

IMPLEMENTATION IN NORTHERN IRELAND OF THE 4TH INDICATIVE OCCUPATIONAL EXPOSURE LIMIT VALUES (IOELV) COMMISSION DIRECTIVE (EU) 2017/164

NOTE ON COSTS AND BENEFITS

1. I declare that:
 - a. the purpose of the revision of the HSE publication entitled “EH40/2005 Workplace exposure limits”, to include new and revised Workplace Exposure Limits (WELs) for the thirty one substances listed in the 4th Indicative Occupational Exposure Limit Values (IOELV) Commission Directive (EU) 2017/164 (“the Directive”), together with the publication of related notices on the HSENI website and in the Belfast Gazette, is to fully implement the Directive in Northern Ireland; and
 - b. I am satisfied that the costs and benefits assessment, prepared in association with the measures to implement the Directive in Great Britain, may be applied, with modifications to the Northern Ireland measures.
2. An estimate of the costs and benefits associated with the measures to implement the Directive in GB, together with the effect on the Northern Ireland costs and benefits is appended to this Note.
3. There is no impact on charities, social enterprise or voluntary bodies.

Louis Burns
Health and Safety Executive for Northern Ireland

14 September 2018

PART I

NORTHERN IRELAND COSTS AND BENEFITS

IMPLEMENTATION IN NORTHERN IRELAND OF THE 4TH INDICATIVE OCCUPATIONAL EXPOSURE LIMIT VALUES (IOELV) COMMISSION DIRECTIVE (EU) 2017/164

General

1. The Health and Safety Executive for Northern Ireland is of the opinion that the analysis and considerations set out in the Great Britain Impact Assessment can be applied on a proportionate basis to Northern Ireland.

Costs

2. The proportionate application leads to an estimated cost to Northern Ireland businesses of approximately £26 thousand over 10 years, with equivalent annual net cost to business of £3 thousand.

Benefits

3. All of the substances listed in the 4th IOELV Directive are known to be harmful to human health, primarily by inhalation, but also by ingestion or through absorption through the skin. However, NI businesses should already be controlling exposures to the substances on the list under the Control of Substances Hazardous to Health Regulations (Northern Ireland) 2003 and so no significant changes are required to the current controls they already have in place. Thus, it would not be expected that any real changes in health outcomes would occur either, if exposure controls don't need to change. In reality, it is understood that some businesses might experience costs on implementing the 4th IOELV by reducing worker exposures, which could therefore lead to some associated improvement in health of workers.

Conclusion

4. Overall it is estimated that the impact on Northern Ireland business will be negligible and since this is an EU driven matter, the small costs are unavoidable.
5. The Health and Safety Executive for Northern Ireland is satisfied that this represents a fair and reasonable view of the expected impact in Northern Ireland.

PART II

GREAT BRITAIN IMPACT ASSESSMENT (Prepared by the Health and Safety Executive)

IMPLEMENTATION OF THE 4TH INDICATIVE OCCUPATIONAL EXPOSURE LIMIT VALUES (IOELV) COMMISSION DIRECTIVE (EU) 2017/164

1. The following pages contain a copy of the Impact Assessment, prepared by the Great Britain Health and Safety Executive, in respect of the implementation measures in GB.
2. It is not anticipated that there will be any compliance costs for the 31 substances, other than for the underground mining and tunnelling industries. This is because, given the baseline (100% compliance with the current regulatory regime, COSHH, is assumed), the control measures that industry should have in place to meet those requirements would already take exposures below the proposed WELs. There should also be no additional measurement costs, as it is expected that COSHH already requires such measurements to be taken. However, for the new respirable limit for manganese and manganese compounds, measurements of respirable exposure are not currently required, and so this will be an additional cost for the industries where manganese exposure occurs. It is estimated that the cost of this respirable monitoring will be a one off cost of £1.03 million over the 10 year appraisal period, with equivalent annual net cost to business of £0.12m.

Title: Implementation of the 4 th Indicative Occupational Exposure Limit Values (IOELV) Directive IA No: RPC Reference No: Lead department or agency: Health and Safety Executive Other departments or agencies:	Impact Assessment (IA)			
	Date:			
	Stage: Final			
	Source of intervention: EU			
	Type of measure: Secondary Legislation			
Contact for enquiries: Gill Smart Anna Barnes				

Summary: Intervention and Options	RPC Opinion:
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Cost of Preferred (or more likely) Option

Total Net Present Value	Business Net Present Value	Net cost to business per year	One-In, Three-Out	Business Impact Target Status
£-1.03m	£-1.03m	£0.12m	N/A	Non-qualifying provision

What is the problem under consideration? Why is government intervention necessary?
 The 4th Indicative Occupational Exposure Limit Values Directive (Directive 164/2017/EU) was adopted on 31st January 2017, and must be implemented into UK legislation by 21 August 2018.
 The Directive introduces new or revised occupational exposure limits for 31 substances harmful to human health. The limits have been agreed by the European Scientific Committee on Occupational Exposure Limits (SCOEL) as threshold limits of exposure below which, in general, no detrimental effects are expected for any given chemical agent after short-term or daily exposure over a working lifetime. The Directive provides for an extended transitional period, until 2023, for the underground mining and tunnelling industries in relation to the limits for nitrogen monoxide, nitrogen dioxide and carbon monoxide.

What are the policy objectives and the intended effects?

- To improve worker protection from hazardous substances.
- To ensure, where possible, consistency of application with other Government Departments.
- To bring the UK regime in line with the latest recommendations from SCOEL and to fulfil the UK's obligations under EU law.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)
 HSE will transpose the Directive by amending the statutory table 1 in the HSE publication EH40/2005. No new legislation or other amendment to existing HSE legislation is required as the legal base is already covered by the Control of Substances Hazardous to Health Regulations 2002 (COSHH).
 Some minor changes to the 'Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Chemical Agents) Regulations' will be required by the Department for Transport (DfT) and a short guidance document will be produced. HSE officials will work with DfT colleagues to agree a coordinated approach.

Will the policy be reviewed? It will not be reviewed. If applicable, set review date:				
Does implementation go beyond minimum EU requirements?		No		
Are any of these organisations in scope?		Micro Yes	Small Yes	Medium Yes
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)		Traded: N/A		Non-traded: N/A

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

Date:

Summary: Analysis & Evidence

Policy Option 1

Description: Do Nothing

FULL ECONOMIC ASSESSMENT

Price Base Year 2017	PV Base Year 2018	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: Nil	High: Nil	Best Estimate: Nil

COSTS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant	Total Cost (Present Value)
Low	Nil	Nil	Nil	Nil
High	Nil		Nil	Nil
Best Estimate	Nil		Nil	Nil

Description and scale of key monetised costs by 'main affected groups'

The 'do nothing' option is not a viable option, but is used as a notional baseline against which option 2 is compared. Hence, the costs are set to zero.

Other key non-monetised costs by 'main affected groups'

N/a

BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant	Total Benefit (Present Value)
Low	Nil	Nil	Nil	Nil
High	Nil		Nil	Nil
Best Estimate	Nil		Nil	Nil

Description and scale of key monetised benefits by 'main affected groups'

The 'do nothing' option is not a viable option, but is used as a notional baseline against which option 2 is compared. Hence, the benefits are set to zero.

Other key non-monetised benefits by 'main affected groups'

N/a

Key assumptions/sensitivities/risks (%) N/a	Discount rate	3.5%
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BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			In scope of	Measure
Costs: Nil	Benefits: Nil	Net: Nil	No	N/a

Summary: Analysis & Evidence

Policy Option 2

Description: Do Minimum – update table 1 of the HSE publication EH40

FULL ECONOMIC ASSESSMENT

Price Base Year 2017	PV Base Year 2018	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: £-1.03m	High: £-1.03m	Best Estimate: £-1.03m

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Optional	Optional	Optional
High	Optional	Optional	Optional
Best Estimate	£1.03m	Nil	£1.03m

Description and scale of key monetised costs by 'main affected groups'

Assuming a baseline of 100% compliance with the existing regulatory regime it has been determined, via discussion with industry and advice from HSE occupational hygienists, that there are not expected to be additional costs associated with meeting the proposed Workplace Exposure Limits (WELs). This is because duty holders should already be meeting the limits to be fully compliant with the requirements of COSHH. However, there will be a cost to those businesses where manganese exposure occurs because of the new respirable WEL for this substance. Although there will be no additional compliance costs, there will be a cost to industry of taking measurements for the first time for respirable manganese, estimated as a one off cost of £1.03m. The UK will take advantage of the extended transitional period in the Directive, until 2023, for underground mining and tunnelling, in relation to carbon monoxide, nitrogen dioxide and nitrogen monoxide only. The likely costs of these industries of the proposed WELs are too uncertain to currently estimate, so HSE is undertaking research with both industries in order to understand the costs for these industries. An IA will be produced following this research and before 2023.

Other key non-monetised costs by 'main affected groups'

None noted

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional	Optional	Optional
High	Optional	Optional	Optional
Best Estimate	Not quantified	Not quantified	Not quantified

Description and scale of key monetised benefits by 'main affected groups'

There are too many uncertainties around how exactly exposures directly contribute to adverse health effects, and how a reduction in exposures will reduce these adverse health effects, to be able to robustly quantify the effect of the reduction in exposures in absolute or monetary terms.

Other key non-monetised benefits by 'main affected groups'

All of the substances listed in the 4th IOELV Directive are known to be harmful to human health, primarily by inhalation, but also by ingestion or through absorption through the skin. One of the potential ill health effects is occupational lung disease, this includes a range of conditions such as asthma, chronic obstructive pulmonary disease and lung cancer. Occupational lung disease continues to contribute substantially to work related ill-health. It can occur in most industry sectors and is caused by a wide range of substances.

Definitive information regarding ill health resulting from present exposure levels is generally not available, and consequently it is difficult to quantify or monetise the benefits of controlling exposure to a comparatively lower level.

Key assumptions/sensitivities/risks rate	Discount 3.5%
<p>The main assumption in this impact assessment is that a nil response to the EU-wide and informal and formal HSE consultation means that there should be no impact associated with the introduction of these limit is assumed that if the introduction of, or reduction of, an exposure limit for a particular substance has not been raised as a concern by industry then it is unlikely there will be costs for that industry. The baseline assumes 100% compliance with the current regulatory regime, COSHH, and that there will be 100% compliance with the proposed 4th IOELV (according to Better Regulation Framework Manual guidance). However, we are aware that compliance with COSHH in certain industries is considerably lower than 100% and so in reality business might experience costs following the introduction of the proposed WELs (for example the Karting industry); however these are costs they should already incur under the current regulatory regime and so are not in scope of this impact assessment..</p>	

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m: N/A
Costs: 0.12	Benefits: Not quantified	Net: -0.12	N/A

Problem under consideration

1. On 31st January 2017 the European Commission, advised by SCOEL (Scientific Committee on Occupational Exposure Limits), published a proposal to introduce new or amended Indicative Occupational Exposure Limit Values (IOELVs) for 31 substances harmful to human health. The Directive was adopted on 1st February 2017 and must be transposed into UK law by 21st August 2018.
2. IOELVs are concentration limits for hazardous substances present in a workplace atmosphere where ill-health effects are likely to occur.
3. There are currently IOELVs for 115 substances listed in three directives which have been adopted since 2000 (2000/39/EC, 2006/15/EC and 2009/161/EU). In the UK these limit values are transposed as Workplace Exposure Limits (WELs) via an amendment to statutory table 1 in the Health and Safety Executive (HSE) publication EH40/2005. No new legislation or other amendment to existing regulation is required as the legal base is already covered by the Control of Substances Hazardous to Health Regulations 2002 (COSHH).
4. Throughout the negotiation process the underground mining and tunnelling industries across the European Union raised issues about the feasibility of complying with the limits for nitrogen monoxide, nitrogen dioxide and carbon monoxide, which largely arise from Diesel Engine Exhaust Emissions (DEEE) from machinery used in underground mines and tunnels. They were particularly concerned about the potential costs which may be associated with replacing expensive machinery. Taking these concerns into account, the EU has granted an extended transitional period for these industries, for the above three substances only. In the interim (21st August 2018-2023) the current EU limit values for nitrogen monoxide set out in Directive 91/322/EEC will apply in these industries, as will the current UK WEL for carbon monoxide. There is currently no UK WEL for nitrogen dioxide so no WEL for this substance will apply during the transition period. HSE, along with the underground mining and tunnelling industry, have committed to working together during the 5 year transition period, to identify solutions to help to enable compliance by 2023. HSE will then produce an impact assessment of the costs of the changes required for the tunnelling and mining industries in relation to nitrogen monoxide, nitrogen dioxide and carbon monoxide ahead of the 2023 deadline. For ease of understanding, timeline details and exposures are provided in Table 1 below:

Table 1 – Timeline for implementation and proposed limits for mining and tunnelling industries

Substance	Limit between 2018 - 2023	Limit after 2023
Nitrogen Monoxide	30mg/m ³	2.5 mg/m ³
Nitrogen Dioxide	None	0.96 mg/m ³
Carbon Monoxide	35 mg/m ³	23 mg/m ³

5. The IOELVs listed in the Directive have been discussed by the Working Party on Chemicals (WPC), a sub-group of the EU's tripartite Advisory Committee on Safety and Health at Work (ACSH), on which the UK is one of only four governments represented. The WPC opinions on appropriate exposure limit values for these substances were subsequently endorsed by the ACSH.

6. On 23 June 2016, the EU referendum took place and the people of the United Kingdom voted to leave the European Union. Until exit negotiations are concluded, the UK remains a full member of the European Union and all the rights and obligations of EU membership remain in force. During this period, the Government will continue to negotiate, implement and apply EU legislation. The assumptions used in this impact assessment have been chosen accordingly.

Background Information

7. Exposure to hazardous substances at work can have a wide range of damaging effects on human health. There are many ways that people can be exposed to hazardous substances at work, which are influenced by the physical form of the substances themselves, including: whether they readily evaporate or create dust, how they are used, and a number of other factors.
8. The United Kingdom has a well-established regulatory system for the control of workplace risks associated with use of hazardous substances, principally the Control of Substances Hazardous to Health Regulations (COSHH) and its list of Workplace Exposure Limits. A WEL is based on the concentration of a hazardous substance present in the air that workers can breathe, averaged over a specified reference period, referred to as a 'time-weighted average' (TWA). Two periods are used: long-term exposure limit (8 hours) and short-term exposure limit (STEL) (15 minutes).
9. In 2006 the UK policy shifted from domestic limit setting to the adoption of European limits (IOELVs). This reflected the increasing efforts at a European level to develop and apply similar levels of control across the EU, avoided duplication of risk assessment work at the domestic level, and helps ensure that British business benefits from a level playing field with other EU member states.
10. The hazards to human health, and the level of exposure at which each substance could cause harm to health, have been examined by SCOEL. SCOEL is a body of experts drawn from throughout the European Union, including from the UK. IOELVs proposed by SCOEL have a role to play as part of a range of risk management measures for reducing exposure to harmful substances and therefore protecting worker health across industry sectors.
11. There are a limited number of ways that exposure to substance hazards can be controlled, namely: elimination of the substance from the workplace; changing the physical form of the substance (e.g. fine powder converted to granules); dilution of the substance to lower the effect of concentrated exposure; extraction of the hazardous substance from the workplace atmosphere, for example by using ventilation hoods; containment of the hazardous substance; and use of personal protection, such as appropriate protective gloves and/or respiratory equipment.
12. Small changes in a WEL are unlikely to lead to a new control measure being necessary, as the same method of exposure control is likely to be already providing the necessary protection.
13. Other factors such as customer pressure, developing technologies and shifting market forces – as well as a general drive on the part of industry to move away from use of hazardous

substances – have in the past, and continue to result in changing use patterns for these substances.

Rationale for intervention

14. Member states are required by Treaty commitments to set legally binding national limits for all thirty one substances, taking into account the level of the IOELV.
15. Where possible the UK will use copy-out from the Directive, except where doing so would adversely affect UK interests.
16. The rationale for the approach to transposition follows the UK Government's Guiding Principles for EU Legislation. Whilst ensuring that standards are maintained, we will ensure that the UK does not go beyond the minimum requirements of the Directive.

Implementation date

17. Member states are required to transpose the Directive by 21st August 2018.
18. The UK will take advantage of the extended transitional period for the underground mining and tunnelling industry. The extended period, until 21st August 2023 for these industries, is in relation to the limits for carbon monoxide, nitrogen dioxide and nitrogen monoxide only. As already noted in paragraph 4, during the interim period the EU limit values for nitrogen monoxide set out in Directive 91/322/EEC will apply, as will the current UK limit for carbon monoxide. There is currently no UK WEL for nitrogen dioxide, so no WEL for that substance will apply during the transition period.
19. The extended period was granted in recognition of the particular technological challenges faced by these industries (see further explanation in paragraphs 4, 28, 84)). Effective implementation as proposed above will ensure the UK avoids infraction proceedings and associated costs for failure to fully implement the Directive.
20. This impact assessment covers the cost and benefit impacts for the 31 substances included in the Directive, for all UK industries *excluding the underground mining and tunnelling industries* For these two industries, this impact assessment will include any cost and benefit impact associated with 28 of the substances included in the Directive, but not include impacts associated with nitrogen monoxide, nitrogen dioxide and carbon monoxide.
21. A further impact assessment will be undertaken in relation to the limits for nitrogen monoxide, nitrogen dioxide and carbon monoxide and their impact on the mining and tunnelling industries once further research has been completed and ahead of the 2023 deadline for implementation.

Policy objectives

22. The policy objectives are to:
 - transpose the requirements of the Directive to bring the UK regime in line with the latest recommendations from SCOEL and to fulfil the UK's obligations under EU law.
 - help to improve worker protection from exposure to hazardous substances.

- ensure, where possible, consistency of application with other Government Departments.

Description of options considered

Do nothing

23. When considering options for transposition of the Directive, the 'do nothing' option was not considered viable as it would not deliver the policy objective and the UK's obligations under EU law. Therefore, the 'do nothing' or status quo option has not been analysed further in this IA, in accordance with Better Regulation guidance on IAs.

Option 1: Do nothing

24. This is not a viable option as explained in paragraph 23. However, it is used in this impact assessment as the notional baseline against which the preferred option 2 is assessed.

Option 2: Do minimum – update table 1 of the HSE publication EH40, and take advantage of the extended transitional period for the underground mining and tunnelling industry

25. Option 2 is presented as the 'do minimum' option, which assesses the costs and benefits of implementing the Directive in a way that does not introduce new requirements which go beyond the scope of the Directive. In this option, HSE would implement the Directive by updating statutory table 1 of the HSE publication EH40/2005 Workplace Exposure Limits, allowing a transitional period for the mining and tunnelling industry until 21st August 2023.
26. Implementing the Directive in this way would minimise changes to existing arrangements, so this option is the least burdensome to duty holders who are already familiar with current requirements and the legislative framework. This option meets the requirement to implement the Directive and is achievable within the implementation timescale.
27. This 'do minimum' option will fully implement the Directive and limits burdens on businesses. It also maintains current standards and helps to protect worker health.

Option considered but not being taken forward

28. The option not to have an additional period for the underground mining and tunnelling industry was considered initially. However, this was discounted at an early stage on the grounds of the Government's Guiding Principles for EU Legislation¹, which require that 'the necessary implementing measures come into force on (rather than before) the transposition deadline specified in a directive, unless there are compelling reasons for earlier implementation.' HSE has determined that there are not compelling reasons for earlier implementation in this circumstance, and in fact the argument is strongly in favour of taking advantage of the additional transition period for the mining and tunnelling industries. There are concerns regarding technical feasibility issues around nitrogen monoxide, nitrogen dioxide and carbon monoxide in these industries. The exposures of concern arise from the diesel emissions from machinery that is integral to current processes in the underground

¹ Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/185626/bis-13-774-guiding-principles-for-eu-legislation.pdf

mining and tunnelling industry. There are also challenges relating to the availability of measurement methodologies that could be used to demonstrate compliance with the proposed limit value for nitrogen dioxide in underground mining and tunnelling environments. Failure to grant the transitional period would undoubtedly cause difficulties for the industries and could place them at a competitive disadvantage compared to their European counterparts. Avoiding such a competitive disadvantage is another of the Government's principles around transposition of European Legislation that must be adhered to. As a result of the technical uncertainty around exposures underground and how compliance could be achieved in the future, HSE is in the process of developing shared research with these industries to better understand current exposures, the technical options available and the associated cost impacts. An assessment of the impact for underground mining and tunnelling associated with the new limits proposed for nitrogen monoxide, nitrogen dioxide and carbon monoxide will be undertaken prior to the 2023 implementation date.

HSE's preferred Option

29. Option 2 is HSE's preferred option, as it implements the requirements of the Directive and places the minimum burden on UK business.

Summary of Proposed changes

30. The 4th IOELV Directive establishes IOELVs for thirty one substances. In the UK IOELVs are transposed as workplace exposure limits (WELs) and short term exposure limits (STELs). The 31 substances can be split into four categories: those where no change to the current WEL is needed; those for which a WEL needs to be established; those for which the current WEL needs to be reduced; and those where currently there is only a UK 8 hour time weighted average and so a short term exposure limit (STEL) needs to be established. The impacts of the changes in exposure limits are discussed for each substance from paragraph 49 to 83.

Monetised and non-monetised costs and benefits of each option (including administrative burden)

Risks and assumptions

Time Horizon, discounting and rounding

31. The standard appraisal period suggested by HM Treasury guidance for when there is no more appropriate time period is 10 years. There is no reason why another time period would be more appropriate in this case so the standard period of 10 years has been used in this analysis when impacts are quantified.
32. A discount rate of 3.5% per annum has been applied, consistent with HM Treasury's (HMT) Green Book²
33. For discounting purposes, the assumption is that the first year of the appraisal period is time zero, i.e. 2018. The 10th year of the appraisal period, 2027, is therefore time period nine.

²https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf

Any on-going costs and savings will be borne from time period zero to time period nine, unless otherwise stated.

Cost of time

34. It has been assumed that a working week is 37.5 hours with 7.5 hours in a working day.
35. For any cost impacts that are associated with the cost of time, we will assume that the value of the employee or a self-employed person's time is equal to the full cost of employing that person (or the full cost of their time in the case of a self-employed person). The full cost includes gross wages plus any non-wage labour costs that the firm faces, such as national insurance and pension contributions. The rationale for this is that firms will employ workers if they are at least as productive as it costs to employ them; or a self-employed worker will value his / her time at the amount which they would have been paid to do that work. We use the Annual Survey of Hours and Earnings (ASHE)³ for data on earnings, inflating the gross hourly wage rates by 19.8%⁴ to reflect the non-labour costs of employment.

Baseline

36. Better Regulation Principles are that an impact assessment should only capture those costs which are in addition to the current regulatory framework and any IA should assume 100% compliance with the proposed changes for any costs and benefits estimates, unless there is evidence to the contrary⁵. So, it is assumed that industry is compliant with the current legislative requirements of COSHH under the existing legislative framework and only costs directly related to the additional requirements stemming from the 4th IOELV Directive will be considered in this assessment.
37. HSE is aware that there may not be 100% compliance with the current legislative framework, notably COSHH, across all industries. In reality, certain industries, particularly the indoor Go-karting industry, have informed us they will incur costs to become compliant with the proposed WELs. HSE scientists and occupational hygienists have indicated that if the industry were currently compliant with the existing COSHH Regulations, additional costs from the 4th IOELV would be minimal. See further details below, in paragraphs 73, 75, 80, 81 and 86.

3

<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/bulletins/annualsurveyofhoursandearnings/2017provisionaland2016revisedresults/relateddata>

⁴ The most recent Eurostat data suggests that non-wage costs are typically 16.5% of total unit labour costs. These are then divided by the proportion of total labour costs made up of wages to estimate non-wage costs as a proportion of gross wages, equivalent to 19.8% ($16.5 \times (100 / (100 - 16.5))$).

<http://ec.europa.eu/eurostat/documents/2995521/6761066/3-30032015-AP-EN.pdf/7462a05e-7118-480e-a3f5-34e690c11545>

⁵ See Better Regulation Framework; Interim Guidance. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/683119/better-regulation-framework-interim-guidance-2018.pdf

Research undertaken

38. At the start of the European negotiation process, details of manufacturers, importers, formulators, and other users for all of the substances in question were obtained from relevant trade associations, literature and internet sources.
39. HSE specialists made contact with the relevant industries throughout the negotiation process and ensured that, where possible, their views were taken in to account at an early stage. A full list of the industry representatives contacted is provided in Annex 1. Following the adoption of the Directive, further contact was made with welding trade associations in relation to the proposed limit for manganese, and the food and drink industry in relation to the proposed limits for diacetyl and sulphur dioxide. This was to confirm that the proposed limits would not prove an additional cost burden, and that further control methods would not be required. These discussions with industry during and after negotiations have meant that the impact of the changes on UK business has been limited wherever possible. In addition, during the SCOEL process the draft recommendations underwent a stakeholder consultation to allow interested parties to submit health-based scientific comments and further data. The information we did and didn't receive from that consultation helped us to understand which substances might lead to cost impacts on industry for the consultation stage impact assessment.
40. Following on from the consultation stage impact assessment, we have undertaken the following further research and analysis:
- Public consultation exercise, which asked for information about cost and benefit impacts. A summary of the consultation comments regarding costs is provided in paragraphs 41 to 44.
 - On-line questionnaire. 6 substances listed in the Directive were identified as having the potential to incur costs for UK industry. A questionnaire targeted those industries where HSE understood that exposure to these substances could occur. These substances were identified by HSE, pre-consultation, as being used or manufactured in UK and therefore could result in associated costs. It was determined, pre-consultation, that for the remaining 25 substances there would be no cost impact in UK. More information on how these 6 substances were identified is provided in paragraph 47 below.
 - For each of the 6 substances identified, analysis was undertaken to identify the industries where these substances might be used. Data was gathered on the number of premises in those industries, identified by SIC codes, taken from the Inter-Departmental Business Register 2017 (IDBR)⁶. The number of workers in those industries was taken from the Annual Population Survey (APS)⁷.
 - Discussions with HSE occupational hygiene specialists about current exposures and current legal requirements under COSHH.
 - Discussions with the tunnelling industry and HSE specialist tunnels inspectors.
 - Discussion with HSE specialist mines inspectors.

⁶ <https://www.ons.gov.uk/aboutus/whatwedo/paidservices/interdepartmentalbusinessregisteridbr>

⁷

<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/met hodologies/annualpopulationsurveyapsqmi>

Summary of Public Consultation responses around the impact assessment

41. HSE conducted a public consultation which ran from 10th November 2017 until 2nd February 2018. In total, the consultation received 103 responses and views were received from a wide range of sectors and organisations, including:
- Industry
 - Consultants
 - Trade unions
 - Trade associations
 - Local and national government
 - Non-government organisations
 - Charities and non-departmental public bodies
 - Members of the public.
42. The consultation asked a general question about the impact assessment, being 'Do you have any positive or negative comments regarding the Impact Assessment? Please explain your comments.'
43. The majority of respondents submitted either a positive or neutral comment on the consultation IA. The majority of the negative comments came from the indoor Go-karting industry around the proposed WEL for carbon monoxide. They suggested that there would be significant costs for their industry as a result of the proposed WEL. This issue is discussed in more detail below, see paragraph 80 and 81.
44. The consultation also asked whether new and revised WELs should be established for the substances listed in the Directive. The majority of respondents agreed that the limits should be introduced, with a minority expressing views against the changes.

Costs

Do nothing

45. While this is not a valid option as this proposal relates to the transposition of a European Directive, 'do nothing' is used as the notional baseline.

Policy Option 1 - implement the Directive by establishing a WEL at the same value as each IOELV

46. Option 1 satisfies the requirement that new legally binding limits be established in UK law for each substance for which an IOELV is listed in the 4th IOELV Directive.
47. An assessment of whether each new WEL would impose costs was presented at consultation; see Table 2 below, which gives an impact summary of the 31 substances for ease of reference. Each assessment of impact was based upon evidence supplied both by industry (through an early initial consultation during the SCOEL process) and HSE's Occupational Hygienists. This information enabled HSE to prioritise the substances that would be investigated in further detail during formal consultation.

Table 2 – Assessment of costs and substance overview

Substance	No Known Impact	Further information sought
1,4-Dichlorobenzene; <i>p</i> -Dichlorobenzene	X	
2-ethylhexan-1-ol		X
Acetic acid	X	
Acrolein; Acrylaldehyde; Prop-2-enal	X	
Acrylic acid; Prop-2-enoic acid	X	
Amitrole	X	
Bisphenol A; 4,4'-Isopropylidenediphenol	X	
But-2-yne-1,4-diol	X	
Calcium dihydroxide	X	
Calcium oxide	X	
Carbon monoxide		X
Carbon tetrachloride; Tetrachloromethane	X	
Diacetyl; Butanedione	X	
Diphenyl ether	X	
Ethyl acetate	X	
Glycerol trinitrate	X	
Hydrogen cyanide (as cyanide)	X	
Lithium hydride	X	
Manganese and inorganic manganese compounds (as manganese)		X
Methyl formate	X	
Methylene chloride; Dichloromethane	X	
Nitroethane	X	
Nitrogen dioxide		X
Nitrogen monoxide		X
Potassium cyanide (as cyanide)	X	
Sodium cyanide (as cyanide)	X	
Sulphur dioxide		X
Terphenyl, hydrogenated	X	
Tetrachloroethylene	X	
Tetraethyl orthosilicate	X	
Vinylidene chloride; 1,1-Dichloroethylene	X	

No known Impact

48. For the 25 substances listed below, information from the informal consultation indicated that no additional costs were expected. In some cases this is because current practices already lead to compliance with the new limits (e.g. because the substance is already used within closed systems), in other cases no manufacture or use are known of in the UK. For all of these substances, informal consultation prompted no responses from businesses indicating additional costs might arise, and information from HSE specialists confirms that this is likely to be the case. The formal consultation period was used to confirm this, see summary of consultation responses in paragraph 41 to 44.

49. **Ethyl Acetate** is used in coating products, cosmetics and personal care products, adhesives and sealants, fillers, putties, plasters, modelling clay, inks and toners and plant protection products. It is manufactured and/or imported in the EU in quantities of 100,000 – 1,000,000 tonnes per year. The proposed 8 hour TWA WEL is identical to the existing WEL with which industry is already required to comply. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.
50. **Methylene Chloride:** (dichloromethane) is used in washing & cleaning products, coating products, adhesives and sealants and extraction agents. It is also used in printing and recorded media reproduction, manufacture of: chemicals, textile, leather or fur, rubber products, plastic products, mineral products (e.g. plasters, cement), machinery and vehicles and furniture. Its use as a paint stripper is restricted under the Registration, Evaluation, Authorisation & restriction of Chemicals (REACH) Regulations. Methylene chloride is manufactured and/or imported in the EU in quantities of 100,000 – 1,000,000 tonnes per year. The proposed 8 hour TWA WEL is identical to the existing WEL with which industry is already required to comply and so no costs or benefits are expected for industry. The STEL is reducing from 250ppm to 200ppm; however, this is not expected to result in any additional costs. Industry enquiries in relation to the reduction in the STEL for methylene chloride did not highlight any issues. Most industries indicated that they were moving away from using the substance, or that the substance was used in an enclosed process. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.
51. **Amitrole** is a colourless to white, crystalline powder. It is used as a herbicide and growth regulator for plants. A WEL needs to be established for this substance. Industry enquiries found no UK manufacture or use; No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44 and so no costs or benefits are expected for industry.
52. **Methyl Formate** is a clear, colourless liquid with an agreeable odour. It is used in the formulation of mixtures and / or re-packaging and for the manufacture of chemicals. A WEL needs to be established for this substance. Methyl formate is manufactured and/ or imported in the EU in quantities of 100,000 – 1,000,000 tonnes per year; however, industry enquiries found no user or manufacturer in the UK. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.
53. **Acetic acid** is used in the manufacture of organic compounds such as acetic anhydride, acetic esters and chloroacetic acid, of synthetic fibre materials such as cellulose acetate and acetate rayon. It is also used in the production of plastics, pharmaceuticals, dyes, insecticides, and photographic chemicals. It is further used as a food additive; as a natural latex coagulant; and in textile dyeing and printing. It is manufactured and/or imported in the EU in quantities of 1,000,000 – 10,000,000 tonnes per year. A WEL needs to be established for this substance. Industry enquiries regarding the use of acetic acid identified no issues; those companies that responded did not envisage having to make any changes to current processes in order to comply with the new WEL, No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.

54. **Tetraethyl orthosilicate** is a colourless liquid which degrades in water. It is used in coating products, adhesives and sealants, fillers, putties, plasters, modelling clay, non-metal-surface treatment products, anti-freeze products, polymers, laboratory chemicals and metal surface treatment products. It is manufactured and/or imported in the EU in quantities of 1,000 – 10,000 tonnes per year. A WEL needs to be established for this substance. The UK suppliers contacted raised no issues with the proposed limits. Industry enquiries regarding the use of tetraethyl orthosilicate identified no issues; those companies that responded did not envisage having to make any changes to current processes in order to comply with the new WEL. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.
55. **Carbon tetrachloride** is manufactured and / or imported in the EU in quantities of 1,000 – 10,000 tonnes per year. The current WEL will be reduced for this substance. A single UK manufacturer is known of, and they have confirmed they do not supply the substance to UK industry. No further information was provided by other businesses in the informal consultation. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.
56. **Potassium cyanide (as cyanide), hydrogen cyanide (as cyanide) and sodium cyanide (as cyanide)** are used in the electroplating, surface engineering plastics and textile industries. The current WEL will be reduced for this substance. Industry enquiries identified no use in the UK. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.
57. **Bisphenol A** is a colourless solid, used predominantly as a chemical intermediate in the manufacture of resins, flame retardants, and rubber chemicals. It is manufactured and/or imported in the EU in quantities of 1,000,000 to 10,000,000 tons per year. It is manufactured by 4 companies in the EU but not in the UK. The current WEL will be reduced for this substance. In a previous public consultation relating to WELs for bisphenol A (for the 3rd IOELV Directive in 2011) no responses were received for the substance. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.
58. **Tetrachloroethylene** is a colourless liquid. It was widely used for dry cleaning of fabrics and is commonly known as 'dry-cleaning fluid.' Tetrachloroethylene is also used as a degreasing agent in manufacturing, to degrease metal parts in the automotive and other metalworking industries (usually as a mixture with other chlorocarbons). The current WEL will be reduced for this substance. Initial enquiries suggest that control in the UK is already very good, and exposures are already controlled below the proposed WEL and STEL. In addition, in relation to its use in the dry-cleaning industry, machinery and advances in both technology and garment care have also contributed to reducing use, and therefore exposures. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.
59. **Lithium Hydride** is an odourless, off-white to grey crystalline solid or a white powder. It is proposed that a short term exposure limit (STEL) will be introduced where currently there is

only a UK 8 hour time weighted average (TWA). Industry enquiries have found no apparent use of this substance in the UK. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.

60. **Acrolein** is a colourless liquid with an acrid odour. Acrolein is used in the synthesis of other chemicals such as acrylic acid derivatives, glycerol, methionine, glutaric aldehyde and a number of chemicals used in the surface treatment of textiles and paper. It occurs after combustion of organic materials such as plastics, glycerol-containing compounds, fats and cooking oils, wood and vegetation, gasoline and diesel. Acrolein is also present in cigarette smoke. Acrolein is manufactured and/or imported in the EU in quantities of 100 – 1,000 tonnes per year. The current WEL will be reduced for this substance. No responses were received to industry enquiries in relation to Acrolein.⁸ No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.
61. **But-2-yne-1, 4-diol** is a white to light-brown solid or brownish-yellow aqueous solution. It is used for the manufacture of: metals, fabricated metal products and electrical, electronic and optical equipment and it is also used in washing and cleaning products, coating products, metal surface treatment products, water treatment chemicals, pH regulators and water treatment products and laboratory chemicals. But-2-yne-1,4-diol is manufactured and/or imported in the EU in quantities of 100+ tonnes per year. A WEL will be established for this substance. HSE made wide ranging enquiries of industry in relation to but-2-yne-1,4-diol but this prompted no responses. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.
62. **Nitroethane** is a colourless oily liquid with a pleasant odour. It is used in adhesives and sealants, anti-freeze products, coating products, fillers, putties, plasters, modelling clay, lubricants and greases and polishes and waxes. It is manufactured and / or imported in the EU in quantities of 100 – 1,000 tonnes per year. A WEL will be established for this substance. HSE made wide ranging enquiries of industry in relation to nitroethane but received no response relating to the new proposed limits. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.
63. **Acrylic Acid** – pure acrylic acid is a clear, colourless liquid with an irritating acrid odour. It is an industrial intermediate used to produce polyacrylate directly or polymerised via the intermediate stage of an acrylate ester. Also used in adhesives, paints, binding agents and printing inks. Acrylic acid is manufactured and / or imported in the EU in quantities of 1,000,000 to 10,000,000 tonnes per year. A WEL will be established for this substance. HSE has made wide-ranging enquiries of industry in relation to acrylic acid but received no response relating to the new proposed limits. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.

⁸ A single response from industry was received in relation to measurement methodology. Further enquiries to the Health and Safety Laboratory indicate that suitable measurement methods are available.

64. **Glycerol trinitrate** is a colourless to pale yellow, viscous liquid, used in the production of dynamite and other explosives. It is also used in medicine for the treatment of angina and hypertension. It is manufactured and / or imported in the EU in quantities of 1,000 to 100,000 tonnes per year. A WEL will be established for this substance. HSE made wide ranging enquiries of industry in relation to glycerol trinitrate and calcium oxide but received no response relating to the new proposed limits. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.
65. **Hydrogenated terphenyl** is a pale-yellow liquid with a slight odour. It is manufactured and / or imported in the EU in quantities of 1,000 – 10,000 tonnes per year. It is used in adhesives and sealants, coating products, fillers and putties, plasters, modelling clay, polymers, laboratory chemicals and heat transfer fluids. No information was received from industry or trade associations to indicate that the introduction of WEL and STEL is likely to cause additional costs for UK industry. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.
66. **Diphenyl ether** is used as a heat transfer agent, as an intermediate in the production of surface agent and high temperature lubricant's and in perfumery. The current WEL will be reduced for this substance. Initial enquiries received no response from industry. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.
67. **Calcium dihydroxide** and **calcium oxide** can also be known as quick lime, lime, un-slaked lime, hydrated lime, slaked lime, lime milk and milk of lime. These substances are manufactured and / or imported in the EU in quantities of 1,000,000 + tonnes per year. The current WEL will be reduced for this substance. HSE made wide ranging enquiries in relation to calcium dihydroxide and calcium oxide but received no response relating to the new proposed limits. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.
68. **1,4 – Dichlorobenzene (P-dichlorobenzene)** is a white crystalline solid with a penetrating camphoraceous odour. It is used in fillers, putties, plasters, modelling clay, metal surface treatment products, non-metal-surface treatment products, air care products, heat transfer fluids and polymers. It is also used in the manufacture of: chemicals, mineral products (e.g. plasters, cement) and plastic products. It is manufactured and/or imported in the EU in quantities of 10,000 – 100,000 tonnes per year. The current WEL will be reduced for this substance. HSE made wide ranging enquiries of industry in relation to 1.4 - Dichlorobeneze but received no response relating to the new proposed limits. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.
69. **Vinylidene chloride** is a clear, colourless volatile liquid with a characteristic sweet odour. It is primarily used in co-polymers for packing materials, adhesives and synthetic fibres. It is used in the manufacture of chemicals, rubber products and plastic products. Vinylidene chloride is manufactured and / or imported in the EU in quantities of 10,000 – 100,000 tonnes. The current WEL will be reduced for this substance. HSE made wide ranging enquiries of industry in relation to vinylidene chloride but received no response relating to the

new proposed limits. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraph 41 to 44, and so no costs or benefits are expected for industry.

70. **Diacetyl** is a yellow/green liquid with a buttery flavour. It is a naturally occurring substance found in plant oils and food products. It is widely used as a flavouring in food products, although its use appears to be decreasing as initial industry enquiries elicited few responses. None of these responses indicated additional costs might arise. A WEL will be established for this substance. The inclusion of diacetyl in the 4th list of IOELV's was raised by HSE at three separate industry meetings, the Food and Drink Manufacturers Forum, the Federation of Bakers and the Food and Drink Federation and no concerns were raised. No issues were raised during the negotiation consultations, see paragraph 39 or during the public consultation, see paragraphs 41 to 44, and so no costs or benefits are expected for industry.

Further Information sought

71. For the 6 substances listed below, information from the SCOEL consultation and the informal consultation by HSE suggested that the new limits could lead to additional costs, and this was explained in the consultation stage IA, along with a plan for gathering more information to determine the cost impacts. The following paragraphs explain how the substances are used and what the research gathering exercise during the consultation period has told us about cost impacts.
72. **2-ethylhexan-1-ol** is a dark brown liquid with an aromatic odour. It is used in lubricants and greases, coating products, hydraulic fluids, fillers and putties, plasters, modelling clay, fuels, anti-freeze products and washing & cleaning products. It is manufactured and/or imported in the EU in quantities of 100,000 – 1,000,000 tonnes per year. For this substance, a WEL will need to be established. During the negotiation phase, one company responded to HSE's enquiries about the proposed limits for 2-ethylhexan-1-ol. They indicated a cost of approximately £100k to install new systems if the WEL is reduced. However, during public consultation, we did not receive any further comments about costs. Data from the IDBR 2017 shows that there are around 140 premises that might be using 2-ethylhexan-1-ol in the UK, and data from the APS shows there are almost 5,000 workers.
73. From discussion with HSE occupational hygienists during the consultation period, we understand that any business working with, or causing exposure to, 2-ethylhexan-1-ol should be already be complying with COSHH under the baseline. HSE occupational hygienists confirmed that the control measures the businesses have in place to comply with COSHH would already be reducing exposures below the proposed WEL. Businesses using this substance should also be monitoring exposures already, in order to demonstrate compliance with COSHH. Therefore, there should be no additional costs associated with the new proposed WEL for 2-ethylhexan-1-ol, compared to the baseline position, see paragraph 36 to 37.
74. **Manganese and inorganic manganese compounds (as manganese)** Manganese is a hard, brittle metallic element. It is brilliant white in colour with a reddish tinge. Manganese occurs naturally, most commonly as oxides and as sulphide, carbonate and silicate. It occurs in most iron ores. Most manganese compounds are water-soluble. Manganese is used in the production of ferrous and non-ferrous metal alloys, including those essential to steel making. Iron and steel production account for 85–95% of the manganese market. Occupational

exposure occurs in mining, production of manganese metal and metal alloys, chemical production of manganese-based chemicals and six main manganese user sectors comprising: steel production, other metal smelting processes, fabrication (including welding), battery manufacture, agricultural products (production and use) and pigments, paints and glass making. Manganese is manufactured and/or imported in the EU in quantities of 1,000,000+ tonnes per year. For this substance, the current WEL will be reduced and a new respirable WEL introduced. Data from the IDBR 2017 shows that there are around 21,000 premises that might be using manganese in the UK, and the APS shows almost 250,000 workers.

75. During public consultation HSE engaged with industry representatives, but no information about cost impacts was provided. From discussion with HSE occupational hygienists during the consultation period, we understand that businesses causing exposure to manganese should already be complying with COSHH under the baseline. HSE occupational hygienists confirmed that the control measures the businesses have in place to comply with COSHH would already be reducing exposures below the proposed WEL. During consultation HSE spoke with the Welding Institute, as manganese fume is one of the by-products of welding. The representative agreed that under the baseline of 100% compliance with the existing legislative framework (see paragraphs 36 to 37), businesses creating exposure to manganese should also already be monitoring exposures, in order to demonstrate compliance with COSHH. No contradictions were received during consultation in relation to manganese, thus there should be no costs associated with the change in the WEL.
76. However, a new respirable WEL will also be introduced for manganese and compounds of manganese. The respirable WEL relates to the small particles of manganese dust that penetrate deep into the gas exchange region of the lung. HSE occupational hygienists have confirmed that because industry is meeting the existing inhalable limit, and should have adequate controls in place already to comply with COSHH, they should meet this new respirable limit. However, because measuring for the respirable fraction of manganese is a new requirement, it is expected that the businesses where worker exposure to manganese is likely will have to also monitor for the respirable limit. HSE occupational hygienists have provided figures for the cost of respirable fraction monitoring. They have explained that sampling would be done on 1/10 of the workforce, in other words 1/10 of the 250,000 workers we have estimated that are exposed to manganese at work. Each of these 25,000 workers ($250,000 / 10$) would be provided with an additional filter, which would cost around £1. There would be no additional administration cost of taking the measurements however, because the sampling would be done at the same time the business was taking other sampling measurements to meet its current requirements under COSHH. The process would just require a different filter. Each filter would then need to be analysed, at a cost of £40 per sample. Once again, the Welding Institute have confirmed to us that these numbers seem realistic based on their experience of monitoring exposures.
77. Using these estimates these numbers, there will be an additional one off cost of monitoring the respirable limit of £41 for approximately 25,000 workers. The total cost of this additional monitoring is estimated as £1.03million. This cost would be a one off cost, because each business would just have to check once that they are within the limit. As the respirable limit is reasonably generous compared to the WEL it is assumed business will already be compliant with the respirable limit if they are currently compliant with COSHH. Therefore a one off measurement would be sufficient to demonstrate this. However, if any processes were to change in the future in any business, then that business may need to re-measure respirable

exposures. For each business, this possible future cost would be minimal, and it is not possible to estimate how many businesses this might apply to over the ten years. However, in any year the total cost could not be more than the £1.03million cost that will occur in the first year when all businesses have to take measurements. Thus, even if each business re-measured every year the costs would still be lower than £5m equivalent annual net cost to Business which is the threshold for independent scrutiny of Regulatory Impact Assessments, as set out in the Better Regulation Framework Manual: Interim Guidance (see foot note 5).⁹ . It is likely that the costs each year after the first year of implementation will be minimal. The net present value of the costs is therefore estimated to be around £1.03million and the equivalent annual net cost to business is estimated to be **£0.12m**.

78. **Sulphur Dioxide** is a gas with a pungent smell. It is used in pH regulators and water treatment products, paper chemicals and dyes, water treatment chemicals, metal surface treatment products, non-metal-surface treatment products and pharmaceuticals. Sulphur dioxide is used in the formulation of mixtures and/or re-packaging. It is also used for the manufacture of: chemicals, metals, food products, mineral products (e.g. plasters, cement), pulp, paper and paper products and fabricated metal products. It is manufactured and/or imported in the EU in quantities of 100,000 – 1,000,000 tonnes per year. For this substance, a WEL needs to be established. Both the steel production and cider industries mentioned potential costs when contacted prior to the public consultation although they did not indicate the potential scale.
79. However, during public consultation, we did not receive any further comments about costs. Data from the IDBR2017 shows that there are around 7,900 premises that might be using sulphur dioxide in the UK, and data from the APS shows there are almost 230,000 workers.
80. From discussion with HSE occupational hygienists during the consultation period, we understand that any business working with, or causing exposure to, sulphur dioxide should be already be complying with COSHH under the baseline. HSE occupational hygienists confirmed that the control measures the businesses have in place to comply with COSHH would already be reducing exposures below the proposed WEL. Several trade associations, including the British Beer and Pub Association and the Scotch Whiskey Association, were contacted to confirm this position. We can therefore conclude there should not be an additional cost because of the proposed changes to the WEL for sulphur dioxide. Similarly, there should not be any additional monitoring costs for sulphur dioxide because businesses should be monitoring already, to demonstrate compliance under COSHH.

Carbon monoxide – arising in industries other than mining and tunnelling.

Carbon monoxide is a colourless, odourless, and tasteless gas. For this substance there will be a reduction in the WEL. It is produced as a by-product, not manufactured or used. It is understood that in occupational settings, carbon monoxide exposures are found primarily in mines and tunnels. The impact on mines and tunnels of the proposed WEL for carbon monoxide will be assessed closer to 2023 when the limits come into force, see paragraphs 20 and 21. However, during consultation, HSE received feedback that there could be considerable costs for the indoor Go-karting industry, with carbon monoxide being contained in the petrol fume emissions from the vehicles used indoors. There are around 100 indoor karting tracks in the UK and approximately

⁹⁹ Better Regulation Framework Manual : Interim Guidance (See footnote 5) states that RPC scrutiny is optional for measures below the threshold of +/- £5m EANDCB. HSE will not therefore be seeking RPC clearance for this IA.

2000 workers, based on industry estimates.¹⁰ From discussion with HSE occupational hygienists during the consultation period, we understand that any business causing exposure to carbon monoxide (other than in the underground mining and tunnelling industries) should already be complying with COSHH under the baseline. HSE occupational hygienists confirmed that the control measures the businesses have in place to comply with COSHH would already be reducing exposures below the proposed WEL. Similarly, there should not be any additional monitoring costs for carbon monoxide because businesses should be monitoring already, to demonstrate compliance under COSHH. Thus, compared to the baseline there should be no additional costs because of the proposed WEL for carbon monoxide for any industries other than mining and tunnelling (See paragraph 84 below).

81. As noted, the karting industry has indicated there will be costs for them to comply with the new WEL. These are costs that they should be incurring now under the current regulatory regime and so are not additional costs that are in scope of this IA.

82. **Nitrogen dioxide (NO₂)** in industries other than mining and tunnelling is found in ambient air as a product of natural as well as human activities. Production of NO₂ as the final product is limited. Production as a chemical intermediate, particularly in nitric acid and fertiliser production, is widespread throughout the EU. Occupational exposure may occur in the chemical industry, during gas welding, in agriculture (silos), in mining (explosives) and from exhaust from combustion engines in confined areas. It is also produced by various industrial emissions and in tobacco smoke. Evidence we collected prior to and during the consultation suggests that exposure to nitrogen dioxide is only an issue for the underground mining and tunnelling industries via diesel exhaust emissions. On the grounds of proportionality therefore, no further analysis of the industries where nitrogen dioxide might be produced is provided here. As noted in paragraphs 20 and 21 the impact on the underground mining and tunnelling industries will be considered in a further IA closer to the 2023 transposition deadline.

83. **Nitrogen monoxide in industries other than mining and tunnelling** (sometimes known as nitric oxide) is a colourless gas with a sharp, sweet odour. It is manufactured in the production of nitric acid for use in the synthesis of nitrate fertilisers. It is also used in nitration reactions and as a respiratory stimulant in hospital intensive care therapy. Occupational exposure to nitrogen monoxide can arise during its production and subsequent use, or where it is produced adventitiously as a product of incomplete combustion of fossil fuels, for example in motor vehicles (diesel and petrol fuels) and in power stations (coal). Exposure also occurs during welding and cutting processes, following explosions, during the use of heating appliances and during the heating of cooking oils, food etc. Evidence we collected prior to and during the consultation suggests that exposure to nitrogen dioxide is only an issue for the underground mining and tunnelling industries via diesel exhaust emissions. On the grounds of proportionality therefore, no further analysis of the industries where nitrogen dioxide might be produced is provided here. As noted in paragraphs 20 and 21 the impact on the underground mining and tunnelling industries will be considered in a further IA closer to the 2023 transposition deadline.

¹⁰ Estimates provided by the National Karting Association (NKA)

Mining and tunnelling industries

84. There is a Europe wide extended transitional period until 2023 for the mining and tunnelling industry in relation to the three substances: carbon monoxide; nitrogen monoxide; and nitrogen dioxide. These substances are a by-product of the diesel engines used in equipment that is integral to the mine or tunnel. The transitional period has been granted across Europe because of the difficulties the industries have explained they will experience in complying with the new limits. The information provided by the mining and tunnelling industry, along with advice from occupational health experts, suggests that the new limits in 2023 could create some cost impacts on these industries. This is because even if these industries are currently fully compliant with COSHH, the circumstances below ground in terms of exposure control mean that what would be deemed sufficient control under COSHH would not take exposures below the proposed WELs. Both industries in GB have explained that they need to undertake an exercise to measure current exposures, in order to understand what the current best available control measures enables them to achieve in terms of exposure. HSE will then work with industry to understand the gap between what is technically possible at present in mines and tunnels, and what needs to be changed to meet the WELs in 2023. HSE will then work with industry to explore their control options for meeting the new WELs, and the cost impacts of these. There is too much uncertainty at the current time to make any assumptions about costs that would not be misleading and highly uncertain. This is because many of the options for achieving compliance will depend on the pace of technical advances between the current time and 2023. Thus, at an appropriate time ahead of the 2023 implementation date, and after a period of research with both industries, a further impact assessment will be produced to include the costs to the mining and tunnelling industries.

Familiarisation costs

85. An amendment of the HSE publication EH40/Workplace Exposure Limits is normally launched with a press release, notifications to trade press and an announcement on the HSE website. The WEL system is already well established. We assume that if compliance is being achieved with current regulatory requirements under COSHH then there will be no further action required by industry. It is therefore reasonable to assume that the familiarisation costs would also be minimal. If compliant with COSHH, businesses should have measurements of the occupational exposures their workers receive. This would mean that a quick glance at the new list would tell them they had no further action to take. It is not proportionate to consider familiarisation costs any further for the 31 substances where compliance with COSHH should mean they are already compliant with the new WELs.

Summary of cost impacts

86. It is not anticipated that there will be any compliance costs for the 31 substances, other than for the underground mining and tunnelling industries. This is because, given the baseline (we assume 100% compliance with the current regulatory regime, COSHH), the control measures that industry should have in place to meet those requirements would already take exposures below the proposed WELs. There should also be no additional measurement costs, as it is expected that COSHH already requires such measurements to be taken. However, for the new respirable limit for manganese and manganese compounds, measurements of respirable exposure are not currently required, and so this will be an additional cost for the industries where manganese exposure occurs. It is estimated that the cost of this respirable monitoring

will be a one off cost of £1.03 million over the 10 year appraisal period, with equivalent annual net cost to business of £0.12m.

Proportionality of approach

87. This is an impact assessment for a European Directive which must be implemented in the UK. Industry across Europe has already been consulted during the evaluation process. The public consultation did not reveal any significant issues, and HSE occupational health experts have explained that there should be no additional costs for any of the substances, except for some measurement costs for respirable manganese.
88. As explained in paragraph 84 HSE has started a research project to better understand the current levels of exposure in the underground mining and tunnelling industry and therefore, the likely cost implications. HSE has therefore not quantified any of the cost impacts that might fall to the underground mining and tunnelling industry in this IA because the most robust estimate will be that which is informed by this research which will only be available at a later date. A plan is in place for gathering the necessary information to fully quantify likely costs in these industries and an impact assessment for these industries will be produced prior to 2023.

Health and safety benefits

89. All of the substances listed in the 4th IOELV Directive are known to be harmful to human health, primarily by inhalation, but also by ingestion or through absorption through the skin.
90. One of the potential ill health effects is occupational lung disease. Occupational lung disease continues to contribute substantially to work related ill-health. It includes a wide range of conditions. Some of these conditions develop shortly after exposure, such as work-related asthma. Others develop many years later, such as pneumoconiosis, Chronic Obstructive Pulmonary Disease (COPD) and lung cancer – these are life-limiting or life-altering. Occupational lung disease can occur in most industry sectors and is caused by a wide range of substances. Some specific examples of health effects associated with a couple of the substances on the 4th IOELV are provided below:
 91. Magnesium fumes or dust of magnesium may cause irritation and metal fume fever, which is characterised by cough, sore throat and tightening of the chest, headache and fever¹¹.
 92. Sulphur dioxide is rapidly corrosive when it comes into contact with moist tissue such as the eyes, skin and upper respiratory tract, causing eye irritation, coughing, chest pain, dyspnea and bronchoconstriction. Laryngospasm and signs of pulmonary edema (shortness of breath, cyanosis, expectoration and cough) may occur.
 93. Preventing cases of occupational ill health, including lung conditions, has benefits to the individuals themselves who would have suffered the ill health (both financial, from preventing lost income, and in terms of preserving their quality of life), to business (associated with reduced absenteeism) and to government and wider society. More details about the financial implications of work-related ill health can be found in HSE's published estimates of the "Costs to Britain of workplace injuries and new cases of work-related ill health"¹². However, for the 4th IOELV, UK business should already be controlling exposures to the substances on the list under COSHH and so no significant changes are required to the current controls they already have in place. Thus, it would not be expected that any real changes in health outcomes would occur either, if exposure controls don't need to change. In reality, we understand that some businesses might experience costs on implementing the 4th IOELV by reducing worker exposures, which could therefore lead to some associated improvement in health of workers, but this is outside the scope of this IA.

¹¹ See Health Protection Agency (now part of Public Health England):

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/31750/2/hpa_Magnesium_General_Information_v1.pdf

¹² See: <http://www.hse.gov.uk/statistics/cost.htm>

Other benefits

94. Failure to establish exposure limits in national law which take the new IOELVs into account would be a breach of Treaty obligations, with the resulting likelihood of infraction proceedings being brought against the Government by the European Commission.
95. The proposed IOELVs should result in the UK maintaining consistent list of WELs in line with the rest of the EU.

Direct costs and benefits to business calculations (following BIT methodology)

96. It is estimated that exposure monitoring for respirable manganese will have a one off cost of NPV of £1.03m in the first year of the appraisal period. The Equivalent Annual Net Cost to Business will be around £0.12 million a year.
97. These costs will not be in scope of One In, Three Out or the Business Impact Target because the changes result from a European Directive and there are no areas in which the UK will go beyond the scope of the Directive.

Wider impacts

98. Wider impacts have been considered and no impacts have been identified for:
 - Statutory Equality Duties;
 - Human Rights;
 - Justice System;
 - Rural Proofing;
 - Social Impacts;
 - Environmental impacts; and
 - Sustainable development
99. We have considered the criteria for wider competition and health and wellbeing impacts and do not consider that there is anything that needs to be addressed.

Summary and preferred option

100. HSE's preferred option is to implement the Directive by updating statutory table 1 of the HSE publication EH40/2005 Workplace Exposure Limits. The total NPV of this option is estimated to be £1.3million over a ten year period, with the costs being one off costs in the first year. The equivalent annual net cost to business is estimated to be £0.12m. This is under the de minimis threshold of £5million equivalent annual net cost to business. Therefore this IA will not require independent scrutiny by the RPC.

Annex 1: Trade associations and consultants contacted for information on the use and exposure to substances on the 4th IOELV Directive list

Absolute solvents
Adhesives.org
Air Products and Chemicals Inc.
Aluminium Federation Ltd
Association for Petroleum and Explosives Administration (APEA)
Association for Professionals in Infection Control and Epidemiology
Association of British Pharmaceutical Industries
Baker Hughes
Banner Chemicals
BASF
BCIRA
BioIndustry Association
BP
Bristol Laboratories
British Adhesives and sealants Association (BASA)
British Aerosol Manufacturers Association
British Association of Chemical Specialties
British Battery Manufacturing Association
British Coatings Federation
British Electrotechnical and Allied Manufacturers Association
British Footwear Association
British Fragrance Association
British Frozen Food Federation
British Generics Manufacturers' Association
British Lead
British Metals Recycling Association
British Non-Ferrous Metals Federation
British Plastics federation
British Plastics Federation
British Printing Industry Federation
British Pyrotechnics Association (BPA)
British Rubber and Polyurethane Products Association
British Stainless Steel Association
British Textile Machinery Association
British Tunnelling Society
BWA Water Additives
Cast Metals Federation
Caswell Adhesives
CBI explosives industry group
Chemical Business Association
Chemical Industry Association
Cleveland Potash
Confederation of Paper Industries
CONIAC
Cornpoppers
Cosmetics Toiletry and Perfumery Association

CTI
Empire popcorn
Engineering Employers Federation
EPC UK
ESSAR
Ester Chemicals
Ethical Medicines Industry Group
European Snacks Association / SNACMA
EXXON
Exxon Mobil
Feralco (UK) Ltd
Food and Drink Federation
GEA Farm Technologies (UK) Ltd
Global Heat Transfer
Hodgson Sealants
Holchem Laboratories Ltd
Horizon Products
Hub Chemical Limited
INEOS
Institute of Metal Finishing
Institution of Cast Metal Engineers
Institution of Engineering and Technology
Largo
Mac Corns
MARCO
Materials, Metals and Mining
Medicines and Health Care Regulatory Agency
Mines Inspectorate
Momentive Specialty Chemicals
Mortar industry association
National Association of Agricultural Contractors
National association of cider makers
National Metals Technology Centre
NBS Biologicals Ltd.
NFU
Office of Nuclear Regulation
Oil and Colours Chemists Association
Paper Industries Association
Paper Industry Technical Association
Pipe Jacking Association
Plastics and Board Industries Federation
Polyflor Ltd
Rexodan International Limited
Road Haulage Association
SABIC UK Petrochemicals Ltd
Safic - Alcan UK Ltd
Shell
Society of Dyers and Colourists
Solutia
Solvay Interlox Ltd

Solvent.org
Solvents Industry Association (SIA)
Special Metals Ltd
Surface Engineering Association
Tata
Textile Services Association
The Proprietary Association of Great Britain
The Rubber Industry Safety Advisory Group
The Welding Institute
TOTAL
UK Chemical Supply Chain
UK Cleaning Products Industry Association
UK Fashion and Textile Association
UKPIA
UNITE
United Utilities
Valero
Wine and spirits trade association