Total non-occupational noise exposure of construction workers

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Total non-occupational noise exposure levels were estimated for a group of 266 construction apprentices participating in a longitudinal study of noise and hearing loss. Subjects were interviewed regarding their exposure to "episodic" activities (e.g., concert attendance), and noise levels for these activities were obtained from a literature review. "Routine" activities were assessed using a combination of self-reported activity logs and non-occupational noise dosimetry measurements. Routine and episodic activity exposures were combined into estimated annual Leq exposure levels for the 6760 nominal non-occupational hours in a year (LAeq6760h). The LAeq6760h levels were then transformed into equivalent levels for a 2000 hour exposure period (LA2000hn), which allowed direct comparison to occupational risk criteria. The median LAeq6760h was 73 dBA, and the median LA2000hn was 78 dBA. Nineteen percent of LA2000hn non-occupational exposures exceeded 85 dBA, the generally recommended occupational limit. Firearms use could not be incorporated into the total noise exposure estimates. However, firearms users reported more exposure to other noisy non-occupational activities than did non-shooters, and had higher estimated exposure levels even without including their firearms exposure. Non-occupational noise exposures among most construction workers present little additional exposure when compared to their occupational exposures. However, they may contribute significantly to overall exposure in the subset of workers who frequently participate in selected noisy activities.

I. INTRODUCTION

The relationship between hearing loss and high levels of occupational noise has been known for hundreds of years. Implementation of hearing conservation standards over the past 50 years has in some cases reduced the incidence of noise-induced hearing loss (NIHL)[1,2], but overall such standards have had little effect on the occurrence of NHL[3-5]. The high rates of NHL in industries covered by occupational noise standards, as well as the apparent occurrence of NIHL in children, have led some authors to conclude that non-occupational noise may be producing NIHL.

Occupational standards typically specify an allowable daily 8-hour equivalent average (L_{A8hn}) level of 85 dBA, and assume that workers have quiet non-occupational periods. However, little research has been done to estimate total non-occupational noise exposure levels. Most previous studies have examined either the noise levels or exposure durations for a select few non-occupational activities – but rarely both. Other studies have assessed the link between NIHL and particularly noisy non-occupational activities, such as shooting, without assessing either exposure levels or durations. The current study estimated total annual non-occupational noise exposures resulting from both "routine" (daily) and "episodic" (infrequent) activities.

2. METHODS

Three-hundred and ninety-four apprentice construction workers in ten trades were enrolled in a longitudinal study of noise and hearing loss. Subjects continuing in their training program were interviewed roughly annually over the course of the study. Episodic activity exposures were estimated from activity durations reported in the first follow-up interview and noise levels from the

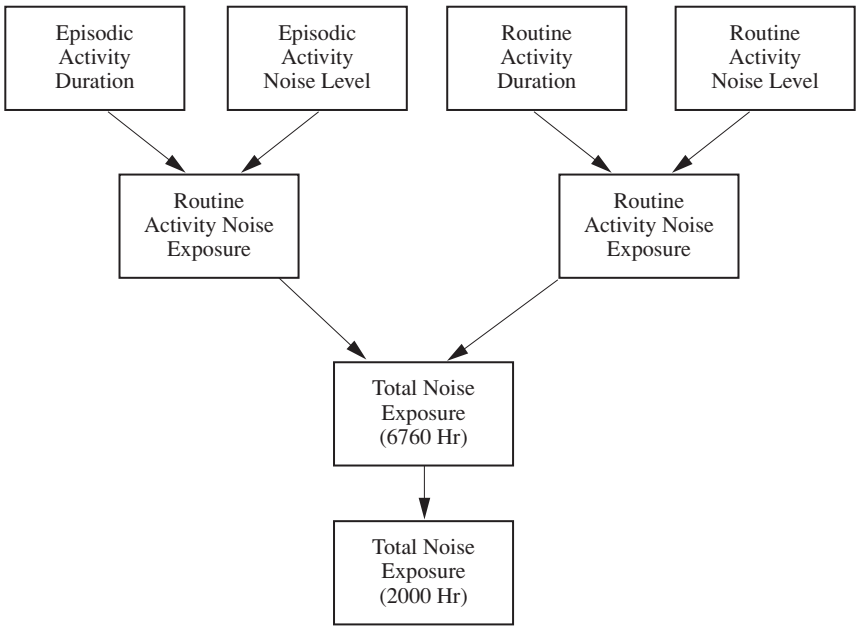

Figure 1. Overview of data sources and combination of data

literature. Routine activity exposures were estimated from activity log data and dosimetry measurements. The non-occupational noise exposure estimates presented here represent the mid-range of exposure levels and durations across all subjects. Low- and high-range estimates are discussed elsewhere[6]. Figure 1 illustrates how the routine and episodic activity data were combined to estimate total non-occupational noise exposure.

Total non-occupational noise exposure was estimated using two metrics. The first, $L_{Aeq6760h}$, represents the actual exposure level for the nominal 6760 hours of non-occupational time in a year (8760 annual hours less 40 hours/week of work time for 50 weeks/year, or 2000 hours). The second, $L_{A2000hn}$, represents the noise level that would have occurred if the total sound energy in the 6760 hour exposure had instead occurred over 2000 hours, and can be compared directly with the risk criteria for occupational exposures.

A. EXPOSURES FROM ROUTINE ACTIVITIES

Routine activity durations were assessed using activity logs with a continuous 40-hr timeline spanning two workshifts and the intervening non-work period. Additional activity log details are presented elsewhere[7]. The logs included a pre-selected list of six non-occupational activities: bar, restaurant, shopping, theatre, home; listen to music or watch TV; travel in a car or bus; yardwork; and other. The average fraction of total non-occupational time spent in each of these activities was calculated across 530 subject-days of activity log data. Each subject was assumed to spend the group-average fraction of time in each activity, since the amount of data available on any one subject was insufficient to create an individualized estimate.

Routine activity noise levels were measured with Quest Q-300 dosimeters using a 40 to 110 dBA measurement range, 85 dBA criterion level, slow response, no threshold, and a 3 dB exchange rate. The dosimeters logged L_{eq} levels for each 1-minute monitoring interval. A group of construction apprentices who were not participants in the longitudinal study wore dosimeters for four consecutive days each and simultaneously completed activity logs. Activity data and corresponding 1-minute L_{eq} levels were

merged, and activity-specific L_{eq} levels were calculated for each subject. Median activity-specific L_{eq} levels across all subjects were then calculated.

B. EXPOSURES FROM EPISODIC ACTIVITIES

Longitudinal study subjects who completed the first follow-up interview reported the total number of hours spent in four episodic activities (riding motorcycles, riding snowmobiles or jetskis, piloting an aircraft, and using power tools) over the previous twelve months. Subjects reported their participation in three other episodic activities (firearms use, heavy machinery operation, and loud recreational activities including concerts, dances, races, and commercial sporting events) as daily (estimated as 800 hours/year), weekly (estimated as 200 hours/year), monthly (estimated as 48 hours/year), or less than monthly (estimated as 4 hours/year).

Because subjects participated in episodic activities infrequently, A-weighted noise levels for six of the seven episodic activities were obtained from a literature review[6]. Noise levels were summarized for each activity as "low-range" and "high-range" (the arithmetic average of the lowest and highest reported activity-specific noise levels, respectively) and "mid-range" (the midpoint between the low and high levels). Only the mid-range exposures are presented here.

C. FIREARMS USE

Although some authors consider firearms use to be the most damaging non-occupational noise exposure, there are no validated models for incorporating impulse noise into L_{eq} levels. Data on firearms use are reported here, but peak firearms noise levels could not be factored into the current analysis. However, shooters and non-shooters were separated for some analyses to see whether firearms users differ from non-firearms users in ways other than firearms use.

D. ESTIMATION OF NON-OCCUPATIONAL NOISE EXPOSURES

Episodic activity-specific L_{eq} noise levels were estimated for each subject by combining the annual number of hours each subject spent in the six episodic activities (from interview responses) with the mid-range activity-specific noise levels from the literature. Again, firearms exposures were not analyzed. Routine activity-specific L_{eq} levels were estimated for each subject by combining the annual number of hours spent in the six routine activities (from activity log reporting) with the median dosimetry levels for these activities.

Total annual non-occupational noise levels ($L_{Aeq6760hi}$) integrated over a 6760-hour period were calculated for each subject using the equation

$$L_{Aeq6760h_i} = 10 \log_{10} \frac{1}{T_n} t_{ij} 10^{Leq_j/10}$$

where T_n is the nominal 6760 hours of annual non-occupational time, t_{ij} is the number of hours spent at activity j by individual i, and L_{eqj} is the median L_{eq} for non-occupational activity j (dBA).

Subject-specific $L_{Aeq6760hi}$ levels were then integrated over a 2000 hour exposure duration for direct comparison to occupational noise standard risk criteria using the equation

$$L_{A2000hn_i} = L_{Aeq6760_i} + 10\log_{10} \frac{\sqrt{T_n}}{\sqrt{T_0}}$$

where $L_{Aeq6760hi}$ is the annual non-occupational noise level for individual i (dBA), T_n is the nominal 6760 annual hours for non-occupational exposure, and T_0 is the nominal annual occupational duration of 2000 hours. $L_{A2000hn}$ levels are always 5.3 dBA higher than $L_{eq6760h}$ levels. The overall group averages and the percentage of subjects exceeding various L_{eq} levels were calculated. Levels were then

NORTHERN IRELAND UNUSED POWERS

Just seven prosecutions were taken against persistent noise offenders in Northern Ireland despite more than 8,000 complaints, it has emerged. A report on the number of calls made against noise pollution in the province last year suggested district councils were taking little or no action to address the problem. It revealed that less than four noise notices per 100 complaints were issued by councils in Northern Ireland, with 11 of the 26 local authorities making no use of their statutory powers to stamp out the nuisance. The report published by the Environment and Heritage Service showed that only Belfast City Council had adopted the Noise Act 1996, which provides additional powers to deal with nighttime disturbances. More than half the 8,397 complaints were received by Belfast City Council (4,388). The council served a total of 256 notices. Derry City Council was second on the list with 375 complaints. However the authority did not serve a single notice in 2003/4. Coleraine had the most proactive approach of the 26 council areas, serving 23 notices after receiving a total of 321 complaints. The report also revealed that 82 per cent of the complaints received related to domestic disturbances.

Table 1. Routine non-occupational activity-specific noise levels (LeqA) from dosimetry and group average routine activity duration

Routine Activity	Total hours	Time reported via activity logs % Total	Hours Yr*	L_{eqA} (dBA) from dosimetry and activity logs Total LeqA hours	Median level
Bar, restaurant, shopping, theatre	318	3.3	223	20.3	70
Home	4,739	48.7	3,292	952	52
Listen to music	988	10.2	690	701	60
Travel in a car/bus	1,754	18.0	1,217	121	70
Yardwork	268	2.8	189	16	70
Other	1,656	17	1,149	332	62
Total	9,724	100	6,760	2,141	58

*Assumes 2000 hours of worktime and 6760 hours of non-worktime per year

Table 2: Episodic non-occupational activity noise levels from literature and reported episodic activity participation

Episodic activity	Participation (hours/y) from questionnaire Group	No. subjects	% of all subjects	Median duration	Leq level (dBA)* Mid
Light aircraft	All Subjects	2	0.8	0	91
	Shooters	0	0	0	
	Non-Shooters	2	1	0	
Loud recreation **	All Subjects	155	59	3.1	94
	Shooters	35	60	4	
	Non-Shooters	120	57	4	
Machinery	All Subjects	46	17	0	97
	Shooters	21	36	0	
	Non-Shooters	26	12	0	
Motorcycles	All Subjects	57	22	0	100
	Shooters	26	45	0	
	Non-Shooters	31	15	0	
Power tools	All Subjects	146	55	3	94
	Shooters	42	72	23.7	
	Non-Shooters	105	50	0.5	
Snowmobiles	All Subjects	44	17	0	95
	Shooters	14	24	0	
	Non-Shooters	30	14	0	
Firearms	All Subjects	58	22	0	***
	Shooters	58	100	4	

*Mid values are the midpoint of the lowest and highest average values reported for this activity in the existing literature. For additional information on the sources of these data, see (6)

**Loud recreation consists of rock concerts, races, and commercial sporting events

***Firearms levels reported in the literature represent peak levels rather than Leq levels, and cannot be included in this model

estimated separately for non-shooters and for shooters without including their firearms exposure.

3. RESULTS

Of the 394 apprentices enrolled in the longitudinal study, 266 (68%) completed the first annual follow-up interview. Mean subject age at follow-up was 28.6 ± 6.2 years.

A. ROUTINE ACTIVITIES

A total of 9,724 hours of activity log reporting was collected over 406 subject-days. An additional 2,141 hours of activity log and simultaneous dosimetry data were collected on 31 apprentices over 124 subject-days. Median annual exposure durations and noise levels for the six routine activities are listed in Table 1. Activities at home constituted the largest portion of non-occupational time reported (nearly 50%). Median dosimetry-derived L_{eq} levels ranged from 52 to 70 dBA, with an overall median level of 58 dBA.

B. EPISODIC ACTIVITIES

Table 2 shows subject participation in the seven episodic activities and the mid-range activity noise levels form the literature for all subjects and stratified by reported use of firearms. Firearms use data are shown, but firearms noise levels are not presented since they could not be used. Shooting was uncommon; 22% (58) subjects reported firearms use, and 62% of these reported less than monthly use. Over half of all subjects reported using power tools off the job and attending loud recreational activities. Fewer subjects participated in the other non-occupational activities. A higher percentage of shooters reported loud machinery use, motorcycle use, power tool use, and snowmobile use than did non-shooters. The time spent in these noisy activities by shooters was also higher than for non-shooters.

C. TOTAL ANNUAL NON-OCCUPATIONAL NOISE EXPOSURE ESTIMATES

The estimated mid-range 6760 hour non-occupational exposure levels, and the equivalent 2000 hour values, are shown in Table 3 for all subjects and stratified by reported firearms use. The mean $L_{Aeq6760h}$ level was 73 dba, and the mean $L_{A2000hn}$ level was 78 dBA. In general, noise exposure from routine activities had more influence on the estimated mean annual exposure level than did episodic activities.

D. DIFFERENCES IN ANNUAL NON-OCCUPATIONAL EXPOSURE LEVEL BY FIREARMS USE

In addition to $L_{Aeq6760h}$ and $L_{A2000hn}$ exposure estimates for all subjects, Table 3 contains estimates for non-shooters and for shooters without inclusion of firearms exposure. Even excluding the effects of firearms exposure, shooters had higher non-occupational exposures than non-shooters ($p<0.001$, Mann-Whitney U test).

E. PERCENT OF ANNUAL NON-OCCUPATIONAL EXPOSURE LEVELS EXCEEDING CERTAIN THRESHOLDS

Table 4 shows the estimated percent of subjects with $L_{A2000hn}$ equivalent annual exposures exceeding various thresholds for all subjects and stratified by firearms use. Overall, 19% of subjects had estimated non-occupational $L_{A2000hn}$ levels that exceeded 85 dBA, and 6% exceeded 90 dBA. Sixteen percent of non-shooting subjects had LA2000hn non-occupational exposure levels above 85 dBA, compared to 29% of shooters excluding firearms exposure. Shooters had significantly higher (Chi-square test, $p<0.001$) percentages than non-shooters for three of the five exceedance intervals. In general, a much higher percent of shooters were exposed above the higher thresholds, even without including their firearms exposure.

Table 3. Estimated annual 6760 hour average non-occupational noise levels ($L_{Aeq6760h}$) and 2000 hour equivalent levels ($L_{A2000hn}$) for routine and episodic activities*

		Annual Noise Level, dBA** Episodic activity level	
Routine activity level	**Group**	**Not included**	**Mid-range**
$L_{Aeq6760h}$			
Not included	All subjects	–	60
	Shooters without firearms	–	71**
	Non-Shooters	–	57**
Mid (50th percentile)	All subjects	64	73
	Shooters without firearms	64	76**
	Non-shooters	64	72**
$L_{A2000hn}$*			
Not included	All subjects	–	65
	Shooters without firearms	–	76**
	Non-Shooters	–	62**
Mid (50th percentile)	All subjects	70	78
	Shooters without firearms	70	81**
	Non-Shooters	70	77**

* Equivalent 6760-hour dose received over a 2000-hour exposure period

** Differences between shooters and non-shooters statistically significant (Chi-Square test, p<0.001)

Table 4. Estimate annual 2000 hour equivalent non-occupational level (L_{A200hn}) risk of overexposure*

	Percent of Subjects				
Group	**%>70 dBA**	**%>75dBA**	**%>80dBA**	**%>85dBA**	**%>90dBA**
All Subjects	83	59	34	19	6
Shooters without firearms	93**	81**	62	29	5**
Non-Shooters	80	53	26	16	6

*Equivalent 6760-hour dose received over a 2000-hour exposure period

**Difference between shooters and non-shooters statistically significant (Mann-Whitney U test, p<0.001)

4. DISCUSSION

Understanding the degree to which non-occupational noise exposure contributes to NIHL is very important. However, accurate determination of non-occupational noise exposures is very difficult, and any estimation of non-occupational noise exposure is necessarily crude. The mid-range levels presented here do not completely summarize the total non-occupational noise exposures of all 266 construction apprentices assessed, but are representative for the majority of group. There is no reason to believe that the non-occupational exposures reported here are particularly different from those of other blue collar groups in North America.

Firearms noise exposure could not be included in this assessment. However, even without the inclusion of firearms exposure, shooters had higher total noise exposure levels than non-shooters. This suggests that some shooters are at higher risk of noise-induced hearing loss than non-shooters

as a result of their non-occupational exposures other than firearms use.

The non-occupational noise exposure estimates presented here suggest a mid-range equivalent 2000 hour exposure level of 78 dBA, which corresponds to an actual 6760 hour level of 73 dBA. Among the construction apprentices studied, 16 percent of non-shooting subjects and 29 percent of shooters (without including their firearms exposure) had $L_{A2000hn}$ levels above 85 dBA. For an occupational $L_{A20000hn}$ of 85 dBA, the US National Institute for Occupational Safety and Health (NIOSH) estimates an 8% excess risk for a 25 dB average hearing loss at 1, 23, and 4 kHz after 40 years of exposure. The excess risk at 90 dBA climbs to 25%.[8] These risk estimates should also apply for the non-occupational $L_{A20000hn}$ estimates presented here.

Occupational exposure levels in construction are typically in the range of 85-90 dBA $L_{eq.}$[9-12] Occupational (L_{eqO}) and non-occupational (L_{eqN}) exposure levels integrated over 2000 hours can be summed to obtain a total annual L_{eq} exposure level (L_{eqAT}) for individual *i* using the equation

$$L_{eqAT_i} = 10\log\left[10^{(L_{eqO_i}/10)} + 10^{(L_{eqN_i}/10)}\right]$$

A construction worker with an occupational exposure of 90 dBA who does not use firearms and has the mid-range non-occupational $L_{A20000hn}$ level of 78 dBA (Table 3) would have a cumulative annual exposure level of 90 dBA, indicating that the non-occupational exposure contributes almost nothing to the cumulative exposure. Only for a worker with low occupational exposure (less than about 81 dBA) would a non-occupational $L_{A2000hn}$ level of 78 dBA make a contribution to the worker's total annual noise exposure. Workers who use firearms will have higher non-occupational exposures than those estimated here, especially if they do not use hearing protection while shooting.

Three previous studies [13-15] which measured non-occupational noise exposures found that certain noisy non-occupational exposures (e.g., parties, concerts) constitute most of an individual's total non-occupational noise exposure, a finding consistent with the current study. These studies also noted that the measured non-occupational exposures were lower than that of an occupationally-exposed worker, a conclusion consistent with another study of non-occupational noise exposure in the UK[16]. None of these previous studies assessed the contribution of episodic activities to total non-occupational noise exposure, but the exposure levels identified in each of the studies are generally consistent with those of the current study.

5. CONCLUSIONS

About one of every five construction apprentices assessed in this study had estimated non-occupational exposures above 85 dBA, placing them at risk for hearing loss even without consideration of their occupational exposures. Conversely, nearly 80% of subjects were at low risk of hearing loss from non-occupational noise. Subjects who reported recreational shooting had higher non-occupational exposures than non-shooters even without accounting for the actual firearms noise, because they were more likely to engage in other noisy non-occupational activities. Firearms exposure could not be modeled in this analysis, but relatively few subjects reported using firearms, so the estimates presented here are representative for most of the subjects assessed. For subjects who did use firearms, and especially for the one-third of shooters who reported never using hearing protection while shooting, the estimates here are low.

Hearing loss prevention efforts should focus on high exposures,

regardless of where they occur. For most workers with high occupational noise exposures, the focus should remain on the workplace. However, additional focus should be placed on individuals with exposure to high noise in other parts of their lives.

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13 CHINESE CITIES

China's general environment monitoring station has released a report on the sound environment in cities nationwide during 2003. According to the report, the nation's urban road traffic sound environment quality is good or relatively good and that in urban areas it is relatively good or lightly polluted. The cities seriously polluted in terms of traffic noise and environmental noise of urban area account for 3.2 per cent and 0.6 percent respectively of the total surveyed. About 1 percent of the population is living in heavily polluted areas. The report was based on monitoring over the road traffic noise in 401 cities and over the environmental noise of urban area in 352 cities. Among the 401 cities, 13 cities or 3.2 percent of the total surveyed are heavily polluted; 21 or 5.2 percent are moderately polluted and 50 or 12.5 percent are lightly polluted. The urban road traffic sound environment is relatively good in 141 cities, or 35.2 percent of the total; while that in 176 cities or 43.9 percent, is good. The year 2003 saw great improvement in the road traffic sound environment in state-controlled cities as the proportion of cities with good environment was 5.8 percentage points higher than in 2002. The top 10 cities are Luoyang in central China's Henan Province; Nantong in east China's Jiangsu Province; Lhasa in Tibet Autonomous Region; Guilin in Guangxi Zhuang Autonomous Region; Zhuhai in Guangdong Province; Chongqing Municipality; Lianyungang in Jiangsu; Hefei in Anhui Province; Zhanjiang in Guangdong and Shenyang in northeaster Liaoning Province.

TRAINS DISTURB PIGS

The Korean railway authority has been ordered to pay compensation to a hog farmer for damages arising from noise made by the bullet train. This is the first time for the authority to pay compensation for noise from its operation. The National Environmental Dispute Resolution Commission said it has ordered the Korean Rail Network Authority to pay 40 million won ($38,000) to the owner of a pig farm, identified as Lee, 53. Lee filed a complaint claiming noise from the bullet train led to miscarriages and stillbirths among his stock. Lee, who raises hogs at a farm located some 65 meters from the high-speed train's track in Maesong-myon, Kyonggi Province, demanded the rail authority pay 860 million won in compensation. He claimed problems among his 110 pigs started shortly after trial operation of the bullet train was launched in July 2003. The committee said in its ruling, "Although the average noise level dropped from 68.5 decibels to 62.3 decibels after the railway construction firm set up soundproof walls between Lee's farm and the railroad in September 2002, the highest level was recorded at 75.1–76.5 decibels in October 2004. Experts say hogs raised in a quiet location could have suffered stress from sudden noise, and such loud noise can be more than 20 percent responsible for problems that include miscarrages and stillbirths. Thus we acknowledge the link between the noise and the damage," the commission said. However it did not recognize claims for damage from vibration during the train's operation or for Lee's mental injury from the noise.

SELF-HELP

Chairs in schools in Broward County, Florida, squeak on the tile floors. A high-pitched, noisome sound; a sound easily made by wilful children seeking to put themselves in the limelight, annoy teacher, or just a sound made ten thousand times in the normal course of a school day. Because of the climate, mould and mildew issues, the School District does not put carpet in schools anymore: hence the noise. Ingeniously someone came up with the idea of cupping chair legs in halves of old tennis balls – and it works; noise was cut dramatically. "We once bought chairs with rubber feet, but they broke off. They couldn't take the wear and tear," said Tom Getz, Broward School District's financial director. So now the local schools' fund raising is replaced by ball-raising drives.

BARRIERS TO TRADE

Concrete walls do a very good job of blocking noise, which is why the state of Indiana is spending about $13 million to erect sound barriers as it widens Interstate 69 between US 24 and Dupont Road. They do an equally thorough job of blocking sight, which isn't necessarily a problem – unless your livelihood depends upon being seen. "I bought lakefront property, and now they've drained the lake," said Gary Osborn, owner of Osborn Enterprises, who bought the building at 819 W. Washington Center Road for his motorcycle business a year ago precisely because I-69 carries 50,000 cars past his back door every day. Since the sound barrier went up two months ago, sales have dropped – which doesn't surprise Osborn, since his building, signs and products are now all but invisible from the interstate. As angry as Osborn and other Washington Center Road business owners are, they are perhaps more fortunate than Dan Brogan. "It may be legal, but it doesn't seem fair," said Brogan, owner of Brogan Outdoor Advertising, who no longer collects revenue from his sign near I-69 and Coldwater Road. An advertiser, after all, pays to attract attention – and a billboard few can see is likely to lure more pigeons than people. If businesses are damaged in some way by obscuring them, for example, there seems to be no legal obligation on the Indiana government to pay compensation.

GOVERNMENT KOREAN AND USAF NOISE

A district court in Korea recently ordered the government pay 2.2 billion won for 1,126 residents around the US Air Force Base in Kunsan, North Cholla Province, in compensation for noise emitted by the base. The Seoul Central District Court said the government should pay compensate of 30,000 won per month for a residing period to residents suffering from the noise level from 80–89 Weighted Equivalent Continuous Perceived Noise Level (WECPNL) and 50,000 won per month for a residing period to residents with 90–95 WECPNL. a panel of judges stated that the index of 80 WECPNL is equivalent to the noise level in industrial areas and other noise regions at around 83 WECPNL or 70 decibels, which means residents have had to endure an excessive environment of noise pollution which is well beyond tolerable. "Under the Status of Forces Agreement (SOFA), which defines the status of American troops stationed in the country, the South Korean government is responsible for the compensation of damages incurred on residents by the US military facilities and equipment, " the court said. "Although the accused claimed that they are not guilty because some of the plaintiffs moved there knowing the area is noisy, the government should compensate for noise damages in that the residents migrated here not seeking to gain from the noise damages," the court added.

HOAXER JAILED

A man who made two bomb hoax calls to Liverpool John Lennon Airport after becoming 'depressed' by constant aircraft noise has been jailed. Alan Burton's home in Moreton, Wirral, is under the flight path, Liverpool Crown Court heart. He phoned the airport twice in three days, claiming there was a bomb on the easyJet Belfast to Liverpool flight. The 40-year-old admitted the offence when the calls were traced to his house. He was jailed for 12 months. Andrew Howe, prosecuting, said the second hoax led to the aircraft being searched and the flight delayed.

LEAF BLOWERS

In Australia, leaf blowers are about to come under investigation by the Environmental Protection Board, primarily because of the noise they make. U.S. EPA studies give the average blower a noise level of 75dB at 20 metres; according to the California Air Resources Board, their motors are 'inordinately large emitters of carbon monoxide, nitrogen dioxides hydrocarbons and particulate matter. The US Lung association says the emissions are the same as from 17 cars …