Eliminate the radios.
- Replace the phone alarm with perhaps a flashing light.

- Investigate opportunities of reducing the rib saw noise levels, isolating the work station, professional advice may be required.
- Minimise the mechanical noise sources produced from elevators, shackle handling and chillers.

Important note, any noise reduction in the high area will positively influence the whole room.

Abattoirs

Leq dB(A)

Evisceration Line (static measurement)	86.5
Stickhole to Shave table	97.7
Backing down to plucks	91
Plucks to Backing down	89.7

Although initiatives have been successful in part, exposure levels still exceed acceptable limits and hearing protection to be worn at all times.

Major maintenance projects scheduled being chain replacement and nylon rollers will further reduce noise levels.

At this stage to make any substantial improvements in my opinion will require professional assistance acoustic engineering expertise, particularly when you consider the plant room noise dampening.

The availability of resources from the Best Practice Project will be investigated.



DAVID SUTERS

BUNGE MEAT INDUSTRIES LTD. - COROWA

INTER-OFFICE MEMO

7 December, 1995

TO: ALASTAIR HERBERT

COPY TO: SAFETY COMMITTEE PHIL TURNBULL

FROM: DAVID SUTERS

REF:

HEARING PROTECTION REPORT

Hearing protectors which incorporate sound output limited radio circuits have been trialed with a high degree of acceptance.

Noise surveys have identified that portable radios contribute a 3dB increase in the Leq(A) noise level which effectively doubles the noise level exposure.

To satisfactorily address the Health and Safety concerns these earmuffs are not only an effective hearing protection device, with a sound level reduction rating of 27dB, the radio also has noise limiting circuitry to limit the level to 82dB(A).

Therefore no matter what volume level is selected the wearer cannot be exposed to a level greater than 82dB(A).

The "Hellberg" brand has the opportunity to input an external communication or cassette player where the output is still limited to 82dB.

Reports indicate that music breaks the isolation of wearing earmuffs for a long period of time, and individuals have commented that they feel less fatigued.

The most important issue in regard to protecting personnel from a significant noise hazard is the proper wearing of protection and the wearing of protection during the entire noise exposure.

These earmuffs effectively promote the wearing and proper fitting of hearing protection.

The normal retail price is quoted at \$200 however with a bulk purchase 20% discount has been suggested.

The cost appears to be in the limiting circuitry technology and the fact that they are imported due to lack of interest in this country and at that price this is easily understood.

The opportunity to receive funding from the Best Practice Noise Control Project will be investigated, find attached project protocol.

Discussions with Paul Frost and Sean Morley seem to suggest that employees would contribute to the purchase of these ear muffs.

Ownership I believe would promote a caring behaviour and discourage abuse and theft.

Trials have indicated that sophisticated radio circuitry is necessary to pick up a good signal even when boosted with the internal aerial.

This is a feature of only the more expensive walkman type radios costing around \$150.

Recommendation.

Enter into immediate discussions with BMI management and the Union to investigate ways to implement radio ear muffs in a cost effective manner, consistent with OH&S hearing conservation requirements.



DAVID SUTERS

BUNGE MEAT INDUSTRIES**Noise Committee.**

Minutes of Meeting held 20th December 1995.

Present: C.Ilsley, G.Dutton, D.Suters, D.Ward, P.Smith, S.Naylor.

Apologies:

Copies to: M.McNamara, A.Herbert, J.Ross, L.Webb.

-
1. **Minutes of meeting held 12th December Read & Confirmed.**
 2. **Business Arising:**
 - (a) Plastic coated shackles are being trialled to lessen the noise when they return to the shackling area. There is no opportunity to slow the process down at this stage.
 - (b) The stunner trapdoor will be fixed when the new chain is installed.
 - (c) Matting is to be trialled on the wall at the shave table area. This should be moulded to the wall.
 - (d) A representative for acoustic dampening material will be calling in the New Year. Stu Naylor to enquire re the plant room and also the shackle return area in an endeavour to have something done.
 - (e) Doors from the lairage area need attention. Stu to look at changing spring or installing hydraulics.
 - (f) Hydraulic closing devise to be fitted to the door between the kill floor and the bottom area. This should eliminate a lot of the noise coming up to the kill floor.
 - (g) Plastic doors to be fitted at final wash where carcasses enter the kill floor. This too should help considerably in reducing the noise coming through.
 - (h) The plastic capping that has been trialled at the toenail table will now be installed at the computer index.
 3. **General Business:**

David Suters spoke on the earmuffs being trialled which have an inbuilt FM radio. These have been worn by personnel over the last week and appear to be successful. A hearing conservation consultant will be calling in January to show the range of muffs available and to offer advice in regard to noise control.
 4. **Next meeting scheduled for February 20.**

Meeting closed 3.45 pm.

BUNGE MEAT INDUSTRIES LTD. - COROWA

INTER-OFFICE MEMO

2 January, 1996

TO: ALASTAIR HERBERT

COPY TO: J.Ross, D.Ward, M.McNamara, S.Naylor, N.Mountjoy, C.Hsley, G.Durton,
L.Webb, P.Frost, S.Morley.

FROM: DAVID SUTERS

REF:

NOISE CONTROL

Len Shenker a Hearing Conservation Consultant and Peter Gebbing an Acoustic Engineer will be visiting the site on *Thursday 4 January* arriving at 10:30 am.

Proposed schedule:

- *11:00 am tour of the Abattoirs and Boning Room.*
- *11:30 am informal presentation, Boning Room Meeting Room.*

Following this meeting the opportunity will be available to inspect any areas of concern as identified.

Len and Peter will be happy to answer any questions related to hearing conservation and noise control strategies.

The availability of the Noise Control, and Consultative Committee representatives with an interest in radio ear muffs as being trialed, would be appreciated.



DAVID SUTERS

BUNGE MEAT INDUSTRIES LTD. - COROWA

HEARING PROTECTION

Following the inspection and information session provided by Len Shenker and Peter Gebbing strategies can be proposed. Noise Control committee members other interested personnel plus union representation actively participated in the discussions.

Personal Protection:

The risk associated with the use of walkman type radios and ear buds was clearly detailed particularly when the ear buds are used under muffs.

The contribution of radios significantly increasing the noise hazard is contradictory to OH&S Hearing Conservation policies and therefore unacceptable.

The use of ear muffs with a sound limited radio incorporated is not only an effective hearing protection device they also promote the continued wearing and proper fitting of ear muffs. It has also been reported that the radio breaks the isolation of wearing hearing protection for long periods of time and can alleviate loss of concentration and fatigue.

Noise Reduction:

Report to be provided by Peter making recommendations as to initiatives for noise reduction presenting a hierarchy of priorities with costing as to noise reduction options.

Hearing Protection Policy (Proposed)**Hearing Protection to be worn in the following areas:**

- All Abattoirs work areas.
- Boning Room High area.
- Boning Room floor only when Rib Top Saw operating or the Noise Level exceeds 85 dB.

The use of Radio Cassette Players in any Processing work area where the Noise level exceeds 85dB(A) is not permitted.

Personal Radios present a significant risk to the hearing of the wearer particularly when used in conjunction with ear muffs.

The company would like to encourage the purchase of Radio Ear muffs as being trialed.

It is proposed to offer the Bilson unit at a reduced price and the facility to pay for the unit direct debit from pay over an agreed period.

DAVID SUTERS

30 January 1996

BUNGE MEAT INDUSTRIES LTD. - COROWA

INTER-OFFICE MEMO

12 February, 1996

TO: ALISTAIR HERBERT

COPY TO: PHIL TURNBULL

FROM: DAVID SUTERS

REF:

RADIO EARMUFF

The response to our offer for personnel to purchase Radio Earmuffs at a subsidised price has been pleasingly successful with 39 orders from the Abattoirs and 51 from the Boning Room. The administration of pay deductions and the allocation of holding accounts has been secured with Shirley Unthank.

Meeting Notes:

Meeting called by Paul Frost and Geoff Dutton on the 12 February where concern was expressed as to the protection of employee in the event that Management were to ban the use of Radio Ear Muffs for what ever reason.

A request was made that formal documentation be provided, stating that management offers a buy back option if such a decision were ever made.

My comments were that the request was reasonable.

Hearing protection to be made compulsory was excepted, but would not except that disciplinary action could be taken against repeat non compliance offenders.

As 18 personnel in the Abattoirs would not be purchasing the Radio Ear Muff the opportunity for them to listen to music should be made available therefore the use of Radios to be permitted.

My comments were that this was unacceptable. However I did not force the issue.

The union proposed that on the wall radios to be allowed with the condition that if Hearing Protection was not being worn the radio could be turned off by manager.

The guarantee was made that employees will in fact wear Hearing protection.

A commitment was sought that the union or committee members would ensure compliance, however did not believe that this was their place.

The situation in the Boning Room with Sean Morley indicating that Radios would not be used simply due to the overwhelming support for the Radio Ear Muff.

Our principle objective is to ensure the wearing of muffs, and also to minimise the exposure to noise, 90 people wearing radio ear muffs and the elimination of radios from the boning room is success in part.

To further pursue through negotiation the abolishment of radios and the opportunity to put in place disciplinary procedures for repeat non compliance for not wearing hearing protection is recommended.

However I personally believe the radios on the wall will disappear naturally as the radio ear muffs are used generally.

The urgency is to place an order for the Muffs to secure the special offer of \$158 50.

DAVID SUTERS

BUNGE MEAT INDUSTRIES LTD**SAFE WORK POLICY****HEARING PROTECTION**

Agreement has now been reached on the introduction of radio earmuffs in the Meat Processing Division.

Bunge is committed to investigate and implement practicable controls which will minimise exposure to noise.

HEARING PROTECTION IS TO BE WORN AT ALL TIMES IN DESIGNATED AREAS.

These are as follows

- ALL ABATTOIRS WORK AREAS INCLUDING CHILLERS AND LOADOUT.
- BONING ROOM HIGH AREA.
- BONING ROOM FLOOR WHEN RIB TOP SAW IS OPERATING.
- ALL INTERNAL WORK AREAS WHILST CLEANING DUTIES ARE PERFORMED.

With the exception of one radio in the Abattoir Chillers, the use of radio/cassette players are to be phased out, and after the 15 May 1996, will not be permitted in any processing work area

Non-compliance will lead to disciplinary action in accordance with BMI Disciplinary Procedure but will not include the use of fines.

This policy will be strictly enforced and shall be reviewed after 12 months.

ALASTAIR HERBERT
MANAGER MEAT PROCESSING