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HEALTH & SAFETY LABORATORY

Wood dust survey 1999/2000.

FINAL REPORT

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SUMMARY

Objectives

- To obtain a picture of current occupational exposure to wood dust by measuring levels of exposure in a representative range of tasks and processes across the woodworking industry.
- To assess compliance with the maximum exposure limits (MELs) for wood dust and certain aspects of the Control of Substances Hazardous to Health (COSHH) Regulations.
- To compare the exposure data with the results of the 1988/9 Technical Development Survey (TDS) to identify any changes in patterns of exposure, and to identify any differences in exposure resulting from the impact of the COSHH Regulations and the MELs for wood dust.

Main Findings

A nationwide survey was carried out to determine personal exposures to wood dust and to assess compliance with certain aspects of the Control of Substances Hazardous to Health Regulations. A total of 386 personal air samples were collected at 47 different woodworking sites representative of the industry as a whole.

Most samples were below the maximum exposure limit (MEL) of 5 mg/m^3 for wood dust, but a significant amount (27.2%) were in excess of the MEL. Circular sawing and sanding were identified as processes giving rise to particularly high exposures.

Only 34% of sites could produce a written COSHH assessment, and a significant percentage of the sites visited did not carry out either weekly or 14 monthly checking of local exhaust ventilation systems.

The air sampling results from this survey were compared with those obtained in a 1988/9 survey. The comparison suggests that there has been an overall decrease in the proportion of samples exceeding the MEL. In 1988/9 fixed position mechanical sanding and circular sawing were the processes leading to the highest exposures, and this is consistent with the findings of this survey.

Main Recommendations

This is a factual report, and as such there are no recommendations.

CONTENTS

1. INTRODUCTION

A Control Limit of 5 mg/m^3 for total inhalable hardwood dust measured as an 8 hour time weighted average (8hr TWA) came into effect in April 1988. This followed a proposal by the Advisory Committee on Toxic Substances (ACTS) which was based on the findings of HSE surveys carried out in 1976 and 1983. The Control Limit was replaced by a maximum exposure limit (MEL) of the same value when the Control of Substances Hazardous to Health Regulations (COSHH) came into force in October 1989.

To coincide with the implementation of COSHH, and in order to assess the standard of control of hardwood dust being achieved, a nationwide Technical Development Survey (TDS) was carried out during 1988/9 (HSE, 1990). A total of 363 personal air samples were collected at 41 factories. Approximately 60% of exposures were found to be below 5 mg/m^3.

The 1988/9 TDS found that very few premises worked solely with hardwoods and there was substantial processing of softwoods using the same machinery. It was considered reasonable to use the 1988/9 data as a guide to exposures to softwood dusts. The findings of the TDS were therefore used by ACTS in the process of setting an occupational exposure limit for softwood dust (HSE, 1996). A MEL for softwood dust of 5 mg/m^3 (8hr TWA) came into force in January 1997.

Since the 1988/9 TDS, the use of composite materials, particularly medium density fibreboard (MDF), has become more prevalent. Although the amount of dust generated when sawing MDF is similar to that generated when sawing pure woods, the amount of dust generated when sanding MDF may be higher (HSE, 1999).

At the request of FOD's Agriculture and Wood Sector (AWS), the Health and Safety Laboratory (HSL) undertook a nationwide study of exposure to wood dust in the woodworking industry. The purpose was to update the information collected in the 1988/9 TDS. In the 1999/2000 survey, exposures to hardwoods, softwoods and composite materials were measured. The impact of the MELs for wood dust and the

requirements of the COSHH Regulations on exposures was also assessed by comparing the results of this survey with those obtained in 1988/9.

2. AIMS AND OBJECTIVES.

The aim of the project was to provide information on occupational exposure to wood dust to determine any changes in patterns of exposure since a previous survey in 1988/9.

The objectives of this project were threefold:

- To obtain a picture of current occupational exposure to wood dust by measuring levels of exposure in a representative range of tasks and processes across the woodworking industry.
- To assess compliance with the maximum exposure limits (MELs) for wood dust and certain aspects of the Control of Substances Hazardous to Health (COSHH) Regulations.
- To compare the exposure data with the results of the 1988/9 Technical Development Survey (TDS) to identify any changes in patterns of exposure, and to identify any differences in exposure resulting from the impact of the COSHH Regulations and the MELs for wood dust.

In addition to the above, two other related HSL projects were carried out concurrently and are detailed elsewhere:

- Visualisation of exposure to wood dust (at a site visited during this survey). Mr RDR Clark, Field Measurement Section, HSL (video available from Mr RDR Clark)
- Field trials of a passive dust sampler in the woodworking industry. Dr M Hemingway, Field Measurement Section, HSL. Project FMS/00/02 (Available from Library Information Services)

3. METHODOLOGY.

3.1 Scope

In order to obtain data representative of the woodworking industry as a whole, the AWS selected a wide range of premises to be visited. These premises were identified from the FOCUS database and covered:

- Different types of woodworking industries (sawmilling, furniture manufacture, joineries, shop fitters etc).
- Different types of wood worked. (Exposure to dust from both hardwoods and softwoods were measured. Also included in the survey were exposures to dust from composite materials such as medium density fibreboard (MDF), plywood, and chipboard)
- Different numbers of employees.

No particular effort was made to include or exclude those premises previously visited during the 1988/9 TDS.

Some 60 sites were identified by the AWS and passed to HSL's Field Scientific Support Unit (FSSU) who selected 47 suitable sites to visit. After informing the relevant FOD Principal Inspector of the intention to visit, a letter was sent to the occupier giving notice of the intended visit (See Appendix 1 for copy of letter). FSSU scientists then visited the premises to collect data during the period January-July 2000.

Field Scientists visited the selected premises and collected a total of 386 personal samples (ie an average of 8 personal air samples were collected at each site). Static samples were not collected, as the main objective of the project was to compare the air sampling results with the MELs for wood dust, and the results of static sampling cannot be compared to a MEL.

Once the air sampling results had been collated, they were passed to the relevant FOD PI for input into the FOCUS database, and to be passed onto the occupier of the premises visited. The air sampling results were also passed to Technology Division 3 for input into the National Exposure Database (NEDB).

An analysis of the data collected was performed to determine:

- The mean, median, 95th percentile value, range and distribution of air sampling results
- The mean, median, 95th percentile value and range of results grouped by type of woodworking process

3.2 Air sampling and analysis procedure

Personal air samples for wood dust were taken in accordance with MDHS 14/3 "General methods for the sampling and gravimetric analysis of respirable and inhalable dust". The method involves drawing air from the breathing zone of an operator into an IOM cassette fitted with a 25mm diameter glass fibre filter at a flow rate of 2 l/min. Gravimetric analysis of the samples was performed locally by the FSSU scientist. Air sampling results were reported on BOHS/NEDB 1 forms as measured results and as 8-hour time weighted averages in accordance with Part 3 of EH40/2000.

3.3 Assessment of compliance with COSHH Regulations

To determine compliance with COSHH, a questionnaire was administered by the FSSU scientist at each site. Information to accompany the air samples, such as hours of work, shift patterns etc, was also recorded on the questionnaire. A copy of the questionnaire is attached as Appendix 2 of this report.

It is not possible to measure absolute compliance to the COSHH Regulations using a questionnaire. To assess compliance, a detailed occupational hygiene survey would need to be carried out at each site visited. The administration of the questionnaire was intended to gain factual information on certain aspects of compliance with COSHH. Factual information on the following topics was collected by the FSSU scientist:

- The types of control measures used
- The maintenance of those controls
- The welfare facilities available to employees
- The availability and content of any COSHH assessment
- The cleaning methods employed by the occupier
- The provision and frequency of any health surveillance
- The availability and use of HSE and AWS guidance

This report contains no analysis of the more subjective information collected, such as the efficiency of any control measures and the adequacy of any COSHH assessment.

3.4 Comparison of results with those obtained from 1988/9 TDS

Despite the similar number of personal samples collected, a direct comparison of the results from the TDS and the results from this survey is not straightforward. Jones and Smith (1989) performed a similar comparison with data collected from surveys in 1976/7 and 1983, but in their case the 2 surveys compared used the same sampling and analytical techniques, and the same premises were visited in 1976/7 and 1983. A comparison between the data collected in this survey and the data collected in the 1988/9 TDS needs to take the following into account:

- The TDS collected data on exposure to hardwood dust only. This survey collected information on exposure to hardwoods, softwoods and composite materials.

- A different measurement method was employed to take air samples in the TDS. This survey uses the current recommended method for collecting wood dust samples (the IOM sampler), whereas the modified UKAEA “7-hole” sampler was used in the TDS. There is evidence to suggest that there are differences in performance between different samplers for inhalable dust (Mark and Vincent (1986) and Chung et al (1987)) .

- The 1988/9 TDS survey report groups together results by woodworking process where possible. The 9 process groups chosen are different from those detailed in this report. In itself, this is not a significant problem, as the data collected during this survey can be regrouped. However, a statistical analysis (mean, median, range, number of samples taken, 95th percentile value) of the data within each process group was not fully detailed in 1988/9, making a comparison by process possible in only 4 woodworking processes (saws, spindle moulders/routers, tenoners/morticers and fixed position sanders).

A comparison between the 2 surveys was performed by firstly examining the distribution of the sampling results, and identifying any change in that distribution. A comparison was also made with respect to the percentage of samples exceeding the MEL. Also the numerical difference between the mean exposures for the 4 process categories detailed above was calculated.

The differences between the 2 sets of results are likely to have large errors associated with them. These errors are not easily quantifiable, for example the difference attributable to using two different sampling methods is not constant and will vary with the particle size distribution of the sampled dust.

4. RESULTS

The air sampling results presented in this section are all expressed as 8-hr TWA's.

4.1 Air sampling results

A total of 386 personal air samples for wood dust were collected at 47 different sites. The 47 sites visited were categorised by their 1992 Standard Industrial Classification codes (SICs) and are shown in Table 1.

Table 1 Breakdown of sites visited by SIC code

SIC code	Description	Number of sites visited	Percentage of total sited visited (%)
20 300	Manufacture of build-ers' carpentry and joinery	18	38.3
36 140	Manufacture of other furniture	10	21.3
36 110	Manufacture of chairs and seats	8	17
20 100	Sawmilling	6	12.8
20 400	Manufacture of pallets and packing cases	3	6.4
20 510	Manufacture of other wooden products	1	2.1
36 120	Shopfitting	1	2.1
36 130	Manufacture of kitchen furniture	1	2.1

Most of the sites visited worked a mixture of hardwood, softwood and composite materials (64%), 23% worked softwoods only, 8% worked composite materials only and 4% worked exclusively with hardwood.

The survey was carried out nationwide and a geographical breakdown of the sites visited, and the number of personal air samples collected is given in Table 2.

Table 2. Breakdown of sites visited and samples collected by FOD Division

FOD Division	Number of sites visited	Number of samples collected
London and South East (LSE)	2	15
Home Counties (HC)	19	196
Wales and South West (WSW)	3	18
Midlands (MID)	5	39
North West (NW)	5	18
North East (NE)	7	52
Scotland (SCO)	6	42
TOTAL	**47**	**386**

The high proportion of sites in the Home Counties Division did not introduce any bias to the results as the woodworking undertaken here was broadly similar to the rest of the country.

A simple statistical analysis of the air sampling data shows the average personal exposure for the 386 samples taken to be 6.57 mg/m^3. The median for the 386 samples was 2.6 mg/m^3 and the range of the results was from 0.05 to 157 mg/m^3. The 95th percentile value for all of the air samples taken was 25.1 mg/m^3.

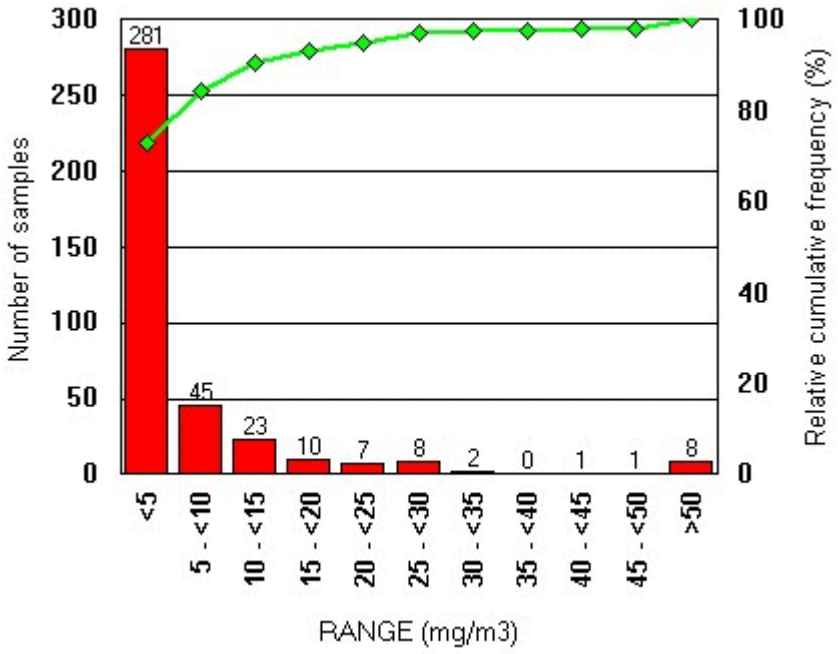
The distribution of the samples is shown in Table 3. The number of samples in each range was determined, and the data was plotted as a frequency histogram in Figure 1.

Table 3. Distribution of air sampling results

Range (mg/m^3)	Number of samples	Percentage of total samples taken (%)	Relative cumulative frequency (%)
<5	281	72.8	72.8
5 to <10	45	11.7	84.5
10 to <15	23	6.0	90.5
15 to <20	10	2.6	93.1
20 to <25	7	1.8	95.0
25 to <30	8	2.1	97.1
30 to <35	2	0.5	97.6
35 to <40	0	0.0	97.6
40 to <45	1	0.3	97.9
45 to <50	1	0.3	98.2
>50	8	2.1	100.0
TOTAL	**386**	**100.0**	**100.0**

The distribution in Figure 1 is “skewed” towards the lower results with a “tail” containing a few extremely high results as is usual in a log-normal type distribution. Given this, the arithmetic mean of 6.57 mg/m^3 may be somewhat misleading, and the median result of 2.6 mg/m^3 may be more generally representative of exposure to wood dust for the samples collected in this survey. The main purpose of calculating arithmetic mean was to allow a comparison with the data collected from the 1988/9 TDS.

Figure 1. Cumulative frequency plot of air sampling data



An analysis of the air sampling result was carried out to determine the range of exposures on a “site by site” basis. Table 4 shows the results of this analysis.

Table 4 Site by site analysis of air sampling results

Range (mg/m^3)	Number of premises	Percentage of premises (%)	Cumulative percentage (%)
All samples <5	16	34.0	34.0
All samples <10	4	8.5	42.5
All samples <15	8	17.0	59.5
All samples<20	2	4.3	63.8
All samples <25	6	12.8	76.6
All samples<30	3	6.4	83.0
All samples<35	2	4.2	87.2
One or more samples >50	6	12.8	100.0
TOTAL	**47**	**100.0**	**100.0**

From Table 4 one can see that at 34% of the sites visited, all exposures were below the MEL of 5 mg/m^3. Conversely, at 66% of sites visited the MEL was exceeded in at

least one case, and at 12.8% of sites the MEL was exceeded by a factor of 10 in at least one case.

An analysis of the data by woodworking process was carried out to identify any relationships between the task and exposure to wood dust. The 386 samples collected were grouped into the 11 categories of woodworking task detailed in Table 5.

Table 5. Breakdown of air sampling results by process.

Process	Description	Number of samples collected	Percentage of total samples (%)
Multitasking	Those workers undertaking more than one process during the sampling period	188	48.7
Sanding	Workers using fixed position sanders, powered hand sanders and manual sanding	54	14
Circular sawing (except cross cut sawing)	Workers undertaking all other forms of sawing, including that by hand	55	14.2
Spindle moulding	Workers exclusively using spindle moulding machines	31	8.0
Cross cutting	Workers exclusively using cross-cut saw	17	4.6
Bandsawing	Workers exclusively using band saw	14	3.6
Routing	Workers exclusively using routing machines	12	3.1
Assembly	Workers putting together pieces to form wooden items	4	1.0
Drilling	Workers exclusively using hand and fixed position drills	4	1.0
Planing	Workers exclusively using machine planers	4	1.0
Mortice/tenoning	Workers exclusively using mortice or tenon machine	3	0.8
ALL PROCESSES		**386**	**100.0**

A simple statistical analysis of the data from the 11 process categories was performed to determine the arithmetic mean, median, range and 95th percentile value for each process, and is presented in Table 6.

Table 6: Breakdown of sampling results by woodworking process

PROCESS	SAMPLES TAKEN	MEAN EXPOSURE (mg/m^3)	MEDIAN EXPOSURE (mg/m^3)	95th PERCENTILE (mg/m^3)	RANGE OF RESULTS (mg/m^3)
Multitasking	188	6.46	2.97	25.1	0.07 - 85.2
Sanding	54	10.57	3.13	49.1	0.21 - 101
Circular sawing	55	10.11	9.46	23.4	0.28 - 157
Spindle moulding	31	3.00	2.15	10.0	0.05 - 13.5
Cross cutting	17	2.34	1.19	6.0	0.25 - 15.7
Bandsawing	14	5.21	2.16	19.7	0.18 - 22.8
Routing	12	7.02	1.98	29.1	1.18 - 48.7
Assembly	4*	1.17	1.16	1.97	0.29 - 2.07
Drilling	4*	3.16	1.74	7.32	0.96 - 8.21
Planing	4*	1.53	1.53	1.18	0.33 - 2.78
Mortice/ tenoning	3*	3.62	3.32	4.88	2.48 - 5.05
ALL PROCESSES	**386**	**6.57**	**2.6**	**25.1**	**0.05 - 157**

*These results are shown for completeness: Due to the relatively small sample sizes for these process categories, an analysis of the data may not be meaningful.

4.2 Compliance with MELs for wood dust

A total of 386 personal samples were collected for the survey. 105 of these 386 samples, or 27.2% of the total, exceeded the MELs for wood dust of 5 mg/m^3. At least one person at 31 of the 47 sites visited (66%) had an exposure to wood dust in excess of the MEL.

A breakdown of those samples exceeding the MEL by woodworking process is shown in Table 7. The samples are broken down into the same 11 woodworking categories shown in Table 6.

Table 7: Breakdown of samples exceeding MEL by process

PROCESS	SAMPLES TAKEN	NUMBER EXCEEDING MEL	PERCENTAGE EXCEEDING BY PROCESS
Multitasking	188	58	31.1
Sanding	54	20	37.0
Circular sawing	55	14	25.4
Mortice/tenoning	3	1	33.3
Drilling	4	1	25.0
Routing	12	3	25.0
Spindle moulding	31	5	16.0
Bandsawing	14	2	14.3
Cross cutting	17	1	5.9
Planing	4	0	0.0
Assembly	4	0	0.0
TOTAL	**386**	**105**	**N/A**

There were 20 air samples in excess of 25 mg/m^3, or 5 times the MEL. These samples were selected for further analysis to identify any common features which would explain such particularly high exposures. The first stage of this analysis was to identify at which premises these samples were taken, and whether these sites had factors in common causing high exposures. The 20 samples in excess of 25 mg/m^3 originated from 13 different sites or 27.7% of the total number of sites visited. One site had 4 exposures in excess of 25 mg/m^3, one site had 3 exposures in excess of 25 mg/m^3 and two sites had two exposures in excess of 25 mg/m^3. The remaining 9 sites had one exposure each in excess of 25 mg/m^3.

No site-specific factors could be identified to explain why the high exposures occurred. The type of wood worked at the 13 sites, the availability of a COSHH assessment, the undertaking of weekly and 14 monthly checking of LEV were similar to the other 34 sites visited during the survey.

The 20 high exposures came from the following processes: Multitasking 10 (50%), hand sanding 6 (30%), circular sawing 3 (15%), and routing 1 (5%). It was not

possible to determine whether LEV was installed and working on all the machines that were operated by workers who were multitasking. None of the 6 hand sanders had LEV installed and operational, but all of the saws and the router did.

In summary, from the data collected during the survey, it was not possible to identify any site- or process-specific factors that led to exposures in excess of 5 times the MEL.

4.3 Compliance with COSHH Regulations

4.3.1 Availability of COSHH assessments

A written COSHH assessment as described in COSHH Regulation 6 (1) was available at 16 (34%) of the sites visited. 10 companies had carried out their own assessment, and 6 were carried out by an external organization. Comment on the quality of the assessments seen is not passed, as this was outside the remit of the survey. Information was collected on whether the assessment covered the following topics: production, maintenance, cleaning and dermal contact. All of the assessments covered production, 4 (25%) covered maintenance, 3 (19%) covered cleaning and 2 (12%) considered dermal contact.

4.3.2 Control measures used in the woodworking industry

All of the 47 sites visited during the survey used local exhaust ventilation (LEV) to control emissions of wood dust from at least some woodworking machines. These systems were either one system ducted to a series of machines, or an individual system dedicated to a single machine, or a mixture of both in one workplace. At 30 (64%) of the sites visited a recirculating LEV system was in place, returning filtered air to the workplace.

Respiratory protective equipment (RPE) was used to control exposure to wood dust at 40 of the 47 sites. At the 40 sites using RPE as a control measure, a variety of respirators were observed in use. The list below details the types of RPE used:

- FFP1 orinasal disposable masks were used at 15 (32%) of the sites visited
- FFP2 orinasal disposable masks were used at 20 (42%) of the sites visited
- FFP3 orinasal disposable masks were used at 13 (28%) of the sites visited
- Powered RPE was used at 5 (11%) of the sites visited
- Unmarked RPE ("nuisance dust masks") were used at 8 (17%) of the sites visited

It should be noted that at some sites more than one type of RPE was used, and as a result the percentage values do not add up to 100. At 76% of the sites where RPE was used, the use of RPE was task-specific in that RPE was worn for the duration of particularly dusty tasks. At the remaining 24% of sites, RPE was worn for the duration of the working shift. Comment on the effectiveness of the RPE in use is not covered in this report, but the incorrect use of RPE (worn with facial hair, worn upside down etc) was noted at many sites. Training and instruction on the correct use of RPE had been administered at only 3 of the 40 sites where RPE was in use, but only one site kept records of the training and instruction provided. At 20 (50%) of the sites where RPE was used, there were inadequate storage facilities, such as personal lockers, for the storage of RPE.

None of the sites visited had an RPE face-fitting program in place.

An assessment of the welfare facilities available to employees was carried out at each site. This included: washing facilities, eating facilities, eating and drinking policies, and smoking policy. 40 of the 47 sites (85%) had at least an acceptable standard of washing facilities available to their employees. An acceptable standard was defined as a clean washing area, with running hot and cold water, an appropriate number of wash basins for the size of workforce, and clean towels.

33 of the 47 sites (70%) had no policy (written or otherwise) regarding the consumption of food and drink whilst working, or in the vicinity of woodworking machinery. 17 of the 47 sites (36%) had no designated area, separate from the workroom for their workforce to take eating and rest breaks.

4.3.3 Maintenance of control measures

All 47 sites had some form of LEV installed as a control measure. At 10 sites (21%) a 14 month maintenance, examination and testing of the LEV system (as described in COSHH Regulation 9(2)(a)) had been performed. At 6 of the 10 sites, the procedure was undertaken by an external organization such as an occupational hygiene consultancy or an insurance company. At the remaining 4 sites it was carried out by the employer, and all 10 sites had written records of the testing procedure and the results obtained. A 14 monthly maintenance, examination and testing scheme was not in place at 37 of the 47 sites visited.

A weekly check of the LEV system was carried out in 17 of the 47 sites visited (36%) and in all cases was carried out by in-house personnel. The remaining 30 sites did not perform a weekly check of the LEV system.

At all the 30 sites with a recirculating LEV system there was no monitoring of the quality of the air returned to the workplace.

4.3.4 Other relevant information

A health surveillance program was in place at 6 of the 47 sites (13%). In all of these cases written records of the results of the surveillance were kept. All 6 health surveillance schemes incorporated lung function testing and skin inspection.

30 of the 47 sites visited (64%) had no copies of any HSE publications. No further analysis of the types of HSE guidance used by the 17 sites was done, but the most commonly encountered guidance were the HSE Woodworking Information Sheets.

Brush cleaning of wood dust was witnessed at 45 of the 47 sites visited (96%). The use of compressed air lines to clean machinery or contaminated clothing was witnessed at 30 of the 47 sites visited (64%). 37 of the 47 sites (79%) had a vacuum cleaner available for use.

40 of the 47 sites had a policy forbidding smoking in the vicinity of woodworking machinery.

5. Comparison of results from this survey with those obtained from the 1988/89 TDS

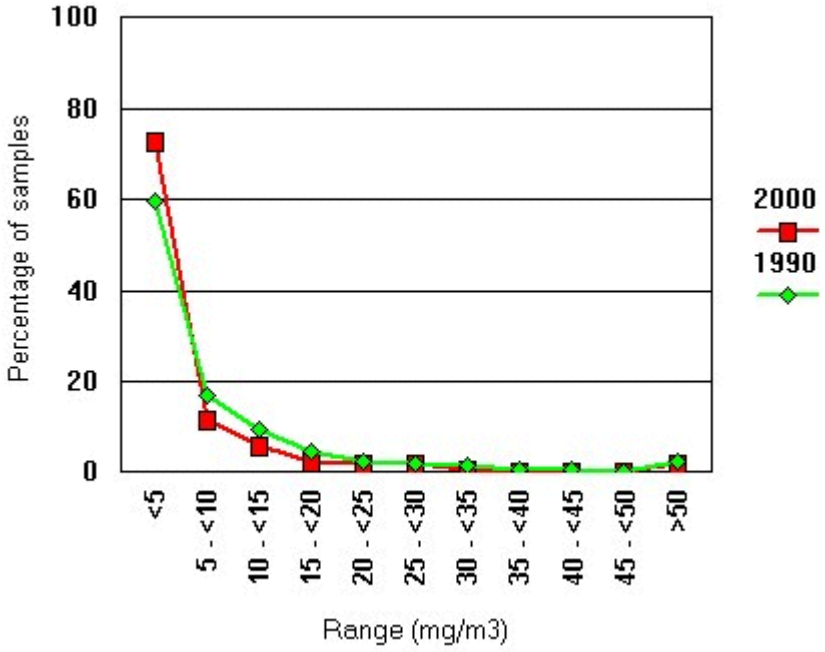
The purpose of this section of the report is to study the data from 2 separate studies and identify any changes in the magnitude and distribution of exposure to wood dust. A direct comparison between the air sampling data collected from this survey and the data collected from the 1988/9 TDS is not straightforward. The reasons for this are detailed in section 3.4 of this report.

The first stage of the comparison exercise was to study the distribution of the air sampling results obtained from the 2 surveys. Table 8 shows the distributions of the air sampling data from the 2 surveys which is plotted as Figure 2.

Table 8: Comparison of distributions of air sampling results

Range	1988/9 TDS		1999/2000 SURVEY	
	Number of samples	Percentage of total samples taken (%)	Number of samples	Percentage of total samples taken (%)
<5	216	59.5	281	72.8
5 to <10	61	16.8	45	11.7
10 to <15	34	9.4	23	6.0
15 to <20	17	4.7	10	2.6
20 to <25	9	2.5	7	1.8
25 to <30	7	1.9	8	2.1
30 to <35	5	1.4	2	0.5
35 to <40	2	0.5	0	0.0
40 to <45	2	0.5	1	0.3
45 to <50	1	0.3	1	0.3
>50	9	2.5	8	2.1
TOTAL	**363**	**100.0**	**386**	**100.0**

Figure 2 Distributions of air sampling results



The distributions of air sampling results shown in Figure 2 are of similar shape with the peak frequency of occurrence well to the left of center and a long “tail” of exposures extending to the highest value. The most noticeable difference between the 2 distributions is the difference in the percentage of samples <5mg/m^3. In 1988/9, only 59.5% of air samples taken were below 5mg/m^3, but in 1999/2000 the proportion below 5mg/m^3 had increased to 72.8%.

The data from the 1988/9 TDS was broken down and analyzed by woodworking process. The categories chosen then were different from those used in this report (shown in Table 5). The data from this survey were reorganized into the categories chosen in 1988/9, but due to a lack of detail in the 1988/9 report, a comparison could only be made for 4 woodworking processes : Sawing, spindle moulding/routing, tenoning/morticing, and fixed position mechanical sanding.

Table 9: Collation and comparison of air sampling results by process

PROCESS	1988/9 TDS			2000 Survey		
	Mean (mg/m^3)	Number	Range	Mean (mg/m^3)	Number	Range
Saws	8.9	92	<1-77	6.14	86	0.18-157
Spindle moulders / routers	11.8	39	<1-70	4.12	43	0.05-48.7
Tenoners/ morticers	3.3	19	<1-<8	3.62	3	2.48-5.05
Fixed position mechanical sanders	8.8	41	<1-66	5.64	11	0.21-40.2

There is a small decrease in the mean exposures for sawing and fixed position mechanical sanders of 2.8 and 3.2 mg/m^3 respectively. These decreases in average exposures are relatively small, and as previously discussed will have measurement error associated with them. As a result it is not possible to establish whether any real reduction in exposure has occurred. There is a significant decrease in the mean exposure for spindle moulding and routing of 7.68 mg/m^3. As only 3 morticer and tenoner samples were collected in the 2000 survey, any comparison with the 19 samples collected in 1988/9 is likely to be unreliable and the figures are shown for interest only.

The results of the site by site data analysis shown earlier in Table 3 were compared with the results obtained from the 1988/9 TDS. The comparison is shown in Table 10.

Table 10: Site by site comparison of air sampling results

Range (mg/m^3)	Number of premises		Percentage of premises (%)		Cumulative percentage (%)	
	1988/9	2000	1988/9	2000	1988/9	2000
All samples <5	5	16	12.2	34.0	12.2	34.0
All samples <10	8	4	19.6	8.5	31.8	42.5
All samples <15	6	8	14.6	17.0	46.4	59.5
All samples <20	5	2	12.2	4.3	58.6	63.8
All samples <25	4	6	9.8	12.8	68.4	76.6
All samples <30	1	3	2.4	6.4	70.8	83.0
All samples <50	6	2	14.6	4.2	85.4	87.2
One or more samples >50	6	6	14.6	12.8	100.0	100.0
TOTAL	**41**	**47**	**100.0**	**100.0**	**100.0**	**100.0**

One can see from Table 10 that in 1988/9, only 12.8% of premises had ***all*** exposures below the MELs of $5mg/m^3$, whereas in 1999/2000 this had increased almost threefold to 34%. This trend is also seen when comparing the percentage of sites where all exposures are below 10, 15, 20, 25, 30 and 50 mg/m^3. For example, in 1988/9 only 70.8% of sites had all exposures below 30 mg/m^3, but in 2000 this had increased to 83%. There is a small decrease of 1.8% in the number of premises where at least one exposure is in excess of the MELs by a factor of 10 , but more importantly 12.8% of premises in 2000 had at least one exposure of more than 50 mg/m^3.

6. CONCLUSIONS

- 386 samples were taken at 47 sites. 105 of these samples were in excess of the MEL of 5 mg/m^3 (8hr TWA) for wood dust.
- Only 16 of the 47 sites visited controlled *all* exposures to below the MEL.
- No site or process specific factors were identified from the survey data to explain results in excess of 5 times the MEL.
- Circular sawing and sanding were identified as processes giving rise to the highest exposures to wood dust.
- Only 34% of sites could produce a written COSHH assessment
- All 47 sites had some form of LEV as a control measure. A weekly check was carried out at 36% of sites, and only 10 carried out a 14-monthly maintenance, examination and testing of the system.
- 40 sites used RPE as a control measure. Training and instruction on the use of RPE had been administered at only 3 of those 40 sites. There were inadequate storage facilities at 20 sites. No site had an RPE face-fitting programme in place.
- 85% of sites had adequate welfare facilities for their employees. 70% had no policy on eating and drinking in the workplace. 36% had no designated dust-free area for rest and eating breaks. 85% had a policy forbidding smoking in the vicinity of woodworking machinery.
- 13% had a health surveillance scheme in place.
- 64% did not have copies of any HSE publication.

- Brush cleaning was observed at 96% of sites, and the use of compressed air lines for cleaning contaminated clothing and machinery was witnessed at 64% of sites.

A comparison exercise was also undertaken comparing the results from this survey with those obtained in 1988/9. The comparison is complicated by several factors which are explained in section 3.4 of this report. Given these difficulties, it is not possible to draw absolute conclusions when comparing the two sets of results. However, it is reasonable to state that the following changes are at least suggestive:

- There has been a change in the distribution of the 2 sets of air sampling results. Both are of similar shape, with most of the results being under 5 mg/m^3 with a long "tail" of higher results. However, a substantial change in the proportion of samples below the MEL of 5 mg/m^3 was observed. In 1988/9 only 59.5% of results were below 5 mg/m^3, whereas in 1999/2000 this had increased to 72.8%.

- A "site by site" analysis of air sampling results is also suggestive of change. In 1988/9 only 12.2% of sites controlled all exposures to wood dust to below the MEL. In 1999/2000 this figure had increased almost threefold to 34.0%.

- The number of premises with at least one exposure in excess of 50 mg/m^3 is similar (14.6% in 1988/9, 12.8% in 1999/2000)

- A "process by process" comparison shows that, as in 1988/9, circular sawing and sanding are still the two processes giving rise to the highest exposures to wood dust.

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8. APPENDICES

Appendix 1: Letter to occupier giving notice of intention to visit

Company:
Address:

Date:

Dear (*Insert name from contact list),*

OCCUPATIONAL EXPOSURE TO WOOD DUST - HSE NATIONWIDE SURVEY

As part of a national project, HSE proposes to visit your site to carry out air sampling and collect information relevant to occupational exposure to wood dust. The purpose of the work is to enable HSE to build a picture of exposure to wood dust in the UK, and how industry controls it. This information is extremely valuable to HSE as it allows us to prepare and target industry guidance.

The survey involves carrying out personal air sampling on operators exposed to wood dust whilst they carry out their normal tasks. This personal sampling equipment consists of a small battery operated pump, which clips onto a belt. Tubing connects this pump to a small sampling head worn on the lapel. This equipment is designed to be light and unobtrusive. Operators will be requested to wear the equipment for a representative period of their shift.

Any information gathered during the survey will be regarded as commercially sensitive and anonymised in the final nationwide report.

Mr/Ms XXXXXX from the Health & Safety Laboratory will contact you in due course to arrange a date to visit.

Yours sincerely,
HM Principal Inspector of Health & Safety

Appendix 2: Survey questionnaire

HEALTH & SAFETY LABORATORY

CONTROL OF EXPOSURE TO WOOD DUST SURVEY 1999/2000

1. INTRODUCTION	
a. Date of survey	
b. Name of surveyor	
c. FOD Inspector/location	
d. Contact name(s)/Position(s)	

2. SITE DETAILS	
a. Company name and address	
b. Nature of business	
c. Number of employees (total)	
d. Number of employees exposed to wood dust	
e Shift pattern and length	

3. PROCESS DETAILS **(Full description of the process including volume and type of material used. List types of machines used eg circular saw, router)**

4. **WORK ENVIRONMENT** (Details of workroom layout, inc photos, details of gross wood dust accumulation, cleaning regime, housekeeping)

5. VENTILATION CONTROLS	
a Overall description (LEV and/or GEV, one system?, capture-transport-fan-filter-exhaust	
b Does the system capture and remove wood dust effectively ? (use judgement/smoke/dust lamp/anemometer). Use a separate sheet if there is more than one system	
c Is the system recirculating ?	YES / NO
d If yes, then describe (individual sock filter, returned air via ducting etc)	
e Is there a maintenace schedule *specifically* for the return air system ?	YES / NO Comment:

e Is there a system for monitoring the quality of returned air ? (alarm, divert etc)	YES / NO Comment:

6. PERSONAL PROTECTIVE EQUIPMENT	
a.Which employees use RPE ?	
b.Respirator manufacturer, type(s) and size (eg 3M 8835 S/M to EN 149)	
c.Have the workers been trained in how to use and maintain RPE ?	YES / NO Comment:
d.Is the RPE worn correctly?	YES / NO Comment:
e Is any other PPE worn ? (safety footwear, safety specs etc)	

7. WELFARE FACILITIES	
a Are the washing facilities adequate ? (clean/soap/hotwater/washbasin/towels etc)	YES / NO Comment:
b Is there a dust-free rest and eating area ?	YES / NO Comment:
c Is there a policy on eating and drinking in the vicinity of machines ?	YES / NO Comment:

8. ASSESSMENT (COSHH Reg 6)	
a Does the company have a written COSHH assessment?	YES / NO Comment:
b Who carried it out ?	Employer Consultant (specify): Other (specify)
c Does it cover	i) Production YES / NO Comment: ii) Maintenance YES / NO Comment: iii) Cleaning YES / NO Comment: iv) Skin contact YES / NO Comment:

9. CONTROL OF EXPOSURE (COSHH Reg 7)	
What control measures are in place to reduce exposure to wood dust ? (eg PPE, LEV, job rotation)	

10. USE OF CONTROLS (COSHH Reg 8)	
a Are the controls identified in 9a used correctly (eg is PPE worn, are good hygiene standards practiced/enforced, is LEV used as intended?)	

11. MAINTENANCE, EXAMINATION AND TESTING (COSHH Reg 9)	
a Are engineering controls (eg LEV) examined and tested at least every 14 months ?	
b Is a weekly visual check of engineering controls carried out ?	
c Who carries out the checks:	Weekly check: 14 month MET:
d Is the RPE provided examined, and where appropriate tested, at suitable intervals ?	
e Is the RPE stored in a clean area ?	
f Are maintenance records kept for:	LEV PPE

12. HEALTH SURVEILLANCE (COSHH Reg 11)	
a Are any health checks carried out on those exposed to wood dust ? (eg questionnaire, lung function testing, skin inspection)	
b If so, are records kept?	

13 INFORMATION, INSTRUCTION AND TRAINING (COSHH Reg 12)	
Has sufficient information, instruction and training been provided to employees to ensure they know:	
i)The risks to health as a result of exposure to wood dust (asthma, dermatitis & cancer)	
ii)The precautions that should be taken to prevent / reduce exposure ?	

14. OTHER INFORMATION	
Any other observations (is the site suitable for video-visualisation, confounding factors etc)	

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