

**REGULATORY IMPACT ASSESSMENT OF THE EUROPEAN
COMMISSION PROPOSAL TO RESTRICT THE MARKETING AND USE OF
CHROMATE-RICH CEMENT AND CEMENT PREPARATIONS**

PURPOSE AND INTENDED EFFECT

Issue and Objectives

1. Cement is used in construction materials such as concrete, mortar and grouting. Due to modern cement production processes, the naturally occurring trivalent chromium content in the cement is oxidised to form hexavalent chromium (chromium VI). While all cement can potentially cause irritant dermatitis, cement that contains chromium VI (higher chromate cement) also has the potential to cause allergic contact dermatitis that can lead to permanent sensitivity or even disability. The European Parliament has agreed a new amendment to the Marketing and Use Directive (76/769/EEC) to restrict the marketing and use of cement and cement containing preparations where the level of chromium VI exceeds 2 ppm. This restriction applies to all cement and activities where there is the possibility of a risk of contact with the skin. However, higher chromate cement or cement containing preparations supplied for use in controlled closed and totally automated systems, are exempt from this restriction. This Regulatory Impact Assessment has been adapted to reflect the final text of the agreed Amendment Directive.
2. Some Member States (MS) have already implemented national legislation, which either bans the use of chromium rich cement outright, or in activities where there is a risk of skin contact, as now required by this new Directive.
3. The aim of this Directive is to reduce the number of cases of allergic contact dermatitis each year.

Risk assessment

4. The highest risk of exposure to chromium VI in cement occurs once cement is mixed with water. The principal health effects are skin irritation, which may lead to irritant dermatitis and allergic contact dermatitis. Workers who are exposed to wet cement on a regular basis are most at risk of developing allergic contact dermatitis. Workers most at risk of exposure are bricklayers, tile layers and grouters, workers in floor construction and those who carry out maintenance and repair work, all of whom are employed in the construction sector.
5. It is very difficult to estimate the numbers of new cases of allergic contact dermatitis each year due to chromates in cement. The majority of construction workers are peripatetic, and unlikely to visit a GP. If they do, very few would be referred to a dermatologist, and if referred, they may not visit a dermatologist who reports to EPIDERM (the HSE – sponsored national skin surveillance project). Epiderm received notification of, on average, 43

new cases of allergic or mixed allergic and irritant contact dermatitis a year, due to chromates in cement. HSE believes 43 new cases per year to be erroneously low and applied a multiplication factor of 10.

6. An alternative to the 430 new cases per year has been estimated using additional data sources. In an attempt to allow for the absence of cases seen by occupational physicians data from the Occupational Physicians Reporting Activity (OPRA) scheme has been examined. OPRA, a sister scheme to EPIDERM, cannot provide figures specifically for allergic contact dermatitis. To allow for the missing occupational physician cases the relationship between EPIDERM and OPRA cases was used to extrapolate a figure for those in the construction industry that would have been seen by occupational physicians. This led to an average figure of 73 new cases per year of allergic contact dermatitis due to chromate cement. This figure does not take account of underreporting or under-identification of cases.

7. To further build on the EPIDERM/OPRA estimate a comparison was made to the Self Reported Work-Related Illness (SWI) survey on skin disease. The 1995 SWI estimated 12,000 new cases of work-related skin disease per year (95% confidence interval of 3,000 to 22,000). This compares with around 4,000 cases per year reported to EPIDERM/OPRA. Thus we can gauge that underreporting to carry a factor of 3. Thus the estimate of 73 becomes 219 new cases per year. The rest of this paper will therefore indicate a range of 219 to 430 new cases per year of contact dermatitis caused by chromate rich cement.

IMPLICATIONS FOR UK CEMENT AND CEMENT PREPARATION MANUFACTURING INDUSTRY

8. Reducing the levels of chromium VI in cement is a relatively straightforward process. A reducing agent is added to the cement or cement preparation to reduce the level of chromium VI present. Due to its technical properties and reasonable cost, ferrous sulphate is currently considered by some MS to be the best reducing agent.

9. Considering the Directive's exemption for cement used in controlled closed or totally automated processes, it has been necessary to estimate how much of the cement manufactured in the UK would be subject to the restriction. Approximately 70%¹ of the cement manufactured in the UK is bagged and bulk cement (for the ready-mixed concrete and pre-cast concrete markets) and, in HSE's judgement, carries a significant risk of contact. The remaining 30% of the cement, sold in bulk, is used in automated procedures or in a closed operation with a lower risk of worker contact, however this could still lead to contact with the skin, eg cleaning machinery.

10. Where the cement poses the possibility of a risk of contact with the skin (most likely in bagged or bulk cement), the Directive calls for a reducing agent to be added to the cement at the earliest possible stage. This could be best

¹British Cement Association, www.bca.org.uk

achieved where the cement manufacturer uses a mechanical process to add ferrous sulphate to the cement during the final grinding stage of production. The British Cement Association (BCA) has indicated that British manufacturers will adopt this approach.

INFORMATION SOURCES AND BACKGROUND ASSUMPTIONS

11. The scale of existing ill health caused by chromium VI in cement has been estimated from case reports, the HSE Epidemiology and Medical Statistics Unit (EPI-DERM) survey of occupational ill health, the Occupational Physicians Reporting Activity (OPRA) scheme and the Self Reported Work-Related Illness (SWI) surveys. Additional sources were the Danish Technological Institute, and the National Chemicals Inspectorate Chemical Products and Biotechnical Regulations, 1998. The costs to the cement industry of implementing the Directive are estimated using information on likely costs from the UK industry as well as other Member States where the proposed restriction is already applied.

TECHNICAL ASSUMPTIONS

DISCOUNTING

12. Costs are discounted at a rate of 3.5% per annum following HM Treasury guidelines. Discounting allows for individuals' observed preferences towards current spending, and rising real income over time. Health and Safety benefits are discounted at 1.5% again following HM Treasury guidelines. Costs and benefits are shown at 2001 values.

APPRAISAL PERIOD

13. The costs and benefits of adopting the proposed restriction are estimated over a ten-year period.

BENEFITS

Health and safety benefits

14. The benefits of the restriction will come from the reduction in the risk of developing allergic contact dermatitis in the construction industry. HSE estimates that there are at least 219 new cases of allergic, or mixed allergic and irritant, contact dermatitis due to chromates in cement a year. Studies in Member States such as Finland and Denmark, where cement has been chromate-reduced for several years, have indicated a reduction in the rate of allergic contact dermatitis of at least 66%, and more usually 100%, in the construction industry. It is therefore assumed that applying the restriction to the 70% of cement that is either bagged or ready-mixed is likely to lead to a reduction of 66% in the number of new cases of allergic contact dermatitis a year. The UK would expect to see a reduction of at least 66% once the

restriction comes into force. If those employers using the “controlled closed and totally automated systems” are applying and following good working practices when maintaining or repairing such machinery, then we could expect to see up to a 100% reduction if the cement manufacturers comply fully.

COSTS OF WORK-RELATED ALLERGIC CONTACT DERMATITIS

15. Allergic contact dermatitis costs the individual, the employer and society as a whole. The most significant direct costs fall to individuals (and equivalently society) in loss of actual or potential income (equivalent to productivity), and in the suffering of the individuals involved. These are estimated below. Firms also incur direct costs in employee absence, administration, recruitment and retraining. Finally, costs are incurred by the rest of society in medical treatment and recuperation.

Quantified costs are as follows:

- a) The loss of income through absence from work or through having to change jobs or take early retirement
- b) Expenditure on medical treatment
- c) Pain and suffering of those affected

16. Administrative costs to firms in dealing with absence, recruitment or retraining have not been estimated. To further elaborate on the costs of training, HSE’s Field Operations Directorate estimate that the construction industry have an employee turnover of 10%. Therefore the construction industry face high training costs to new employees. Those leaving the construction industry may move onto benefits or other employment and thus may need to be re-trained. Such costs have not been quantified here due to the lack of suitable data. Any work-related illness has wider effects on those concerned and their families, which also remain unquantified.

LOSS OF INCOME

17. There are no UK data dealing with the employment effects on workers with confirmed occupational allergic contact dermatitis. Medical studies indicate that the condition can be severe and debilitating, while studies from other Member States suggest that allergic contact dermatitis can have a varying effect on workers’ employment. It is assumed, therefore, that 10% of UK sufferers change their jobs as a result of allergic contact dermatitis.

18. A follow-up study of workers with confirmed occupational asthma found that the median reported income loss of workers who changed jobs was £3888² per case per year. It is assumed that workers who leave the construction industry as a result of allergic contact dermatitis suffer the comparable average income loss, given that occupational asthma is prevalent

² ‘Health, Employment and Financial Outcomes in Workers with Occupational Asthma’, Gannon, Weir et al, British Journal of Medicine 1993.

in industries employing workers with similar skills to construction, such as timber and woodworking and vehicle repair.

19. The value of lost output can be proxied by the wages paid to the worker by the employer. These are gross earnings, plus a 30% allowance for non-wage labour costs (employer's national insurance etc), uprated in to 2001 prices in line with nominal earnings' growth. This gives a loss of output figure of around £6800³ per case.

20. Some allergic contact dermatitis sufferers will take time off work during the year as a result of their illness. While this is likely to result in only a partial income loss to individuals (because of sick payments etc) there will be costs to employers and society through loss of output and extra administration.

21. The SWI 95 Self-reported Work-related illness Survey reveals that, of those who take time off work, the average number of days' absence per year due to skin disease was 11 per case. It is assumed that of the remaining 90%, half the sufferers of allergic contact dermatitis take, on average, 11 days off each year because of their illness. Based on average earnings in manual occupations in the construction industry (New Earnings Survey 2000), plus an allowance for non-wage labour costs, 11 days absence costs society £860⁴ in lost income (2001 prices) per case.

22. For the remaining 45% of allergic contact dermatitis sufferers it is assumed that they do not take time off work and therefore do not experience any loss of income.

23. Therefore the average annual loss of output associated with an individual case of allergic contact dermatitis in the construction industry is estimated as:

$$(0.10 \times £6800) + (0.45 \times £860) + (0.45 \times £0) = \mathbf{£1067} \text{ per case per year}$$

MEDICAL TREATMENT

24. In 1999, HSE estimated the average treatment costs of illnesses and accidents leading to different durations of absence⁵. In 2001 prices, the average cost of treating an illness (or accident) that does not lead to absence from work is £33 and the average cost of treating an illness leading to 11 days absence from work is £130 - £723. These costs include prescription charges, GP visits, the cost of hospital outpatient and any in-patient services.

³ [(Median reported income loss, 1992) x (earnings growth 1992 – 2001, 33.9%)] x 1.30 to add in 30% non-wage costs.

⁴ {[(Average hourly wage, 2000 prices) + (30% of average hourly wage for non-wage labour costs)] uprated by 5.1% in line with nominal earnings growth 2000 - 2001} x hours in a day x number of days absent

=

{[(7.13) + (2.14)] x 1.051} x 8 x 11 = £857.36

⁵ The costs to Britain of workplace accidents and work-related ill health in 1995/1996, HSE books 1999 ISBN 0-7176-1709-2.

25. The average cost of treatment of a case of allergic contact dermatitis in the construction industry is estimated as

Minimum $(0.45 \times \text{£}33) + (0.55 \times \text{£}130) = \text{£}86$
Maximum $(0.45 \times \text{£}33) + (0.55 \times \text{£}723) = \text{£}410$

PAIN AND SUFFERING

26. This section uses monetary values for pain, grief and suffering published by HSE 1999, based on stated preference studies, which rank different illnesses by their severity. The length of time taken off work is used as a proxy for severity.

27. A non-permanently incapacitating illness, involving absence of over 1 calendar week, involves a welfare loss of around £2080 in 2001 prices. An illness that does not require taking time off work will not result in any loss of income but there will still be an element of pain and suffering. A notional allowance of £170 is assumed for the pain and suffering from minor cases of ill health.

28. The loss in terms of pain and suffering of the average case of allergic contact dermatitis is estimated as:

$(0.45 \times 170) + (0.55 \times 2080) = \text{£}1220$

29. This is not an estimate of the value of pain and suffering each year. It is an estimate for pain and suffering, in present value terms, expressed by how much individuals are willing to pay to avoid having allergic contact dermatitis.

OVERALL COSTS OF ALLERGIC CONTACT DERMATITIS

30. The estimates of loss of income and medical treatment range between £1,149 and £1,476 a year. Discounting over a ten-year period gives a present value per case of around £10,620 - £13,430.

31. Adding these costs to the estimated present value of pain and suffering yields an average cost per case of allergic contact dermatitis (in the construction industry) of £11,840 - £14,650, in present value terms. **£13,244** is taken as a midpoint. This figure represents the average benefit to society, over a ten-year period, of preventing an individual from contracting allergic contact dermatitis in 2001.

TOTAL REALISABLE BENEFITS OF CONTROL MEASURES

32. Given the estimated number of new cases each year ranging from 219 to 430, and the estimated cost of each case, the total benefit to society of preventing 66 – 100% of new cases of allergic contact dermatitis each year, over a ten-year period, is £18 million - £27 million and £35 million - £53 million respectively in present value terms.

33. In addition, the restriction can be expected to mitigate existing cases. No explicit allowance is made for this further potential benefit.

34. Regulation of chromate levels in cement should be seen within the wider context of a shortage of skilled workers in the construction industry. The Construction Industry Training Board has predicted that over the next five years, 350 000 extra construction workers will be needed to meet this skills shortage. Reducing chromate levels in cement should also have the long-term benefit that fewer skilled workers will leave the industry as a result of ill health. Retaining workers will benefit construction firms by reducing recruitment and training costs, although these benefits cannot be quantified.

COSTS

Business sectors affected

35. The application of the restriction to all cements, cement preparations and dry packed products, except those used in controlled closed and totally automated systems, will result in costs falling on the cement and cement preparation manufacturing industry. In 2001, 11.9 million tonnes of cement were sold in the UK. Four large firms manufactured 90% of this. The remaining 10% consists of some imported cement and UK-manufactured cementitious material.

Compliance costs to business

36. The Directive states that “cement and cement-containing preparations may not be used or placed on the market (for activities where there is the possibility of contact with the skin) if they contain, when hydrated, more than 0.0002% soluble chromium VI of the total dry weight of the cement”. In addition, where a reducing agent is used, the packaging of cement or cement preparations shall be marked with information on the packing date, storage conditions and storage period during which the content of soluble chromium VI is not more than 0.0002% of the total dry weight of the cement. Potential costs arise in connection with equipment, labelling, shelf life limitation, storage, testing and purchase of reducing agent.

37. The 10-year costs to business of this restriction are presented below.

INITIAL COSTS

EQUIPMENT

38. The Directive requires the reducing agent to be added to the cement at the earliest possible stage in manufacture. Cement manufacturing firms will therefore have to install appropriate machinery to add ferrous sulphate (or another reducing agent) to the silos of cement at this early stage (ie during the grinding stage). The machinery required includes tanks to hold the ferrous sulphate (or other reducing agent) and equipment to convey it into the silo,

together termed a 'dosing unit'. Other equipment such as filters and level devices may also incur a cost.

39. This equipment is assumed to last longer than ten years, i.e. there should be no replacement costs within the ten-year appraisal period.

40. Based on industry estimates, it will be assumed that one dosing unit is required for every 300 000 tonnes of cement treated a year. The capital cost of each dosing unit is assumed to be £125 000 - £150 000 (2001 prices). The industry noted that the assessment of costs should be based on the worst case number of dosing units. However, some cement plants have equipment (such as blenders) that can act as effective substitutes for dosing units. Similarly, some plants may not need to comply with the restriction if they comprise the exempted "controlled closed and totally automated systems" described in the Directive. It is worth noting that no further cost information was provided by industry to enable HSE to evaluate these cost estimates.

41. In 2001, 11.9 million tonnes of cement was sold in the UK, of which around 2.4 million tonnes were bagged, and 5.9 million tonnes were ready-mixed. The total initial capital cost will therefore be £3.5 million - £4.2 million for 28 dosing units to cover bagged and ready-mixed cement.

42. These costs will be incurred in the first year of implementation, Annually recurring costs of 10% of initial costs are assumed for maintenance. The ten-year maintenance cost in present value terms is therefore £3.0 million - £3.6 million.

43. The British Adhesives and Sealants Association (BASA) suggests that there are between 13 and 18 companies that manufacture cement preparations in Great Britain. Each of these companies is assumed to require dosing equipment costing approximately £5,000 to £10,000. The equipment is expected to last longer than the ten year appraisal period used in this RIA. Investment in the dosing equipment is estimated to cost between £65,000 and £180,000. Assuming a 10% (of capital) annual recurring cost for maintenance, the annual estimated cost is between £6,500 and £18,000, and the ten-year present value is between £56,000 and £156,000.

44. The dry packed products industry is unlikely to require significant new investment in dosing equipment.

RECURRING COSTS

DATESTAMPING/LABELLING

45. The Directive requires marking of the packages of reduced chromium VI cements and cement preparations to show information on the packing date, the storage conditions and the storage period appropriate to maintaining the activity of the reducing agent. At present each bag of cement is labelled and date-stamped individually. Adding a sentence to the label giving the additional information should not impose any significant costs. In the same way, the

marking requirement is not expected to impose significant new costs on preparations manufacturers.

SHELFLIFE

46. The cement manufacturers have advised that the storage period (ie compliance life) for cement dosed with ferrous sulfate will be 2 months. However there should be no additional costs due to tighter stock handling, as cement is typically in the marketplace within days or hours of manufacture, and the turnover time is a matter of weeks.

47. The issue of shortened shelf life is more challenging for cement preparations because they move more slowly through the supply chain. The problem is made more acute by the Directive itself, which assesses chromium VI concentration of a preparation with respect to the weight of contained cement rather than the overall weight of the preparation. Since the weight of the cement is smaller the effect is to inflate the concentration figure and thereby create a higher dosing requirement to get below the 2 ppm compliance limit and stay there long enough to yield an acceptable shelf life. Representatives of some preparation manufacturers expressed concern about the amounts of reducing agent needed and the possible impact on the performance of the products. They suggested that the Directive's treatment of preparations is anomalous and that the implementing legislation be framed in terms of the chromium VI concentration of the whole preparation. This, they argued, would limit the amount of extra dosing needed to obtain reasonable shelf lives without creating any risk to health. Two policy options presented themselves:

- a) transpose the Directive faithfully on the assumption that preparation manufacturers could cope with it by adding enough ferrous sulfate; or
- b) transpose the Directive in the way suggested by the preparation manufacturers if they could show convincing evidence that faithful transposition created insuperable difficulties for them, and there was no loss of health protection in so doing.

48. No one is yet sure of the likely technical constraints that option a) would impose on the cement preparations industry. However, it is possible that those manufacturers wishing to maintain a 12 month shelf life may have to make a compromise on product quality. Costing the potential impact of this is not currently possible because of the large uncertainties involved.

STORAGE

49. Chromate-reduced cement is stored in 3-ply moisture-retaining bags, whereas ordinary cement is stored in 2-ply bags. However there is no evidence to suggest that switching to 3-ply bags will impose additional costs on cement manufacturers. In Member States already implementing the Directive, 3-ply bags are the same price, or sometimes cheaper, than the 2-ply bags.

TESTING

50. The cement industry will have to conduct regular tests as a form of quality control, to check chromate levels in their cement. This will enable cement manufacturing firms to make sure that enough reducing agent has been added to the cement and that the reduction time is sufficient. The need to adopt a harmonised testing method is recognised in the Directive and the European Commission has been called upon to establish such a method preferably through the European Committee for Standardisation (CEN). This could take a number of years to achieve, however, but Member States were unwilling to delay the Directive until a test method was established. In the interim, Member States will need to use their own test methods or adopt those used elsewhere in the EU to ensure chromium VI levels in cement do not exceed 2ppm. HSE judges that the costs to the UK cement industry will not be significant, given that firms already test for chromates in cement.

51. The cement preparation industry is likely to incur incremental costs from testing. Two testing systems have been discussed, one whereby the number of tests is proportional to throughput, and another whereby testing is conducted periodically as part of a quality assurance process. Estimated costs are presented for both possibilities:

- a) Testing proportional to throughput: Assuming that each of the estimated 4,200 deliveries⁶ per year of cement to the industry is tested, that an additional 5% of tests are conducted after ageing⁷, and that one test costs between £50 and £60, the following estimated costs apply: Annual recurring costs of between £221,000 and £265,000, with a ten year present value of £1.90 million to £2.28 million
- b) Testing through certification: Assuming that there are initial certification set-up costs (including initial testing) of £10,000 for the whole industry, that testing is conducted annually, that each of the 13 to 18 companies has 10 products, and that the cost of one test is £50 to £60, the following estimated costs apply: Annual recurring costs of between £17,000 to £21,000, with a ten year present value of £0.07 million to £0.10 million.

Providing that the cement preparations industry establishes an effective certification system, in which testing is conducted at suitable intervals, HSE recommends the adoption of certification testing.

Subject to similar guarantees, HSE also recommends certification testing should be allowed for the dry packed cement products industry. On-going testing would impose minimal costs on the industry. However, initial testing for the purposes of establishing appropriate reformulation after the inclusion of

⁶ A contact from the cement industry estimated that 105,000 tonnes of cement is delivered to the cement preparations industry each year. Each delivery is of 25 tonnes.

⁷ Assumptions come from BASA

a reducing agent will impose one off costs. HSE is unable to provide an aggregate estimate for this initial cost.

REDUCING AGENT

52. Estimates of the quantity of ferrous sulphate required to achieve a sufficient reduction of chromate VI in cement vary. A study in 1973⁸ found that the amount of ferrous sulphate required to achieve a complete reduction of chromium VI was small: 0.1-0.2%. The current industry estimate is 0.5% and HSE judges that this is an appropriate basis for calculating costs.

53. In 2001, 11,854,000 tonnes of cement was sold in the UK, of which around 2 370 800 was bagged and 5 927 000 ready-mixed. Total demand for ferrous sulphate would be 41 489 tonnes. Given the price of ferrous sulphate as £200/tonne⁹, the total annual cost of ferrous sulphate would be £8.30 million. This cost would recur annually. The 10-year net present cost of the reducing agent is £71.49 discounted amount million.

54. The cement preparations industry will need to add extra reducing agent (secondary dose) to minimise the negative impact on its products' shelf life. Quality problems associated with using ferrous sulphate mean that a proportion of the industry's products will probably have to be treated using tin sulphate. HSE has assumed that tin sulphate will cost £2000 per tonne¹⁰. BASA estimates that an additional 0.5% of ferrous sulphate by volume of cement will be required for 60% to 70% of the cement used, and 0.3% to 0.4% of tin sulphate will be used for the remaining cement. This amounts to annual requirement of 315 to 368 tonnes of ferrous sulphate and 110 to 147 tonnes of tin sulphate. The annual recurring cost is estimated at between £284,000 and £368,000, which has a ten year present value of between £2.14 million and £3.16 million

55. The dry packed cement products industry would also need to add extra reducing agent in order to minimise the impact of the proposals on the shelf lives of their products. Annually, the industry takes delivery of approximately 1,000,000 tonnes of cement and an estimated 70% to 80% will require secondary dosing. Assuming a 0.5% ferrous sulphate inclusion rate leads to the following cost estimates: Annual recurring cost of £700,000 to £800,000 and a ten year present value of £6 million to £6.9 million.

⁸ Fregert and Gruvberger

⁹ Information from BASA suggests that the cost of ferrous sulphate in 2004 is between £160 and £180 per tonne. Although the 2001 prices (the base year for this RIA) would probably be lower in nominal terms, increased demand for ferrous sulphate after implementation of the Chromium VI regulation would probably lead to price inflation. Furthermore BASA believes that currently available ferrous sulphate would require further refinement by the suppliers before it could be used in cement and its preparations. Previous HSE estimates had assumed £100 per tonne.

¹⁰ The cost of tin sulphate in 2004 was approximately £1600. This figure has been increased for this RIA because of the anticipated effects of increased demand and worries over availability.

Option to under-implement directive with regard to restriction on cement preparations

56. HSE offered to recommend to HSC and ministers under-implementation (see option (b) in paragraph 47) in respect of cement preparations if firms produced evidence that full implementation forced them to add so much reducing agent to achieve compliance that they incurred excessive costs or the performance of their products was seriously affected. No evidence of product performance impairment was received, and only one firm provided evidence of excessive financial cost but this was based on extremely high prices for ferrous sulfate. In light of this, and indications that it had receded as a preference for the industry, HSE opted not to recommend under-implementation.

Costs to HSE

57. Costs are likely to be small and contained within existing resources.

Total costs to society

58. The total costs to society are estimated as follows:

Table 2. Compliance Costs for Industry

	Initial cost £million	Recurring cost £million	Ten year PV £million
<i>Cement industry</i>	3.50 to 4.20	8.66 to 8.73	78.00 to 79.30
<i>Dry packed products industry</i>	Not Known	0.70 to 0.80	6.03 to 6.89
<i>Cement preparation industry</i>	0.07 to 0.18	0.31 to 0.32	2.63 to 3.60
Total	3.57 to 4.38	9.67 to 9.85	86.66 to 89.79

The estimated annualised cost¹¹ of the proposals is £9.1 million to £9.2 million for the cement industry, £0.3 million to £0.4 million for the cement preparations industry, and £0.7 million to £0.8 million for the dry packed cement products industry.

Note that all costs are policy costs. There should be no implementation costs as the affected firms are already very familiar with the requirements of the proposal.

IMPACT ON SMALL BUSINESSES, CHARITIES AND VOLUNTARY ORGANISATIONS

59. Buying and adding ferrous sulphate will cost cement manufacturers about 30p per tonne of cement. Swedish experience has indicated that the price of cement increased by about 1% after implementation of the Directive. If the restriction is applied to all cement, it will not affect small construction businesses disproportionately. However, if it is applied only to bagged and ready-mixed cement, then small firms will face disproportionate costs, since the majority of users of bagged cement are small firms. The question is

¹¹ This can be interpreted as the average undiscounted annual cost.

whether a small price increase will be enough to affect the small firms involved in 'low volume' activities that use bagged cement.

60. Seven firms were contacted, all with less than 30 employees, including bricklayers, roofers, tilers, and builders. None of these firms expressed serious concerns about a small increase in the price of cement. However there were worries that there could be further opportunistic price increases in the future. There were also worries about the proper storage of reduced-chromate cement on site, as it is more susceptible to hot conditions. However, the general consensus was that a small price increase would not affect small firms too much.

61. The British Adhesives and Sealants Association (BASA) has expressed concern that although the overall impact of the proposals on the industry as a whole may be small, a few small companies may bear a disproportionate burden if technical information on how to prolong shelf-life is not shared within the industry.

COMPETITION ASSESSMENT

62. The cement industry has a highly concentrated market structure, with 90% of production controlled by three large firms. However, the proposed requirement to manufacture reduced-chromate cement would not affect any one of these firms more than the others. Since there will not be any differential effects, the proposed Directive should not affect market structure or competition in the cement industry. Nor should it lead to higher set-up costs for new firms, that existing firms would not have to meet. Costs should fall on firms in proportion to their cement production. The closest thing to fixed costs are the initial outlay on equipment (dosing units), these however increase with the quantity of cement produced. Thus smaller firms do not face higher costs than larger as no economies of scale are anticipated.

63. The Directive requires the chromium VI in cement to be reduced by means of a reducing agent. Although ferrous sulphate is by far the most common such agent, it is not the only chemical that can be used to achieve the same effect. In practice, however, ferrous sulphate is expected to be the reducing agent most used. There is understood to be ample capacity in the UK to produce sufficient ferrous sulphate (ferrous sulphate is produced as a by-product from other industrial processes and considerable tonnage is produced each year). This should alleviate any concerns about the creation of the potential for anti-competitive practices in the short-term, in the market for ferrous sulphate..

64. The issue of costs being passed downstream, to consumers of cement, does not have serious implications for competition. If the restriction is applied to all cement, all construction firms will be affected in proportion to the amount of cement they use in a year. If the restriction is applied only to bagged and ready-mixed cement, small firms will be affected more relative to large firms,

but these two groups within the construction sector do not generally compete for the same business.

ENVIRONMENTAL IMPACTS

65. There are no direct environmental effects of the proposals, other than the health benefits detailed above.

BALANCE OF COSTS AND BENEFITS

66. Applying the restriction to bagged and mixed cement will cost about £28.6 million (mid-point) in present value terms. The estimation of the benefits relies on evidence from other MS, which suggests a decrease of between 66% and 100% in new cases of allergic contact dermatitis. It is assumed that the benefits of reducing the bagged and ready mixed cement coupled with stringent safety measures on the remaining automated processes should find us closer to the higher end of this reduction.

67. Table 3 shows that according to the present estimates, the cost-benefit ratio ranges from a minimum of 1 : 0.4 to a maximum of 1 : 0.6. Issues raised in the uncertainties section should be noted when considering these ratios.

Table 3. Summary of costs and benefits

	Initial cost	Recurring cost	Ten year PV
Costs	£million	£million	£million
<i>Cement industry</i>	3.50 to 4.20	8.66 to 8.73	78.00 to 79.30
<i>Dry packed products industry</i>		0.70 to 0.80	6.03 to 6.89
<i>Cement preparation industry</i>	0.07 to 0.18	0.31 to 0.32	2.63 to 3.60
Total	3.57 to 4.38	9.67 to 9.85	86.66 to 89.79
Benefits			£million
219 cases per year			17.92 to 27.15
430 cases per year			35.18 to 53.31

68. It is worth noting considerable uncertainties surround these estimates, and these have been detailed in the 'Uncertainties' section.

UNCERTAINTIES

69. BASA has suggested that time-expired cements and cement preparations may need to be disposed of as special waste and that this will increase costs for manufacturers, suppliers and end users. However, no figures were offered to estimate these costs. Otherwise, uncertainties are divided into three categories: those that imply that costs have been overestimated, those implying that benefits have been underestimated, and the hidden costs due to the nature of the ill health being described and the construction sector – seen to be the industrial group most at risk from higher chromate cement.

Overestimated costs

70. The data for initial capital rely entirely on the cement industry's own estimates of the costs that firms will face. The cost of each dispensing unit (£125 000 – £150 000) conflicts with the view from European cement producers who are already implementing the directive. Several producers in Member States have said that they did not face any extra equipment costs and simply incorporated the process using existing equipment. However, the UK industry has said one of its producers incurred costs while operating cement kilns in in other European countries, although no costing were provided to HSE.

71. Furthermore, the quantity of ferrous sulphate required to reduce chromate VI may well have been overestimated. The requirement is likely to be less in the UK given that untreated cement in the UK is much lower in chromium VI than cement in Europe. UK Portland cement has typically 7-8 ppm chromates, and always less than 15 ppm, whereas untreated Danish cement is around 40.5 ppm chromates.

Underestimated benefits

72. Assumptions made in estimating the benefits are also subject to considerable uncertainty. Firstly, the reported number of new cases of allergic contact dermatitis due to chromates in cement (219 - 430 a year) is calculated from a number of sources, including the EPIDERM Survey, OPRA and the SWI 95. There are limitations to these data sources (eg. restricted to dermatologists who participate voluntarily in the scheme; provision of only sample data on cases of dermatitis and other skin diseases; entirely voluntary self-reporting) which may reflect a level of under-reporting.

Hidden costs

73. However, dermatologists will only see the most severe cases of allergic contact dermatitis. Non-specialist doctors or occupational health physicians who do not report to the scheme treat many cases, and not all dermatologists participate in the scheme, so the 219 cases should, in HSE's judgement, be regarded as a minimal estimate of the true incidence of work-related disease. The true number of new cases a year could be substantially greater than the present range, and total benefits from the proposal would multiply accordingly. It is also worth considering other factors relating to workers in the construction sector that may also demonstrate a higher level of under-reporting.

74. Many workers in the construction sector are self-employed or peripatetic, moving from project to project. Such workers may find registration with a local GP or even ready access to a GP difficult to arrange. The absence of easy access to a GP could dissuade workers from seeking medical advice for what is often seen as a skin irritation, the potential seriousness of which may not be realised by the worker.

75. It is understood that some workers in the construction sector may be employed illegally on a 'cash-in-hand' basis. Such informal or local arrangements could again dissuade workers from seeking GP's advice if there was a risk of their illegal employment being uncovered.

76. Elsewhere in this assessment, HSE has indicated the assumed 10% turnover of workers in the construction sector may be the result of allergic contact dermatitis cases. Whereas this 10% incurs a loss of income, the sector must also bear the cost of retraining skilled labourers (such as bricklayers). Those affected who seek employment elsewhere will also face retraining. Precise costings are difficult to assess.

77. The 219 - 430 cases a year are occupational cases. There may be many more cases among people who do not work in the construction sector, but use cement independently for DIY. Again, total costs to society of 'consumer cases' of allergic contact dermatitis, and the benefit of reducing chromates in cement, would be higher. For instance, the average loss of income per case would increase disproportionately, assuming that the income of the average sufferer of 'consumer dermatitis' is higher than the income of the average sufferer of 'construction-dermatitis'.

78. While benefits have been calculated using a range of reduction levels of the disease, from 66 – 100%, there has been a 100% reduction in new cases in member states that already reduce their cement. The reduction in the UK could be close to 100%.

79. Finally, several assumptions have been made regarding the effects of the illness on the individual. In calculating the average loss of income associated with a case of the disease it was assumed:

- a) That the number of day's absence from work in a case of allergic contact dermatitis is 11. This is the average for all skin diseases and may well be higher for allergic contact dermatitis, which is a more serious skin disease.
- b) That only half of sufferers take time off. Again, the number may be higher.

80. In calculating the average cost of treatment of the disease it was assumed:

- c) That the HSE 1999 average cost for treatment of an illness requiring 1-4 weeks' absence was appropriate. This took treatment to constitute about 3 GP consultations, 1 outpatient visit and 1 in-patient visit.

Treatment for allergic contact dermatitis may be longer running and more costly, as it may well continue after the worker returns to work.

Enforcement, sanctions, monitoring and review

81. Enforcement arrangements and sanctions will be determined during the transposition of the Directive into UK law. The implementing regulations will be monitored and reviewed in accordance with HSE's normal procedures – a review is likely once the implementing regulations have been in force for 2-3 years.

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