

**EXPLANATORY MEMORANDUM TO  
THE COAL MINES (CONTROL OF INHALABLE DUST) REGULATIONS  
2007**

**2007 No. 1894**

1. This explanatory memorandum has been prepared by the Health and Safety Executive on behalf of the Department for Work and Pensions and is laid before Parliament by Command of Her Majesty.
2. **Description**
  - 2.1. The Regulations establish a goal-setting framework which imposes duties on mine owners, mine managers, employers and employees to protect persons at work below ground in coal mines from risks to their health arising from exposure to inhalable dust. Key duties require the mine manager to assess the risk to workers from the effects of exposure to inhalable dust below ground in a coal mine, identify dust sources and take steps to reduce the dust exposure of all workers to as low a level as is reasonably practicable. The mine manager must also identify those workers who have significant exposure for regular exposure sampling and employers must provide health surveillance for all persons identified as likely to have significant exposure to inhalable dust. The regulations also require employers to provide health surveillance for all employees with significant exposure to coal dust.
3. **Matters of special interest to the Joint Committee on Statutory Instruments**
  - 3.1 . None.
4. **Legislative Background**
  - 4.1 . The Regulations are made under the Health and Safety at Work etc Act 1974. They replace the Coal Mines (Respirable Dust) Regulations 1975 (RDR) which were amended in 1978 and further amended to include provisions for small mines by the Mines (Control of Substances Hazardous to Health) Regulations 1996.
  - 4.2 . An HSE investigation into the rise in the number of cases of pneumoconiosis highlighted weaknesses in the RDR control regime which warrant revised arrangements to reflect the changes in working practices in the 30 years since RDR was introduced.
  - 4.3 . The regulations also implement the Chemical Agents Directive 98/24/EC insofar as it relates to the control of coal mine dust as a health hazard. A transposition note is appended.
  - 4.4 The regulations place certain duties on the mine manager and others on the mine owner. This is in line with other regulations in the industry. This reflects the industry tradition and is the approach that the industry prefers. The mine owner is required by the Management and Administration of Safety and Health at Mines Regulations 1993 (SI no. 1897/1993) to make financial and other provision to secure so far as is practicable that the mine is managed and worked in accordance with the relevant statutory provisions.

## 5. **Extent**

5.1 These Regulations apply to Great Britain.

## 6. **European Convention on Human Rights**

As the instrument is subject to negative resolution procedure and does not amend primary legislation, no statement is required.

## 7. **Policy background**

*Background: size and nature of the problem*

7.1 In 1975, when the Coal Mines (Respirable Dust) Regulations (RDR) were introduced one miner in 10 developed pneumoconiosis during their working lives (and 0.9% had the most serious and disabling form of the disease, Progressive Massive Fibrosis). The measures introduced by RDR were successful in reducing the prevalence of pneumoconiosis and by the mid 1990s PMF seemed to have been eliminated, and the rate of simple pneumoconiosis amongst working miners was one in 500.

7.2 However, investigations into a number of new cases discovered at the end of the 1990s have confirmed a number of weaknesses in RDR:

- the system of fixed point monitoring has generally been effective in detecting excessive dust levels on production faces but not those occurring during development tunnelling work;
- the present limits do not take into account the amount of time people spend exposed to dust (a number of the individuals who had developed pneumoconiosis had a history of working long hours);
- the duties on health surveillance are only placed on mine owners rather than all employers with employees working below ground (contractors' employees were disproportionately represented among the new cases);
- while mine owners have made medical examinations available there have been no arrangements for actively identifying and following-up those who do not attend (a number of those who were found to have developed the disease had missed at least one previous four-yearly X-ray examination).

*Objectives*

7.3 The fundamental objective of the new regulations is to continue progress in reducing the incidence of pneumoconiosis and other work-related respiratory ill-health and to eradicate progressive massive fibrosis - the most severe form of pneumoconiosis.

*Features*

7.4 In line with the Chemical Agents Directive, the regulations require a hierarchy of measures:

- eliminating sources of dust;
- 'engineering controls' – eg dust suppression and ventilation;
- personal protective equipment.

7.5 The regulations set exposure levels that must be achieved through engineering controls or organisational controls (ie reducing the time workers are exposed).

7.6 One of the keys to the success of RDR was that it introduced a sampling regime and required that if the level of dust in the samples was over a specified threshold then the regulations lay out a series of steps which ultimately lead, if the problem is not resolved, to the dust-producing operations having to stop. The regulations retain this basic approach but refine it in a number of ways by:

- moving from fixed-point to personal sampling - with sampling arrangements focused on those at greatest risk of exposure above the exposure control limits - not just on those working at the face;
- introducing time-weighted exposure control limits to take account of working hours;
- introducing an exposure control limit for the quartz component of respirable coal mine dust that will apply throughout the mine.

#### *Consultation*

7.7 The regulations and their supporting Approved Code of Practice and Guidance have been developed in association with a working group of the Mining Industry Committee (formally the Deep Mined Coal Industry Advisory Committee). This involved coal mine operators, (including the Federation of Small Mines), trade unions, health specialists, HSE specialists. There has also been consultation with members of the HSC's Advisory Committee on Toxic Substances who have a specific interest and expertise in this topic.

7.8 The proposals have the broad support of both the mine operators and trade unions.

#### *Guidance*

7.9 The regulations will be supported by comprehensive guidance intended to assist mine managers and others with duties under the regulations. Copies of the Approved Code of Practice are available from HSE (see 'contact' below).

#### *Consolidation*

7.10 The regulations will entirely replace the Coal Mines (Respirable Dust) Regulations 1975 so consolidation will not be an issue.

#### *Importance*

7.11 Because this legislation applies to a small industry and updates existing measures for the control of inhalable dust in coal mines, rather than introducing new measures, the regulations are not considered to raise important political or legal issues.

## **8. Impact**

8.1 A Regulatory Impact Assessment is attached to this memorandum. The annualised benefits of the new regulation amount to approximately £4.1 million and are far larger than the total annualised compliance costs to society, which are equal to less than £97,000. Even if the new regulation were to prevent only one case a year of chronic bronchitis, with no other reduction in incidence of ill health, the benefits, which would amount to an annualised value over 35 years of ca. £155,000 per annum, would still substantially exceed the costs. There are no additional costs to the Exchequer.

## **9. Contact**

Andy Miller at the Health and Safety Executive can answer any queries regarding these Regulations: Tel: 020 7717 6345 email: [andy.miller@hse.gsi.gov.uk](mailto:andy.miller@hse.gsi.gov.uk)

**Transposition Note for the Provisions of Council Directive 98/24/EC on the Protection of the Health and Safety of Workers from the Risks Related to Chemical Agents at Work)(Fourteenth Individual Directive within the Meaning of Article 16(1) of Directive 89/391/EEC) as Relevant to the Exposure of Persons at Work below Ground in Coal Mines to Inhalable Dust of Mineral Origin, and Transposed by the Coal Mines (Control of Inhalable Dust) Regulations 2007**

Article	Purpose	Implementation as Relevant	Responsibility
1.	Objectives and scope - to lay down minimum requirements for protection of workers from risks to their safety and health arising, or likely to arise, from the effects of chemical agents that are present at the workplace.	The Coal Mines (Control of Inhalable Dust) Regulations 2007 (CMCID 2007) reg. 3(1).	The Secretary of State by new Regulations, CMCID 2007, replacing the Coal Mines (Respirable Dust) Regulations 1975 (S.I. 1975/1433).
2.	Definitions.	CMCID 2007 reg. 2 defines inter alia 'inhalable dust', 'respirable dust', 'quartz content', 'exposure control limit for respirable dust', 'exposure control limit for quartz', hazard, risk, and health surveillance.	The Secretary of State by CMCID 2007.
3.	Occupational exposure limit values and biological limit values.	CMCID 2007 reg. 2(1) refers to exposure control limits for respirable dust and quartz as approved from time to time by, and calculated by a method approved by, the Health and Safety Commission.	The Secretary of State by CMCID 2007, and the Health and Safety Commission.
4.	Determination and assessment of risk of hazardous chemical agents, and recording and updating of risk assessments.	CMCID 2007 reg. 4.	The Secretary of State by CMCID 2007.
5.	General principles for prevention of risks associated with hazardous chemical agents and application of this Directive in relation to assessment	CMCID 2007 reg. 5(3).	The Secretary of State by CMCID 2007.

Article	Purpose	Implementation as Relevant	Responsibility
	of risks.		
6.	Specific protection and prevention measures.	CMCID 2007 reg. 5(1) establishes the duty on a mine manager to ensure that exposure to inhalable dust is eliminated at source, or reduced to as low a level as is reasonably practicable. Reg. 5(2) sets out a prioritised list of control measures. Further measures are set out in reg. 8 (sampling scheme for respirable dust), reg. 9 (evaluation of samples), and reg. 10 (action to be taken in the event of excessive dust, including stopping operations in specified circumstances).	The Secretary of State by CMCID 2007.
7.	Arrangements to deal with accidents, incidents and emergencies.	Not relevant because the ill-health effect of coal mine dust results from sustained exposures over a period of time.	No action required.
8.	Information and training for workers.	CMCID 2007 reg. 12.	The Secretary of State by CMCID 2007.
9.	Prohibitions relating to chemical agents and activities listed in Annex III.	Not relevant.	No action required.
10.	Health Surveillance, including health records.	CMCID 2007 reg. 11.	The Secretary of State by CMCID 2007.

Article	Purpose	Implementation as Relevant	Responsibility
11.	Consultation and participation of workers in accordance with Framework Directive 89/391/EEC Article 11.	Implemented by Safety Representative and Safety Committee Regulations 1977 and Health and Safety (Consultation with Employees) Regulations 1996.	No action required.
12.	Adaptation of the Annexes, preparation and adoption of technical guidance.	Procedures at Community level.	No action required.
13.	Repeal and Amendment of earlier Directives.	The Coal Mines (Respirable Dust) Regulations 1975 are national legislation and do not implement Community obligations.	No action required.
14 to 17.	Miscellaneous final provisions, including deadline for transposition.	Administrative actions for Health and Safety Executive, save that CMCID 2007 to come into force by date shown on instrument.	No action required beyond coming into force of CMCID 2007.

# **The Coal Mines (Control of Inhalable Dust) Regulations 2007**

## **Impact Assessment**

### **Purpose and intended effect**

#### **Issue**

1. Existing legislation, the Coal Mines (Respirable Dust) Regulations 1975 (RDR) has been extremely successful in reducing the prevalence of pneumoconiosis. However, these regulations were drawn up based upon practices and assumptions made over 30 years ago, which do not reflect current working patterns, conditions and techniques.
2. Arguably, the main weakness in RDR is that the exposure limits it imposes are not time-weighted. While RDR directly regulates the concentration of respirable dust in the workplace there is no mechanism to take account of the other main factor that affects the risk - the time people spend at the workplace. Shift patterns worked by today's miners are more variable, and generally add up to longer hours being worked each year, than was the norm when RDR was introduced. Current thinking on occupational exposure limits is to specify them on a time-weighted basis so that if exposure time is longer than the reference period, the permitted concentration is reduced in proportion.
3. The recent rise in prevalence of pneumoconiosis, as seen during the tenth four-yearly round of x-rays of working miners (1998-2001), shows that while compliance with RDR has protected the majority of individuals from high levels of exposure, it has not been successful in protecting individuals working long hours.
4. There is also a need to implement the European Directive on Chemical Agents (CAD) in so far as it relates to the control of coal mine dust as a health hazard.

#### **Objectives**

5. The ultimate objective of these proposals is to reduce the number and severity of cases of pneumoconiosis, chronic bronchitis and emphysema attributable to dust exposure to a level that would avoid significant disablement. A secondary objective is to implement the requirements of the European Chemical Agents Directive in respect of the health effects of coal mine dust and quartz below ground in coal mines.

#### **Risk assessment**

##### **Prevalence of pneumoconiosis**

6. The prevalence of pneumoconiosis among the working miners x-rayed during the tenth four-yearly round was 0.6%. This was a significant increase from the previous prevalence of pneumoconiosis in the mid 90s of 0.2%, all at the

lowest category. Of the 40 miners this represented, 10 were diagnosed with higher category pneumoconiosis, including two with PMF in 2000. Part of this deterioration may be due to the altered age structure of the industry with practically no recruitment and increased numbers of older miners remaining in the industry. Likewise, some of the earlier improvements may be due to widespread redundancies among older mineworkers as collieries closed. However, age is clearly not the only factor as the trends are the same for different age groups as the overall.

7. Investigations by HM Inspectors of Mines into the circumstances of the recent pneumoconiosis cases suggested that the mines were generally complying with RDR workplace limits but the individuals concerned had a history of working extended hours and so would have had particularly high exposures. In most cases, at least one four-yearly medical examination had been missed and there were a disproportionate number of contractors' employees among working miners being diagnosed with pneumoconiosis. This is supported by the results of the tenth four-yearly round where the overall prevalence is 1.8% amongst contractors' employees compared with 0.5% amongst directly employed miners.
8. In 2005, the Health and Safety Laboratory (HSL) calculated that, assuming a constant workforce of 4,500 workers, under the current regulation there would be 225 cases of pneumoconiosis over the next 35 years<sup>1</sup>. This is equivalent to an incidence of 5% over the next 35 years. Previous studies give an approximate ratio of pneumoconiosis to chronic bronchitis of 1:5. HSL therefore estimated that, under the current regulation, 1125 individuals would contract chronic bronchitis over the next 35 years.
9. Data provided by the Coal Authority indicates that there were 3,819 workers in underground mines in September 2006. Assuming that there is an average of 3,500 workers in the sector over the next 35 years, and that the incidence rates of pneumoconiosis and chronic bronchitis are the same as previously estimated by HSL, this indicates that there would be 175 cases of pneumoconiosis over the next 35 years. Assuming an approximate ratio of pneumoconiosis to chronic bronchitis of 1:5, it can be estimated that 875 individuals would contract chronic bronchitis over the next 35 years.

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<sup>1</sup> This estimate has been obtained by using HSL exposure data and the formula contained in the HSL document '*Impact of proposed changes to the respirable dust regulations on the risk of contracting of pneumoconiosis*'.

## Options

10. In this RIA two options are considered:
  - **Option 1: Leave regulations unaltered.**
  - **Option 2: Impose time weighted exposure control limits for respirable coal mine dust of  $3\text{mg.m}^{-3}$  and respirable crystalline silica of  $0.3\text{mg.m}^{-3}$  on coal mines; focus dust sampling on personal exposures and extend health surveillance cover to all employees below ground at risk of significant exposure to inhalable coal mine dust.**
11. Regulatory control already exists for controlling inhalable dust below ground in a coal mine. It is deemed appropriate to maintain a similar regulatory regime to maintain standards of health and safety that the industry supports. The sanctions on operations at a mine, if exposure limits are exceeded, is fundamental to securing strict adherence to the tight control that is demanded in order to protect the health of workers. This enforcement is only possible through a legislative regime. The requirements of CAD have also to be implemented at coal mines and this needs to be done via regulatory action to avoid infraction proceedings. Option 2 is therefore the recommended option. For these reasons, other non-regulatory methods of implementation have not been considered further.

## Information sources and assumptions

12. Information contained in this RIA that is identified as supplied by the Mines Inspectorate, is based on their industry knowledge. Information relating to the assessments was taken from detailed questionnaire responses obtained in 2000 from the managers of a representative sample of seven mines, all of who had taken part in the early HSL field trials. The Federation of Independent Mines was contacted to conduct the Small Firms Impact Test. Information on wages was taken from the Annual Survey of Hours and Earnings (ASHE 2006), which is published by the Office for National Statistics.
13. Costs and benefits have been discounted in line with current HM Treasury appraisal guidance: costs and non-health benefits are discounted at 3.5%, and health benefits are discounted at 1.5%. The costs are presented as annualised costs unless stated otherwise, with a base year of 2006 and an appraisal period of 35 years. The costs are separated into policy costs (those costs that arise from prescribed changes to achieve policy goals) and administrative costs.

## Benefits

### Health and safety benefits

14. The health effect most clearly identifiable with coal mine dust is pneumoconiosis. However, chronic bronchitis and emphysema can also be attributed to dust exposure though that is not the only cause. In addition, exposure to respirable quartz dust (crystalline silica) is now known to be associated with rapid progression of pneumoconiosis.

15. Pneumoconiosis can be further classified into 'simple' pneumoconiosis, and 'complicated' pneumoconiosis or progressive massive fibrosis (PMF), with the distinguishing characteristic being the size of the associated lesions on the lung. Simple pneumoconiosis is not significantly disabling. In general, long-term cumulative exposure to coal mine dust has found to be associated with increasing severity and a progression from simple pneumoconiosis to PMF - however, PMF has occasionally been observed in miners without them first developing simple pneumoconiosis.

### ***Option 1***

16. No additional health and safety benefits would be generated under this option

### ***Option 2***

17. It is estimated that under this option 147 pneumoconiosis cases and 735 chronic bronchitis cases would be prevented over a period of 35 years. This corresponds to about 5 and 21 cases per year, respectively. We assume that most (ca. 96%) prevented cases of pneumoconiosis are of the 'simple' type, and therefore 4% of prevented cases are of progressive massive fibrosis (PMF). This implies that benefits would largely arise from preventing cases of chronic bronchitis that would have occurred under the existing regulations<sup>2</sup>.
18. The benefits of preventing a disease are equal to the costs that would otherwise have been associated with contracting the disease. This assessment considers the three main types of costs arising from ill health: lost output, medical treatment and subjective costs (an allowance for pain, grief and suffering)<sup>3</sup>.
19. The present value of lost output over the appraisal period of 35 years is estimated to amount to approximately £9.032 million. This corresponds to an annualised value over 35 years of approximately £258,000 per annum<sup>4</sup>. This figure is calculated by assuming that once a worker has been diagnosed with chronic bronchitis, they will be off work for an average of an additional 5.4 days a year per case for the following 20 years. The value of lost output is set equal to the cost of labour. Labour costs are estimated to average £21.67<sup>5</sup> per hour in 2006, and are assumed to increase in real terms at a rate of 1.5% per year. An average working day is assumed to consist of 8 hours working time. Based on these assumptions, the annualised value of lost output due to chronic bronchitis is estimated to be around £192,678 per annum. The remaining £65,392 is estimated to be due to pneumoconiosis. This is estimated to be the value of the lost output attributable to pneumoconiosis, due to time spent in unemployment looking for a new job (on average 103 working days). For the

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<sup>3</sup> These three components account for most of the costs of work-related ill health. There are other costs associated with ill health, including administrative costs and sick pay costs incurred by employers, and transfer payments such as social security benefits incurred by the government. These additional costs are expected to be relatively small and have not been estimated.

<sup>4</sup> All the monetary per annum (or annualised) values in this document have been calculated by dividing the present value by the length of the appraisal period (35 years).

<sup>5</sup> £21.67 comprises of £16.67 wage costs (mean hourly pay in SIC code 10.1 "mining and agglomeration of hard coal", (Source: Annual Survey of Hours and Earnings (ASHE) 2006) plus non-wage labour costs of a third.

purposes of this calculation, the simplifying assumption has been adopted that, for each case, the period in unemployment occurs in the year of diagnosis.

20. The present value of medical treatment costs is estimated to amount to approximately £1.972 million (ca. £56,352 per annum), nearly all of which is attributable to chronic bronchitis. This corresponds to annualised medical treatment costs for each affected worker of £310<sup>6</sup> per annum over a 35-year period. Costs of medical treatment are assumed to apply to chronic bronchitis and PMF only.
21. The present value of human costs (including subjective costs of pain, grief and suffering) is estimated to be approximately £129.70 million (ca. £3.7 million per annum), of which approximately around 80% is attributed to chronic bronchitis. To calculate this amount the subjective cost per case of chronic bronchitis and PMF was estimated at £223,204 per affected worker. The subjective cost per case of “simple” pneumoconiosis was estimated at £2,542<sup>7</sup>.

### **Other benefits**

22. No non-health benefits have been identified under either of the two options.

### **Total benefits**

#### ***Option 1***

23. No additional benefits have been identified under this option

#### ***Option 2***

24. The sum of health and safety and other benefits yields a benefit from introducing the new regulation of ca. £140.28 million (ca. £4 million per annum), of which approximately £3.88 million (ca. £110,556 per annum) are derived from preventing pneumoconiosis.

### **Costs**

#### **Business sectors affected**

25. All coal mines are affected under both options. By the time the Regulations come into effect, there are expected to be no more than 10 small mines and 10 large mines, with an underground workforce (i.e. workers effected by the Regulations) of an average of approximately 3,500 over the next 35 years. For the purposes of this analysis, it has been assumed that the number workers employed in this workforce will remain constant over the entire appraisal period.

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<sup>6</sup> This value is based on the estimated average medical treatment cost for a permanently incapacitating illness, adapted from updated estimates to HSE (1999), *The costs to Britain of workplace accidents and work-related ill health in 1995/96*

<sup>7</sup> These values has been taken from HSE (1999), *The costs to Britain of workplace accidents and work-related ill health in 1995/96*, p. 77, and uprated by average gross domestic product (per head) at current market prices (source: Office for National Statistics). The value for chronic bronchitis and PMF corresponds to the estimated average value for a permanently incapacitating illness. The value for the “simple” type of pneumoconiosis corresponds to the average value for “other case of ill health”.

## **Compliance costs for a ‘typical’ business**

26. It is obviously hard to identify a ‘typical’ mine, as they vary considerably in size. Therefore this section shall be calculated on assumptions regarding an ‘average’ small mine, and an ‘average’ large mine. It is assumed that the average number of employees in each of the 10 small mines is 25, and the average number of employees in large mines is 325.

### ***Option 1***

27. No additional costs have been identified under this option

### ***Option 2***

28. As the costs are calculated based on an ‘average’ mine, they are unlikely to reflect the position of any specific mine, but are intended to be illustrative.

## **Familiarisation Costs**

29. It is assumed that the senior management team, (assumed to consist of an average of 4 individuals at a large mine, and 1 individual at a small mine), would need half a day training session, probably delivered by a team including an HSE Mines Inspector, a Laboratory service provider, and a medical service provider. It is assumed that the laboratory service provider and the medical service provider would have to be reimbursed for their time. Cost of the time of the Mines Inspector is estimated as a cost to the HSE. Attendees would also need another half day (4 hours) to prepare before attending the training.
30. Management time is estimated to be valued at £34.23 per hour<sup>8</sup>. Laboratory staff time is valued at £23.76 per hour<sup>9</sup> and medical service staff time is valued at £44.20 per hour<sup>10</sup>. Therefore the total costs of senior management training is estimated at approximately £818 for a small mine and £1639 for a large mine.
31. It is assumed that three people (a manager, the mine safety engineer and a dust control officer) for a large mine, and one person for a small mine (a manager) would need more detailed training over about three days. This is assumed to incorporate the half-day aimed at management with some external trainers. The rest of the training is assumed to be delivered separately by safety staff.
32. As mentioned earlier, management time is valued at £34.23. Safety engineers time is valued at £22.35<sup>11</sup> and dust control officers time is valued at £9.54<sup>12</sup>. In addition, the value of time for the safety staff running the training is

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<sup>8</sup> £34.23 comprises of £26.33 wage costs (Managers in mining and energy, ASHE, 2006) plus non-wage labour costs of a third.

<sup>9</sup> £23.76 comprises of £18.28 wage costs (Science and technology professionals, ASHE 2006) plus non-wage labour costs of a third.

<sup>10</sup> £44.20 comprises of £34 wage costs (Medical practitioners, ASHE 2006) plus non-wage labour costs of a third.

<sup>11</sup> £22.35 comprises of £17.19 wage costs (Engineering professionals, ASHE 2006) plus non-wage labour costs of a third.

<sup>12</sup> £9.54 comprises of £7.34 wage costs (Industrial cleaning process occupations, ASHE 2006) plus non-wage labour costs of a third.

estimated at £20.97<sup>13</sup>. Therefore, the cost of completing detailed training would be approximately £1,104 for a small mines and £1,953 for a large mine.

33. The entire underground workforce would need about half a day of training to introduce the new regime. This would probably be delivered by previously trained mine management and specialist staff and be incorporated in a 'safety day' which run at most mines periodically anyway. It is assumed that 325 workers would need to attend this training per large mine, and 25 per small mine. It is assumed that, on average, mine workers time is valued at an average of £21.67 per hour<sup>14</sup>. This would therefore generate a cost of approximately £28,172 per large mine, and £2,167 per small mine. It is assumed that the training would be delivered internally, rather than contracted to external training providers. Costs of training of the management and specialist staff who would deliver the training is assumed to be included in the familiarisation costs identified above. As such safety days are run periodically anyway, there are assumed to be no other additional costs associated with this training.
34. The total cost of training to familiarise the workforce with the regulations has been estimated at approximately £4,089 in a small mine, and £31,765 in a large mine. When annualised over the appraisal period, the cost for a small mine is £117, and the cost for a large mine is £908. This is an administrative cost.

### **Initial Assessment**

35. Three large mines were able to provide information on the time taken to do an initial assessment of the conditions at their mine, and to decide on an appropriate sampling strategy. All three mines reported that this would take three months in total (or 65 days of time). One mine that was able to give details said a number of specialist personnel would be involved. Based on this response, which appears typical, we assume a total of 32.5 days of management time, and 6.5 days each for mechanical and safety engineers, surveyors, ventilation officers, dust officers and samplers.
36. As mentioned earlier management time is valued at £34.23 and mechanical and safety engineers' time is valued at £22.35. In addition, surveyors' time is valued at £23.43<sup>15</sup>, with the ventilation officers, dust officers and samplers' time being valued at £9.54, as stated previously. This wage costs give an estimated cost of completing an initial assessment for the sample mine of around £11776.
37. Costs of assessment are likely to vary in line with the size of the mine. Taking into account the size of the workforce in the mine surveyed, it is estimated that

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<sup>13</sup> £20.97 comprises of £16.13 wage costs (Occupational hygienists and safety officers (health and safety), ASHE 2006) plus non-wage labour costs of a third.

<sup>14</sup> £21.67 comprises of £16.67 wage costs (workers in SIC 10.10 "Mining and agglomeration of hard coal", ASHE 2006) plus non-wage labour costs of a third.

<sup>15</sup> £23.43 comprises of £18.02 wage costs (Chartered surveyors, ASHE, 2006) plus non-wage labour costs of a third.

the cost to a small mine of initial assessment will be £707, and a large mine £9,917. This is an initial cost occurring in the first year of appraisal only, and is a policy cost. When annualised over the 35-year appraisal period, this cost is £20 for a small mine and £283 for a large mine.

### **Recurring Assessment**

38. Information was obtained from mines regarding how often new developments would take place, and the average working life of typical developments at their mine. The responses indicated that conditions would change often enough at each large mine so that over the course of one year, present working faces and drivages would be fully replaced. However, mines are not expected to require the same amount of time in reassessing these new workings, as they would have spent for the initial assessment, since some information obtained from previous assessments could be carried forward.
39. We therefore allow a recurring cost of half the initial amount, or £353 for small mines and £4958 for large mines each year. This is a recurring cost that will occur in each year of the appraisal period. When annualised over 35 years, this cost is approximately £212 for small mines and £2,978 for large mines and is a policy cost.

### **Managers Sampling Scheme**

40. Information supplied by the Mines Inspectorate indicated that 1 static sample per month is currently needed for an average small mine, and 2 personal samples will be needed per month under the new regime. This suggests an additional 12 samples annually, and perhaps an additional 3 assessment validation samples might be needed in the first year.
41. The information also suggested that 9 static samples per month are currently needed for an average large mine, and 1 static and 28 personal samples per month would be needed under the new regime. This suggests an additional 216 samples annually, with a further 36 personal samples in the first year to validate initial assessments.
42. We expect the average unit cost to be approximately £30 per sample. This assumes no overhead to cover purchase and maintenance of the new sampler. This is because the current samplers are obsolescent and would have had to be replaced soon, even if the Regulations did not force the issue, and the maintenance overheads of the old samplers are likely to be significantly greater than the new samplers, effectively suggesting a cost saving by moving to the new sampling method.
43. When the costs are assessed over the 35-year appraisal period and annualised, the annualised cost to a small mine is £220, and a large mine is £3,900. This is a policy cost.

## Control measures

44. The idea behind the time-weighted exposure control limit is to refocus the control measure away from the workplace (i.e. dust suppression machinery etc) and on to the individual workers. That is, to comply, the mines are unlikely to have to alter the average dust levels. Instead, they will have to reorganise the work to move workers away from dust sources or prevent individuals from working excessively long hours that would cause that worker to exceed their limit.
45. What this will mean in practice for mines will vary enormously, and will be crucially dependent on the type of staffing arrangements that they have in place already. In an extreme case, where a mine relies on a limited number of individuals to work for extended periods, the mine may have to alter substantially its work patterns and as a result may have to increase its workforce. This will obviously have a significant cost, but this situation is expected to be unusual. It is expected that the majority of mines will find it relatively easy to comply with the new exposure control limits by reorganising work patterns and ‘tweaking’ systems of working. Therefore, this is assumed to have minimal costs.

## Health surveillance

46. Health surveillance will now be available for all underground workers as opposed to just mine employees. This means there will be an additional cost of providing health surveillance to an estimated average of 540 contractors’ employees operating in the industry. It has been assumed that health surveillance would take 0.5 hours per contractors’ employee, and would therefore require 0.5 hours time per contractors’ employee. It is assumed that one health surveillance session per year would be provided to each of the employees. Each worker’s health surveillance would also require 0.5 hours time for a medical practitioner. As noted earlier, medical service staff time is valued at £44.20<sup>16</sup>. Mine workers time is valued at an average of £21.67 per hour<sup>17</sup>. Other additional costs, such as use of medical equipment, are expected to be minimal, as health surveillance will simply involve the rolling out of existing systems to additional workers. The total cost of providing health surveillance to the 540 contractors’ employees is estimated at £17,785 per year. Over 35 years this is estimated to have a total present value of £370,309, and an annualised value of approximately £10,580. It is assumed that this cost will be incurred by the mines, and allocated in proportion to the number of employees in each mine. The annualised cost per large mine is therefore estimated at approximately £982, and the annualised cost per small mine is estimated at approximately £76. This will be a policy cost.

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<sup>16</sup> £44.20 comprises of £34 wage costs (Medical practitioners, ASHE 2006) plus non-wage labour costs of a third.

<sup>17</sup> £21.67 comprises of £16.67 wage costs (workers in SIC 10.10 “Mining and agglomeration of hard coal”, ASHE 2006) plus non-wage labour costs of a third.

## Linking health records

47. The extra administration linking together the exposure data and health surveillance will be minimal, probably involving a small extension to existing systems in large mines. The small mines may be offered the software solutions by the large mine's service providers, otherwise they may need to set up a new hard copy record system to replace those for the current regime. Either way the costs will only consist of a small initial policy cost.

*Table 1: Summary of annualised costs to an 'average' small and large mines*

Cost area	Small mine	Large mine
Familiarisation	£117	£908
Initial assessment	£20	£283
Recurring assessment	£212	£2978
Sampling	£220	£3,900
Control	Minimal	Minimal
Health surveillance	£76	£982
Linking health records	Minimal	Minimal
<b>Total</b>	<b>£645</b>	<b>£9052</b>

N.B the figures may not add due to rounding

## Total compliance costs to business

### *Option 1*

48. No additional costs to business have been identified under this option

### *Option 2*

49. To calculate the total compliance costs to business under the new regulations, the average cost is multiplied by the number of mines, i.e. the small mines cost by 10, and the large firms cost by 10. A breakdown of the total compliance costs to business is provided in the "costs to society" section.

## Costs to HSE

### *Option 1*

50. No additional costs to HSE have been identified under this option

### *Option 2*

51. Additional costs to the HSE have been identified as the cost of time allocated to delivering training to the mines affected. It is assumed that an HSE inspector would provide training equivalent to an average of 4 hours per mine. Based on an estimated cost of HSE inspector time of £88 per hour, this is estimated to have a one-off cost in the first year of approximately £7040. This is equivalent to an annualised cost over 35 years of approximately £200.

## Other costs

52. No other costs have been identified under either of the options additional to the costs identified above.

## Environmental impacts

53. No environmental impacts have been identified under either of the options.

## Total costs to society

### *Option 1*

54. No additional costs to society have been identified under this option

### *Option 2*

**Table 2: Total annualised costs to society**

<b>Area of cost</b>	<b>Annualised costs</b>
Familiarisation	£10,244
Initial Assessment	£3,035
Recurring Assessment	£31,905
Sampling	£40,800
Control	Minimal
Health surveillance	£10,580
Linking health records	Minimal
Cost to HSE	£98
<b>Total</b>	<b>£96,964</b>

N.B the figures may not add due to rounding

55. The annualised cost to society with the new regulations is estimated to be £96,964. Of this, £10,244 of this total is accounted for by administrative costs associated with familiarisation. The remaining £86,721 are policy costs. First year/initial costs amount to ca. 32% of total costs.

## Administrative Costs

### *Option 1*

56. No additional administrative costs have been identified to arise under this option.

### *Option 2*

57. The administrative costs generated under this option have been identified as the costs of familiarisation and training. This is estimated to impose, in 2006 prices, a total administrative cost of £358,540, or an annualised cost of £10,244. In 2005 prices (adjusting by the Gross Domestic Product (Expenditure) at market prices deflator), this is estimated to be a total cost of £351,513, or an annualised cost of £10,043.

## **Small firms' impact test**

### ***Option 1***

58. No additional impact on small firms have been identified under this option

### ***Option 2***

59. The Federation of Independent mines were contacted to identify impacts on small firms under this option. They said that while small mines were very diverse, making it difficult to generalise, in their opinion, the proposals would not impose a significant cost on small mines.
60. They said that small mines should not have a problem complying with the proposals for Quartz, but the new time weighted exposure control limit for coal mine dust could pose a problem, but that this would depend on the limit set. They said that the cost of the proposals per tonne of coal produced might be slightly higher than for the larger mines. This is because while small mines generally have lower dust levels, it could be harder for them to conduct the sampling.
61. They emphasised that the proposals should not pose a significant problem for small mines, and they recognised the need to address the potential danger of high exposure.

## **Competition assessment**

### ***Option 1***

62. No competition issues have been identified to arise under this option.

### ***Option 2***

63. These proposals will generate impacts on a number of markets, namely, the coal and energy markets, as well as the market for the provision of personal samplers and analysis of the results. Both the market for coal and the energy market are international markets, with over half of the supply of coal coming in as imports and over a third of all energy being supplied in the form of imports. Given these large, international markets, it is unlikely that any one firm will hold a dominant position with a large market share.
64. The market for the provision of the personal samplers and analysis of the results consists of the 20 mines under the scope of the proposals. Despite the fact that, theoretically, any suitable laboratory could provide this service, the current sampling service is provided by just one laboratory, and this situation is expected to continue. The monopolistic nature of the market is more likely to be due to the declining nature of the mining industry meaning that the market is unable to support more than one provider, rather than high barriers to entry.
65. These Regulations are not expected to have a negative impact on the structure of any of the markets they affect. The costs of the Regulations, start-up and ongoing, will not systematically impact differently on different firms in the market, or on firms entering the markets.

## **Equity and fairness**

### ***Option 1***

66. Leaving the regulations unaltered will maintain a discriminatory regime between contractors' employees and mines' employees (see next paragraph)

### ***Option 2***

67. Under this option, there will be an improvement in equity and fairness among the coal-mining workforce. Health surveillance under the current regulations is limited to mine owners' employees, (although some voluntary arrangements do exist for some contractors' employees). The new regulations would place duties on all coal mine owners and other employers who have people working below ground at a mine who are likely to be exposed to inhalable coal mine dust. I.e. contractors' employees are now protected to the same extent as mines employees.

## **Atypical workers**

### ***Option 1***

68. Since the current regime does not take into account exposure time, it is less protective of workers who work long hours. However, there is no evidence that contractors' employees work longer hours than mines' employees.

### ***Option 2***

69. These proposals could be considered to have a disproportionate effect on contractual workers, as they could be more likely to work longer hours. There are 3 mine contracting companies with 540 employees active in the industry.
70. The Coal Mining Contractors Association was contacted, and in their opinion, these proposals would not have a disproportionate effect on contractual workers. This is mainly because they have to follow the hours the mine operates, so even currently, will not work longer than a twelve-hour shift.

## **Balance of costs and benefits**

### ***Option 1***

71. No additional costs or benefits would be generated under this option.

### ***Option 2***

72. The annualised benefits of the new regulation amount to approximately £4.1 million and are far larger than the total annualised compliance costs to society, which are approximately £96,964. Even if the new regulation were to prevent only one case a year of chronic bronchitis, with no other reduction in incidence of ill health, the benefits, which would amount to an annualised value over 35 years of ca. £154,486 per annum, would still substantially exceed the costs.

## **Uncertainties**

### ***Option 1***

73. There is some uncertainty regarding the number of additional cases of ill health that would arise under the current regulations.

### ***Option 2***

74. The 'average' number of employees in large and small mines is uncertain, and based on an arbitrary assumption. However, this will only influence the illustrative costs to a 'typical' business, and will have no effect on the overall costs to society.
75. The costs of control are uncertain, as there is uncertainty regarding the control measures that mines will have to implement to comply with the time weighted exposure control limits. However, it is expected that most mines will be able to comply by reorganising work patterns and 'tweaking' systems of working.
76. The costs of linking of health records are difficult to quantify. However, this is expected to require only minor updating of IT software, and the additional costs are expected to be minimal.

## **Enforcement and sanctions**

### ***Options 1 and 2***

77. Under both options, the regulations are enforced by the existing enforcement authority, the Mines Inspectorate, and will have usual powers under HSWA to serve notices for non-compliance.

## **Arrangements for monitoring and evaluation**

### ***Options 1 and 2***

78. Evidence is gathered very slowly over time as the development of respiratory health problems occurs over a working life. Evidence will be gathered from continuation of the 4 yearly periodic x-ray (PXR) programme, along with information from individual health records. If option 2 is chosen, robust statistical evidence can be obtained on the success of meeting the objectives of the proposals only after several rounds of the PXR programme have been conducted. This will be 12 to 16 years from the introduction of the regulations. During the early part of this period, the implementation and administrative costs of the regulations will need to be evaluated by HSE and the industry to confirm that they have been minimal in scale.

## **Consultation**

### ***Option 2***

79. These proposals are exclusive to the coal mining industry and have been developed in association with a working group of the Mining Industry Committee (formally the Deep Mined Coal Industry Advisory Committee). Coal mine operators, large and small, trade unions, health specialists, sampling experts and HSE specialists with coal mining expertise have been represented. This comprehensive representation meant that there were only a small number of comments from 9 respondents, as the main interested parties, having been

represented on the working group, felt it unnecessary to comment separately. The Coal Mining Contractors Association met with HSE and had no overriding objections to the proposals, a view shared by the National Union of Mineworkers, who were advised of progress throughout the development of the proposals.

80. The main issues raised were the proposed exposure control limits, use of respiratory protective equipment (RPE) and the effect of working patterns involving successive long shifts. The working group took the view that the proposed exposure control limits were stretching but achievable and should remain at  $3\text{mg.m}^{-3}$  for respirable coal mine dust and  $0.3\text{mg.m}^{-3}$  for respirable crystalline silica. Arrangements for provision and use of RPE are set out in the Approved Code of Practice (ACoP), with the circumstances when the wearing of RPE will be mandatory, specified in the manager's dust control scheme. Minimum standards for such mandatory use are also set out in the ACoP. The concern over working successive long shifts arises from the unease that working such shifts might overload the body's recovery mechanisms and the body would not be able to recover in time before work and exposure resumed. These concerns were based on evidence concerning high levels of exposure over a period of months, and not, as is the case in a coal mine, where the possibility arises over a period of days. HSE has sought to address these issues so far as it is able, including commissioning research from HSL and the Institute of Occupational Medicine using a biomathematical model to investigate the effect of changes in shift pattern on the risk of pneumoconiosis. The results suggest that mineworkers on extended shifts should not be at increased risk if the exposure limits are time-weighted as proposed.

### **Summary and recommendation**

81. Option 2 is recommended. When introducing the proposed new regulations for the control of inhalable dust in coal mines, the projected annualised benefits at £4.1 million will considerably exceed total annualised costs at £154,486. While there is uncertainty regarding the number of cases of ill health that would be prevented, even if the new regulations were to prevent only 1 case of chronic bronchitis per year, the benefits would exceed the costs. Approximately 90% of the costs associated with the regulation are estimated to be policy costs.

### **Declaration**

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister

*Bill McKenzie*

Date 29th June 2007